

To:
Peter Loetcher & Jeff Balle
Knappett Industries Ltd.

Project name:
Comox Valley Regional District
Sewer Conveyance Project

Project ref:
60436108

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AECOM
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From:
Sean Moggridge,
Tyler Ross, and
Chuck Jochems

Date:
July 31, 2024

Memorandum

Subject: Groundwater Sampling for Discharge - Courtenay Pump Station (Revision 1)

AECOM was requested by Knappett Industries Ltd (Knappett) to complete groundwater sampling at 1992 Comox Road (the proposed new Courtenay Pump Station site). It is understood the intent is to provide analytical results to the Comox Valley Regional District (CVRD) in support of a sanitary discharge permit for dewatering activities anticipated as part of the excavation and development of the new Courtenay Pump Station. It is understood that Knappett intends to use a Baker tank to allow for discharge from dewatering practices to settle before being pumped to the sanitary sewer.

A groundwater sample was collected on July 16, 2024, from a test pit that was excavated on July 11, 2024. The test pit was excavated to a depth below the water table, allowing groundwater to infiltrate over several days. At the time of the sampling, the groundwater that infiltrated the test pit had a layer of dust/silt at the surface but was generally clear with no evidence of petroleum sheen or hydrocarbon odours. No other indications of contamination were observed during the sampling event. The groundwater sample was collected by bailing water from the test pit utilizing laboratory supplied bottles, then transferring to laboratory supplied bottles precharged with preservative from Bureau Veritas laboratory and immediately placed in a cooler with ice. Samples were then transported to Bureau Veritas' depot facility in Courtenay, then shipped to Bureau Veritas' Burnaby location for analysis. Groundwater samples were submitted on a 1-day turn around time to facilitate a quick response to the groundwater sampling request.

As the stretch of Comox Road immediately south of the Property is located within the bounds of the City of Courtenay, the analytical results were compared to the limitations set out in Section 2.2.1 of the City of Courtenay Bylaw No. 1327 governing sanitary sewer use. The table below summarizes the analytical results in comparison to Bylaw No. 1327.

Water meter probes were utilized to assess the water for turbidity and pH at the time of sampling. The water within the test pit was measured to have a turbidity between 14.4 and 29.5 Nephelometric Turbidity unit (NTU), pH of 4.18, and temperature of 20.3 °C. Bylaw No. 1327 dictates a suitable pH range for waters of a pH factor between 5.0 and 9.5. It is strongly recommended that Knappett open a few small test holes to allow for in-situ pH measurements during the next Environmental Monitor visit, in order to confirm and determine if pH varies across the Site.

It is understood that dewatering wells are slated for installation between August 5th and August 8th, 2024. AECOM will complete an assessment of the dewatering wells to confirm the initial pH results obtained from the test pit, utilizing field measurements and laboratory analysis. If the pH remains below 5 at the dewatering wells, the contractor shall raise the pH above 5 before discharging to the sanitary sewer, in accordance with Bylaw 1327.

As directed by the Knappett relaying a request from Comox Valley Regional District, the groundwater samples were submitted for analysis of benzene, toluene, ethylbenzene, xylenes (BTEX), volatile petroleum hydrocarbons (VPH), light/heavy extractable hydrocarbons (LEPH/HEPH), polycyclic aromatic hydrocarbons (PAH), total metals, and total suspended solids (TSS).

BTEX, VPH, LEPH/HEPH, and PAH results were below the laboratory's detection limits. Metals and TSS were detected above the laboratory detection limits, but below the Bylaw No. 1327 limits. The results are presented in Tables 1, 2, 3, and 4, attached to this memo. The laboratory certificate of analysis attached to this memo.

This memo does not serve as a permit for discharge and results from the discrete test pit location cannot be extrapolated for other locations on the project alignment. Knappett shall familiarize themselves with the applicable Bylaw No. 1327 and any permit they acquire to meet monitoring requirements to ensure the effluent discharged to the sanitary sewer remains within the acceptable limitations set out by the Bylaw or applicable permits.

Sincerely,
AECOM Canada Ltd.



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Report Reviewer

Attachments:

- Table 1 - Summary of Analytical Results for Volatile Petroleum Hydrocarbons
- Table 2 - Summary of Analytical Results for Polycyclic Aromatic Hydrocarbons and Extractable Petroleum Hydrocarbons
- Table 3 - Summary of Analytical Results for Metals
- Table 4 - Summary of Analytical Results for Total Suspended Solids
- Laboratory Certificate of Analysis

Statement of Qualifications and Limitations

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

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- 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.

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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: Summary of Analytical Results for Volatile Petroleum Hydrocarbons

			Location	CTY PS-PIT
			Sample ID	CTY PS-PIT_20240716
			Date	2024-Jul-16
			Lab sample ID	CR1134
			Lab work order	C453322
Parameter	Units	Minimum RDL		
VPH (VH6 to 10 - BTEX)	µg/L	300		< 300
VPH (C6-C10)	µg/L	300		< 300
Methyl T-Butyl Ether (MTBE)	µg/L	4		< 4.0
Benzene	µg/L	0.4		< 0.40
Toluene	µg/L	0.4		< 0.40
Ethylbenzene	µg/L	0.4		< 0.40
Xylene, m & p	µg/L	0.4		< 0.40
O-Xylene	µg/L	0.4		< 0.40
Xylenes, Total	µg/L	0.4		< 0.40
Styrene	µg/L	0.4		< 0.40
VH C6-C10	µg/L	300		< 300

Notes:

yyyy/mm/dd: year/month/day

< : Denotes concentration less than indicated detection limit

- : Not analyzed

--: No Standard/Guideline

Exceeds Applicable Standard/Guideline

Detection Limit Exceeds Applicable Standard/Guideline

Table 2: Summary of Analytical Results for Polycyclic Aromatic Hydrocarbons and Extractable Petroleum Hydrocarbons

		Location	CTY PS-PIT
		Sample ID	CTY PS-PIT_20240716
		Date	2024-Jul-16
		Lab sample ID	CRI134
		Lab work order	C453322
Parameter	Units	Minimum RDL	
Methylnaphthalene, 1-	µg/L	0.05	< 0.050
Low Molecular Weight PAH's	µg/L	0.1	< 0.10
High Molecular Weight PAH's	µg/L	0.05	< 0.050
Total PAH	µg/L	0.1	< 0.10
Naphthalene	µg/L	0.1	< 0.10
2-Methylnaphthalene	µg/L	0.1	< 0.10
Acenaphthylene	µg/L	0.05	< 0.050
Acenaphthene	µg/L	0.05	< 0.050
Fluorene	µg/L	0.05	< 0.050
Phenanthrene	µg/L	0.05	< 0.050
Anthracene	µg/L	0.01	< 0.010
Acridine	µg/L	0.05	< 0.050
Fluoranthene	µg/L	0.02	< 0.020
Pyrene	µg/L	0.02	< 0.020
Benzo(A)Anthracene	µg/L	0.01	< 0.010
Chrysene	µg/L	0.02	< 0.020
Benzo(b/j)fluoranthene	µg/L	0.03	< 0.030
Benzo(b&j)fluoranthene	µg/L	0.03	< 0.030
Benzo(K)Fluoranthene	µg/L	0.05	< 0.050
Benzo(A)Pyrene	µg/L	0.005	< 0.0050
Indeno(1,2,3-cd)pyrene	µg/L	0.05	< 0.050
Benzo(G,H,I)Perylene	µg/L	0.05	< 0.050
LEPH	mg/L	0.2	< 0.20
HEPH	mg/L	0.2	< 0.20
EPH (C10-C19)	mg/L	0.2	< 0.20
EPH (C19-C32)	mg/L	0.2	< 0.20
Dibenzo(A,H)Anthracene	µg/L	0.003	< 0.0030
Quinoline (Benzo(b)pyridine)	µg/L	0.02	< 0.020

Notes:

yyyy/mm/dd: year/month/day

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Exceeds Applicable Standard/Guideline

Detection Limit Exceeds Applicable Standard/Guideline

Table 3: Summary of Analytical Results for Metals

				Location
				Sample ID
				Date
				Lab sample ID
				Lab work order
Parameter	Bylaw No. 1327	Units	Minimum RDL	
Aluminum	50.0	mg/L	0.006	5.200
Antimony	--	mg/L	0.001	< 0.001
Arsenic	1.0	mg/L	0.0002	0.00138
Barium	5.0	mg/L	0.002	0.0162
Beryllium	--	mg/L	0.0002	0.00036
Bismuth	--	mg/L	0.002	< 0.002
Boron	50.0	mg/L	0.1	< 0.1
Cadmium	0.2	mg/L	0.00002	0.000287
Calcium	--	mg/L	0.1	56.3
Chromium	4.0	mg/L	0.002	< 0.002
Cobalt	5.0	mg/L	0.0004	0.0757
Copper	2.0	mg/L	0.001	0.0085
Iron	10.0	mg/L	0.020	1.71
Lead	1.0	mg/L	0.0004	< 0.0004
Lithium	--	mg/L	0.004	0.105
Magnesium	--	mg/L	0.1	15.2
Manganese	5.0	mg/L	0.002	1.110
Mercury	0.05	mg/L	0.0000019	0.0000020
Molybdenum	1.0	mg/L	0.002	< 0.002
Nickel	2.0	mg/L	0.002	0.112
Phosphorus	--	mg/L	0.020	0.026
Potassium	--	mg/L	0.1	1.34
Selenium	--	mg/L	0.0002	< 0.00020
Silver	1.0	mg/L	0.00004	< 0.000040
Sodium	--	mg/L	0.1	8.66
Strontium	--	mg/L	0.002	0.221
Thallium	--	mg/L	0.00002	0.000021
Tin	1.0	mg/L	0.010	< 0.010
Titanium	--	mg/L	0.010	0.044
Uranium	--	mg/L	0.0002	0.00039
Vanadium	--	mg/L	0.010	< 0.010
Zinc	3.0	mg/L	0.010	0.114
Zirconium	--	mg/L	0.0002	0.00027
Hardness (as CaCO3)	--	mg/L	0.5	203

Notes:

yyyy/mm/dd: year/month/day

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-- : Not analyzed

--: No Standard/Guideline

Exceeds Applicable Standard/Guideline

Detection Limit Exceeds Applicable Standard/Guideline

Table 4: Summary of Analytical Results for Total Suspended Solids

			Location	CTY PS-PIT
			Sample ID	CTY PS-PIT_20240716
			Date	2024-Jul-16
			Lab sample ID	CRI134
			Lab work order	C453322
Parameter	Bylaw No. 1327	Units	Minimum RDL	
Total Suspended Solids	500	mg/L	1	14

Notes:

yyyy/mm/dd: year/month/day

< : Denotes concentration less than indicated detection limit

- : Not analyzed

--: No Standard/Guideline

Exceeds Applicable Standard/Guideline

Detection Limit Exceeds Applicable Standard/Guideline



Your P.O. #: 13846
 Your Project #: 60719424
 Site Location: COURTENAY PUMP STATION
 Your C.O.C. #: 08535344

Attention: Sean Moggridge

AECOM CANADA LTD.
 4th Floor
 3292 Production Way
 BURNABY, BC
 Canada V5A 4R4

Report Date: 2024/07/17
 Report #: R3528586
 Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C453322

Received: 2024/07/16, 12:00

Sample Matrix: Ground Water
 # Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
BTEX/MTBE LH, VH, F1 SIM/MS (1)	1	N/A	2024/07/17	BBY8SOP-00010 / BBY8SOP-00011 / BBY8SOP-00012	BCMOE BCLM Jul 2017
Hardness Total (calculated as CaCO3) (1, 2)	1	N/A	2024/07/17	BBY WI-00033	Auto Calc
Mercury (Total) by CV (1)	1	2024/07/17	2024/07/17	BBY7SOP-00032	BCMOE LM 2023 C1.1.3
EPH in Water when PAH required (1)	1	2024/07/17	2024/07/17	BBY8SOP-00029	BCMOE BCLM Sep2017 m
Na, K, Ca, Mg, S by CRC ICPMS (total) (1)	1	2024/07/16	2024/07/17	BBY WI-00033	Auto Calc
Elements by CRC ICPMS (total) (1)	1	2024/07/17	2024/07/17	BBY7SOP-00003 / BBY7SOP-00002	EPA 6020b R2 m
PAH in Water by GC/MS (SIM) (1)	1	2024/07/17	2024/07/17	BBY8SOP-00021	BCMOE BCLM Jul2017m
Total LMW, HMW, Total PAH Calc (1, 3)	1	N/A	2024/07/17	BBY WI-00033	Auto Calc
EPH less PAH in Water by GC/FID (1, 4)	1	N/A	2024/07/17	BBY WI-00033	Auto Calc
Total Suspended Solids (NFR) (1)	1	2024/07/17	2024/07/17	BBY6SOP-00034	SM 24 2540 D m
Volatile HC-BTEX (1, 5)	1	N/A	2024/07/17	BBY WI-00033	Auto Calc

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, EPA, APHA or the Quebec Ministry of Environment.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas 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. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas 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 Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

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. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.



Your P.O. #: 13846
Your Project #: 60719424
Site Location: COURTENAY PUMP STATION
Your C.O.C. #: 08535344

Attention: Sean Moggridge

AECOM CANADA LTD.
4th Floor
3292 Production Way
BURNABY, BC
Canada V5A 4R4

Report Date: 2024/07/17
Report #: R3528586
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C453322

Received: 2024/07/16, 12:00

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 Bureau Veritas Vancouver, 4606 Canada Way , Burnaby, BC, V5G 1K5
- (2) "Total Hardness" was calculated from Total Ca and Mg concentrations and may be biased high (Hardness, or Dissolved Hardness, calculated from Dissolved Ca and Mg, should be used for compliance if available).
- (3) Total PAHs in Water include: Quinoline, Naphthalene, 1-Methylnaphthalene, 2-Methylnaphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Acridine, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b&j)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenz(a,h)anthracene, and Benzo(g,h,i)perylene.
- (4) LEPH = EPH (C10 to C19) - (Acenaphthene + Acridine + Anthracene + Fluorene + Naphthalene + Phenanthrene)
- HEPH = EPH (C19 to C32) - (Benzo(a)anthracene + Benzo(a)pyrene + Fluoranthene + Pyrene)
- (5) VPH = VH - (Benzene + Toluene + Ethylbenzene + m & p-Xylene + o-Xylene + Styrene)

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:
Parminder Virk, Key Account Specialist
Email: Parminder.Virk@bureauveritas.com
Phone# (403)735-2235

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For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Raphael Kwan, Senior Manager, BC and Yukon Regions responsible for British Columbia Food laboratory operations.



BUREAU
VERITAS

Bureau Veritas Job #: C453322
Report Date: 2024/07/17

AECOM CANADA LTD.
Client Project #: 60719424
Site Location: COURTENAY PUMP STATION
Your P.O. #: 13846
Sampler Initials: KM

RESULTS OF CHEMICAL ANALYSES OF GROUND WATER

Bureau Veritas ID		CRI134		
Sampling Date		2024/07/16 08:55		
COC Number		08535344		
	UNITS	CTY PS-PIT	RDL	QC Batch
Misc. Inorganics				
Total Suspended Solids	mg/L	14	1.0	B441971
RDL = Reportable Detection Limit				



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Bureau Veritas Job #: C453322
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AECOM CANADA LTD.
Client Project #: 60719424
Site Location: COURTENAY PUMP STATION
Your P.O. #: 13846
Sampler Initials: KM

CSR BTEX/VPH IN WATER (GROUND WATER)

Bureau Veritas ID		CRI134		
Sampling Date		2024/07/16 08:55		
COC Number		08535344		
	UNITS	CTY PS-PIT	RDL	QC Batch
Calculated Parameters				
VPH (VH6 to 10 - BTEX)	ug/L	<300	300	B440663
Volatiles				
Methyl-tert-butylether (MTBE)	ug/L	<4.0	4.0	B441886
Benzene	ug/L	<0.40	0.40	B441886
Toluene	ug/L	<0.40	0.40	B441886
Ethylbenzene	ug/L	<0.40	0.40	B441886
m & p-Xylene	ug/L	<0.40	0.40	B441886
o-Xylene	ug/L	<0.40	0.40	B441886
Styrene	ug/L	<0.40	0.40	B441886
Xylenes (Total)	ug/L	<0.40	0.40	B441886
VH C6-C10	ug/L	<300	300	B441886
Surrogate Recovery (%)				
1,4-Difluorobenzene (sur.)	%	110		B441886
4-Bromofluorobenzene (sur.)	%	91		B441886
D4-1,2-Dichloroethane (sur.)	%	112		B441886
RDL = Reportable Detection Limit				



BUREAU
VERITAS

Bureau Veritas Job #: C453322
Report Date: 2024/07/17

AECOM CANADA LTD.
Client Project #: 60719424
Site Location: COURTENAY PUMP STATION
Your P.O. #: 13846
Sampler Initials: KM

LEPH & HEPH WITH CSR/CCME PAH IN WATER (GROUND WATER)

Bureau Veritas ID		CRI134		
Sampling Date		2024/07/16 08:55		
COC Number		08535344		
	UNITS	CTY PS-PIT	RDL	QC Batch
Calculated Parameters				
Low Molecular Weight PAH's	ug/L	<0.10	0.10	B440659
High Molecular Weight PAH's	ug/L	<0.050	0.050	B440659
Total PAH	ug/L	<0.10	0.10	B440659
Polycyclic Aromatics				
Quinoline	ug/L	<0.020	0.020	B441811
Naphthalene	ug/L	<0.10	0.10	B441811
1-Methylnaphthalene	ug/L	<0.050	0.050	B441811
2-Methylnaphthalene	ug/L	<0.10	0.10	B441811
Acenaphthylene	ug/L	<0.050	0.050	B441811
Acenaphthene	ug/L	<0.050	0.050	B441811
Fluorene	ug/L	<0.050	0.050	B441811
Phenanthrene	ug/L	<0.050	0.050	B441811
Anthracene	ug/L	<0.010	0.010	B441811
Acridine	ug/L	<0.050	0.050	B441811
Fluoranthene	ug/L	<0.020	0.020	B441811
Pyrene	ug/L	<0.020	0.020	B441811
Benzo(a)anthracene	ug/L	<0.010	0.010	B441811
Chrysene	ug/L	<0.020	0.020	B441811
Benzo(b&j)fluoranthene	ug/L	<0.030	0.030	B441811
Benzo(k)fluoranthene	ug/L	<0.050	0.050	B441811
Benzo(a)pyrene	ug/L	<0.0050	0.0050	B441811
Indeno(1,2,3-cd)pyrene	ug/L	<0.050	0.050	B441811
Dibenz(a,h)anthracene	ug/L	<0.0030	0.0030	B441811
Benzo(g,h,i)perylene	ug/L	<0.050	0.050	B441811
Calculated Parameters				
LEPH (C10-C19 less PAH)	mg/L	<0.20	0.20	B440661
HEPH (C19-C32 less PAH)	mg/L	<0.20	0.20	B440661
Ext. Pet. Hydrocarbon				
EPH (C10-C19)	mg/L	<0.20	0.20	B441821
EPH (C19-C32)	mg/L	<0.20	0.20	B441821
RDL = Reportable Detection Limit				



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Bureau Veritas Job #: C453322
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AECOM CANADA LTD.
Client Project #: 60719424
Site Location: COURTENAY PUMP STATION
Your P.O. #: 13846
Sampler Initials: KM

LEPH & HEPH WITH CSR/CCME PAH IN WATER (GROUND WATER)

Bureau Veritas ID		CRI134		
Sampling Date		2024/07/16 08:55		
COC Number		08535344		
	UNITS	CTY PS-PIT	RDL	QC Batch
Surrogate Recovery (%)				
O-TERPHENYL (sur.)	%	98		B441821
D10-ANTHRACENE (sur.)	%	92		B441811
D8-ACENAPHTHYLENE (sur.)	%	87		B441811
D8-NAPHTHALENE (sur.)	%	64		B441811
TERPHENYL-D14 (sur.)	%	92		B441811
RDL = Reportable Detection Limit				



BUREAU
VERITAS

Bureau Veritas Job #: C453322
Report Date: 2024/07/17

AECOM CANADA LTD.
Client Project #: 60719424
Site Location: COURTENAY PUMP STATION
Your P.O. #: 13846
Sampler Initials: KM

CSR TOTAL METALS IN WATER WITH CV HG (GROUND WATER)

Bureau Veritas ID		CRI134		
Sampling Date		2024/07/16 08:55		
COC Number		08535344		
	UNITS	CTY PS-PIT	RDL	QC Batch
Calculated Parameters				
Total Hardness (CaCO3)	mg/L	203	0.50	B440451
Elements				
Total Mercury (Hg)	ug/L	0.0020	0.0019	B442184
Total Metals by ICPMS				
Total Aluminum (Al)	ug/L	5200	6.0	B441907
Total Antimony (Sb)	ug/L	<1.0	1.0	B441907
Total Arsenic (As)	ug/L	1.38	0.20	B441907
Total Barium (Ba)	ug/L	16.2	2.0	B441907
Total Beryllium (Be)	ug/L	0.36	0.20	B441907
Total Bismuth (Bi)	ug/L	<2.0	2.0	B441907
Total Boron (B)	ug/L	<100	100	B441907
Total Cadmium (Cd)	ug/L	0.287	0.020	B441907
Total Chromium (Cr)	ug/L	<2.0	2.0	B441907
Total Cobalt (Co)	ug/L	75.7	0.40	B441907
Total Copper (Cu)	ug/L	8.5	1.0	B441907
Total Iron (Fe)	ug/L	1710	20	B441907
Total Lead (Pb)	ug/L	<0.40	0.40	B441907
Total Lithium (Li)	ug/L	105	4.0	B441907
Total Manganese (Mn)	ug/L	1110	2.0	B441907
Total Molybdenum (Mo)	ug/L	<2.0	2.0	B441907
Total Nickel (Ni)	ug/L	112	2.0	B441907
Total Phosphorus (P)	ug/L	26	20	B441907
Total Selenium (Se)	ug/L	<0.20	0.20	B441907
Total Silicon (Si)	ug/L	33800	200	B441907
Total Silver (Ag)	ug/L	<0.040	0.040	B441907
Total Strontium (Sr)	ug/L	221	2.0	B441907
Total Thallium (Tl)	ug/L	0.021	0.020	B441907
Total Tin (Sn)	ug/L	<10	10	B441907
Total Titanium (Ti)	ug/L	44	10	B441907
Total Uranium (U)	ug/L	0.39	0.20	B441907
Total Vanadium (V)	ug/L	<10	10	B441907
RDL = Reportable Detection Limit				



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Bureau Veritas Job #: C453322
Report Date: 2024/07/17

AECOM CANADA LTD.
Client Project #: 60719424
Site Location: COURTENAY PUMP STATION
Your P.O. #: 13846
Sampler Initials: KM

CSR TOTAL METALS IN WATER WITH CV HG (GROUND WATER)

Bureau Veritas ID		CRI134		
Sampling Date		2024/07/16 08:55		
COC Number		08535344		
	UNITS	CTY PS-PIT	RDL	QC Batch
Total Zinc (Zn)	ug/L	114	10	B441907
Total Zirconium (Zr)	ug/L	0.27	0.20	B441907
Total Calcium (Ca)	mg/L	56.3	0.10	B440690
Total Magnesium (Mg)	mg/L	15.2	0.10	B440690
Total Potassium (K)	mg/L	1.34	0.10	B440690
Total Sodium (Na)	mg/L	8.66	0.10	B440690
Total Sulphur (S)	mg/L	79.9	6.0	B440690
RDL = Reportable Detection Limit				



**BUREAU
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Bureau Veritas Job #: C453322
Report Date: 2024/07/17

AECOM CANADA LTD.
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GENERAL COMMENTS

Results relate only to the items tested.



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Bureau Veritas Job #: C453322

Report Date: 2024/07/17

QUALITY ASSURANCE REPORT

AECOM CANADA LTD.

Client Project #: 60719424

Site Location: COURTENAY PUMP STATION

Your P.O. #: 13846

Sampler Initials: KM

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
B441811	D10-ANTHRACENE (sur.)	2024/07/17	84	50 - 140	60	50 - 140	100	%		
B441811	D8-ACENAPHTHYLENE (sur.)	2024/07/17	82	50 - 140	61	50 - 140	89	%		
B441811	D8-NAPHTHALENE (sur.)	2024/07/17	67	50 - 140	55	50 - 140	60	%		
B441811	TERPHENYL-D14 (sur.)	2024/07/17	84	50 - 140	55	50 - 140	100	%		
B441821	O-TERPHENYL (sur.)	2024/07/17	101	60 - 140	102	60 - 140	107	%		
B441886	1,4-Difluorobenzene (sur.)	2024/07/17	108	70 - 130	107	70 - 130	109	%		
B441886	4-Bromofluorobenzene (sur.)	2024/07/17	96	70 - 130	97	70 - 130	90	%		
B441886	D4-1,2-Dichloroethane (sur.)	2024/07/17	109	70 - 130	110	70 - 130	116	%		
B441811	1-Methylnaphthalene	2024/07/17	69	50 - 140	65	50 - 140	<0.050	ug/L		
B441811	2-Methylnaphthalene	2024/07/17	67	50 - 140	63	50 - 140	<0.10	ug/L		
B441811	Acenaphthene	2024/07/17	78	50 - 140	73	50 - 140	<0.050	ug/L		
B441811	Acenaphthylene	2024/07/17	77	50 - 140	73	50 - 140	<0.050	ug/L		
B441811	Acridine	2024/07/17	89	50 - 140	95	50 - 140	<0.050	ug/L		
B441811	Anthracene	2024/07/17	78	50 - 140	70	50 - 140	<0.010	ug/L		
B441811	Benzo(a)anthracene	2024/07/17	74	50 - 140	61	50 - 140	<0.010	ug/L		
B441811	Benzo(a)pyrene	2024/07/17	72	50 - 140	68	50 - 140	<0.0050	ug/L		
B441811	Benzo(b&j)fluoranthene	2024/07/17	70	50 - 140	63	50 - 140	<0.030	ug/L		
B441811	Benzo(g,h,i)perylene	2024/07/17	73	50 - 140	63	50 - 140	<0.050	ug/L		
B441811	Benzo(k)fluoranthene	2024/07/17	75	50 - 140	60	50 - 140	<0.050	ug/L		
B441811	Chrysene	2024/07/17	76	50 - 140	64	50 - 140	<0.020	ug/L		
B441811	Dibenz(a,h)anthracene	2024/07/17	70	50 - 140	60	50 - 140	<0.0030	ug/L		
B441811	Fluoranthene	2024/07/17	74	50 - 140	59	50 - 140	<0.020	ug/L		
B441811	Fluorene	2024/07/17	79	50 - 140	71	50 - 140	<0.050	ug/L		
B441811	Indeno(1,2,3-cd)pyrene	2024/07/17	71	50 - 140	62	50 - 140	<0.050	ug/L		
B441811	Naphthalene	2024/07/17	70	50 - 140	69	50 - 140	<0.10	ug/L		
B441811	Phenanthrene	2024/07/17	78	50 - 140	72	50 - 140	<0.050	ug/L		
B441811	Pyrene	2024/07/17	74	50 - 140	60	50 - 140	<0.020	ug/L		
B441811	Quinoline	2024/07/17	99	50 - 140	103	50 - 140	<0.020	ug/L		
B441821	EPH (C10-C19)	2024/07/17	95	60 - 140	95	70 - 130	<0.20	mg/L	1.5	30
B441821	EPH (C19-C32)	2024/07/17	104	60 - 140	100	70 - 130	<0.20	mg/L	NC	30
B441886	Benzene	2024/07/17	100	70 - 130	99	70 - 130	<0.40	ug/L	2.9	30



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Bureau Veritas Job #: C453322

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QUALITY ASSURANCE REPORT(CONT'D)

AECOM CANADA LTD.

Client Project #: 60719424

Site Location: COURTENAY PUMP STATION

Your P.O. #: 13846

Sampler Initials: KM

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
B441886	Ethylbenzene	2024/07/17	89	70 - 130	89	70 - 130	<0.40	ug/L	1.7	30
B441886	m & p-Xylene	2024/07/17	95	70 - 130	94	70 - 130	<0.40	ug/L	2.5	30
B441886	Methyl-tert-butylether (MTBE)	2024/07/17	87	70 - 130	87	70 - 130	<4.0	ug/L		
B441886	o-Xylene	2024/07/17	93	70 - 130	94	70 - 130	<0.40	ug/L	NC	30
B441886	Styrene	2024/07/17	73	70 - 130	73	70 - 130	<0.40	ug/L	NC	30
B441886	Toluene	2024/07/17	92	70 - 130	91	70 - 130	<0.40	ug/L	NC	30
B441886	VH C6-C10	2024/07/17			104	70 - 130	<300	ug/L	NC	30
B441886	Xylenes (Total)	2024/07/17					<0.40	ug/L	2.5	30
B441907	Total Aluminum (Al)	2024/07/17	97	80 - 120	96	80 - 120	<3.0	ug/L	1.4	20
B441907	Total Antimony (Sb)	2024/07/17	NC	80 - 120	113	80 - 120	<0.50	ug/L		
B441907	Total Arsenic (As)	2024/07/17	108	80 - 120	103	80 - 120	<0.10	ug/L		
B441907	Total Barium (Ba)	2024/07/17	102	80 - 120	97	80 - 120	<1.0	ug/L		
B441907	Total Beryllium (Be)	2024/07/17	90	80 - 120	87	80 - 120	<0.10	ug/L		
B441907	Total Bismuth (Bi)	2024/07/17	96	80 - 120	96	80 - 120	<1.0	ug/L		
B441907	Total Boron (B)	2024/07/17	86	80 - 120	85	80 - 120	<50	ug/L		
B441907	Total Cadmium (Cd)	2024/07/17	103	80 - 120	100	80 - 120	<0.010	ug/L	NC	20
B441907	Total Chromium (Cr)	2024/07/17	96	80 - 120	96	80 - 120	<1.0	ug/L	NC	20
B441907	Total Cobalt (Co)	2024/07/17	99	80 - 120	102	80 - 120	<0.20	ug/L	0.57	20
B441907	Total Copper (Cu)	2024/07/17	94	80 - 120	95	80 - 120	<0.50	ug/L		
B441907	Total Iron (Fe)	2024/07/17	104	80 - 120	103	80 - 120	<10	ug/L	1.5	20
B441907	Total Lead (Pb)	2024/07/17	100	80 - 120	97	80 - 120	<0.20	ug/L		
B441907	Total Lithium (Li)	2024/07/17	88	80 - 120	85	80 - 120	<2.0	ug/L		
B441907	Total Manganese (Mn)	2024/07/17	NC	80 - 120	96	80 - 120	<1.0	ug/L	0.88	20
B441907	Total Molybdenum (Mo)	2024/07/17	NC	80 - 120	103	80 - 120	<1.0	ug/L	0.54	20
B441907	Total Nickel (Ni)	2024/07/17	98	80 - 120	99	80 - 120	<1.0	ug/L		
B441907	Total Phosphorus (P)	2024/07/17	105	80 - 120	98	80 - 120	<10	ug/L		
B441907	Total Selenium (Se)	2024/07/17	100	80 - 120	98	80 - 120	<0.10	ug/L	5.6	20
B441907	Total Silicon (Si)	2024/07/17	103	80 - 120	101	80 - 120	<100	ug/L		
B441907	Total Silver (Ag)	2024/07/17	101	80 - 120	99	80 - 120	<0.020	ug/L		
B441907	Total Strontium (Sr)	2024/07/17	NC	80 - 120	92	80 - 120	<1.0	ug/L		
B441907	Total Thallium (Tl)	2024/07/17	101	80 - 120	97	80 - 120	<0.010	ug/L	1.1	20



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QUALITY ASSURANCE REPORT(CONT'D)

AECOM CANADA LTD.

Client Project #: 60719424

Site Location: COURTENAY PUMP STATION

Your P.O. #: 13846

Sampler Initials: KM

QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
B441907	Total Tin (Sn)	2024/07/17	103	80 - 120	102	80 - 120	<5.0	ug/L		
B441907	Total Titanium (Ti)	2024/07/17	102	80 - 120	98	80 - 120	<5.0	ug/L		
B441907	Total Uranium (U)	2024/07/17	109	80 - 120	101	80 - 120	<0.10	ug/L	0.50	20
B441907	Total Vanadium (V)	2024/07/17	98	80 - 120	95	80 - 120	<5.0	ug/L		
B441907	Total Zinc (Zn)	2024/07/17	102	80 - 120	103	80 - 120	<5.0	ug/L		
B441907	Total Zirconium (Zr)	2024/07/17	106	80 - 120	100	80 - 120	<0.10	ug/L		
B441971	Total Suspended Solids	2024/07/17	105	80 - 120	98	80 - 120	<1.0	mg/L	NC	20
B442184	Total Mercury (Hg)	2024/07/17	100	80 - 120	97	80 - 120	<0.0019	ug/L	3.0	20

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.

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 (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

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).



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Your P.O. #: 13846
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VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Mauro Oselin, Scientific Specialist



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