

April 12, 2018

Public Services and Procurement Canada

Michael Lyzaniwski
Project Manager, Southern Alberta
Public Services and Procurement Canada
Harry Hays Buidling
759 – 220 4 Avenue SE
Calgary, AB T2G 4X3

Dear Mr. Lyzaniwski:

Project No: 60539384 (512)

**Regarding: Norman Wells Wharf Repair, Norman Wells, Northwest Territories
Spring 2018 Environmental Sampling Results**

AECOM Canada Ltd. (AECOM) is pleased to provide Public Services and Procurement Canada (PSPC) this report summarizing the results of environmental soil sampling conducted from March 24 to 26, 2018 at the Canadian Coast Guard (CCG) Wharf in Norman Wells, Northwest Territories.

Background

The CCG Wharf, Norman Wells, Northwest Territories is located on the northern shore of the Mackenzie River, south of the intersection of Mackenzie Drive and Quarry Road.

The CCG Wharf, originally constructed in the early 1980s, consists of an earthfill contained within sheet piles driven into the riverbed. Over the years, the tops of the sheet piles have suffered substantial ice damage during spring break-up. Some maintenance was carried out to repair ice damage during the first decade. During the past two decades annual maintenance has consisted of clearing the ice off the wharf after break-up and replacing gravel that had washed off the surface. Maintenance dredging has also occurred every few to several years to remove sediments deposited in front of the wharf. The last dredging program was completed in 2015.

The CCG Wharf in Norman Wells is currently owned by the Department of Fisheries and Oceans (DFO). In 2017, DFO initiated a project to rehabilitate the sheet pile walls and complete maintenance dredging in front of the wharf to improve vessel access at low water.

AECOM was retained by PSPC to complete the dredging and wharf rehabilitation work at the CCG Wharf in Norman Wells, Northwest Territories.

Part D of the water license for the project (SLWB 2018) requires verification that the dredged material from the CCG wharf complies with the requirements of the Town of Norman Wells water license, before being deposited at the Norman Wells Municipal Landfill.

To meet this requirement, AECOM completed a Limited Phase I Environmental Site Assessment (ESA) to determine the potential for environmental concerns to exist at the site (AECOM 2018). During the assessment the potential for hydrocarbon contamination to exist at the site was identified. After discussion with the Town of Norman Wells Public Works Foreman and the Sahtu Regional Water Resource Officer, AECOM recommended that samples be submitted for laboratory analysis of Total Petroleum Hydrocarbons (TPH); benzene, toluene, ethylbenzene, and xylenes (BTEX); and Petroleum Hydrocarbon (PHC) Fractions 1 to 4 (F1-F4).

Investigation Methodology

Nine sample locations were selected from the approximately 1000 cubic metres (m³) of dredged material stockpiled at the site from March 24 to 26, 2018. Samples were collected from a depth of approximately 0.3 metres (m) into the stockpile using a spade. The equipment was cleaned between sample locations by brushing off excess soil.

One sample was collected from each sample location and submitted for laboratory analysis of TPH, BTEX, and PHC F1-F4. Each sample consisted of two soil jars.

The samples were analyzed by Maxxam Analytics (Maxxam) in Edmonton, Alberta. Maxxam is accredited by the Standards Council of Canada in accordance with the recognized International Standard ISO/IEC 17025:2005 demonstrating technical competence for a defined scope and the operation of a laboratory quality management system.

Investigation Results

Field Observations

The stockpiled dredged material consisted of a mixture of sand, gravel, and large cobbles. Each of the nine soil samples collected was analyzed for petroleum hydrocarbon content as described in the Investigation Methodology Section of this report.

Assessment Soil Quality Criteria

The laboratory analytical results for this assessment were compared to the Canadian Council of Ministers of the Environment (CCME) Canadian Environmental Quality Guidelines (CEQG 2004) and the CCME Canada-Wide Standards for Petroleum Hydrocarbons in Soil (CWS 2008), referencing industrial land use and coarse-grained soil.

Laboratory Analytical Results

Table 1: Summary of Analytical Data and the **Maxxam Analytical Report** for the soil samples are attached.

All of the results from the samples collected met the referenced guidelines.

It should be noted that the samples were submitted to the laboratory past the seven day hold time for BTEX and PHC F1 analyses. Additionally, the jars for samples SP-A-03 and SP-B-04 were broken in transit. The quality control issues identified present an increased potential for the lighter petroleum hydrocarbons, BTEX and PHC F1, to have volatilized from the samples that were analyzed. However, since the dredged material that the samples were collected from was stockpiled on the Site until the laboratory analyses were complete, the stockpiled material has had equal or greater potential for volatilization due to aeration. Therefore, the samples analyzed are considered an accurate representation of the dredged material stockpiled on the Site that will be sent for disposal.

Discussion

The stockpiled dredged material meets the specified requirements for disposal at the Norman Wells Municipal Landfill.

Closing

If you have any questions with regards to this report, do not hesitate to contact the undersigned at (780) 930-0040. We thank you again for the opportunity to work with you.

Sincerely,
AECOM Canada Ltd.



Katie Marowitch
Environmental Professional
katie.marowitch@aecom.com



Roland Merkosky, P.Eng.
Senior Project Engineer, Environment
roland.merkosky@aecom.com

KM:cn

Encl.

- Statement of Qualifications and Limitations
- Table 1: Summary of Analytical Data
- Maxxam Analytical Report

References

AECOM Canada Ltd., Edmonton, Alberta (AECOM 2018). Limited Phase I Environmental Site Assessment, Norman Wells Wharf Repair, Norman Wells, NT. Report for Public Services and Procurement Canada. April 2018.

Canadian Council of Ministers of the Environment, Canadian Environmental Quality Guidelines, 2004.

Canadian Council of Ministers of the Environment, Canada-Wide Standards for Petroleum Hydrocarbons (PHC) in Soil, January 2008.

SAHTU Land and Water Board, Fort Good Hope, Northwest Territories (SLWB 2018). Water Licence, S16L8-002 (Administrative Amendment). January 18, 2018.

Statement of Qualifications and Limitations

The attached Report (the "Report") has been prepared by AECOM Canada Ltd. ("AECOM") for the benefit of the Client ("Client") in accordance with the agreement between AECOM and Client, including the scope of work detailed therein (the "Agreement").

The information, data, recommendations and conclusions contained in the Report (collectively, the "Information"):

- is subject to the scope, schedule, and other constraints and limitations in the Agreement and the qualifications contained in the Report (the "Limitations");
- represents AECOM's professional judgement in light of the Limitations and industry standards for the preparation of similar reports;
- may be based on information provided to AECOM which has not been independently verified;
- has not been updated since the date of issuance of the Report and its accuracy is limited to the time period and circumstances in which it was collected, processed, made or issued;
- must be read as a whole and sections thereof should not be read out of such context;
- was prepared for the specific purposes described in the Report and the Agreement; and
- in the case of subsurface, environmental or geotechnical conditions, may be based on limited testing and on the assumption that such conditions are uniform and not variable either geographically or over time.

AECOM shall be entitled to rely upon the accuracy and completeness of information that was provided to it and has no obligation to update such information. AECOM accepts no responsibility for any events or circumstances that may have occurred since the date on which the Report was prepared and, in the case of subsurface, environmental or geotechnical conditions, is not responsible for any variability in such conditions, geographically or over time.

AECOM agrees that the Report represents its professional judgement as described above and that the Information has been prepared for the specific purpose and use described in the Report and the Agreement, but AECOM makes no other representations, or any guarantees or warranties whatsoever, whether express or implied, with respect to the Report, the Information or any part thereof.

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This Statement of Qualifications and Limitations is attached to and forms part of the Report and any use of the Report is subject to the terms hereof.

Table 1
Soil Analytical Results

				Sample Name	SP-A-01	SP-B-01	SP-A-03	SP-A-04	SP-B-03	SP-B-04	SP-A-05	SP-A-06	SP-B-05
				Sample ID	TF4959	TF4960	TF4961	TF4962	TF4963	TF4964	TF4965	TF4966	TF4967
Parameter Name	Unit	Guideline	Detection Limit										
Other Parameters													
Moisture	% by weight	-	-	21	7.0	23	25	25	25	24	21	23	
Petroleum Hydrocarbons													
Benzene	mg/kg	0.030 ¹	0.0050	<0.0050	0.0058	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.014	<0.0050	<0.0050
Toluene	mg/kg	0.37 ¹	0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Ethylbenzene	mg/kg	0.082 ¹	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.019	<0.010	<0.010
Total Xylenes (m,p,o)	mg/kg	11 ¹	0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045
F1 (C6-C10)	mg/kg	320 ²	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
F2 (C10-C16)	mg/kg	260 ²	10	19	<10	13	13	15	<10	<10	15	24	15
F3 (C16-C34)	mg/kg	1700 ²	50	120	57	83	87	110	75	100	130	92	
F4 (C34-C50)	mg/kg	3300 ²	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Total Hydrocarbons (C6-C50)	mg/kg	N/A	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50

Notes:

¹ CCME Canadian Environmental Quality Guidelines 2004, for industrial land use and coarse-grained soil

² CCME Canada-Wide Standards for Petroleum Hydrocarbons in Soil 2008, for industrial land use and coarse-grained soil

Exceeds Applicable Guideline

mBGS = metres below ground surface

mg/kg = milligrams per kilogram

PHC = Petroleum Hydrocarbon

Your Project #: 60539384
 Site Location: CCG Wharf, Norman Wells, NT
 Your C.O.C. #: W5383

Attention: Katie Marowitch

AECOM
 200 - 6807 RAILWAY STREET SE
 CALGARY, AB
 CANADA T2H2V6

Report Date: 2018/04/10
 Report #: R2539160
 Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B825168

Received: 2018/04/04, 11:23

Sample Matrix: Soil
 # Samples Received: 9

Analyses	Quantity	Date		Laboratory Method	Analytical Method
		Extracted	Analyzed		
BTEX/F1 by HS GC/MS/FID (MeOH extract)	9	2018/04/06	2018/04/07	AB SOP-00039	CCME CWS/EPA 8260c m
F1-BTEX	9	N/A	2018/04/09	AB SOP-00039	Auto Calc
CCME Hydrocarbons (F2-F4 in soil) (2)	9	2018/04/06	2018/04/06	AB SOP-00036 / AB SOP-00040	CCME PHC-CWS m
Moisture	9	N/A	2018/04/07	AB SOP-00002	CCME PHC-CWS m
Hydrocarbon by IR (Mineral oil & grease) (1)	9	2018/04/07	2018/04/09	CAL SOP-00096	SM 22 5520 C m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by Maxxam Calgary Environmental

(2) All CCME results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following Alberta Environment's Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil, Validation of Performance-Based Alternative Methods September 2003. Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.

Your Project #: 60539384
Site Location: CCG Wharf, Norman Wells, NT
Your C.O.C. #: W5383

Attention: Katie Marowitch

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CANADA T2H2V6

Report Date: 2018/04/10
Report #: R2539160
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B825168
Received: 2018/04/04, 11:23

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Alaina Hunter, Dip. BioSci, Project Manager, Environmental
Email: AHunter@maxxam.ca
Phone# (780)577-7139

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Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B825168
Report Date: 2018/04/10

AECOM
Client Project #: 60539384
Site Location: CCG Wharf, Norman Wells, NT
Sampler Initials: JB

RESULTS OF CHEMICAL ANALYSES OF SOIL

Maxxam ID		TF4959	TF4959	TF4960	TF4961	TF4962	TF4963	TF4964		
Sampling Date		2018/03/24 14:30	2018/03/24 14:30	2018/03/24 17:00	2018/03/25 11:30	2018/03/25 16:00	2018/03/25 11:35	2018/03/25 16:05		
COC Number		W5383	W5383	W5383	W5383	W5383	W5383	W5383		
	UNITS	SP-A-01	SP-A-01 Lab-Dup	SP-B-01	SP-A-03	SP-A-04	SP-B-03	SP-B-04	RDL	QC Batch

Misc. Organics										
Total Petroleum Hydrocarbon	mg/kg	<50	<50	<50	<50	<50	<50	<50	50	8954006
RDL = Reportable Detection Limit Lab-Dup = Laboratory Initiated Duplicate										

Maxxam ID		TF4965	TF4966	TF4967		
Sampling Date		2018/03/26 09:00	2018/03/26 16:30	2018/03/26 13:20		
COC Number		W5383	W5383	W5383		
	UNITS	SP-A-05	SP-A-06	SP-B-05	RDL	QC Batch
Misc. Organics						
Total Petroleum Hydrocarbon	mg/kg	<50	<50	<50	50	8954006
RDL = Reportable Detection Limit						

Maxxam Job #: B825168
Report Date: 2018/04/10

AECOM
Client Project #: 60539384
Site Location: CCG Wharf, Norman Wells, NT
Sampler Initials: JB

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID			TF4959	TF4960	TF4961	TF4962	TF4963	TF4964		
Sampling Date			2018/03/24 14:30	2018/03/24 17:00	2018/03/25 11:30	2018/03/25 16:00	2018/03/25 11:35	2018/03/25 16:05		
COC Number			W5383	W5383	W5383	W5383	W5383	W5383		
	UNITS	Criteria	SP-A-01	SP-B-01	SP-A-03	SP-A-04	SP-B-03	SP-B-04	RDL	QC Batch
Ext. Pet. Hydrocarbon										
F2 (C10-C16 Hydrocarbons)	mg/kg	150	19	<10	13	13	15	<10	10	8953304
F3 (C16-C34 Hydrocarbons)	mg/kg	300	120	57	83	87	110	75	50	8953304
F4 (C34-C50 Hydrocarbons)	mg/kg	2800	<50	<50	<50	<50	<50	<50	50	8953304
Reached Baseline at C50	mg/kg	-	Yes	Yes	Yes	Yes	Yes	Yes	N/A	8953304
Surrogate Recovery (%)										
O-TERPHENYL (sur.)	%	-	111	100	97	100	103	96	N/A	8953304
No Fill	No Exceedance									
Grey	Exceeds 1 criteria policy/level									
Black	Exceeds both criteria/levels									
RDL = Reportable Detection Limit										
N/A = Not Applicable										

Maxxam ID			TF4965	TF4966	TF4967		
Sampling Date			2018/03/26 09:00	2018/03/26 16:30	2018/03/26 13:20		
COC Number			W5383	W5383	W5383		
	UNITS	Criteria	SP-A-05	SP-A-06	SP-B-05	RDL	QC Batch
Ext. Pet. Hydrocarbon							
F2 (C10-C16 Hydrocarbons)	mg/kg	150	15	24	15	10	8953304
F3 (C16-C34 Hydrocarbons)	mg/kg	300	100	130	92	50	8953304
F4 (C34-C50 Hydrocarbons)	mg/kg	2800	<50	<50	<50	50	8953304
Reached Baseline at C50	mg/kg	-	Yes	Yes	Yes	N/A	8953304
Surrogate Recovery (%)							
O-TERPHENYL (sur.)	%	-	100	96	99	N/A	8953304
No Fill	No Exceedance						
Grey	Exceeds 1 criteria policy/level						
Black	Exceeds both criteria/levels						
RDL = Reportable Detection Limit							
N/A = Not Applicable							

Maxxam Job #: B825168
Report Date: 2018/04/10

AECOM
Client Project #: 60539384
Site Location: CCG Wharf, Norman Wells, NT
Sampler Initials: JB

PHYSICAL TESTING (SOIL)

Maxxam ID		TF4959	TF4960	TF4961	TF4962	TF4963	TF4964	TF4965		
Sampling Date		2018/03/24 14:30	2018/03/24 17:00	2018/03/25 11:30	2018/03/25 16:00	2018/03/25 11:35	2018/03/25 16:05	2018/03/26 09:00		
COC Number		W5383	W5383	W5383	W5383	W5383	W5383	W5383		
	UNITS	SP-A-01	SP-B-01	SP-A-03	SP-A-04	SP-B-03	SP-B-04	SP-A-05	RDL	QC Batch

Physical Properties										
Moisture	%	21	7.0	23	25	25	25	24	0.30	8953252

RDL = Reportable Detection Limit

Maxxam ID		TF4966	TF4967		
Sampling Date		2018/03/26 16:30	2018/03/26 13:20		
COC Number		W5383	W5383		
	UNITS	SP-A-06	SP-B-05	RDL	QC Batch

Physical Properties					
Moisture	%	21	23	0.30	8953252

RDL = Reportable Detection Limit

Maxxam Job #: B825168
Report Date: 2018/04/10

AECOM
Client Project #: 60539384
Site Location: CCG Wharf, Norman Wells, NT
Sampler Initials: JB

VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID			TF4959	TF4960	TF4961	TF4962	TF4963	TF4964		
Sampling Date			2018/03/24 14:30	2018/03/24 17:00	2018/03/25 11:30	2018/03/25 16:00	2018/03/25 11:35	2018/03/25 16:05		
COC Number			W5383	W5383	W5383	W5383	W5383	W5383		
	UNITS	Criteria	SP-A-01	SP-B-01	SP-A-03	SP-A-04	SP-B-03	SP-B-04	RDL	QC Batch

Volatiles										
Benzene	mg/kg	-	<0.0050	0.0058	<0.0050	<0.0050	<0.0050	<0.0050	0.0050	8949781
Toluene	mg/kg	-	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	8949781
Ethylbenzene	mg/kg	-	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	8949781
m & p-Xylene	mg/kg	-	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	8949781
o-Xylene	mg/kg	-	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	8949781
Xylenes (Total)	mg/kg	-	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	0.045	8953031
F1 (C6-C10) - BTEX	mg/kg	30	<10	<10	<10	<10	<10	<10	10	8953031
F1 (C6-C10)	mg/kg	-	<10	<10	<10	<10	<10	<10	10	8949781

Surrogate Recovery (%)										
1,4-Difluorobenzene (sur.)	%	-	100	121	126	71	100	102	N/A	8949781
4-Bromofluorobenzene (sur.)	%	-	99	102	100	88	98	109	N/A	8949781
D10-o-Xylene (sur.)	%	-	96	98	100	85	100	102	N/A	8949781
D4-1,2-Dichloroethane (sur.)	%	-	95	115	126	81	80	108	N/A	8949781

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels
RDL = Reportable Detection Limit	
N/A = Not Applicable	

Maxxam Job #: B825168
Report Date: 2018/04/10

AECOM
Client Project #: 60539384
Site Location: CCG Wharf, Norman Wells, NT
Sampler Initials: JB

VOLATILE ORGANICS BY GC-MS (SOIL)

Maxxam ID			TF4965	TF4966	TF4967		
Sampling Date			2018/03/26 09:00	2018/03/26 16:30	2018/03/26 13:20		
COC Number			W5383	W5383	W5383		
	UNITS	Criteria	SP-A-05	SP-A-06	SP-B-05	RDL	QC Batch
Volatiles							
Benzene	mg/kg	-	0.014	<0.0050	<0.0050	0.0050	8949781
Toluene	mg/kg	-	<0.020	<0.020	<0.020	0.020	8949781
Ethylbenzene	mg/kg	-	0.019	<0.010	<0.010	0.010	8949781
m & p-Xylene	mg/kg	-	<0.040	<0.040	<0.040	0.040	8949781
o-Xylene	mg/kg	-	<0.020	<0.020	<0.020	0.020	8949781
Xylenes (Total)	mg/kg	-	<0.045	<0.045	<0.045	0.045	8953031
F1 (C6-C10) - BTEX	mg/kg	30	<10	<10	<10	10	8953031
F1 (C6-C10)	mg/kg	-	<10	<10	<10	10	8949781
Surrogate Recovery (%)							
1,4-Difluorobenzene (sur.)	%	-	120	125	119	N/A	8949781
4-Bromofluorobenzene (sur.)	%	-	101	100	99	N/A	8949781
D10-o-Xylene (sur.)	%	-	102	94	98	N/A	8949781
D4-1,2-Dichloroethane (sur.)	%	-	118	111	115	N/A	8949781
No Fill	No Exceedance						
Grey	Exceeds 1 criteria policy/level						
Black	Exceeds both criteria/levels						
RDL = Reportable Detection Limit							
N/A = Not Applicable							

Maxxam Job #: B825168
Report Date: 2018/04/10

AECOM
Client Project #: 60539384
Site Location: CCG Wharf, Norman Wells, NT
Sampler Initials: JB

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	8.0°C
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Sample TF4959 [SP-A-01] : Sample extracted past 7 day hold time for BTEX/F1. Sample received was not in compliance with CCME sampling requirements for VOC/BTEX/F1 in soil.

Sample TF4960 [SP-B-01] : Sample extracted past 7 day hold time for BTEX/F1. Sample received was not in compliance with CCME sampling requirements for VOC/BTEX/F1 in soil.

Sample TF4961 [SP-A-03] : Sample extracted past 7 day hold time for BTEX/F1.
Sample extracted for volatile parameters from broken container. Sample received was not in compliance with CCME sampling requirements for VOC/BTEX/F1 in soil.

Sample TF4962 [SP-A-04] : Sample extracted past 7 day hold time for BTEX/F1. Sample received was not in compliance with CCME sampling requirements for VOC/BTEX/F1 in soil.

Sample TF4963 [SP-B-03] : Sample extracted past 7 day hold time for BTEX/F1. Sample received was not in compliance with CCME sampling requirements for VOC/BTEX/F1 in soil.

Sample TF4964 [SP-B-04] : Sample extracted past 7 day hold time for BTEX/F1.
Sample extracted for volatile parameters from broken container. Sample received was not in compliance with CCME sampling requirements for VOC/BTEX/F1 in soil.

Sample TF4965 [SP-A-05] : Sample extracted past 7 day hold time for BTEX/F1. Sample received was not in compliance with CCME sampling requirements for VOC/BTEX/F1 in soil.

Sample TF4966 [SP-A-06] : Sample extracted past 7 day hold time for BTEX/F1. Sample received was not in compliance with CCME sampling requirements for VOC/BTEX/F1 in soil.

Sample TF4967 [SP-B-05] : Sample extracted past 7 day hold time for BTEX/F1. Sample received was not in compliance with CCME sampling requirements for VOC/BTEX/F1 in soil.

Results relate only to the items tested.

Maxxam Job #: B825168
Report Date: 2018/04/10

AECOM
Client Project #: 60539384
Site Location: CCG Wharf, Norman Wells, NT
Sampler Initials: JB

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
8949781	AMJ	Matrix Spike	1,4-Difluorobenzene (sur.)	2018/04/03		98	%	50 - 140
			4-Bromofluorobenzene (sur.)	2018/04/03		99	%	50 - 140
			D10-o-Xylene (sur.)	2018/04/03		100	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2018/04/03		87	%	50 - 140
			Benzene	2018/04/03		77	%	50 - 140
			Toluene	2018/04/03		81	%	50 - 140
			Ethylbenzene	2018/04/03		89	%	50 - 140
			m & p-Xylene	2018/04/03		86	%	50 - 140
			o-Xylene	2018/04/03		89	%	50 - 140
			F1 (C6-C10)	2018/04/03		119	%	60 - 140
8949781	AMJ	Spiked Blank	1,4-Difluorobenzene (sur.)	2018/04/03		124	%	50 - 140
			4-Bromofluorobenzene (sur.)	2018/04/03		100	%	50 - 140
			D10-o-Xylene (sur.)	2018/04/03		96	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2018/04/03		125	%	50 - 140
			Benzene	2018/04/03		113	%	60 - 130
			Toluene	2018/04/03		85	%	60 - 130
			Ethylbenzene	2018/04/03		89	%	60 - 130
			m & p-Xylene	2018/04/03		88	%	60 - 130
			o-Xylene	2018/04/03		89	%	60 - 130
			F1 (C6-C10)	2018/04/03		73	%	60 - 140
8949781	AMJ	Method Blank	1,4-Difluorobenzene (sur.)	2018/04/03		88	%	50 - 140
			4-Bromofluorobenzene (sur.)	2018/04/03		96	%	50 - 140
			D10-o-Xylene (sur.)	2018/04/03		93	%	50 - 140
			D4-1,2-Dichloroethane (sur.)	2018/04/03		92	%	50 - 140
			Benzene	2018/04/03	<0.0050		mg/kg	
			Toluene	2018/04/03	<0.020		mg/kg	
			Ethylbenzene	2018/04/03	<0.010		mg/kg	
			m & p-Xylene	2018/04/03	<0.040		mg/kg	
			o-Xylene	2018/04/03	<0.020		mg/kg	
			F1 (C6-C10)	2018/04/03	<10		mg/kg	
8949781	AMJ	RPD	Benzene	2018/04/03	7.8		%	50
			Toluene	2018/04/03	11		%	50
			Ethylbenzene	2018/04/03	13		%	50
			m & p-Xylene	2018/04/03	9.8		%	50
			o-Xylene	2018/04/03	14		%	50
			F1 (C6-C10)	2018/04/03	NC		%	40
8953252	RBN	Method Blank	Moisture	2018/04/07	<0.30		%	
8953252	RBN	RPD	Moisture	2018/04/07	1.3		%	20
8953304	JR1	Matrix Spike	O-TERPHENYL (sur.)	2018/04/07		101	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2018/04/07		115	%	60 - 130
			F3 (C16-C34 Hydrocarbons)	2018/04/07		114	%	60 - 130
			F4 (C34-C50 Hydrocarbons)	2018/04/07		111	%	60 - 130
			F1 (C6-C10)	2018/04/07		NC	%	40
8953304	JR1	Spiked Blank	O-TERPHENYL (sur.)	2018/04/07		86	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2018/04/07		96	%	70 - 130
			F3 (C16-C34 Hydrocarbons)	2018/04/07		96	%	70 - 130
			F4 (C34-C50 Hydrocarbons)	2018/04/07		92	%	70 - 130
			F1 (C6-C10)	2018/04/07		106	%	60 - 140
8953304	JR1	Method Blank	O-TERPHENYL (sur.)	2018/04/07		106	%	60 - 140
			F2 (C10-C16 Hydrocarbons)	2018/04/07	<10		mg/kg	
			F3 (C16-C34 Hydrocarbons)	2018/04/07	<50		mg/kg	
			F4 (C34-C50 Hydrocarbons)	2018/04/07	<50		mg/kg	
			F1 (C6-C10)	2018/04/07	NC		%	40
8953304	JR1	RPD	F2 (C10-C16 Hydrocarbons)	2018/04/07		NC	%	40
			F3 (C16-C34 Hydrocarbons)	2018/04/07		17	%	40

Maxxam Job #: B825168
Report Date: 2018/04/10

AECOM
Client Project #: 60539384
Site Location: CCG Wharf, Norman Wells, NT
Sampler Initials: JB

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			F4 (C34-C50 Hydrocarbons)	2018/04/07	NC		%	40
8954006	MWB	Matrix Spike [TF4959-02]	Total Petroleum Hydrocarbon	2018/04/09		95	%	70 - 130
8954006	MWB	QC Standard	Total Petroleum Hydrocarbon	2018/04/09		107	%	47 - 135
8954006	MWB	Spiked Blank	Total Petroleum Hydrocarbon	2018/04/09		95	%	70 - 130
8954006	MWB	Method Blank	Total Petroleum Hydrocarbon	2018/04/09	<50		mg/kg	
8954006	MWB	RPD [TF4959-02]	Total Petroleum Hydrocarbon	2018/04/09	NC		%	40

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

Maxxam Job #: B825168
Report Date: 2018/04/10

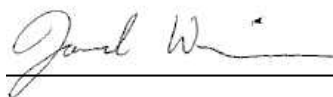
AECOM
Client Project #: 60539384
Site Location: CCG Wharf, Norman Wells, NT
Sampler Initials: JB

VALIDATION SIGNATURE PAGE

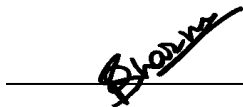
The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Justin Geisel, B.Sc., Organics Supervisor



Jared Wiseman, B.Sc., P.Chem., QP, Senior Analyst, Organics



Poonam Sharma, cCT, Organics Supervisor

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Custody Tracking Form 126



Please use this form for custody tracking when submitting the work instructions via eTR (electronic Test Requisition). Please ensure your form has a barcode or a Maxxam eTR confirmation number in the top right hand side. This number links your electronic submission to your samples.

First Sample: SP-A-01
Last Sample: SP-B-05
Sample Count: 9

Relinquished By				Received By			
Michel LANTEIGNE	<i>[Signature]</i>	Date	2018/04/04	Chris Kelly	<i>[Signature]</i>	Date	2018.04.05
		Time (24 HR)	11:23			Time (24 HR)	16:28
Print	Sign	Date	YYYY/MM/DD	Print	Sign	Date	YYYY/MM/DD
		Time (24 HR)	HH:MM			Time (24 HR)	HH:MM
		Date	YYYY/MM/DD			Date	YYYY/MM/DD
		Time (24 HR)	HH:MM			Time (24 HR)	HH:MM

Submission Triage Information

Sampled By: Joseph Barron # of Coolers/Pkgs: 1

Rush Immediate Test Food Residue
Micro Food Chemistry

*** LAB USE ONLY ***

Received At	MED2	Comments: RECEIVED IN YELLOWKNIFE By: <i>JS/Jefferery Smith</i> Ice - No 2018 -04- 04 11:23am Sealed - No Temp: 7 / 8 / 9	Custody Seal		Cooling Media	Temperature °C		
Labeled By	AHD		Present (Y/N)	Intact (Y/N)		1	2	3
Verified By			Y	Y	Y	2	1	3

04-Apr-18 11:23
Alaina Hunter
 B825168
HD