Since 1957

2650 Queensview Drive
Suite 100
Ottawa, ON
K2B 8H6

Tel: (613) 688-1899
Fax: (613) 225-7337

August 27, 2010 Ref: OTT-00019055-A0

Mr. Richard Carbonnier
Department of Community Government Services
Baffin Region, Government of Nunavut
P.O. Box 379
Pond Inlet, NU X0A 0S0

Via Facsimile:
867-899-7328

Clyde River Sewage Sludge Assessment
Hamlet of Clyde River, Nunavut

Dear Mr. Carbonnier:

Introduction

Trow Associates Inc. (Trow) was retained by the Department of Government and Community Services (CGS), Government of Nunavut (GN) to conduct an assessment of the sewage sludge from the Hamlet of Clyde River (Hamlet). Removal of sludge from the sewage lagoons is planned and prior to disposal, the sludge must be tested to ensure the disposal method chosen is safe and environmentally responsible.

Background

Clyde River is a community located on Patricia Bay on the east coast of Baffin Region of Nunavut. Its geographical coordinates are 70º27'N latitude and 68º33'W longitude. Its current population is about 908.

The Clyde River sewage lagoon is located approximately 1 km west of the community. The bulky metals dump bounds the existing lagoon on the north side. The community landfill, part of which is occupied by a soil remediation site, is located on the east side of the lagoon. Undeveloped tundra lies to the south and to the west of the existing lagoon. Effluent from the lagoon drains overland an approximate distance of 800 m to Patricia Bay.

Purpose

The purpose of this letter report is to summarize the chemical analyses of the sewage sludge sample, based on its chemical makeup, to make recommendations as to appropriate disposal methodology.

Results

A sewage lagoon sludge sample was collected by Hamlet municipal staff and sent directly to Caduceon Environmental Laboratories (Caduceon) in Ottawa for laboratory analyses of metals, volatile organic compounds (VOCs) and petroleum hydrocarbons (PHCs). Caduceon is a certified laboratory under the Canadian Association for Laboratory Accreditation Inc. (CALA).

Assessment Criteria

In terms of evaluating the analytical results obtained, the Government of Nunavut defaults to criteria established by the Canadian Council of Ministers of the Environment (CCME). For soil the CCME *Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health (updated September 2007)* was used to compare the metals and VOC analytical results. The CCME has also established the *Canada-Wide Standards (CWS) for Petroleum Hydrocarbons (PHC) in Soil (April 2001)*, which is the federal remedial standard for petroleum impacted soils. The CCME and CWS criteria are based on four land use categories: i) agricultural; ii) residential/parkland; iii) commercial; and iv) industrial. As the sludge is to be disposed of at the landfill site, the industrial land use category was utilized for the comparison.

Sewage Sludge Analytical Results

The analytical results are summarized in Tables 1-3 along with the applicable assessment criteria (Appendix A). Laboratory Certificates of Analysis are presented in Appendix B.

Based on the laboratory analytical results, an exceedence of toluene was observed. It should be noted that, in addition to the toluene exceedences, the method detection limits for benzene, ethylbenzene, and trichloroethylene were above the CCME criteria due to complex matrix of the sewage sludge sample.

Exceedences of the CWS criteria were also measured for PHC Fractions 2 to 4. Upon receipt of the analytical results, Trow contacted Caduceon to discuss the PHC exceedences. The Laboratory Manager at Caduceon explained that the there was a wide peak in the chromatogram where the PHC peaks are normally found. He explained that the PHC peaks associated with Fractions 1 to 4 are distinct and normally easily identifiable and the peak observed in the sewage sludge showed no distinct pattern. The Laboratory Manager could not say with absolute uncertainty that the sewage sludge sample contained PHCs. As such, Trow picked up the remainder of the sewage sludge sample and submitted it to Paracel Laboratories (Paracel) in Ottawa for re-analysis of PHCs. Paracel is also a certified laboratory under CALA.

Before analyzing the sample, Paracel noted that the holding time had been exceeded for the measurement of PHCs, but Trow requested that they proceed with the analysis. Paracel noted that the sample had a high non-mineral organic component and as such performed additional silica gel clean-up on the sample. The sample was also air dried prior to extraction. The analytical results from the re-analysis conducted by Paracel have been included in Table 3 (Appendix A). As indicated in Table 3, no exceedences of the CWS criteria were observed. However, Trow discussed the results with the Laboratory Manager at Paracel and was informed that the chromatogram for the sample lacked the distinct peaks typical of PHC contamination, but even after repeated attempts to clean up the sample with silica gel (a process that eliminates animal and vegetable fats), a significant, but broad peak in the chromatogram in the normal range for PHCs remained. As such, the Laboratory Manager could not say with absolute uncertainty that the sewage sludge sample did not contain PHCs.

Conclusions

Laboratory analysis of the sewage sludge sample was undertaken initially at Caduceon. The sample exhibited a wide peak in the chromatogram in the area where the distinct petroleum hydrocarbon peaks are normally found. As such, elevated PHC concentrations were reported. Trow then submitted the remainder of the sample to Paracel for reanalysis. Paracel also reported that the chromatogram for the sample lacked the distinct peaks typical of PHC contamination, but contained a broad peak in the area. Both laboratories were unable to confirm the presence or absence of petroleum hydrocarbons in the sewage sludge sample.

Recommendations

Based on the inconclusive PHC results from the sewage sludge sample submitted to two analytical laboratories, Trow recommends that the sewage sludge removed from the lagoon be disposed of in a separate cell constructed at the landfill site. The bottom of the cell should be lined with an impermeable layer (either clay or an appropriate geotextile) to prevent potential PHC leachate generation. The sludge should be covered with granular material and allowed to freeze.

Limitations

The information presented in this letter report is based in part on information provided by others. Sampling and analysis of the sewage sludge sample was carried out by others. The findings may not be representative of all portions of the site.

Trow has attempted to provide professional services consistent with sound engineering practices and incorporates our knowledge of those publicly announced federal, territorial and local laws, regulations, codes and standards that are applicable at the time Trow renders his services. While in the employ of Government of Nunavut, in the event of change in a law, regulation, etc., Trow will assess its impact.

This report was prepared by Trow for the exclusive use of the Government of Nunavut and may not be reproduced in whole or in part, without the prior written consent of Trow, or used or relied upon in whole or in part by a party other than of the Government of Nunavut and the Hamlet of Clyde River. Any use which a third party makes of this report, or any part thereof, or any reliance on or decisions to be made based on it, are the sole responsibility of such third parties. Trow Associates Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

We trust this summary report is satisfactory for your purposes. If you have any questions regarding our submission, please do not hesitate to contact this office.

Yours truly,
Trow Associates Inc.

Robert Renaud, M.Sc., P.Geo (ON)
Hydrogeologist
Earth and Environment

Chris Kimmerly, M.Sc., P.Geo (ON)
Manager, Environmental Services
Earth and Environment

RR/CTK:kmr

Attachments: Appendix A – Tables
Appendix B – Laboratory Certificates of Analysis

Appendix A:
Tables

Table 1 - Sewage Sludge Analytical Results for Metals
Clyde River Sewage Lagoon, Clyde River, Nunavut
(all values in µg/g or parts per million)

Sample ID		**Lagoon**
Sample Date		24-Jun-10
Sample Depth (m)		(bottom/floor)
Parameter	**Federal Guideline[1]**	
Antimony	40	<2
Arsenic	12	<1
Barium	2000	26
Beryllium	8	<0.2
Boron	NV	4.2
Cadmium	22	<0.5
Chromium (total)	87	69
Chromium (VI)	1.4	<0.5
Cobalt	300	2
Copper	91	91
Lead	600	6
Mercury	50	0.486
Molybdenum	40	1
Nickel	50	35
Selenium	2.9	<2
Silver	40	1.1
Thallium	1	<0.4
Vanadium	130	13
Zinc	360	130

Notes:
1) CCME *Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health*. Sept. 2007
- industrial land use, coarse grained soil

Shaded values exceed Federal Criteria

NV - no value

Table 2 - Sewage Sludge Analytical Results for Volatile Organic Compounds Clyde River Sewage Lagoon, Clyde River, Nunavut

(all values in µg/g or parts per million)

Sample ID		**Lagoon**
Sample Date		24-Jun-10
Sample Depth (m)		(bottom/floor)
Parameter	**Federal Guideline[1]**	
Benzene	0.03	<0.2
Bromodichloromethane	NV	<0.2
Bromoform	NV	<0.2
Bromomethane	NV	<0.2
Carbon Tetrachloride	50	<0.2
Chloroform	50	<0.2
Dibromochloromethane	NV	<0.2
1,2-Dibromoethane	NV	<0.2
1,2-Dichlorobenzene	10	<0.2
1,3-Dichlorobenzene	10	<0.2
1,4-Dichlorobenzene	10	<0.2
1,1-Dichloroethane	50	<0.2
1,2-Dichloroethane	50	<0.2
1,1-Dichloroethylene	NV	<0.2
cis-1,2-Dichloroethylene	NV	<0.2
trans-1,2-Dichloroethylene	NV	<0.2
1,2-Dichloropropane	50	<0.2
cis-1,3-Dichloropropylene	NV	<0.2
trans-1,3-Dichloropropylene	NV	<0.2
Ethylbenzene	0.082	<0.2
Chlorobenzene	10	<0.2
Napthalene	22	<0.2
Styrene	50	<0.2
1,1,1,2-Tetrachloroethane	50	<0.2
1,1,2,2-Tetrachloroethane	50	<0.2
Tetrachloroethylene	0.6	<0.2
Toluene	0.37	9.6
1,2,4-Trichlorobenzene	10	<0.2
1,1,1-Trichloroethane	50	<0.2
1,1,2-Trichloroethane	50	<0.2
Trichloroethylene	0.01	<0.2
Vinyl chloride	NV	<0.2
o-Xylene	11	<0.2
m,p-Xylenes		<0.4

Notes:

1) CCME *Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health*. Sept. 2007 - industrial land use, coarse grained soil

Shaded values exceed Federal Criteria

NV - no value

Table 3 - Sewage Sludge Analytical Results for Petroleum Hydrocarbons
Clyde River Sewage Lagoon, Clyde River, Nunavut

(all values in µg/g or parts per million)

Sample ID		**Lagoon**	**Lagoon - Retest**
Sample Date		24-Jun-10	24-Jun-10
Sample Depth (m)		(bottom/floor)	(bottom/floor)
Parameter	**Federal Guideline[1]**		
Benzene	0.03	<0.2	n/a
Ethylbenzene	0.082	<0.2	n/a
Toluene	0.37	9.6	n/a
Xylenes	11	<0.6	n/a
F_1 (C_6-C_{10})	320 [2]	20	<10
F_2 (C_{10}-C_{16})	260 [2]	599	13
F_3 (C_{16}-C_{34})	1700 [2]	**12200**	856
F_4 (C_{34}-C_{50})	3300 [2]	7540	299

Notes:

1) CCME *Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health*. Sept 2007
- industrial land use, coarse grained soil

2) CCME *Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil*, 2008
- industrial land use, coarse grained soil

Shaded values exceed Federal Criteria

Appendix B: Laboratory Certificates of Analysis

CADUCEON™ ENVIRONMENTAL LABORATORIES
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CERTIFICATE OF ANALYSIS

Final Report

C.O.C.: G 04596 **REPORT No. B10-18666**

Report To:

Hamlet of Clyde River
Box 89
Clyde River, Nunavut, X0A 0E0
Attention: Steven Aipeelee

Caduceon Environmental Laboratories
2378 Holly Lane
Ottawa, Ontario, K1V 7P1
Tel: 613-526-0123
Fax: 613-526-1244

DATE RECEIVED: 30-Jun-10
DATE REPORTED: 09-Jul-10
SAMPLE MATRIX: Solid Sludge

JOB/PROJECT NO.:
P.O. NUMBER:
WATERWORKS NO.

			Client I.D.:		Lagoon (Bottom / Floor)			
			Sample I.D.:		B10-18666-1			
			Date Collected:		24-Jun-10			
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Antimony	µg/g	0.5	EPA 6020	05-Jul-10/O	< 2			
Arsenic	µg/g	0.5	EPA 6020	05-Jul-10/O	< 2			
Barium	µg/g	1	EPA 6010	02-Jul-10/O	26			
Beryllium	µg/g	0.2	EPA 6010	02-Jul-10/O	< 0.2			
Boron (Hot Water Ext.)	µg/g	0.1	EPA 200.7	05-Jul-10/O	4.2			
Cadmium	µg/g	0.5	EPA 6010	02-Jul-10/O	< 0.5			
Chromium	µg/g	1	EPA 6010	02-Jul-10/O	69			
Chromium (VI)	µg/g	0.5	EPA7196	05-Jul-10/O	< 0.5			
Cobalt	µg/g	1	EPA 6010	02-Jul-10/O	2			
Copper	µg/g	1	EPA 6010	02-Jul-10/O	91			
Lead	µg/g	5	EPA 6010	02-Jul-10/O	6			
Mercury	µg/g	0.005	EPA 7471A	06-Jul-10/O	0.486			
Molybdenum	µg/g	1	EPA 6010	02-Jul-10/O	1			
Nickel	µg/g	1	EPA 6010	02-Jul-10/O	35			
Selenium	µg/g	0.5	EPA 6020	05-Jul-10/O	< 2			

Note: NDP = No Distinct Pattern, FO = Fuel Oil #2 Range Organics, HO = Heavy Oil like Pattern.

Gord Murphy
Lab Supervisor

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston W-Windsor O-Ottawa P-Peterborough M-Moncton

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			Client I.D.:		Lagoon (Bottom / Floor)			
			Sample I.D.:		B10-18666-1			
			Date Collected:		24-Jun-10			
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Silver	µg/g	0.2	EPA 6010	02-Jul-10/O	1.1			
Thallium	µg/g	0.1	EPA 6020	05-Jul-10/O	< 0.4			
Vanadium	µg/g	1	EPA 6010	02-Jul-10/O	13			
Zinc	µg/g	1	EPA 6010	02-Jul-10/O	130			
Benzene	µg/g	0.001	EPA 8260	05-Jul-10/O	< 0.2 [1]			
Bromodichloromethane	µg/g	0.001	EPA 8260	05-Jul-10/O	< 0.2			
Bromoform	µg/g	0.001	EPA 8260	05-Jul-10/O	< 0.2			
Bromomethane	µg/g	0.001	EPA 8260	05-Jul-10/O	< 0.2			
Carbon Tetrachloride	µg/g	0.001	EPA 8260	05-Jul-10/O	< 0.2			
Chloroform	µg/g	0.001	EPA 8260	05-Jul-10/O	< 0.2			
Dibromochloromethane	µg/g	0.001	EPA 8260	05-Jul-10/O	< 0.2			
Dibromoethane,1,2- (Ethylene Dibromide)	µg/g	0.001	EPA 8260	05-Jul-10/O	< 0.2			
Dichlorobenzene,1,2-	µg/g	0.001	EPA 8260	05-Jul-10/O	< 0.2			
Dichlorobenzene,1,3-	µg/g	0.001	EPA 8260	05-Jul-10/O	< 0.2			

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			Sample I.D.:		B10-18666-1			
			Date Collected:		24-Jun-10			
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Dichlorobenzene,1,4-	µg/g	0.001	EPA 8260	05-Jul-10/O	< 0.2			
Dichloroethane,1,1-	µg/g	0.001	EPA 8260	05-Jul-10/O	< 0.2			
Dichloroethane,1,2-	µg/g	0.001	EPA 8260	05-Jul-10/O	< 0.2			
Dichloroethene, 1,1-	µg/g	0.001	EPA 8260	05-Jul-10/O	< 0.2			
Dichloroethene, cis-1,2-	µg/g	0.001	EPA 8260	05-Jul-10/O	< 0.2			
Dichloroethene, trans-1,2-	µg/g	0.001	EPA 8260	05-Jul-10/O	< 0.2			
Dichloromethane (Methylene Chloride)	µg/g	0.001	EPA 8260	05-Jul-10/O	< 0.2			
Dichloropropane,1,2-	µg/g	0.001	EPA 8260	05-Jul-10/O	< 0.2			
Dichloropropene, cis-1,3-	µg/g	0.001	EPA 8260	05-Jul-10/O	< 0.2			
Dichloropropene, trans-1,3-	µg/g	0.001	EPA 8260	05-Jul-10/O	< 0.2			
Ethylbenzene	µg/g	0.001	EPA 8260	05-Jul-10/O	< 0.2			
Monochlorobenzene (Chlorobenzene)	µg/g	0.001	EPA 8260	05-Jul-10/O	< 0.2			
Naphthalene	µg/g	0.001	EPA 8260	05-Jul-10/O	< 0.2			

Note: NDP = No Distinct Pattern, FO = Fuel Oil #2 Range Organics, HO = Heavy Oil like Pattern.

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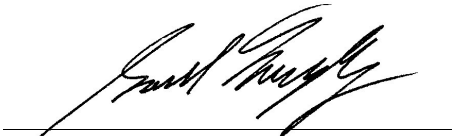
			Client I.D.:		Lagoon (Bottom / Floor)			
			Sample I.D.:		B10-18666-1			
			Date Collected:		24-Jun-10			
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
Styrene	µg/g	0.001	EPA 8260	05-Jul-10/O	< 0.2			
Tetrachloroethane,1,1,1,2-	µg/g	0.001	EPA 8260	05-Jul-10/O	< 0.2			
Tetrachloroethane,1,1,2,2-	µg/g	0.001	EPA 8260	05-Jul-10/O	< 0.2			
Tetrachloroethylene	µg/g	0.001	EPA 8260	05-Jul-10/O	< 0.2			
Toluene	µg/g	0.001	EPA 8260	05-Jul-10/O	9.6			
Trichlorobenzene,1,2,4-	µg/g	0.001	EPA 8260	05-Jul-10/O	< 0.2			
Trichloroethane,1,1,1-	µg/g	0.001	EPA 8260	05-Jul-10/O	< 0.2			
Trichloroethane,1,1,2-	µg/g	0.001	EPA 8260	05-Jul-10/O	< 0.2			
Trichloroethylene	µg/g	0.001	EPA 8260	05-Jul-10/O	< 0.2			
Vinyl Chloride	µg/g	0.001	EPA 8260	05-Jul-10/O	< 0.2			
Xylene, m,p-	µg/g	0.002	EPA 8260	05-Jul-10/O	< 0.4			
Xylene, o-	µg/g	0.001	EPA 8260	05-Jul-10/O	< 0.2			
PHC F1 (C6-C10)	µg/g	10	CWS Tier 1	06-Jul-10/O	20			
PHC F2 (>C10-C16)	µg/g	3	CWS Tier 1	06-Jul-10/O	599			
PHC F3 (>C16-C34)	µg/g	9	CWS Tier 1	06-Jul-10/O	12200			

Note: NDP = No Distinct Pattern, FO = Fuel Oil #2 Range Organics, HO = Heavy Oil like Pattern.



Gord Murphy
Lab Supervisor

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Site Analyzed: K-Kingston W-Windsor O-Ottawa P-Peterborough M-Moncton

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CERTIFICATE OF ANALYSIS

Final Report

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WATERWORKS NO.

			Client I.D.:		Lagoon (Bottom / Floor)			
			Sample I.D.:		B10-18666-1			
			Date Collected:		24-Jun-10			
Parameter	**Units**	**M.D.L.**	**Reference Method**	**Date/Site Analyzed**				
PHC F4 (>C34-C50)	µg/g	8	CWS Tier 1	06-Jul-10/O	7540			
Comment-extractable	-		-	06-Jul-10	FO/HO			
Comment-purgeable	-		-	06-Jul-10/O	NDP			

1 . Diluted due to sample matrix

Note: NDP = No Distinct Pattern, FO = Fuel Oil #2 Range Organics, HO = Heavy Oil like Pattern.

µg/g = micrograms per gram (parts per million)
F1 C6-C10 hydrocarbons in µg/g, (F1-btex if requested)
F2 C10-C16 hydrocarbons in µg/g, (F2-napth if requested)
F3 C16-C34 hydrocarbons in µg/g, (F3-pah if requested)
F4 C34-C50 hydrocarbons in µg/g
This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.
Any deviations from the method are noted and reported for any particular sample.
nC6 and nC10 response factor is within 30% of response factor for toluene:
nC10,nC16 and nC34 response factors within 10% of each other:
C50 response factors within 70% of nC10+nC16+nC34 average:
Linearity is within 15%:
All results expressed on a dry weight basis.
Unless otherwise noted all chromatograms returned to baseline by the retention time of nC50.
Unless otherwise noted all extraction and analysis limits for holding time were met.
QC will be made available upon request.

M.D.L. = Method Detection Limit
Site Analyzed: K-Kingston W-Windsor O-Ottawa P-Peterborough M-Moncton

Gord Murphy
Lab Supervisor

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OTTAWA ◉ NIAGARA FALLS ◉ MISSISSAUGA ◉ SARNIA

Certificate of Analysis

Trow Associates Inc. (Ottawa)
100-2650 Queensview Dr.
Ottawa, ON K2B 8K2
Attn: Chris Kimmerly

Phone: (613) 225-9940
Fax: (613) 225-7337

Client PO:
Project: OTT-00019055-A0
Custody: 76455

Report Date: 27-Jul-2010
Order Date: 20-Jul-2010
Order #: 1030088

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
1030088-01	Clyde River - Lagoon

Approved By: Mark Foto

Mark Foto, M.Sc. For Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 27-Jul-2010
Order Date:20-Jul-2010

Client: **Trow Associates Inc. (Ottawa)**
Client PO: Project Description: OTT-00019055-A0

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
CCME PHC F1	CWS Tier 1 - P&T GC-FID	21-Jul-10	23-Jul-10
CCME PHC F2 - F4	CWS Tier 1 - GC-FID, extraction	21-Jul-10	27-Jul-10
Solids, %	Gravimetric, calculation	21-Jul-10	21-Jul-10

Certificate of Analysis

Report Date: 27-Jul-2010
Order Date:20-Jul-2010

Client: **Trow Associates Inc. (Ottawa)**
Client PO: Project Description: OTT-00019055-A0

Client ID:		Clyde River - Lagoon	-	-	-
Sample Date:		24-Jun-10	-	-	-
Sample ID:		1030088-01	-	-	-
	MDL/Units	Soil	-	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	22.1	-	-	-
Hydrocarbons					
F1 PHCs (C6-C10)	10 ug/g dry	<10 [1]	-	-	-
F2 PHCs (C10-C16)	10 ug/g dry	13 [2] [3]	-	-	-
F3 PHCs (C16-C34)	10 ug/g dry	856 [2] [3]	-	-	-
F4 PHCs (C34-C50)	10 ug/g dry	299 [2] [3]	-	-	-

Certificate of Analysis

Report Date: 27-Jul-2010
Order Date:20-Jul-2010

Client: **Trow Associates Inc. (Ottawa)**
Client PO: Project Description: OTT-00019055-A0

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	10	ug/g						
F2 PHCs (C10-C16)	ND	10	ug/g						
F3 PHCs (C16-C34)	ND	10	ug/g						
F4 PHCs (C34-C50)	ND	10	ug/g						

Certificate of Analysis

Report Date: 27-Jul-2010
Order Date:20-Jul-2010

Client: **Trow Associates Inc. (Ottawa)**
Client PO: Project Description: OTT-00019055-A0

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	29	10	ug/g dry	ND				32	QR-01
F2 PHCs (C10-C16)	104	10	ug/g dry	192			59.1	50	QR-01
F3 PHCs (C16-C34)	267	10	ug/g dry	287			7.4	50	
F4 PHCs (C34-C50)	31	10	ug/g dry	14			73.7	50	QR-01
Physical Characteristics									
% Solids	85.1	0.1	% by Wt.	85.7			0.6	25	

Certificate of Analysis

Report Date: 27-Jul-2010
Order Date:20-Jul-2010

Client: **Trow Associates Inc. (Ottawa)**
Client PO: Project Description: OTT-00019055-A0

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	104	10	ug/g	ND	104	80-120			
F2 PHCs (C10-C16)	61	10	ug/g	ND	76.0	61-129			
F3 PHCs (C16-C34)	176	10	ug/g	ND	88.0	61-129			
F4 PHCs (C34-C50)	96	10	ug/g	ND	80.0	61-129			

Certificate of Analysis

Report Date: 27-Jul-2010
Order Date:20-Jul-2010

Client: **Trow Associates Inc. (Ottawa)**
Client PO: Project Description: OTT-00019055-A0

Sample and QC Qualifiers Notes

1- H-01 : Holding time had been exceeded upon sample receipt.

2- ORG11 : High non-mineral organic content in sample. Additional silica gel cleanup performed, however, results may be biased high.

3- PHC01 : Moisture content >50%, sample air dried prior to extraction.

4- QR-01 : Duplicate RPD is high, however, the sample result is less than 10x the MDL.

Sample Data Revisions

None

Work Order Revisions/Comments:

None

Other Report Notes:

n/a: not applicable
MDL: Method Detection Limit
Source Result: Data used as source for matrix and duplicate samples
%REC: Percent recovery.
RPD: Relative percent difference.
Soil results are reported on a dry weight basis when the units are denoted with 'dry'.
Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.

CCME PHC additional information:

- The method for the analysis of PHCs complies with the Reference Method for the CWS PHC and is validated for use in the laboratory. All prescribed quality criteria identified in the method has been met.
- F1 range corrected for BTEX.
- F2 to F3 ranges corrected for appropriate PAHs where available.
- The gravimetric heavy hydrocarbons (F4G) are not to be added to C6 to C50 hydrocarbons.
- In the case where F4 and F4G are both reported, the greater of the two results is to be used for comparison to CWS PHC criteria.

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800-749-1947
f: 613-731-9064
e: paracel@paracellabs.com

Chain of Custody

(lab use only)

Nº 76455

Reg. Drinking Water

Client Name: Trow Associates Inc.	Project Ref: OTT-00019055-A0	Waterworks Name:	Page 1 of 1
Contact Name: Mark Devlin / Chris Kimmerly	Quote #	Waterworks Number:	Sample Taken by:
Address:	PO #	Address:	Print Name:
	E-mail Address:	After hours Contact:	Signature:
Telephone:	Fax:	Public Health Unit:	TAT: [ ] 1-day [ ] 2-day [✓] Reg.

Matrix Types: **S**–Soil/Sed. **GW**–Ground Water **SW**–Surface Water **SS**–Storm/Sanitary Sewer **DW**–Drinking Water **RDW**–Regulated Drinking Water **P**- Paint **A**-Air **O**-Other

Samples submitted under: (Indicate **ONLY** one)
☐ O. Reg 153 (511) Table ___ ☐ O. Reg 170/03 ☐ O. Reg 318/08 ☐ Private well
☑ CCME ____ ☐ O. Reg 243/07 ☐ O. Reg 319/08 ☐ Other: ____

Type of **DW** Sample: **R** = Raw; **T** = Treated; **D** = Distribution
Location Types: **S** = Surface Water; **G** = Ground Water

Paracel Order Number: 1030088

	Sample ID / Location Name	Matrix	Air Volume	Type of Sample	# of Containers	Sample Taken: Date	Sample Taken: Time	Free / Combined Chlorine Residual mg/L	Required Analyses: PHC(F1-F4)								
1	Clyde River - Lagoon	SED		R	1	June 24/10			X								
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Comments: Analysis dispite holding time & container. Not labelled coll Clyde River - Lagoon

Preservation Verification: pH _____ Temperature ____
Verified by: _____

Relinquished By (Print & Sign):	Lab Use Only:		
Mark Devlin / Mark Devlin	Received By Driver/Depot:	Received at Lab: DR	Verified By: WP
Date/Time: July 20, 2010 / 5:31pm	Date/Time:	Date/Time: 20-July-10 5:30PM	Date/Time: July 20/10 18:21