NOVA Consultants, Inc.

Professional Engineering, Environmental, Construction Management and Surveying Services

21580 Novi Road, Suite 300
Novi, Michigan 48375
(248) 347-3512 • FAX (248) 347-4152

July 8, 2009

Commissioner
Indiana Department of Environmental Management
100 North Senate Avenue
Indianapolis, Indiana 46206-2241
Attention: Chief, Permits Branch

Subject: **Groundwater Data Statistical Evaluation**
Closed Hazardous Waste Surface Impoundment
GM Former AGT Division
INR000021436
2701 West Raymond Street
Indianapolis, Indiana

Dear Commissioner:

On behalf of General Motors Corporation (GM), NOVA Consultants, Inc. (NOVA) has prepared this Groundwater Monitoring Statistical Evaluation (Evaluation) as specified in the Final Hazardous Waste Post-Closure Permit Renewal (Permit) dated January 26, 2007. As required by the Permit, this Evaluation provides details regarding the semi-annual groundwater monitoring performed in May 2009 and is being submitted within sixty (60) days of the final laboratory report, which was received by NOVA on May 29, 2009. The final laboratory report (revised) was submitted to NOVA on June 17, 2009, with the proper reporting limits for Arsenic and Selenium. Signed Certifications by GM, Favero Geosciences, and NOVA are attached as per the Permit. The following sections provide details of the groundwater monitoring.

An application to renew the Hazardous Waste Post-Closure Permit was resubmitted to IDEM on August 3, 2006. IDEM made the GM Former AGT Division Draft Post-Closure Permit Renewal available for public comment on October 26, 2006. The final Hazardous Waste Post-Closure Permit Renewal (Final Permit Renewal) was issued January 26, 2007. The May 2009 sampling event was conducted in accordance with the requirements of the Permit.

Groundwater Monitoring

As specified in the Permit, one (1) groundwater sample was collected from downgradient monitoring wells MW-201B, MW-202B, MW-203B and upgradient monitoring well MW-206B in May 2009. The locations of the monitoring wells are shown in **Figure 1**. Groundwater samples were analyzed for dissolved arsenic, barium, cadmium, chromium, lead, mercury, silver, selenium, and cyanide (indicator parameters). Analytical results are tabulated in **Table 1**, which includes the data from 2002 through 2009. Laboratory data sheets from the May 2009 sampling event are provided in **Appendix A**. A compact disc is also included in **Appendix A**, which consists of the additional laboratory quality control data.

During the low-flow groundwater sampling, field measurements for ph, temperature, specific conductance, oxidation-reduction potential, dissolved oxygen, and turbidity were obtained. Groundwater samples were collected after stabilization of the field measurements. After collection, the groundwater samples were submitted to the laboratory for analysis. Groundwater samples were collected in accordance with the Permit. Groundwater monitoring well sampling data sheets for each monitoring well from the May 2009 sampling event are provided in **Appendix B**.

Groundwater Evaluation

In accordance with the Permit, GM has collected sixteen (16) background samples for monitoring well MW-206B (designated as the background up-gradient monitoring well from 2001 through 2009. A summary of the background data collected to date is included in **Table 2**. Tolerance limits were calculated for the indicator parameters based on the data collected from the sampling of monitoring well MW-206B as described in Appendix H, Section 4.3 of the Permit. Current tolerance limits are shown in **Table 3**. Because the analytical data sets for all nine (9) indicator parameters has greater than 90 percent non-detects, tolerance limits were developed using the Gibbon's Poisson Model.

A review of the analytical data from the sampling performed by NOVA in May 2009 indicates that the analytical results from all of the samples collected from monitoring wells MW-201B, MW-202B, and MW-203B (designated as the downgradient monitoring wells) were below the Permit specific quantitation limits for all indicator parameters. As shown in the current tolerance limits calculated in **Table 3**, all indicator parameter results (i.e., quantitation limits) for the samples collected in May 2009 were below the current upper 95 percent tolerance limit.

In July 2008, Mr. Greg Waltz, LPG, Geologist for IDEM, had a question regarding the value for chi-squared at the 95 percentile used in the calculation of tolerance limits in the *Groundwater Data Statistical Evaluation* dated July 17, 2008. ARCADIS prepared a response to Mr. Waltz' question, which is attached as **Appendix C**. The response was accepted in a March 6, 2009, email correspondence from Mr. Waltz. The information shown in **Appendix C** was used to calculate the current upper 95 percent tolerance limit.

In addition to this report, an electronic digital dataset report in the format prescribed in Appendix H, Table 3 and Table 4 of the Permit will be submitted electronically to the email address specified in the Permit. If you have any questions or concerns, please contact our office at (248) 347-3512.

Regards,

Jeff Eckhout, EIT
Project Manager

Sunil Agrawal, Ph.D., P.E.
Senior Engineer

Certification

Certification: I certify, under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

INR000021436	GM Former AGT Division
U.S. EPA I.D. Number	Facility Name

Marilyn J. Dedyne, P.E., CHMM
Program Manager
General Motors WFG Remediation Team
General Motors Corporation

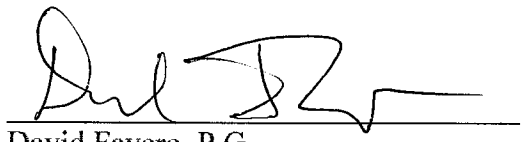
8 Jul 09

Date

Certification

Certification: I certify, under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

INR000021436	GM Former AGT Division
U.S. EPA I.D. Number	Facility Name



David Favero, P.G.
Favero Geosciences
General Motors Contract Project Manager

23 June 2009
Date

Certification

Certification: I certify, under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

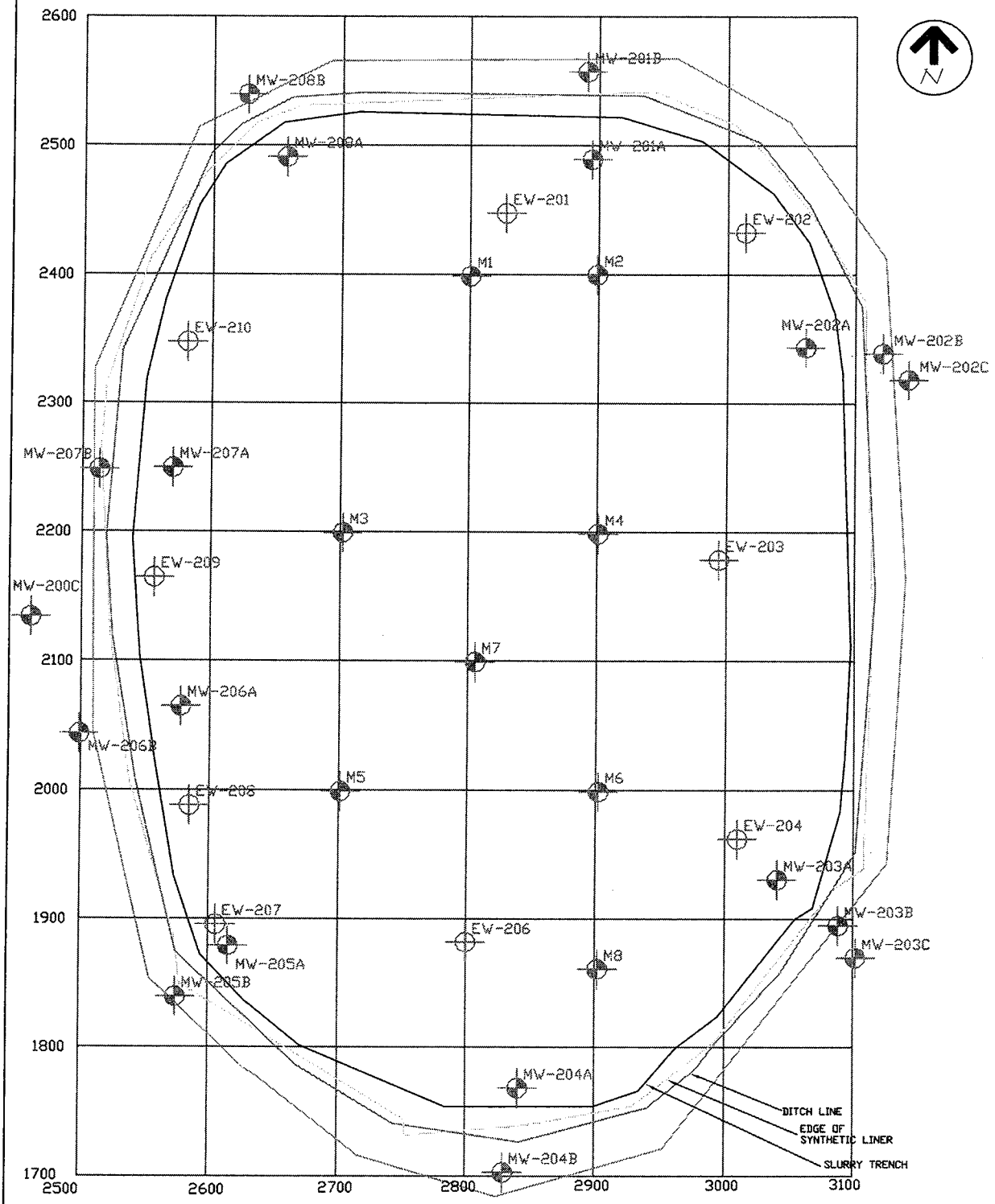
INR000021436
U.S. EPA I.D. Number

GM Former AGT Division
Facility Name

Jeff Eckhout, EIT
NOVA Consultants, Inc.
Consultant to General Motors Corporation

July 8, 2009
Date

FIGURE 1



MW-201A — Existing Hydraulic Monitoring Well

EW-201 — Existing Extraction Well

M1 — Existing Monument

0 50 100

APPROXIMATE SCALE

NOVA CONSULTANTS, INC. PROFESSIONAL ENGINEERING AND ENVIRONMENTAL SERVICES	FORMER ALLISON GAS TURBINE DIVISION HAZARDOUS WASTE SURFACE IMPOUNDMENT INDIANAPOLIS, INDIANA	MONITORING WELL AND CUTOFF WALL LOCATION MAP	DRAWN: JE	DATE: 6/12/09	FIG. 1
			CHK'D: SA	PROJECT NO. 97-05-154	

TABLE 1

TABLE 1

GROUNDWATER ANALYTICAL DATA
CLOSED HAZARDOUS WASTE SURFACE IMPOUNDMENT
FORMER ALLISON GAS TURBINE DIVISION - PLANT 5
INDIANAPOLIS, INDIANA
INR000021436

Monitoring Well	Sample ID	Sample Date	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver	Cyanide
MW-201B	MW-201B (052902)	05/29/02	<0.0500	<0.100	<0.0100	<0.0500	<0.0500	<0.00200	<0.0100	<0.0500	<0.0200
	MW-201B (112002)	11/20/02	<0.0500	<0.100	<0.00500	<0.0500	<0.0500	<0.00200	<0.0100	<0.0500	<0.0200
	MW-201B (A)	05/21/03	<0.0500	<0.100	<0.00500	<0.0500	<0.0500	<0.00200	<0.0100	<0.0500	<0.0200
	MW-201B (B)	05/21/03	<0.0500	<0.100	<0.00500	<0.0500	<0.0500	<0.00200	0.0102	<0.0500	0.0253
	MW-201B (C)	05/21/03	<0.0500	<0.100	<0.00500	<0.0500	<0.0500	<0.00200	<0.0100	<0.0500	<0.0200
	MW-201B (D)	05/21/03	<0.0500	<0.100	<0.00500	<0.0500	<0.0500	<0.00200	<0.0100	<0.0500	<0.0200
	MW-201B (A)	11/19/03	<0.0500	<0.100	<0.00500	<0.0500	<0.0500	<0.00200	<0.0100	<0.0500	<0.0200
	MW-201B (B)	11/19/03	<0.0500	<0.100	<0.00500	<0.0500	<0.0500	<0.00200	<0.0100	<0.0500	<0.0200
	MW-201B (C)	11/19/03	0.011	<0.100	<0.00500	<0.0500	<0.0500	<0.00200	<0.0100	<0.0500	<0.0200
	MW-201B (D)	11/19/03	<0.0500	<0.100	<0.00500	<0.0500	<0.0500	<0.00200	<0.0100	<0.0500	<0.0200
	MW-201B (A)	05/25/04	<0.0100	<0.0500	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-201B (B)	05/25/04	<0.0100	<0.0500	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-201B (C)	05/25/04	<0.0100	<0.0500	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-201B (D)	05/25/04	<0.0100	<0.0500	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-201B (A)	11/11/04	<0.0100	<0.0500	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-201B (B)	11/11/04	<0.0100	<0.0500	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-201B (C)	11/11/04	<0.0100	<0.0500	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-201B (D)	11/11/04	<0.0100	<0.0500	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-201B (A)	05/09/05	<0.0100	<0.0500	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-201B (B)	05/09/05	<0.0100	<0.0500	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-201B (C)	05/09/05	<0.0100	<0.0500	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-201B (D)	05/09/05	<0.0100	<0.0500	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-201B (A)	11/10/05	<0.0100	<0.100	<0.00500	<0.0100	<0.00500	<0.00020	<0.0100	<0.0100	<0.0100
	MW-201B (B)	11/10/05	<0.0100	<0.100	<0.00500	<0.0100	<0.00500	<0.00020	<0.0100	<0.0100	<0.0100
	MW-201B (C)	11/10/05	<0.0100	<0.100	<0.00500	<0.0100	<0.00500	<0.00020	<0.0100	<0.0100	<0.0100
	MW-201B (D)	11/10/05	<0.0100	<0.100	<0.00500	<0.0100	<0.00500	<0.00020	<0.0100	<0.0100	<0.0100
	MW-201B (A)	05/17/06	<0.0100	<0.100	<0.00500	<0.0100	<0.0100	<0.00200	<0.0100	<0.0500	<0.0200
	MW-201B (B)	05/17/06	<0.0100	<0.100	<0.00500	<0.0100	<0.0100	<0.00200	<0.0100	<0.0500	<0.0200
	MW-201B (C)	05/17/06	<0.0100	<0.100	<0.00500	<0.0100	<0.0100	<0.00200	<0.0100	<0.0500	<0.0200
	MW-201B (D)	05/17/06	<0.0100	<0.100	<0.00500	<0.0100	<0.0100	<0.00200	<0.0100	<0.0500	<0.0200
	MW-201B (110806)	11/08/06	<0.0100	<0.100	<0.00500	<0.0100	<0.0100	<0.00200	<0.0100	<0.0500	<0.0200
	MW-201B (051607)	05/16/07	<0.0100	<0.100	<0.00500	<0.0100	<0.0100	<0.00200	<0.0100	<0.0500	<0.0100
	MW-201B (111507)	11/15/07	<0.0100	<0.100	<0.00500	<0.0100	<0.0100	<0.00200	<0.0100	<0.0500	<0.0100
	MW-201B (051408)	05/14/08	<0.0100	<0.100	<0.00500	<0.0100	<0.0100	<0.00200	<0.0100	<0.0500	<0.0100
	MW-201B (110608)	11/06/08	<0.0100	<0.100	<0.00500	<0.0100	<0.0050	<0.00200	<0.0100	<0.0500	<0.0050
	MW-201B (051409)	05/14/09	<0.0100	<0.100	<0.0050	<0.0100	<0.0050	<0.0020	<0.0100	<0.0500	<0.010

Concentrations are in mg/L

TABLE 1

GROUNDWATER ANALYTICAL DATA
CLOSED HAZARDOUS WASTE SURFACE IMPOUNDMENT
FORMER ALLISON GAS TURBINE DIVISION - PLANT 5
INDIANAPOLIS, INDIANA
INR000021436

Monitoring Well	Sample ID	Sample Date	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver	Cyanide
MW-202B	MW-202B (052902)	05/29/02	<0.0500	<0.100	<0.0100	<0.0500	<0.0500	<0.00200	<0.0100	<0.0500	<0.0200
	MW-202B (112002)	11/20/02	<0.0500	<0.100	<0.00500	<0.0500	<0.0500	<0.00200	<0.0100	<0.0500	<0.0200
	MW-202B (A)	05/21/03	<0.0500	<0.100	<0.00500	<0.0500	<0.0500	<0.00200	<0.0100	<0.0500	<0.0200
	MW-202B (B)	05/21/03	<0.0500	<0.100	<0.00500	<0.0500	<0.0500	<0.00200	<0.0100	<0.0500	<0.0200
	MW-202B (C)	05/21/03	<0.0500	<0.100	<0.00500	<0.0500	<0.0500	<0.00200	<0.0100	<0.0500	0.0209
	MW-202B (D)	05/21/03	<0.0500	<0.100	<0.00500	<0.0500	<0.0500	<0.00200	<0.0100	<0.0500	<0.0200
	MW-202B (A)	11/19/03	<0.0500	<0.100	<0.00500	<0.0500	<0.0500	<0.00200	<0.0100	<0.0500	<0.0200
	MW-202B (B)	11/19/03	<0.0500	<0.100	<0.00500	<0.0500	<0.0500	<0.00200	<0.0100	<0.0500	<0.0200
	MW-202B (C)	11/19/03	<0.0500	<0.100	<0.00500	<0.0500	<0.0500	<0.00200	<0.0100	<0.0500	<0.0200
	MW-202B (D)	11/19/03	<0.0500	<0.100	<0.00500	<0.0500	<0.0500	<0.00200	<0.0100	<0.0500	<0.0200
	MW-202B (A)	05/25/04	<0.0100	<0.0500	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-202B (B)	05/25/04	<0.0100	<0.0500	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-202B (C)	05/25/04	<0.0100	<0.0500	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-202B (D)	05/25/04	<0.0100	<0.0500	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-202B (A)	11/11/04	<0.0100	<0.0500	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-202B (B)	11/11/04	<0.0100	<0.0500	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-202B (C)	11/11/04	<0.0100	<0.0500	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-202B (D)	11/11/04	<0.0100	<0.0500	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-202B (A)	05/09/05	<0.0100	<0.0500	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-202B (B)	05/09/05	<0.0100	<0.0500	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-202B (C)	05/09/05	<0.0100	<0.0500	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-202B (D)	05/09/05	<0.0100	<0.0500	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-202B (A)	11/10/05	<0.0100	<0.100	<0.00500	<0.0100	<0.00500	<0.00020	0.0103	<0.0100	<0.0100
	MW-202B (B)	11/10/05	<0.0100	<0.100	<0.00500	<0.0100	<0.00500	<0.00020	<0.0100	<0.0100	<0.0100
	MW-202B (C)	11/10/05	<0.0100	<0.100	<0.00500	<0.0100	<0.00500	<0.00020	<0.0100	<0.0100	<0.0100
	MW-202B (D)	11/10/05	<0.0100	<0.100	<0.00500	<0.0100	<0.00500	<0.00020	<0.0100	<0.0100	<0.0100
	MW-202B (A)	05/17/06	<0.0100	<0.100	<0.00500	<0.0100	<0.0100	<0.00200	<0.0100	<0.0500	<0.0200
	MW-202B (B)	05/17/06	<0.0100	<0.100	<0.00500	<0.0100	<0.0100	<0.00200	<0.0100	<0.0500	<0.0200
	MW-202B (C)	05/17/06	<0.0100	<0.100	<0.00500	<0.0100	<0.0100	<0.00200	<0.0100	<0.0500	<0.0200
	MW-202B (D)	05/17/06	<0.0100	<0.100	<0.00500	<0.0100	<0.0100	<0.00200	<0.0100	<0.0500	<0.0200
	MW-202B (110806)	11/08/06	<0.0100	<0.100	<0.00500	<0.0100	<0.0100	<0.00200	<0.0100	<0.0100	<0.0200
	MW-202B (051607)	05/16/07	<0.0100	<0.100	<0.00500	0.0359	<0.0100	<0.00200	<0.0100	<0.0500	<0.0100
	MW-202B (111507)	11/15/07	<0.0100	<0.100	<0.00500	<0.0100	<0.0100	<0.00200	<0.0100	<0.0500	<0.0100
	MW-202B (051408)	05/14/08	<0.0100	<0.100	<0.00500	<0.0100	<0.0100	<0.00200	<0.0100	<0.0500	<0.0100
	MW-202B (110608)	11/06/08	<0.0100	<0.100	<0.00500	<0.0100	<0.0050	<0.00200	<0.0100	<0.0500	<0.0050
	MW-202B (051409)	05/14/09	<0.0100	<0.100	<0.0050	<0.0100	<0.0050	<0.0020	<0.0100	<0.0500	<0.010

Concentrations are in mg/L

TABLE 1

GROUNDWATER ANALYTICAL DATA
CLOSED HAZARDOUS WASTE SURFACE IMPOUNDMENT
FORMER ALLISON GAS TURBINE DIVISION - PLANT 5
INDIANAPOLIS, INDIANA
INR000021436

Monitoring Well	Sample ID	Sample Date	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver	Cyanide
MW-203B	MW-203B (052902)	05/29/02	<0.0500	<0.100	<0.0100	<0.0500	<0.0500	<0.00200	0.0133	<0.0500	<0.0200
	MW-203B (112002)	11/20/02	<0.0500	<0.100	<0.00500	<0.0500	<0.0500	<0.00200	<0.0100	<0.0500	<0.0200
	MW-203B (A)	05/21/03	<0.0500	<0.100	<0.00500	<0.0500	<0.0500	<0.00200	0.0104	<0.0500	<0.0200
	MW-203B (B)	05/21/03	<0.0500	<0.100	<0.00500	<0.0500	<0.0500	<0.00200	<0.0100	<0.0500	<0.0200
	MW-203B (C)	05/21/03	<0.0500	<0.100	<0.00500	<0.0500	<0.0500	<0.00200	<0.0100	<0.0500	<0.0200
	MW-203B (D)	05/21/03	<0.0500	<0.100	<0.00500	<0.0500	<0.0500	<0.00200	<0.0100	<0.0500	0.0239
	MW-203B (A)	11/19/03	<0.0500	<0.100	<0.00500	<0.0500	<0.0500	<0.00200	<0.0100	<0.0500	<0.0200
	MW-203B (B)	11/19/03	<0.0500	<0.100	<0.00500	<0.0500	<0.0500	<0.00200	<0.0100	<0.0500	<0.0200
	MW-203B (C)	11/19/03	<0.0500	<0.100	<0.00500	<0.0500	<0.0500	<0.00200	<0.0100	<0.0500	<0.0200
	MW-203B (D)	11/19/03	<0.0500	<0.100	<0.00500	<0.0500	<0.0500	<0.00200	<0.0100	<0.0500	<0.0200
	MW-203B (A)	05/25/04	<0.0100	<0.0500	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-203B (B)	05/25/04	<0.0100	<0.0500	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-203B (C)	05/25/04	<0.0100	<0.0500	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-203B (D)	05/25/04	<0.0100	<0.0500	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-203B (A)	11/11/04	<0.0100	<0.0500	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-203B (B)	11/11/04	<0.0100	<0.0500	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-203B (C)	11/11/04	<0.0100	<0.0500	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-203B (D)	11/11/04	<0.0100	<0.0500	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-203B (A)	05/09/05	<0.0100	<0.0500	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-203B (B)	05/09/05	<0.0100	<0.0500	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-203B (C)	05/09/05	<0.0100	<0.0500	0.00132	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-203B (D)	05/09/05	<0.0100	<0.0500	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-203B (A)	11/10/05	<0.0100	<0.100	<0.00500	<0.0100	<0.00500	<0.00020	<0.0100	<0.0100	<0.0100
	MW-203B (B)	11/10/05	<0.0100	<0.100	<0.00500	<0.0100	<0.00500	<0.00020	<0.0100	<0.0100	<0.0100
	MW-203B (C)	11/10/05	<0.0100	<0.100	<0.00500	<0.0100	<0.00500	<0.00020	<0.0100	<0.0100	<0.0100
	MW-203B (D)	11/10/05	<0.0100	<0.100	<0.00500	<0.0100	<0.00500	<0.00020	<0.0100	<0.0100	<0.0100
	MW-203B (A)	05/17/06	<0.0100	<0.100	<0.00500	<0.0100	<0.0100	<0.00200	<0.0100	<0.0500	<0.0200
	MW-203B (B)	05/17/06	<0.0100	<0.100	<0.00500	<0.0100	<0.0100	<0.00200	<0.0100	<0.0500	<0.0200
	MW-203B (C)	05/17/06	<0.0100	<0.100	<0.00500	<0.0100	<0.0100	<0.00200	<0.0100	<0.0500	<0.0200
	MW-203B (D)	05/17/06	<0.0100	<0.100	<0.00500	<0.0100	<0.0100	<0.00200	<0.0100	<0.0500	<0.0200
	MW-203B (110806)	11/08/06	<0.0100	<0.100	<0.00500	<0.0100	<0.0100	<0.00200	<0.0100	<0.0100	<0.0200
	MW-203B (051607)	05/16/07	<0.0100	<0.100	<0.00500	0.0147	<0.0100	<0.00200	<0.0100	<0.0500	<0.0100
	MW-203B (111507)	11/15/07	<0.0100	<0.100	<0.00500	<0.0100	<0.0100	<0.00200	<0.0100	<0.0500	<0.0100
	MW-203B (051408)	05/14/08	<0.0100	<0.100	<0.00500	<0.0100	<0.0100	<0.00200	<0.0100	<0.0500	<0.0100
	MW-203B (110608)	11/06/08	<0.0100	<0.100	<0.00500	<0.0100	<0.0050	<0.00200	<0.0100	<0.0500	<0.0050
	MW-203B (051409)	05/14/09	<0.0100	<0.100	<0.0050	<0.0100	<0.0050	<0.0020	<0.0100	<0.0500	<0.010

Concentrations are in mg/L

TABLE 1

GROUNDWATER ANALYTICAL DATA
CLOSED HAZARDOUS WASTE SURFACE IMPOUNDMENT
FORMER ALLISON GAS TURBINE DIVISION - PLANT 5
INDIANAPOLIS, INDIANA
INR000021436

Monitoring Well	Sample ID	Sample Date	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver	Cyanide
MW-206B	MW-206B (052902A)	05/29/02	<0.0500	<0.100	<0.0100	<0.0500	<0.0500	<0.00200	<0.0100	<0.0500	<0.0200
	MW-206B (052902B)	05/29/02	<0.0500	<0.100	<0.0100	<0.0500	<0.0500	<0.00200	<0.0100	<0.0500	<0.0200
	MW-206B (052902C)	05/29/02	<0.0500	<0.100	<0.0100	<0.0500	<0.0500	<0.00200	<0.0100	<0.0500	<0.0200
	MW-206B (052902D)	05/29/02	<0.0500	<0.100	<0.0100	<0.0500	<0.0500	<0.00200	<0.0100	<0.0500	<0.0200
	MW-206B (112002A)	11/20/02	<0.0500	<0.100	<0.00500	<0.0500	<0.0500	<0.00200	<0.0100	<0.0500	<0.0200
	MW-206B (112002B)	11/20/02	<0.0500	<0.100	<0.00500	<0.0500	<0.0500	<0.00200	<0.0100	<0.0500	<0.0200
	MW-206B (112002C)	11/20/02	<0.0500	<0.100	<0.00500	<0.0500	<0.0500	<0.00200	<0.0100	<0.0500	<0.0200
	MW-206B (112002D)	11/20/02	<0.0500	<0.100	<0.00500	<0.0500	<0.0500	<0.00200	<0.0100	<0.0500	<0.0200
	MW-206B (A)	05/21/03	<0.0500	<0.100	<0.00500	<0.0500	<0.0500	<0.00200	<0.0100	<0.0500	<0.0200
	MW-206B (B)	05/21/03	<0.0500	<0.100	<0.00500	<0.0500	<0.0500	<0.00200	<0.0100	<0.0500	0.214
	MW-206B (C)	05/21/03	<0.0500	<0.100	<0.00500	<0.0500	<0.0500	<0.00200	<0.0100	<0.0500	<0.0200
	MW-206B (D)	05/21/03	<0.0500	<0.100	<0.00500	<0.0500	<0.0500	<0.00200	<0.0100	<0.0500	<0.0200
	MW-206B (A)	11/19/03	<0.0100	<0.0500	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-206B (B)	11/19/03	<0.0100	<0.0500	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-206B (C)	11/19/03	<0.0100	<0.0500	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-206B (D)	11/19/03	<0.0100	<0.0500	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-206B (A)	05/25/04	<0.0100	0.0885	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-206B (B)	05/25/04	<0.0100	0.0884	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-206B (C)	05/25/04	<0.0100	0.0875	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-206B (D)	05/25/04	<0.0100	0.0889	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-206B (A)	11/11/04	<0.0100	<0.0500	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-206B (B)	11/11/04	<0.0100	<0.0500	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-206B (C)	11/11/04	<0.0100	<0.0500	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-206B (D)	11/11/04	<0.0100	<0.0500	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-206B (A)	05/09/05	<0.0100	0.0989	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-206B (B)	05/09/05	<0.0100	0.0942	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-206B (C)	05/09/05	<0.0100	0.0967	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-206B (D)	05/09/05	0.0162	<0.0500	<0.00100	<0.0200	<0.00500	<0.00200	<0.0100	<0.0100	<0.0200
	MW-206B (A)	11/10/05	<0.0100	0.0839	<0.00500	<0.0100	<0.00500	<0.00020	<0.0100	<0.0100	<0.0100
	MW-206B (B)	11/10/05	<0.0100	0.0802	<0.00500	<0.0100	<0.00500	<0.00020	<0.0100	<0.0100	<0.0100

Concentrations are in mg/L

TABLE 1

GROUNDWATER ANALYTICAL DATA
CLOSED HAZARDOUS WASTE SURFACE IMPOUNDMENT
FORMER ALLISON GAS TURBINE DIVISION - PLANT 5
INDIANAPOLIS, INDIANA
INR000021436

Monitoring Well	Sample ID	Sample Date	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver	Cyanide
MW-206B (continued)	MW-206B (C)	11/10/05	<0.0100	0.0804	<0.00500	<0.0100	<0.00500	<0.00020	0.0114	<0.0100	<0.0100
	MW-206B (D)	11/10/05	<0.0100	0.0793	<0.00500	<0.0100	<0.00500	<0.00020	<0.0100	<0.0100	<0.0100
	MW-206B (A)	05/17/06	<0.0100	0.1000	<0.00500	0.0266	<0.0100	<0.00200	<0.0100	<0.0500	<0.0200
	MW-206B (B)	05/17/06	<0.0100	0.0986	<0.00500	0.0550	<0.0100	<0.00200	<0.0100	<0.0500	<0.0200
	MW-206B (C)	05/17/06	<0.0100	0.0966	<0.00500	0.0176	<0.0100	<0.00200	<0.0100	<0.0500	<0.0200
	MW-206B (D)	05/17/06	<0.0100	<0.100	<0.00500	0.0140	<0.0100	<0.00200	<0.0100	<0.0500	<0.0200
	MW-206B (110806)	11/08/06	<0.0100	<0.100	<0.00500	<0.0100	<0.0100	<0.00200	<0.0100	<0.0500	<0.0200
	MW-206B (051607)	05/16/07	<0.0100	0.112	<0.00500	0.0111	<0.0100	<0.00200	<0.0100	<0.0500	<0.0100
	MW-206B (111507)	11/15/07	<0.0100	<0.100	<0.00500	0.0760	<0.0100	<0.00200	<0.0100	<0.0500	<0.0100
	MW-206B (051408)	05/14/08	<0.0100	0.114	<0.00500	<0.0100	<0.0100	<0.00200	<0.0100	<0.0500	<0.0100
	MW-206B (110608)	11/06/08	<0.0100	<0.100	<0.00500	<0.0100	<0.0050	<0.00200	<0.0100	<0.0500	<0.0050
	MW-206B (051409)	05/14/09	<0.0100	<0.100	<0.0050	<0.0100	<0.0050	<0.0020	<0.0100	<0.0500	<0.010

Concentrations are in mg/L

TABLE 2

TABLE 2

UPGRADIENT MONITORING WELL MW-206B BACKGROUND DATA
CLOSED HAZARDOUS WASTE SURFACE IMPOUNDMENT
FORMER ALLISON GAS TURBINE DIVISION - PLANT 5
INDIANAPOLIS, INDIANA
INR000021436

Monitoring Well	Sample ID	Sample Date	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver	Cyanide
MW-206B	MW-206B(8-17-01A)	8/17/2001	<0.0100*	<0.100	<0.0050*	<0.0100*	<0.0100	<0.0020	<0.0100	<0.0500	<0.0200
	MW-206B (100801)A	10/8/2001	<0.0100	<0.100	<0.0050	<0.0100	<0.0100	<0.0020	<0.0100	<0.0500	<0.0200
	206B (103001)	10/30/2001	<0.0100	<0.100	<0.0050	<0.0100	<0.0100	<0.0020	<0.0100	<0.0500	<0.0200
	206B (112001)A	11/20/2001	0.036	<0.100	<0.0050	<0.0100	<0.0100	<0.0020	0.0161	<0.0500	<0.0200
	MW-206B (052902A)	5/29/2002	<0.0100*	<0.100	<0.0050*	<0.0100*	<0.0100*	<0.0020	<0.0100	<0.0500	<0.0200
	MW-206B (112002A)	11/20/2002	**<0.0150***	<0.100	<0.0050	<0.0100*	<0.0100*	<0.0020	<0.0100	<0.0500	<0.0200
	MW-206BA(052103)	5/21/2003	<0.0100*	<0.100	<0.0050	<0.0100*	<0.0100	<0.0020	<0.0100	<0.0500	<0.0200
	MW-206BA(111903)	11/19/2003	<0.0100	<0.0500	<0.0010	<0.0100*	<0.0050*	<0.0020	<0.0100	<0.0100	<0.0200
	MW-206B (A)-052504	5/25/2004	<0.0100	0.0885	<0.0010	<0.0100*	<0.0050	<0.0020	<0.0100	<0.0100	<0.0200
	MW-206B (A)-111104	11/11/2004	<0.0100	<0.0500	<0.0010	<0.0100*	<0.0050	<0.0020	<0.0100	<0.0100	<0.0200
	MW-206B (A)	5/9/2005	<0.0100	0.0989	<0.0010	<0.0100*	<0.0050	<0.0020	<0.0100	<0.0100	<0.0200
	MW-206B (A)	11/10/2005	<0.0100	0.0839	<0.0050	<0.0100	<0.0050	<0.0002	<0.0100	<0.0100	<0.0100
	MW-206B (A) 05/17/06	5/17/2006	<0.0100	0.100	<0.0050	0.0266	<0.0100	<0.0020	<0.0100	<0.0500	<0.0200
	MW-206B (110806)	11/8/2006	<0.0100	<0.100	<0.0050	<0.0100	<0.0100	<0.0020	<0.0100	<0.0500	<0.0200
	MW-206B (051607)	5/16/2007	<0.0100	0.112	<0.0050	0.0111	<0.0100	<0.0020	<0.0100	<0.0500	<0.0100
	MW-206B (111507)	11/15/2007	<0.0100	<0.100	<0.0050	0.0760	<0.0100	<0.0020	<0.0100	<0.0500	<0.0100
	MW-206B (051408)	5/14/2008	<0.0100	0.114	<0.0050	<0.0100	<0.0100	<0.0020	<0.0100	<0.0500	<0.0100
	MW-206B (110608)	11/6/2008	<0.0100	<0.100	<0.0050	<0.0100	<0.0050	<0.0020	<0.0100	<0.0500	<0.0050
	MW-206B (110608)	11/6/2008	<0.0100	<0.100	<0.0050	<0.0100	<0.0050	<0.0020	<0.0100	<0.0500	<0.0050
	MW-206B (051409)	5/14/2009	<0.0100	<0.100	<0.0050	<0.0100	<0.0050	<0.0020	<0.0100	<0.0500	<0.010
	Estimated Quantitation Limit		**0.0100**	**0.100**	**0.0050**	**0.0100**	**0.0100**	**0.0020**	**0.0100**	**0.0500**	**0.0200**

Notes: Value in bold exceed the EQLs established by permit and are excluded from the statistical calculation
* Reevaluation of Reporting limits provided by Pace Analytical Services, Inc. (letter dated April 28, 2006)
Concentrations are in mg/l

TABLE 3

Table 3
Calculation of Background Upper Tolerance Limits for Nine (9) Indicator Parameters Using the Gibbon's Poisson Model (95/95 UTL)
August 17, 2001 - May 14, 2009
Closed Hazardous Waste Surface Impoundment
Former Allison Gas Turbine Division - Plant 5
Indianapolis, Indiana
INR000021436

Sample ID	Replicate[1]	Date	Arsenic (mg/L)	Barium (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Lead (mg/L)	Mercury (mg/L)	Selenium (mg/L)	Silver (mg/L)	Cyanide (mg/L)
MW-206B (08172001)A	A	8/17/2001	0.010	0.10	0.005	0.010	0.010	0.002	0.01	0.05	0.02
MW-206B (100801)A	A	10/8/2001	0.010	0.10	0.005	0.010	0.010	0.002	0.01	0.05	0.02
206B (103001)	A	10/30/2001	0.010	0.10	0.005	0.010	0.010	0.002	0.01	0.05	0.02
206B (112001)A	A	11/20/2001	0.0360	0.10	0.005	0.010	0.010	0.002	0.0161	0.05	0.02
MW-206B (052902A)	A	5/29/2002	0.010	0.10	0.005	0.010	0.010	0.002	0.01	0.05	0.02
MW-206B (112002A)	A	11/20/2002	0.015	0.10	0.005	0.010	0.010	0.002	0.01	0.05	0.02
MW-206BA(052103)	A	5/21/2003	0.010	0.10	0.005	0.010	0.010	0.002	0.01	0.05	0.02
MW-206BA(111903)	A	11/19/2003	0.010	0.05	0.001	0.010	0.005	0.002	0.01	0.01	0.02
MW-206B (A)-052504	A	5/25/2004	0.010	0.0885	0.001	0.010	0.005	0.002	0.01	0.01	0.02
MW-206B (A)-111104	A	11/11/2004	0.010	0.05	0.001	0.010	0.005	0.002	0.01	0.01	0.02
MW-206B (A)	A	5/9/2005	0.010	0.0989	0.001	0.010	0.005	0.002	0.01	0.01	0.02
MW-206B (A)	A	11/10/2005	0.010	0.0839	0.005	0.010	0.005	0.000	0.01	0.01	0.01
MW-206B (A)05/17/06	A	5/17/2006	0.010	0.10	0.005	0.0266	0.010	0.002	0.01	0.05	0.02
MW-206B (110806)	none	11/8/2006	0.010	0.10	0.005	0.010	0.010	0.002	0.01	0.05	0.02
MW-206B (051607)	none	5/16/2007	0.010	0.112	0.005	0.0111	0.010	0.002	0.01	0.05	0.01
MW-206B (111507)	none	11/15/2007	0.010	0.1000	0.005	0.0760	0.010	0.002	0.01	0.05	0.01
MW-206B (051408)	none	5/14/2008	0.010	0.114	0.005	0.010	0.010	0.002	0.01	0.05	0.01
MW-206B (110608)	none	11/6/2008	0.010	0.10	0.005	0.010	0.005	0.002	0.01	0.05	0.01
MW-206B (051409)	none	5/14/2009	0.010	0.10	0.005	0.010	0.005	0.002	0.01	0.05	0.01

= excluded from calculations = detect

[1] For sampling events 8/17/2001 through 5/17/2006, values are based on the first of four replicates (i.e., Replicate A)

Upper Limit Calculation

Poisson Count of Sum (µg/L) T_n	186.0	1497.3	64.0	243.7	125.0	30.2	166.1	600.0	250.0
1/(2*n)	0.03125	0.03125	0.03125	0.03125	0.03125	0.03125	0.03125	0.03125	0.03125
$2T_n+2$	374.0	2996.6	130.0	489.4	252.0	62.4	334.2	1202.0	502.0
$X^2_{95}[2T_n+2]$	420.094	3125.068	157.609	541.973	290.028	81.837	377.832	1283.771	555.232
$\lambda_T=1/(2n)*X_{0.95}^2[2T_n+2]$	13.128	97.658	4.925	16.937	9.063	2.557	11.807	40.118	17.351
$2*\lambda_T$	26.256	195.317	9.851	33.873	18.127	5.115	23.614	80.236	34.702
Smallest degree of freedom (df), k, such that $X^2_{.05}[2k+2] > 2*\lambda_T$	40	230	19	49	30	12	37	103	50
at above degrees of freedom, $X^2_{.05}[2k+2]$ =	26.509	195.895	10.117	33.930	18.493	5.226	24.075	80.582	34.764
k=(df-2)/2	19.0	114.0	8.5	23.5	14.0	5.0	17.5	50.5	24.0
95/95 UTL (mg/L) ** = UTL exceeds maximum value in dataset	**0.0190**	**0.1140**	**0.0085****	**0.0235**	**0.014****	**0.005****	**0.0175****	**0.0505****	**0.024****
Most recent result (mg/L) from monitoring wells MW-201B, MW-202B, and MW-203B (Nov 2008)	<0.010	<0.10	<0.005	<0.010	<0.005	<0.002	<0.010	<0.05	<0.010
Most Recent < UTL ?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

APPENDIX A

LABORATORY ANALYTICAL DATA SHEETS
MAY 2009

Pace Analytical Services, Inc.
7726 Moller Road
Indianapolis, IN 46268
(317)875-5894

June 17, 2009

Ms. Susan Scrocchi
Conestoga-Rovers and Associates
2055 Niagara Falls Blvd
Suite 2
Niagara Falls, NY 14304

RE: Project: Rolls Royce (Revised Report)
Pace Project No.: 5026195

Dear Ms. Scrocchi:
Enclosed are the analytical results for sample(s) received by the laboratory on May 14, 2009. The results relate only to the samples included in this report. Results reported herein conform to the most current NELAC standards, where applicable, unless otherwise narrated in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Kenneth Hunt for
Donna Spyker
donna.spyker@pacelabs.com
Project Manager

Illinois/NELAC Certification #: 100418
Indiana Certification #: C-49-06
Kansas Certification #: E-10247
Kentucky Certification #: 0042
Ohio VAP: CL0065
Pennsylvania: 68-00791
West Virginia Certification #: 330

Enclosures

Pace Analytical Services, Inc.
7726 Moller Road
Indianapolis, IN 46268
(317)875-5894

SAMPLE SUMMARY

Project: Rolls Royce
Pace Project No.: 5026195

Lab ID	Sample ID	Matrix	Date Collected	Date Received
5026195001	MW-201B(051409)	Water	05/14/09 09:05	05/14/09 13:46
5026195002	MW-202B(051409)	Water	05/14/09 10:18	05/14/09 13:46
5026195003	MW-203B(051409)	Water	05/14/09 11:22	05/14/09 13:46
5026195004	FD-1(051409)	Water	05/14/09 11:27	05/14/09 13:46
5026195005	EB-1(051409)	Water	05/14/09 12:45	05/14/09 13:46
5026195006	MW-206B(051409)	Water	05/14/09 12:35	05/14/09 13:46

Pace Analytical Services, Inc.
7726 Moller Road
Indianapolis, IN 46268
(317)875-5894

SAMPLE ANALYTE COUNT

Project: Rolls Royce
Pace Project No.: 5026195

Lab ID	Sample ID	Method	Analysts	Analytes Reported
5026195001	MW-201B(051409)	EPA 6010	FRW	7
		EPA 7470	LLB	1
		EPA 9012	CLS	1
5026195002	MW-202B(051409)	EPA 6010	FRW	7
		EPA 7470	LLB	1
		EPA 9012	CLS	1
5026195003	MW-203B(051409)	EPA 6010	FRW	7
		EPA 7470	LLB	1
		EPA 9012	CLS	1
5026195004	FD-1(051409)	EPA 6010	FRW	7
		EPA 7470	LLB	1
		EPA 9012	CLS	1
5026195005	EB-1(051409)	EPA 6010	FRW	7
		EPA 7470	LLB	1
		EPA 9012	CLS	1
5026195006	MW-206B(051409)	EPA 6010	FRW	7
		EPA 7470	LLB	1
		EPA 9012	CLS	1

Pace Analytical Services, Inc.
7726 Moller Road
Indianapolis, IN 46268
(317)875-5894

ANALYTICAL RESULTS

Project: Rolls Royce
Pace Project No.: 5026195

Sample: MW-201B(051409) **Lab ID: 5026195001** Collected: 05/14/09 09:05 Received: 05/14/09 13:46 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, Dissolved	Analytical Method: EPA 6010 Preparation Method: EPA 3010							
Arsenic, Dissolved	ND	ug/L	10.0	1	05/21/09 00:00	05/21/09 23:46	7440-38-2	
Barium, Dissolved	ND	ug/L	100	1	05/21/09 00:00	05/21/09 23:46	7440-39-3	
Cadmium, Dissolved	ND	ug/L	5.0	1	05/21/09 00:00	05/21/09 23:46	7440-43-9	
Chromium, Dissolved	ND	ug/L	10.0	1	05/21/09 00:00	05/21/09 23:46	7440-47-3	
Lead, Dissolved	ND	ug/L	5.0	1	05/21/09 00:00	05/21/09 23:46	7439-92-1	
Selenium, Dissolved	ND	ug/L	10.0	1	05/21/09 00:00	05/21/09 23:46	7782-49-2	
Silver, Dissolved	ND	ug/L	50.0	1	05/21/09 00:00	05/21/09 23:46	7440-22-4	
7470 Mercury, Dissolved	Analytical Method: EPA 7470 Preparation Method: EPA 7470							
Mercury, Dissolved	ND	ug/L	2.0	1	05/15/09 00:00	05/19/09 12:09	7439-97-6	
9012 Cyanide, Total	Analytical Method: EPA 9012							
Cyanide	ND	mg/L	0.010	1		05/28/09 16:35	57-12-5	

Pace Analytical Services, Inc.
7726 Moller Road
Indianapolis, IN 46268
(317)875-5894

ANALYTICAL RESULTS

Project: Rolls Royce
Pace Project No.: 5026195

Sample: MW-202B(051409) **Lab ID: 5026195002** Collected: 05/14/09 10:18 Received: 05/14/09 13:46 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, Dissolved	Analytical Method: EPA 6010 Preparation Method: EPA 3010							
Arsenic, Dissolved	ND	ug/L	10.0	1	05/21/09 00:00	05/21/09 23:52	7440-38-2	
Barium, Dissolved	ND	ug/L	100	1	05/21/09 00:00	05/21/09 23:52	7440-39-3	
Cadmium, Dissolved	ND	ug/L	5.0	1	05/21/09 00:00	05/21/09 23:52	7440-43-9	
Chromium, Dissolved	ND	ug/L	10.0	1	05/21/09 00:00	05/21/09 23:52	7440-47-3	
Lead, Dissolved	ND	ug/L	5.0	1	05/21/09 00:00	05/21/09 23:52	7439-92-1	
Selenium, Dissolved	ND	ug/L	10.0	1	05/21/09 00:00	05/21/09 23:52	7782-49-2	
Silver, Dissolved	ND	ug/L	50.0	1	05/21/09 00:00	05/21/09 23:52	7440-22-4	
7470 Mercury, Dissolved	Analytical Method: EPA 7470 Preparation Method: EPA 7470							
Mercury, Dissolved	ND	ug/L	2.0	1	05/15/09 00:00	05/19/09 12:10	7439-97-6	
9012 Cyanide, Total	Analytical Method: EPA 9012							
Cyanide	ND	mg/L	0.010	1		05/28/09 16:36	57-12-5	

Pace Analytical Services, Inc.
7726 Moller Road
Indianapolis, IN 46268
(317)875-5894

ANALYTICAL RESULTS

Project: Rolls Royce
Pace Project No.: 5026195

Sample: MW-203B(051409) **Lab ID: 5026195003** Collected: 05/14/09 11:22 Received: 05/14/09 13:46 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, Dissolved	Analytical Method: EPA 6010 Preparation Method: EPA 3010							
Arsenic, Dissolved	ND	ug/L	10.0	1	05/21/09 00:00	05/21/09 23:58	7440-38-2	
Barium, Dissolved	ND	ug/L	100	1	05/21/09 00:00	05/21/09 23:58	7440-39-3	
Cadmium, Dissolved	ND	ug/L	5.0	1	05/21/09 00:00	05/21/09 23:58	7440-43-9	
Chromium, Dissolved	ND	ug/L	10.0	1	05/21/09 00:00	05/21/09 23:58	7440-47-3	
Lead, Dissolved	ND	ug/L	5.0	1	05/21/09 00:00	05/21/09 23:58	7439-92-1	
Selenium, Dissolved	ND	ug/L	10.0	1	05/21/09 00:00	05/21/09 23:58	7782-49-2	
Silver, Dissolved	ND	ug/L	50.0	1	05/21/09 00:00	05/21/09 23:58	7440-22-4	
7470 Mercury, Dissolved	Analytical Method: EPA 7470 Preparation Method: EPA 7470							
Mercury, Dissolved	ND	ug/L	2.0	1	05/15/09 00:00	05/19/09 12:15	7439-97-6	
9012 Cyanide, Total	Analytical Method: EPA 9012							
Cyanide	ND	mg/L	0.010	1		05/28/09 16:37	57-12-5	

Pace Analytical Services, Inc.
7726 Moller Road
Indianapolis, IN 46268
(317)875-5894

ANALYTICAL RESULTS

Project: Rolls Royce
Pace Project No.: 5026195

Sample: FD-1(051409) **Lab ID: 5026195004** Collected: 05/14/09 11:27 Received: 05/14/09 13:46 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, Dissolved	Analytical Method: EPA 6010 Preparation Method: EPA 3010							
Arsenic, Dissolved	ND	ug/L	10.0	1	05/21/09 00:00	05/22/09 00:03	7440-38-2	
Barium, Dissolved	ND	ug/L	100	1	05/21/09 00:00	05/22/09 00:03	7440-39-3	
Cadmium, Dissolved	ND	ug/L	5.0	1	05/21/09 00:00	05/22/09 00:03	7440-43-9	
Chromium, Dissolved	ND	ug/L	10.0	1	05/21/09 00:00	05/22/09 00:03	7440-47-3	
Lead, Dissolved	ND	ug/L	5.0	1	05/21/09 00:00	05/22/09 00:03	7439-92-1	
Selenium, Dissolved	ND	ug/L	10.0	1	05/21/09 00:00	05/22/09 00:03	7782-49-2	
Silver, Dissolved	ND	ug/L	50.0	1	05/21/09 00:00	05/22/09 00:03	7440-22-4	
7470 Mercury, Dissolved	Analytical Method: EPA 7470 Preparation Method: EPA 7470							
Mercury, Dissolved	ND	ug/L	2.0	1	05/15/09 00:00	05/19/09 12:16	7439-97-6	
9012 Cyanide, Total	Analytical Method: EPA 9012							
Cyanide	ND	mg/L	0.010	1		05/28/09 16:38	57-12-5	

Pace Analytical Services, Inc.
7726 Moller Road
Indianapolis, IN 46268
(317)875-5894

ANALYTICAL RESULTS

Project: Rolls Royce
Pace Project No.: 5026195

Sample: EB-1(051409) **Lab ID: 5026195005** Collected: 05/14/09 12:45 Received: 05/14/09 13:46 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, Dissolved	Analytical Method: EPA 6010 Preparation Method: EPA 3010							
Arsenic, Dissolved	ND	ug/L	10.0	1	05/21/09 00:00	05/22/09 00:09	7440-38-2	
Barium, Dissolved	ND	ug/L	100	1	05/21/09 00:00	05/22/09 00:09	7440-39-3	
Cadmium, Dissolved	ND	ug/L	5.0	1	05/21/09 00:00	05/22/09 00:09	7440-43-9	
Chromium, Dissolved	ND	ug/L	10.0	1	05/21/09 00:00	05/22/09 00:09	7440-47-3	
Lead, Dissolved	ND	ug/L	5.0	1	05/21/09 00:00	05/22/09 00:09	7439-92-1	
Selenium, Dissolved	ND	ug/L	10.0	1	05/21/09 00:00	05/22/09 00:09	7782-49-2	
Silver, Dissolved	ND	ug/L	50.0	1	05/21/09 00:00	05/22/09 00:09	7440-22-4	
7470 Mercury, Dissolved	Analytical Method: EPA 7470 Preparation Method: EPA 7470							
Mercury, Dissolved	ND	ug/L	2.0	1	05/15/09 00:00	05/19/09 12:18	7439-97-6	
9012 Cyanide, Total	Analytical Method: EPA 9012							
Cyanide	ND	mg/L	0.010	1		05/28/09 16:39	57-12-5	

Pace Analytical Services, Inc.
7726 Moller Road
Indianapolis, IN 46268
(317)875-5894

ANALYTICAL RESULTS

Project: Rolls Royce
Pace Project No.: 5026195

Sample: MW-206B(051409) **Lab ID: 5026195006** Collected: 05/14/09 12:35 Received: 05/14/09 13:46 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, Dissolved	Analytical Method: EPA 6010 Preparation Method: EPA 3010							
Arsenic, Dissolved	ND	ug/L	10.0	1	05/21/09 00:00	05/22/09 00:15	7440-38-2	
Barium, Dissolved	ND	ug/L	100	1	05/21/09 00:00	05/22/09 00:15	7440-39-3	
Cadmium, Dissolved	ND	ug/L	5.0	1	05/21/09 00:00	05/22/09 00:15	7440-43-9	
Chromium, Dissolved	ND	ug/L	10.0	1	05/21/09 00:00	05/22/09 00:15	7440-47-3	
Lead, Dissolved	ND	ug/L	5.0	1	05/21/09 00:00	05/22/09 00:15	7439-92-1	
Selenium, Dissolved	ND	ug/L	10.0	1	05/21/09 00:00	05/22/09 00:15	7782-49-2	
Silver, Dissolved	ND	ug/L	50.0	1	05/21/09 00:00	05/22/09 00:15	7440-22-4	
7470 Mercury, Dissolved	Analytical Method: EPA 7470 Preparation Method: EPA 7470							
Mercury, Dissolved	ND	ug/L	2.0	1	05/15/09 00:00	05/19/09 12:19	7439-97-6	
9012 Cyanide, Total	Analytical Method: EPA 9012							
Cyanide	ND	mg/L	0.010	1		05/28/09 16:40	57-12-5	

Pace Analytical Services, Inc.
7726 Moller Road
Indianapolis, IN 46268
(317)875-5894

QUALITY CONTROL DATA

Project: Rolls Royce
Pace Project No.: 5026195

QC Batch: MERP/2102 Analysis Method: EPA 7470
QC Batch Method: EPA 7470 Analysis Description: 7470 Mercury Dissolved
Associated Lab Samples: 5026195001, 5026195002, 5026195003, 5026195004, 5026195005, 5026195006

METHOD BLANK: 297940 Matrix: Water
Associated Lab Samples: 5026195001, 5026195002, 5026195003, 5026195004, 5026195005, 5026195006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury, Dissolved	ug/L	ND	2.0	05/19/09 11:58	

LABORATORY CONTROL SAMPLE: 297941

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury, Dissolved	ug/L	5	4.6	92	75-117	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 297942 297943

Parameter	Units	5026056004 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury, Dissolved	ug/L	ND	5	5	4.7	4.7	95	93	52-133	2	20	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 297944 297945

Parameter	Units	5026195006 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury, Dissolved	ug/L	ND	5	5	4.6	4.6	92	93	52-133	.4	20	

Pace Analytical Services, Inc.
7726 Moller Road
Indianapolis, IN 46268
(317)875-5894

QUALITY CONTROL DATA

Project: Rolls Royce
Pace Project No.: 5026195

QC Batch: MPRP/4383 Analysis Method: EPA 6010
QC Batch Method: EPA 3010 Analysis Description: 6010 MET Dissolved
Associated Lab Samples: 5026195001, 5026195002, 5026195003, 5026195004, 5026195005, 5026195006

METHOD BLANK: 299995 Matrix: Water
Associated Lab Samples: 5026195001, 5026195002, 5026195003, 5026195004, 5026195005, 5026195006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Arsenic, Dissolved	ug/L	ND	10.0	05/21/09 23:35	
Barium, Dissolved	ug/L	ND	100	05/21/09 23:35	
Cadmium, Dissolved	ug/L	ND	5.0	05/21/09 23:35	
Chromium, Dissolved	ug/L	ND	10.0	05/21/09 23:35	
Lead, Dissolved	ug/L	ND	5.0	05/21/09 23:35	
Selenium, Dissolved	ug/L	ND	10.0	05/21/09 23:35	
Silver, Dissolved	ug/L	ND	50.0	05/21/09 23:35	

LABORATORY CONTROL SAMPLE: 299996

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Arsenic, Dissolved	ug/L	1000	1060	106	80-120	
Barium, Dissolved	ug/L	1000	1020	102	80-120	
Cadmium, Dissolved	ug/L	1000	995	99	80-120	
Chromium, Dissolved	ug/L	1000	1020	102	80-120	
Lead, Dissolved	ug/L	1000	998	100	80-120	
Selenium, Dissolved	ug/L	1000	1020	102	80-120	
Silver, Dissolved	ug/L	500	535	107	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 299997 299998

Parameter	Units	5026195006 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Arsenic, Dissolved	ug/L	ND	1000	1000	1070	1050	107	105	75-125	3	20	
Barium, Dissolved	ug/L	ND	1000	1000	1080	1050	102	99	75-125	3	20	
Cadmium, Dissolved	ug/L	ND	1000	1000	987	962	99	96	75-125	3	20	
Chromium, Dissolved	ug/L	ND	1000	1000	1020	990	102	99	75-125	3	20	
Lead, Dissolved	ug/L	ND	1000	1000	988	965	99	96	75-125	2	20	
Selenium, Dissolved	ug/L	ND	1000	1000	1030	1000	103	100	75-125	2	20	
Silver, Dissolved	ug/L	ND	500	500	546	532	109	106	75-125	3	20	

Pace Analytical Services, Inc.
7726 Moller Road
Indianapolis, IN 46268
(317)875-5894

QUALITY CONTROL DATA

Project: Rolls Royce
Pace Project No.: 5026195

QC Batch: WETA/3683 Analysis Method: EPA 9012
QC Batch Method: EPA 9012 Analysis Description: 9012 Cyanide, Total
Associated Lab Samples: 5026195001, 5026195002, 5026195003, 5026195004, 5026195005, 5026195006

METHOD BLANK: 301732 Matrix: Water
Associated Lab Samples: 5026195001, 5026195002, 5026195003, 5026195004, 5026195005, 5026195006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Cyanide	mg/L	ND	0.010	05/28/09 16:31	

LABORATORY CONTROL SAMPLE: 301733

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cyanide	mg/L	.2	0.21	107	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 301734 301735

Parameter	Units	5026195006 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cyanide	mg/L	ND	.2	.2	0.20	0.20	100	100	75-125	.6	20	

Pace Analytical Services, Inc.
7726 Moller Road
Indianapolis, IN 46268
(317)875-5894

QUALIFIERS

Project: Rolls Royce
Pace Project No.: 5026195

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

Pace Analytical is NELAP accredited. Contact your Pace PM for the current list of accredited analytes.

U - Indicates the compound was analyzed for, but not detected.

GM REALM ENCORE

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

PAGE 1 OF 1

ID # Nº 03891

SSOW Ref. Code: R031015

Required Client Information:

Company: NOVA Consultants	Report To: Jeff Eckhart
Address: 21580 Novi Road Suite 300 Novi, MI 48375	Copy To: —
	Invoice To: Sue Shevock - CBA
	P.O.: 9705154
Phone: 248 347 3512	Project Name: GM-Rolls Royce
Fax: 248 347 4152	Project Number: 97-05-154
E-mail: jeff_eckhart@novaconsultants.com	

Laboratory: Pace Analytical	
Laboratory Location: Indianapolis, IN	
Laboratory Contact: D. Spyke	
Requested Due Date: 5/28/09	TAT: 2 weeks
QA/QC Requirements: Level IV	

Valid Matrix Codes: WG Groundwater; WB Borehole Water; WS Surface Water; SO Soil; SE Sediment; See Back for Additional Codes

	Sample Identification:	Matrix Code	Date Collected	Time Collected	# Containers	Preservative: Unpreserved	HCl	H2SO4	HNO3	NaOH	Other:	Analysis and Method: BTEX & Methyl Cyclohexane	Cyclohexane										Remarks/Lab ID
1.	MW-201B (051409)	WG	5/14/09	9:05	2				1	1		X	X										001
2.	MW-202B (051409)	WG	5/14/09	10:18	2				1	1		X	X										002
3.	MW-203B (051409)	WG	5/14/09	11:22	2				1	1		X	X										003
4.	MW-206B (051409)	WG	5/14/09	12:35	6				3	3		X	X								006		MS/MSD 004
5.	FD-1 (051409)	WG	5/14/09	11:27	2				1	1		X	X										004 005
6.	EB-1 (051409)	WGQ	5/14/09	12:45	2				1	1		X	X										005
7.																							
8.																							
9.																							
10.																							
11.																							
12.																							
13.																							
14.																							
15.																							
	TOTAL NUMBER OF CONTAINERS																						

SHIPMENT METHOD	NO. OF COOLERS	RELINQUISHED BY / AFFILIATION	DATE	TIME	RECEIVED BY / AFFILIATION	DATE	TIME
Drop-Off	1	[signature] / NOVA	5/14/09	13:46	[signature] Pace	5/14/09	13:46
AIRBILL NO.							

Sample Condition

Temp in °C	0.1°C
Received on Ice	(Y) / N
Sealed Cooler	Y / (N)
Samples Intact	(Y) / N

Additional Comments: WI Client

Sampler Name: Jeff Eckhart

Sampler Signature: [signature] Date: 5/14/09

Distribution: WHITE - Fully Executed Copy YELLOW - Receiving Laboratory Copy PINK - Sampler Copy

REV. 0 (6/04)

Sample Condition Upon Receipt

Pace Analytical

Client Name: Nova Consultants Project # 0026195

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☒ Client ☐ Commercial ☐ Pace Other _____

Tracking #: _____

Optional: Proj. Due Date: Proj. Name:

Custody Seal on Cooler/Box Present: ☐ yes ☒ no Seals intact: ☐ yes ☒ no

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☒ None ☐ Other _____

Thermometer Used 123456 Type of Ice: Wet Blue None ☐ Samples on ice, cooling process has begun

Cooler Temperature 10.1°C Biological Tissue is Frozen: Yes No

Date and Initials of person examining contents: _____

Temp should be above freezing to 6°C (recently sampled) Comments:

Chain of Custody Present:	☒Yes	☐No	☐N/A	1.
Chain of Custody Filled Out:	☒Yes	☐No	☐N/A	2.
Chain of Custody Relinquished:	☒Yes	☐No	☐N/A	3.
Sampler Name & Signature on COC:	☒Yes	☐No	☐N/A	4.
Samples Arrived within Hold Time:	☒Yes	☐No	☐N/A	5.
Short Hold Time Analysis (<72hr):	☐Yes	☐No	☒N/A	6.
Rush Turn Around Time Requested:	☐Yes	☐No	☒N/A	7.
Sufficient Volume:	☒Yes	☐No	☐N/A	8.
Correct Containers Used:	☒Yes	☐No	☐N/A	9.
-Pace Containers Used:	☒Yes	☐No	☐N/A	
Containers Intact:	☒Yes	☐No	☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes	☐No	☒N/A	11.
Sample Labels match COC:	☒Yes	☐No	☐N/A	12.
-Includes date/time/ID/Analysis Matrix: GCT				
All containers needing preservation have been checked.	☒Yes	☐No	☐N/A	13.
All containers needing preservation are found to be in compliance with EPA recommendation.	☒Yes	☐No	☐N/A	
exceptions: VOA, coliform, TOC, O&G, WI-DRO (water)	☒Yes	☐No		Initial when completed / Lot # of added preservative
Samples checked for dechlorination:	☐Yes	☐No	☒N/A	14.
Headspace in VOA Vials (>6mm):	☐Yes	☐No	☒N/A	15.
Trip Blank Present:	☐Yes	☐No	☒N/A	16.
Trip Blank Custody Seals Present	☐Yes	☐No	☒N/A	
Pace Trip Blank Lot # (If purchased): _____				

Client Notification/ Resolution: Field Data Required? Y / N

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: _____ **Date:** 5/15/09

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)

Sample Container Count

CLIENT: Nova Consultants

COC PAGE 1 of 1
COC ID# 03891

Project # _____

6026195

Sample Line Item	DG9H	AG1U	WGFU	R 4/6	BP2N	BP2U	BP2S	BP3N	BP3U	BP3S	AG3S	AG1H	BP2O			Comments
1					1								1			
2					↓								↓			
3					↓								↓			
4					3								3			
5					1								1			
6					↓								↓			
7																
8																
9																
10																
11																
12																

Container Codes

DG9H	40mL HCL amber voa vial	AF	Air Filter	BP1N	1 liter HNO3 plastic	DG9P	40mL TSP amber vial
AG1U	1liter unpreserved amber glass	AG1H	1 liter HCL amber glass	BP1S	1 liter H2SO4 plastic	DG9S	40mL H2SO4 amber vial
WGFU	4oz clear soil jar	AG1S	1 liter H2SO4 amber glass	BP1U	1 liter unpreserved plastic	DG9T	40mL Na Thio amber vial
R	terra core kit	AG1T	1 liter Na Thiosulfate amber gl	BP1Z	1 liter NaOH, Zn, Ac	DG9U	40mL unpreserved amber vial
BP2N	500mL HNO3 plastic	AG2N	500mL HNO3 amber glass	BP2A	500mL NaOH, Asc Acid plastic	I	Wipe/Swab
BP2U	500mL unpreserved plastic	AG2S	500mL H2SO4 amber glass	BP2O	500mL NaOH plastic	JGFU	4oz unpreserved amber wide
BP2S	500mL H2SO4 plastic	AG2U	500mL unpreserved amber gla	BP2Z	500mL NaOH, Zn Ac	U	Summa Can
BP3N	250mL HNO3 plastic	AG3U	250mL unpreserved amber gla	BP3A	250mL NaOh, Asc Acid plastic	VG9H	40mL HCL clear vial
BP3U	250mL unpreserved plastic	BG1H	1 liter HCL clear glass	BP3C	250mL NaOH plastic	VG9T	40mL Na Thio. clear vial
BP3S	250mL H2SO4 plastic	BG1S	1 liter H2SO4 clear glass	BP3Z	250mL NaOH, Zn Ac plastic	VG9U	40mL unpreserved clear vial
AG3S	250mL H2SO4 glass amber	BG1T	1 liter Na Thiosulfate clear gla	C	Air Cassettes	VSG	Headspace septa vial & HCL
AG1S	1 liter H2SO4 amber glass	BG1U	1 liter unpreserved glass	DG9B	40mL Na Bisulfate amber vial	WGFX	4oz wide jar w/hexane wipe
BP1U	1 liter unpreserved plastic	BP1A	1 liter NaOH, Asc Acid plastic	DG9M	40mL MeOH clear vial	ZPLC	Ziploc Bag

APPENDIX B

GROUNDWATER MONITORING WELL SAMPLING DATA SHEETS

WELL PURGING FIELD INFORMATION FORM

JOB# 1M000-297

SITE/PROJECT NAME: GM-Rolls Royce

WELL# MW-201B

WELL PURGING INFORMATION

PURGE DATE (MM DD YY)	SAMPLE DATE (MM DD YY)	WATER VOL. IN CASING (LITRES/GALLONS)	ACTUAL VOLUME PURGED (LITRES/GALLONS)
05/14/09	05/14/09	11.22	19.0

PURGING AND SAMPLING EQUIPMENT

PURGING EQUIPMENT.....DEDICATED (Y) N (CIRCLE ONE)

SAMPLING EQIPMENT.....DEDICATED (Y) N (CIRCLE ONE)

PURGING DEVICE	C	A - SUBMERSIBLE PUMP	D - GAS LIFT PUMP	G - BAILER	X- PURGING OTHER (SPECIFY)
SAMPLING DEVICE		B - PERISTALTIC PUMP C - BLADDER PUMP	E - PURGE PUMP F - DIPPER BOTTLE	H - WATERRA®	X- SAMPLING OTHER (SPECIFY)
PURGING DEVICE	B	A - TEFLON	D - PVC		X- PURGING OTHER (SPECIFY)
SAMPLING DEVICE		B - STAINLESS STEEL C - POLYPROPYLENE	E - POLYETHYLENE		X- SAMPLING OTHER (SPECIFY)
PURGING DEVICE		A - TEFLON	D - POLYPROPYLENE	F - SILICONE	X- PURGING OTHER (SPECIFY)
SAMPLING DEVICE		B - TYGON C - ROPE X- (SPECIFY)	E - POLYETHYLENE	G - COMBINATION TEFLON/POLYPROPYLENE	X- SAMPLING OTHER (SPECIFY)
FILTERING DEVICES 0.45	A	A - IN-LINE DISPOSABLE	B - PRESSURE	C - VACUUM	

FIELD MEASUREMENTS

WELL ELEVATION	619.16	(m/ft)	GROUNDWATER ELEVATION	617.97	(m/ft)
DEPTH TO WATER	12.019	(m/ft)	WELL DEPTH	13.145	(m/ft)

pH	TURBIDITY	CONDUCTIVITY	ORP	DO	SAMPLE TEMPERATURE
7.32 (std)	4.3 (ntu)	2652 (µm/cm) AT 25°C	155.2 (mV)	11.34 (mg/L)	17.6 (°C)
(std)	(ntu)	(µm/cm) AT 25°C	(mV)	(mg/L)	(°C)
(std)	(ntu)	(µm/cm) AT 25°C	(mV)	(mg/L)	(°C)
(std)	(ntu)	(µm/cm) AT 25°C	(mV)	(mg/L)	(°C)
(std)	(ntu)	(µm/cm) AT 25°C	(mV)	(mg/L)	(°C)

FIELD COMMENTS

SAMPLE APPEARANCE: Non filter ODOR: None COLOR: Clear TURBIDITY: See Above

WEATHER CONDITIONS: WIND SPEED 10-15 mph DIRECTION W PRECIPITATION Y/N OUTLOOK Partly cloudy

SPECIFIC COMMENTS

I CERTIFY THAT SAMPLING PROCEDURES WERE IN ACCORDANCE WITH APPLICABLE GM PROTOCOLS

5/14/09 DATE — Jeff Fabian PRINT — SIGNATURE

FMG MODIFICATIONS MUST BE ACCOMPANIED BY A REVISION REQUEST FORM APPROVED BY THE PROJECT MANAGER

17300 (2) PART C FMG-06-4-01
Revision 3, October 29, 2002

Figure 2: Well Purging Field Information Form.

Project Data:

MONITORING WELL RECORD FOR LOW-FLOW PURGING

Project Name: 67-Rolls Royce
Ref. No.: IN000297

Date: 5/14/09
Personnel: JMB
Jeff Eckhart

Monitoring Well Data:

Well No.: MW-201.3
Measurement Point: TOC-693.06
Constructed Well Depth (ft): 38.51'
Measured Well Depth (ft): 38.45
Depth of Sediment (ft): 654.61

Screen Length (ft): 10'
Depth to Pump Intake (ft)[1]: 659.55'
Well Diameter, D (in): 2"
Well Screen Volume, V_s (mL)[2]: 6200
Initial Depth to Water (ft): 20.09'

Time	Pumping Rate (mL/min)	Depth to Water (ft)	Drawdown from Initial Water Level[3] (ft)	pH	Temperature °C	Conductivity (mS/cm)	ORP (mV)	DO (mg/L)	Turbidity (NTU)	Volume Purged, V_p (mL)	No. of Well Screen Volumes Purged[4]
8:20	~200	20.09	0.00	7.97	18.02	2.262	152.1	16.83	14.1	-	
8:25	~200	20.14	0.05	7.54	17.78	2.914	154.7	1.79	6.8	1000	
8:30	~200	20.15	0.06	7.43	17.72	2.726	155.2	1.47	4.9	2000	
8:35	~200	20.16	0.07	7.41	17.68	2.701	156.8	1.27	4.8	3000	
8:40	~200	20.17	0.08	7.44	17.60	2.684	155.1	1.21	4.4	4000	
8:45	~200	20.18	0.09	7.39	17.64	2.596	157.2	1.27	4.5	5000	
8:50	~200	20.17	0.08	7.35	17.59	2.621	156.5	1.31	4.3	6000	
8:55	~200	20.17	0.08	7.30	17.61	2.641	154.3	1.33	4.2	7000	
9:00	~200	20.17	0.08	7.32	17.65	2.657	155.8	1.36	4.4	8000	
9:05	~200	20.17	0.08	7.33	17.60	2.652	155.2	1.34	4.3	9000	21.45

Notes:

(1) The pump intake will be placed at the well screen mid-point or at a minimum of 2 ft above any sediment accumulated at the well bottom.

(2) The well screen volume will be based on a 5-foot screen length, $V_s = p*(D/2)^2*(5*12)*(2.54)^3$

(3) The drawdown from the initial water level should not exceed 0.3 ft.

(4) Purging will continue until stabilization is achieved or until 3 well screen volumes have been purged (unless purge water remains visually turbid and appears to be clearing, or unless stabilization parameters are varying slightly outside of the stablization criteria and appear to be stablizing), No. of Well Screen Volumes Purged= Vp/Vs.

Figure 3: Monitoring Well Record for Low-Flow Purging.

WELL PURGING FIELD INFORMATION FORM

JOB# FM00-297

SITE/PROJECT NAME: GM-Rolls Royce

WELL# MW-202B

WELL PURGING INFORMATION

PURGE DATE (MM DD YY)	SAMPLE DATE (MM DD YY)	WATER VOL. IN CASING (LITRES/GALLONS)	ACTUAL VOLUME PURGED (LITRES/GALLONS)
05 14 09	05 14 09	11.20	

PURGING AND SAMPLING EQUIPMENT

PURGING EQUIPMENT.....DEDICATED Y N (CIRCLE ONE)

SAMPLING EQIPMENT.....DEDICATED Y N (CIRCLE ONE)

PURGING DEVICE	C	A - SUBMERSIBLE PUMP	D - GAS LIFT PUMP	G - BAILER	X- PURGING OTHER (SPECIFY)
SAMPLING DEVICE		B - PERISTALTIC PUMP C - BLADDER PUMP	E - PURGE PUMP F - DIPPER BOTTLE	H - WATERRA®	X- SAMPLING OTHER (SPECIFY)
PURGING DEVICE	B	A - TEFLON B - STAINLESS STEEL	D - PVC E - POLYETHYLENE		X- PURGING OTHER (SPECIFY)
SAMPLING DEVICE		C - POLYPROPYLENE			X- SAMPLING OTHER (SPECIFY)
PURGING DEVICE	B	A - TEFLON B - TYGON	D - POLYPROPYLENE E - POLYETHYLENE	F - SILICONE G - COMBINATION TEFLON/POLYPROPYLENE	X- PURGING OTHER (SPECIFY)
SAMPLING DEVICE		C - ROPE X- (SPECIFY)			X- SAMPLING OTHER (SPECIFY)
FILTERING DEVICES 0.45	A	A - IN-LINE DISPOSABLE	B - PRESSURE	C - VACUUM	

FIELD MEASUREMENTS

WELL ELEVATION	614.43	(m/ft)	GROUNDWATER ELEVATION	617.88	(m/ft)
DEPTH TO WATER	19.55	(m/ft)	WELL DEPTH	37.51	(m/ft)

pH	TURBIDITY	CONDUCTIVITY	ORP	DO	SAMPLE TEMPERATURE
7.14 (std)	14.6 (ntu)	2479 (µm/cm) AT 25°C	115.6 (mV)	1.56 (mg/L)	17.6 (°C)
(std)	(ntu)	(µm/cm) AT 25°C	(mV)	(mg/L)	(°C)
(std)	(ntu)	(µm/cm) AT 25°C	(mV)	(mg/L)	(°C)
(std)	(ntu)	(µm/cm) AT 25°C	(mV)	(mg/L)	(°C)
(std)	(ntu)	(µm/cm) AT 25°C	(mV)	(mg/L)	(°C)

FIELD COMMENTS

SAMPLE APPEARANCE: Clear ODOR: None COLOR: Clear TURBIDITY: See Above

WEATHER CONDITIONS: WIND SPEED ~10-15 mph DIRECTION W PRECIPITATION Y/N OUTLOOK P. Cloudy

SPECIFIC COMMENTS

I CERTIFY THAT SAMPLING PROCEDURES WERE IN ACCORDANCE WITH APPLICABLE GM PROTOCOLS

DATE	PRINT	SIGNATURE
5/14/09	Jeff Elliott	

FMG MODIFICATIONS MUST BE ACCOMPANIED BY A REVISION REQUEST FORM APPROVED BY THE PROJECT MANAGER

17300 (2) PART C FMG-06-4-01
Revision 3, October 29, 2002

Figure 2: Well Purging Field Information Form.

Project Data:

MONITORING WELL RECORD FOR LOW-FLOW PURGING

Project Name: GM - Rolls Royce
Ref. No.: IN000297

Date: 5/14/09
Personnel: JM
Jeff Eckhout

Monitoring Well Data:

Well No.: MW-2023
Measurement Point: TOC - 691.43
Constructed Well Depth (ft): 37.71'
Measured Well Depth (ft): 37.51'
Depth of Sediment (ft): 653.92

Screen Length (ft): 10'
Depth to Pump Intake (ft)[1]: 658.72
Well Diameter, D (in): 2"
Well Screen Volume, V_s (mL)[2]: 6200
Initial Depth to Water (ft): 19.55

Time	Pumping Rate (mL/min)	Depth to Water (ft)	Drawdown from Initial Water Level[3] (ft)	pH	Temperature °C	Conductivity (mS/cm)	ORP (mV)	DO (mg/L)	Turbidity (NTU)	Volume Purged, Vp (mL)	No. of Well Screen Volumes Purged[4]
9:33	~200	19.55	0.00	8.01	18.42	9.141	160.1	21.71	15.8	-	
9:38		19.61	0.06	7.47	17.91	2.641	154.6	2.07	5.7	1000	
9:43		19.63	0.08	7.41	17.74	2.420	152.2	1.78	4.4	2000	
9:48		19.63	0.08	7.38	17.68	2.411	154.5	1.65	4.9	3000	
9:53		19.64	0.09	7.39	17.58	2.507	156.2	1.59	4.3	4000	
9:58		19.63	0.08	7.44	17.60	2.437	155.9	1.57	4.4	5000	
10:03		19.64	0.09	7.37	17.61	2.457	156.5	1.64	4.5	6000	
10:08		19.64	0.09	7.43	17.64	2.501	156.0	1.60	4.6	7000	
10:13		19.65	0.10	7.48	17.59	2.404	155.5	1.53	4.7	8000	
10:18	~200	19.65	0.10	7.44	17.63	2.479	156.2	1.56	4.6	9000	~1.45

Notes:

(1) The pump intake will be placed at the well screen mid-point or at a minimum of 2 ft above any sediment accumulated at the well bottom.

(2) The well screen volume will be based on a 5-foot screen length, $V_s = p*(D/2)^2*(5*12)*(2.54)^3$

(3) The drawdown from the initial water level should not exceed 0.3 ft.

(4) Purging will continue until stabilization is achieved or until 3 well screen volumes have been purged (unless purge water remains visually turbid and appears to be clearing, or unless stabilization parameters are varying slightly outside of the stablization criteria and appear to be stablizing), No. of Well Screen Volumes Purged= Vp/Vs.

Figure 3: Monitoring Well Record for Low-Flow Purging.

WED
10 AM
Jim Ferrito

WELL PURGING FIELD INFORMATION FORM

JOB# 5M00-297

SITE/PROJECT NAME: 6M-Rolls Royce

WELL# MW-203B

WELL PURGING INFORMATION

PURGE DATE (MM DD YY)	SAMPLE DATE (MM DD YY)	WATER VOL. IN CASING (LITRES/GALLONS)	ACTUAL VOLUME PURGED (LITRES/GALLONS)
05 14 09	05 14 09	10	10

PURGING AND SAMPLING EQUIPMENT

PURGING EQUIPMENT.....DEDICATED (Y) N (CIRCLE ONE)

SAMPLING EQIPMENT.....DEDICATED (Y) N (CIRCLE ONE)

PURGING DEVICE	C	A - SUBMERSIBLE PUMP	D - GAS LIFT PUMP	G - BAILER	X- PURGING OTHER (SPECIFY)
SAMPLING DEVICE		B - PERISTALTIC PUMP C - BLADDER PUMP	E - PURGE PUMP F - DIPPER BOTTLE	H - WATERRA®	X- SAMPLING OTHER (SPECIFY)
PURGING DEVICE	B	A - TEFLON	D - PVC		X- PURGING OTHER (SPECIFY)
SAMPLING DEVICE		B - STAINLESS STEEL C - POLYPROPYLENE	E - POLYETHYLENE		X- SAMPLING OTHER (SPECIFY)
PURGING DEVICE	E	A - TEFLON B - TYGON	D - POLYPROPYLENE E - POLYETHYLENE	F - SILICONE G - COMBINATION TEFLON/POLYPROPYLENE	X- PURGING OTHER (SPECIFY)
SAMPLING DEVICE		C - ROPE X- (SPECIFY)			X- SAMPLING OTHER (SPECIFY)
FILTERING DEVICES 0.45	A	A - IN-LINE DISPOSABLE	B - PRESSURE	C - VACUUM	

FIELD MEASUREMENTS

WELL ELEVATION	619.65	(m/ft)	GROUNDWATER ELEVATION	617.96	(m/ft)
DEPTH TO WATER	1.78	(m/ft)	WELL DEPTH	34.30	(m/ft)

pH	TURBIDITY	CONDUCTIVITY	ORP	DO	SAMPLE TEMPERATURE
7.48 (std)	1.4 (ntu)	2517 (µm/cm) AT 25°C	155.4 (mV)	11.49 (mg/L)	17.69 (°C)
(std)	(ntu)	(µm/cm) AT 25°C	(mV)	(mg/L)	(°C)
(std)	(ntu)	(µm/cm) AT 25°C	(mV)	(mg/L)	(°C)
(std)	(ntu)	(µm/cm) AT 25°C	(mV)	(mg/L)	(°C)
(std)	(ntu)	(µm/cm) AT 25°C	(mV)	(mg/L)	(°C)

FIELD COMMENTS

SAMPLE APPEARANCE: Clear ODOR: None COLOR: Clear TURBIDITY: See Above

WEATHER CONDITIONS: WIND SPEED 10-15 mph DIRECTION W PRECIPITATION Y (N) OUTLOOK P. Cloudy

SPECIFIC COMMENTS

I CERTIFY THAT SAMPLING PROCEDURES WERE IN ACCORDANCE WITH APPLICABLE GM PROTOCOLS

DATE	PRINT	SIGNATURE
5/14/09	Jeff Eckhart	

FMG MODIFICATIONS MUST BE ACCOMPANIED BY A REVISION REQUEST FORM APPROVED BY THE PROJECT MANAGER

17300 (2) PART C FMG-06-4-01
Revision 3, October 29, 2002

Figure 2: Well Purging Field Information Form.

Project Data:

MONITORING WELL RECORD FOR LOW-FLOW PURGING

Project Name: GM-Rolls Royce
Ref. No.: IN000297

Date: 5/14/09
Personnel: JM
Jeff Fehn

Monitoring Well Data:

Well No.: MW-203B
Measurement Point: TOC-691.65
Constructed Well Depth (ft): 34.30'
Measured Well Depth (ft): 34.30'
Depth of Sediment (ft): 657.35

Screen Length (ft): 10'
Depth to Pump Intake (ft)[1]: 662.35'
Well Diameter, D (in): 2"
Well Screen Volume, V_s (mL)[2]: 6200
Initial Depth to Water (ft): 17.86'

Time	Pumping Rate (mL/min)	Depth to Water (ft)	Drawdown from Initial Water Level[3] (ft)	pH	Temperature °C	Conductivity (mS/cm)	ORP (mV)	DO (mg/L)	Turbidity (NTU)	Volume Purged, Vp (mL)	No. of Well Screen Volumes Purged[4]
10:32	~200	17.86	0.00	8.14	18.17	8.472	164.1	17.42	15.2	-	
10:37	~200	17.96	0.10	7.91	18.09	2.915	160.9	2.07	5.8	1000	
10:42		17.97	0.11	7.80	18.01	2.726	157.5	1.80	5.2	2000	
10:47		17.98	0.12	7.72	17.92	2.641	156.4	1.74	4.9	3000	
10:52		17.97	0.11	7.64	17.84	2.607	155.7	1.65	4.8	4000	
10:57		17.97	0.11	7.55	17.81	2.586	155.0	1.58	4.6	5000	
11:02		17.98	0.12	7.51	17.74	2.574	154.7	1.51	4.5	6000	
11:07		17.97	0.11	7.48	17.75	2.547	155.1	1.47	4.6	7000	
11:12		17.97	0.11	7.45	17.72	2.555	155.5	1.45	4.5	8000	
11:17		17.98	0.12	7.46	17.71	2.567	155.7	1.44	4.5	9000	
11:22	~200	17.97	0.11	7.48	17.69	2.571	155.4	1.48	4.4	10,000	≥1.6

Notes:

(1) The pump intake will be placed at the well screen mid-point or at a minimum of 2 ft above any sediment accumulated at the well bottom.

(2) The well screen volume will be based on a 5-foot screen length, $V_s=p*(D/2)^2*(5*12)*(2.54)^3$

(3) The drawdown from the initial water level should not exceed 0.3 ft.

(4) Purging will continue until stabilization is achieved or until 3 well screen volumes have been purged (unless purge water remains visually turbid and appears to be clearing, or unless stabilization parameters are varying slightly outside of the stablization criteria and appear to be stablizing), No. of Well Screen Volumes Purged= Vp/Vs.

Figure 3: Monitoring Well Record for Low-Flow Purging.

WELL PURGING FIELD INFORMATION FORM

JOB# 1M000-297

SITE/PROJECT NAME: 62-Rolls Royce

WELL# MW-2063

WELL PURGING INFORMATION

PURGE DATE (MM DD YY)	SAMPLE DATE (MM DD YY)	WATER VOL. IN CASING (LITRES/GALLONS)	ACTUAL VOLUME PURGED (LITRES/GALLONS)
051409	051409	1125	80

PURGING AND SAMPLING EQUIPMENT

PURGING EQUIPMENT.....DEDICATED (Y) N (CIRCLE ONE)

SAMPLING EQIPMENT.....DEDICATED (Y) N (CIRCLE ONE)

PURGING DEVICE	C	A - SUBMERSIBLE PUMP	D - GAS LIFT PUMP	G - BAILER	X- PURGING OTHER (SPECIFY)
SAMPLING DEVICE		B - PERISTALTIC PUMP C - BLADDER PUMP	E - PURGE PUMP F - DIPPER BOTTLE	H - WATERRA®	X- SAMPLING OTHER (SPECIFY)
PURGING DEVICE	B	A - TEFLON B - STAINLESS STEEL	D - PVC E - POLYETHYLENE		X- PURGING OTHER (SPECIFY)
SAMPLING DEVICE		C - POLYPROPYLENE			X- SAMPLING OTHER (SPECIFY)
PURGING DEVICE	D	A - TEFLON B - TYGON	D - POLYPROPYLENE E - POLYETHYLENE	F - SILICONE G - COMBINATION TEFLON/POLYPROPYLENE	X- PURGING OTHER (SPECIFY)
SAMPLING DEVICE		C - ROPE X- (SPECIFY)			X- SAMPLING OTHER (SPECIFY)
FILTERING DEVICES 0.45	A	A - IN-LINE DISPOSABLE	B - PRESSURE	C - VACUUM	

FIELD MEASUREMENTS

WELL ELEVATION	691346 (m/ft)	GROUNDWATER ELEVATION	674531 (m/ft)
DEPTH TO WATER	11819.3 (m/ft)	WELL DEPTH	31766 (m/ft)

pH	TURBIDITY	CONDUCTIVITY	ORP	DO	SAMPLE TEMPERATURE
7.15 (std)	3.9 (ntu)	2731 (µm/cm) AT 25°C	175.1 (mV)	10.57 (mg/L)	17.7 (°C)
(std)	(ntu)	(µm/cm) AT 25°C	(mV)	(mg/L)	(°C)
(std)	(ntu)	(µm/cm) AT 25°C	(mV)	(mg/L)	(°C)
(std)	(ntu)	(µm/cm) AT 25°C	(mV)	(mg/L)	(°C)
(std)	(ntu)	(µm/cm) AT 25°C	(mV)	(mg/L)	(°C)

FIELD COMMENTS

SAMPLE APPEARANCE: Clear ODOR: None COLOR: Clear TURBIDITY: See Above

WEATHER CONDITIONS: WIND SPEED 2-10-15 mph DIRECTION W PRECIPITATION Y (N) OUTLOOK P. Cloudy

SPECIFIC COMMENTS

I CERTIFY THAT SAMPLING PROCEDURES WERE IN ACCORDANCE WITH APPLICABLE GM PROTOCOLS

5/14/09 (DATE) Jeff Bethart (PRINT) (SIGNATURE)

FMG MODIFICATIONS MUST BE ACCOMPANIED BY A REVISION REQUEST FORM APPROVED BY THE PROJECT MANAGER

17300 (2) PART C FMG-06-4-01
Revision 3, October 29, 2002

Figure 2: Well Purging Field Information Form.

Project Data:

MONITORING WELL RECORD FOR LOW-FLOW PURGING

Project Name: GM-Rolls Royce
Ref. No.: FM000297

Date: 5/14/09
Personnel: JM
Jeff Eckhart

Monitoring Well Data:

Well No.: MW-2063
Measurement Point: TOC - 693.46
Constructed Well Depth (ft): 37.73'
Measured Well Depth (ft): 37.66'
Depth of Sediment (ft): 655.80'

Screen Length (ft): 10'
Depth to Pump Intake (ft)[1]: 660.73'
Well Diameter, D (in): 2"
Well Screen Volume, V_s (mL)[2]: 6200
Initial Depth to Water (ft): 18.93'

Time	Pumping Rate (mL/min)	Depth to Water (ft)	Drawdown from Initial Water Level[3] (ft)	pH	Temperature °C	Conductivity (mS/cm)	ORP (mV)	DO (mg/L)	Turbidity (NTU)	Volume Purged, Vp (mL)	No. of Well Screen Volumes Purged[4]
11:55	~200	18.93	0.00	8.27	18.42	3.141	171.5	17.2	15.2	-	
12:00		19.01	0.000	8.07	18.07	3.079	174.2	1.17	5.2	1000	
12:05		19.02	0.09	7.91	18.91	2.914	175.5	0.86	4.8	2000	
12:10		19.03	0.10	7.86	18.88	2.810	174.1	0.74	4.4	3000	
12:15		19.02	0.09	7.81	17.79	2.772	173.9	0.68	4.2	4000	
12:20		19.03	0.10	7.79	17.75	2.752	175.4	0.62	4.1	5000	
12:25		19.02	0.09	7.74	17.74	2.714	176.2	0.59	3.9	6000	
12:30		19.02	0.09	7.71	17.75	2.726	175.9	0.55	3.8	7000	
12:35	~200	19.02	0.09	7.75	17.77	2.731	175.1	0.57	3.9	8000	21.3

Notes:

(1) The pump intake will be placed at the well screen mid-point or at a minimum of 2 ft above any sediment accumulated at the well bottom.

(2) The well screen volume will be based on a 5-foot screen length, $V_s = p*(D/2)^2*(5*12)*(2.54)^3$

(3) The drawdown from the initial water level should not exceed 0.3 ft.

(4) Purging will continue until stabilization is achieved or until 3 well screen volumes have been purged (unless purge water remains visually turbid and appears to be clearing, or unless stabilization parameters are varying slightly outside of the stablization criteria and appear to be stablizing), No. of Well Screen Volumes Purged= Vp/Vs.

Figure 3: Monitoring Well Record for Low-Flow Purging.

APPENDIX C

RESPONSE TO IDEM EMAIL DATED JULY 30, 2008

ARCADIS

Response to Indiana Department of Environmental (IDEM) Management Email Dated July 30, 2008

General Motors (GM) Former AGT Division (EPA ID# INR000021436) Closed Surface Impoundment (2701 West Raymond Street, Indianapolis, Indiana)

ARCADIS has prepared this document on behalf of GM in response to the email from Greg Waltz with the Indiana Department of Environmental Management (IDEM) dated July 30, 2008, regarding the report for the May 2008 ground water monitoring event at GM Closed Hazardous Waste Surface Impoundment located in Indianapolis, Indiana, USEPA ID: INR000021436. Mr. Waltz asked the following question regarding Table 3 of the report:

> What source was used for the chi-squared value at the 95 percentile? EPA's Statistical Analysis of Ground Water Monitoring Data at RCRA Facilities, dated April 1989, has the chi-squared 95 percentile value for 15 degrees of freedom as 25.00. This would make chi-squared at 95% (Tn + 2) = 9,600, which is greater than 430.692 value given for the arsenic column.

This response explains how the upper tolerance limit (UTL) of a Poisson distribution is calculated, and how the chi-squared distribution is used in this calculation. References are provided to support the approach that was used.

USEPA's Interim Final guidance for statistical analysis of groundwater data (USEPA, 1989, Section 5.3) originally presented methods for calculating the more common normal and lognormal UTLs. In its 1992 addendum, USEPA introduced an approach for calculating a Poisson UTL (USEPA, 1992; Section 2.2.5), based on a method originally described by Gibbons (1987; 1994, pp. 38-40). It is suggested that the Poisson UTL may be more reliable for data sets with many nondetects.

In order to calculate the Poisson distribution, it is important to recognize how the chi-squared distribution is utilized. Evans, Hastings, and Peacock (1993; p. 127, footnote 4) provide a concise description as follows:

> The probability that the Poisson variate P: λ is less than or equal x is equal to the probability that the Chi-squared variate with 2(1+x) degrees of freedom, denoted χ^2: 2(1+x), is greater than 2λ:

$$Pr[(P: \lambda) \leq x] = Pr[(\chi^2: 2(1+x)) > 2\lambda]$$

The degrees of freedom (*df* or *v*) is the parameter that defines the chi-square distribution. In this approach, *df* is given by the quantity 2(1+x), or equivalently 2x + 2. USEPA (1992, p. 40) describes the same concept, using the quantity $[2T_n + 2]$ to represent *df*, where T_n is the sum of the values in the data set. Note that this differs from the more standard representation of *df* based on sample size minus one (*df* = n-1). This difference explains why the 95th percentile calculated by IDEM for arsenic differs from the value presented in the report. It is correct that the sample size is n=16, and that the 95th percentile of chi-square with *df*=15 is equal to 25. However, for this application, the *df* is not based on sample size, but instead on the quantity $[2T_n + 2]$. To facilitate the calculation of T_n, all values are first converted to units of µg/L by multiplying by 1000 (subsequently, the final UTL is obtained by dividing by

1000). For arsenic, T_n = 191, and $2T_n+2 = 382 + 2 = 384$. So we want to solve for percentiles of the chi-squared distribution with *df* = 384. For the Poisson UTL, we need to solve for both the 95th percentile and 5th percentile of a chi-squared distribution, as explained below.

Different approximations are available to solve for percentiles of a chi-squared distribution. In MS Excel, a formula referred to as the inverse of the one-tailed probability of the chi-squared distribution may be used: chiinv(probability, *df*). In this context, probability refers to the probability of exceedance (area in the upper tail). To obtain the 95th percentile, probability = 1.0 – 0.95 = 0.05. Similarly, to obtain the 5th percentile, probability = 1.0 – 0.05 = 0.95. The formula needed to obtain the 95th percentile of the chi-squared distribution with *df*=384 is chiinv(0.05, 384) and the solution is 430.69. Because the function in Excel is not defined for certain *df* values, an alternate approach was used for calculations in Table 3. Abramowitz and Stegun's Handbook of Mathematical Functions with Formulas, Graphs, and Mathematical Tables (Zelen and Severo, 1964) is an excellent source for numerical approximations regarding many different probability distributions. It is available free online at http://www.math.sfu.ca/~cbm/aands/. The numerical approximation for the percentile of a chi-squared distribution used in Table 3 is based on Equation 26.4.17 (p. 941), which is accurate for *df* > 30:

$$\chi_p^2 = v\left[1 - \frac{2}{9v} + x_p\sqrt{\frac{2}{9v}}\right]^3$$

where,

v = degrees of freedom

x_p = value of standard normal distribution that corresponds to the p^{th} percentile value

Substituting v = 384 and x_p = 1.645 into the approximation yields:

$$\chi_p^2 = 384\left[1 - \frac{2}{9 \times 384} + 1.645\sqrt{\frac{2}{9 \times 384}}\right]^3$$

$$\chi_p^2 = 384\,[1 - 0.0005787 + 0.03957]^3 = 384 \times 1.216 = 430.69$$

The 95th percentile of the chi-squared distribution is used in Step 2 of USEPA's approach (USEPA, 1992; p.41) to calculate λ_{Tn}:

$$\lambda_{T_n} = \frac{1}{2n}\chi^2_{0.95}\,[2T_n + 2]$$

Substituting n = 16 and T_n = 191 for arsenic, the degrees of freedom for the chi-squared distribution is $[2T_n+2]$ = 384, so $\chi^2_{0.95}$ with this *df* is 430.69:

$$\lambda_{T_n} = \frac{1}{2 \times 16}(430.69) = 13.46$$

Next, USEPA (p. 41, Step 3) indicates: "... using a chi-square table, find the smallest *df*, k, such that

$$\chi^2_{0.05}[2k+2] \geq 2\lambda$$

In other words, given that we know (can calculate) 2λ, solve for the degrees of freedom of the chi-squared distribution (2k+2). Either the approximation equation above or the Excel function chiinv(probability, *df*) can again be used in an iterative fashion to solve for the *df* needed such that the 5th percentile of the chi-squared distribution is greater than or equal to 2λ. For arsenic, the quantity 2λ is equal to **26.9**. This value is bounded by the 5th percentile of the chi-square distribution with the *df* = 40 (which yields **26.5**) *df* = 41 (which yields **27.3**). Therefore, the smallest *df* that satisfies the constraint is *df* = 41. So [2k+2] = 41, and k = 19.5, and the Poisson UTL is 19.5 µg/L or 0.0195 mg/L.

References

Evans, M., N. Hastings, and B. Peacock. 1993. Statistical Distributions. Second Edition. John Wiley & Sons, Inc., 170 pp.

Gibbons, R.D. 1987. Statistical Models for the Analysis of Volatile Organic Compounds in Waste Disposal Sites. *Ground Water*, 25: 572-580.

Gibbons, R.D. 1994. Statistical Methods for Groundwater Monitoring. John Wiley & Sons, New York, 286 pp.

USEPA, 1989. *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Interim Final Guidance.* Office of Solid Waste, Waste Management Division. EPA/530-SW-89.026. April.

USEPA, 1992. *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Addendum to Interim Final Guidance.* Office of Solid Waste, Permits and State Programs Division. July. http://www.epa.gov/swertio1/chartext_edu.htm#stats.

Zelen, M. and N.C. Severo. 1964. Probability Functions. In: *Handbook of Mathematical Functions with Formulas, Graphs, and Mathematical Tables.* M. Abramowitz and I.A. Stegun, Eds. National Bureau of Standards Applied Mathematics Series 55. Tenth Printing with corrections issued 1972, US Government Printing Office, Washington DC, p.1046. Available online: http://www.math.sfu.ca/~cbm/aands/