island health

DRINKING WATER SYSTEM ANNUAL REPORT

Reporting Period: January 1st to December 31st, 2018 (year)

Water System Cowichan River - Horseshoe Bend Group Site

Water System Owner BC Parks

Primary Contact Name (Operator or Manager) Tom Porsborg

Phone Number (Operator or Manager) 778 974-2782

E-mail (Operator or Manager) Thomas.Porsborg@gov.bc.ca

DESCRIBE YOUR WATER SUPPLY SYSTEM

What is the Source(s) of Raw Water?

☒ Deep Well ☐ Shallow Well ☐ Surface Water ☐ Other

If other, specify details:

Does the Drinking Water System have Primary Disinfection? ☐ Yes ☒ No

☐ Chlorination ☐ Ultraviolet Light ☐ Ozone ☐ Other

If other, specify details:

Does the Drinking Water System have Secondary Disinfection? ☐ Yes ☒ No

☐ Chlorination ☐ Other

If other, specify details:

Does the Drinking Water System have Filtration? ☐ Yes ☒ No

Check all boxes that apply

☐ Cartridge Filter(s) ☐ Carbon Filter ☐ Sand Filtration ☐ Reverse Osmosis ☐ Other

If other, specify details:

PUBLIC REPORTING

Emergency Response & Contingency Plan (ERCP)

Is your ERCP up to Date? ☒ Yes ☐ No

How do you Inform the System Users of the ERCP?

☐ Hand Delivered ☐ Bulletin Board ☐ Newspaper ☐ Utility Bill Insert ☐ Website

☒ Other (specify details) Contractor - K2 Park Services

Drinking Water System Annual Report

How do you Inform the System Users of the Annual Report?

☐ Hand Delivered ☐ Bulletin Board ☐ Newspaper ☐ Utility Bill Insert ☒ Website

☐ Other (specify details) V.I.H.A. web site

COMPLIANCE WITH OPERATING PERMIT

List the conditions of your Operating Permit (Contact the DWO for a copy if needed):

EOCP credits current

Are you in compliance with your Operating Permit? ☒ Yes ☐ No

BACTERIOLOGICAL TESTING AND DRINKING WATER PROTECTION REGULATION WATER QUALITY STANDARDS

How many bacteriological samples were collected during this reporting period? 15

What is the minimum required sampling frequency for this system? (#samples/month) 2/month

Additional sampling details:

Was the minimum required sampling frequency achieved? ☒ Yes ☐ No

Comments:

Bacteriological summary attached to this report? ☐ Yes ☒ No

If no, how do the users of the system view the results?

WATER QUALITY STANDARDS FOR POTABLE WATER

Parameter:	***Standard:***	**Did this system meet standard?**	
Escherichia coli (for all samples)	No detectable *Escherichia coli* per 100ml	☒ Yes	☐ No
Total Coliform Bacteria *(if only 1 sample collected in a 30 day period)*	No detectable total coliform bacteria per 100ml	☐ Yes	☐ No
Total Coliform Bacteria *(if more than 1 sample collected in a 30 day period)*	No more than 10% of samples contain total coliform bacteria, **and** No sample has more than 10 total coliform bacteria per 100ml	☒ Yes	☐ No

If the system did not meet any of above Drinking Water Protection Regulation standards, record the results in the table below; attach additional sheets if necessary.

Date	TC/100ml	E.coli/100ml	Reason	Corrective Action

CHEMICAL SAMPLING COMPLETED DURING THIS REPORTING PERIOD

Was any chemical sampling conducted during reporting period?	☒ Yes	☐ No
If no, when were the last chemical samples conducted for this system? (date)		☐ Don't know
If yes, attach a list of the chemical results	attached Dec. 2018 & March, 2019 (not attached)	
If any water samples did not meet the Guidelines for Canadian Drinking Water Quality, record the results in the table below; attach additional sheets if necessary.		
Next scheduled full chemical test (date)	2024	

Parameter	Result	Corrective Action / Treatment / Comments

ADDITIONAL TESTING

Does the system have analyzers for continuous monitoring? ☐ Yes ☒ No

If yes, check all boxes that apply:

☐ Chlorine ☐ Turbidity ☐ Other (details)

Are the results available on request?

If any additional testing or sampling was conducted, record results in the table below; attach additional sheets if necessary.

Additional Testing & Reason for Sampling	Corrective Action Taken

WATER QUALITY COMPLAINTS

Were there any water quality complaints in this reporting period? (e.g. taste, odour, colour etc.) ☐ Yes ☒ No

If yes, complete the table below; attach additional sheets if necessary.

Date	Water Quality Complaint	Corrective Action / Treatment

OPERATIONAL PROBLEMS

Were there any operational problems during this reporting period? (e.g. insufficient water supply, malfunction of disinfection equipment, line breaks, elevated turbidity etc.). ■ Yes ☐ No

If yes, complete the table below; attach additional sheets if necessary. See chemical analysis report.

Incident Date	Type of Operational Problem	Corrective Action Taken

MAJOR UPGRADES/REPAIRS & EXPENSES

Were there any major upgrades/repairs or any major costs incurred during this reporting period? ☐ Yes ■ No

If yes, complete the table below; attach additional sheets if necessary.

Major Upgrades/Expenses	Details
Improvements required by DWO	
Additions/changes to system	
Purchase or install new equipment	
Equipment repair or replacement	
Annual maintenance of system	Well shocked at Spring start up of Operating Season.
Specialist report	
Other	

FUTURE IMPROVEMENTS

Are there any plans for future improvements? ■ Yes ☐ No

If yes, complete the table below; attach additional sheets if necessary.

Future Upgrades or Improvements	Estimated Date of Completion
Drill wells deeper to avoid turbidity levels - BC Parks	2020

Click here to enter a date. May 20, 2019 **DATE COMPLETED:**	Debbie King **COMPLETED BY:**

Maxxam
A Bureau Veritas Group Company

Success Through Science®

Site Location: SPECT CT
Your C.O.C. #: 568449-04-01

Attention: Fred King

K2 Parks Services Ltd
S3, C9
Galiano Island, BC
Canada V0N1P0

Report Date: 2018/11/06
Report #: R2646761
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B894764
Received: 2018/10/29, 12:50

Sample Matrix: DRINKING WATER
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity - Water	1	N/A	2018/10/31	BBY6SOP-00026	SM 22 2320 B m
Chloride by Automated Colourimetry	1	N/A	2018/10/31	BBY6SOP-00011	SM 22 4500-Cl- E m
True Colour (Single Wavelength) (1)	1	N/A	2018/11/01	VIC SOP-00010	SM23 2120 C m
Conductance - water	1	N/A	2018/10/31	BBY6SOP-00026	SM 22 2510 B m
Fluoride	1	N/A	2018/11/03	BBY6SOP-00048	SM 22 4500-F C m
Iron Bacteria (1)	1	N/A	2018/10/29	VIC SOP-00114	SM23 9240B m
Sulphide (as H2S) Calculation - total	1	N/A	2018/11/02	BBY WI-00033	Auto Calc
Hardness Total (calculated as CaCO3) (2)	1	N/A	2018/10/31	BBY WI-00033	Auto Calc
Mercury (Total) by CVAF	1	2018/11/01	2018/11/01	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Heterotropic Plate Count Water Mem. Filt (1)	1	N/A	2018/10/29	BBY4 SOP-00003	SM23 9215 m
Na, K, Ca, Mg, S by CRC ICPMS (total)	1	N/A	2018/10/31	BBY WI-00033	Auto Calc
Elements by CRC ICPMS (total)	1	2018/10/31	2018/10/31	BBY7SOP-00003 BBY7SOP-00002	EPA 6020b R2 m
Nitrogen (Total)	1	N/A	2018/11/01	BBY6SOP-00016	SM 22 4500-N C m
Ammonia-N (Preserved)	1	N/A	2018/10/31	BBY6SOP-00009	EPA 350.1 m
Nitrate + Nitrite (N)	1	N/A	2018/11/01	BBY6SOP-00010	SM 23 4500-NO3- I m
Nitrite (N) by CFA	1	N/A	2018/11/01	BBY6SOP-00010	SM 22 4500-NO3- I m
Nitrogen - Nitrate (as N)	1	N/A	2018/11/02	BBY WI-00033	Auto Calc
Nitrogen (Tot. Organic) Calculation	1	N/A	2018/11/02	BBY WI-00033	Auto Calc
pH Water (3)	1	N/A	2018/10/31	BBY6SOP-00026	SM 22 4500-H+ B m
Sat. pH and Langelier Index (@ 4.4C)	1	N/A	2018/11/01	BBY WI-00033	Auto Calc
Sat. pH and Langelier Index (@ 60C)	1	N/A	2018/11/01	BBY WI-00033	Auto Calc
Sulphate by Automated Colourimetry	1	N/A	2018/10/31	BBY6SOP-00017	SM 22 4500-SO42- E m
Sulphate Reducing Bacteria (1)	1	N/A	2018/10/29	VIC SOP-00114	SM23 9240C m
Sulphide - total	1	N/A	2018/11/01	BBY6SOP-00006	SM 23 4500-S2- D m
Total Dissolved Solids (Filt. Residue) (1)	1	N/A	2018/10/31	VIC SOP-00008	SM23 2540C m
Total Coliform & E.Coli by MF-Chromocult (1)	1	N/A	2018/10/30	VIC SOP 00112	SM23 9222J
Carbon (Total Organic) (4)	1	N/A	2018/10/31	BBY6SOP-00003	SM 22 5310 C m
Turbidity	1	N/A	2018/10/30	BBY6SOP-00027	SM 22 2130 B m
UV absorbance @254nm-Unfiltered	1	N/A	2018/10/31	BBY6SOP-00055	SM 22 5910 B

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Site Location: SPECT CT
Your C.O.C. #: 568449-04-01

Attention: Fred King

K2 Parks Services Ltd
S3, C9
Galiano Island, BC
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Report Date: 2018/11/06
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CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B894764
Received: 2018/10/29, 12:50

Sample Matrix: DRINKING WATER
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
UV transmittance @254nm-Unfiltered	1	N/A	2018/11/01	BBY WI-00033	Auto Calc

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. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

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. Maxxam 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 Maxxam, results relate to the supplied samples tested.

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 Victoria
(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) The BC-MOE and APHA Standard Method require pH to be analysed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the BC-MOE/APHA Standard Method holding time.
(4) TOC present in the sample should be considered as non-purgeable TOC.

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CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B894764
Received: 2018/10/29, 12:50

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
BC Env Customer Service, BC Environmental Customer Service
Email: Enviro.CS.BC@maxxam.ca
Phone# (604) 734 7276
==========

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 #: B894764
Report Date: 2018/11/06

K2 Parks Services Ltd
Site Location: SPECT CT

RESULTS OF CHEMICAL ANALYSES OF DRINKING WATER

Maxxam ID					UQ8252		
Sampling Date					2018/10/29 11:15		
COC Number					568449-04-01		
	UNITS	MAC	AO	OG	COWICHAN RIVER PRO.PARK HORSESHOE BAND GROUP	RDL	QC Batch
Physical Properties							
Turbidity	NTU	see remark	see remark	see remark	2.28	0.10	9207848

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

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Maxxam Job #: B894764
Report Date: 2018/11/06

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Site Location: SPECT CT

ELEMENTS BY ATOMIC SPECTROSCOPY (DRINKING WATER)

Maxxam ID					UQ8252		
Sampling Date					2018/10/29 11:15		
COC Number					568449-04-01		
	UNITS	MAC	AO	OG	COWICHAN RIVER PRO.PARK HORSESHOE BAND GROUP	RDL	QC Batch
Total Metals by ICPMS							
Aluminum (Al)	ug/L	-	-	100	59.6	3.0	9208165
Antimony (Sb)	ug/L	6	-	-	< 0.50	0.50	9208165
Arsenic (As)	ug/L	10	-	-	< 0.10	0.10	9208165
Barium (Ba)	ug/L	1000	-	-	502	1.0	9208165
Beryllium (Be)	ug/L	-	-	-	< 0.10	0.10	9208165
Bismuth (Bi)	ug/L	-	-	-	< 1.0	1.0	9208165
Boron (B)	ug/L	5000	-	-	124	50	9208165
Cadmium (Cd)	ug/L	5	-	-	< 0.010	0.010	9208165
Chromium (Cr)	ug/L	50	-	-	< 1.0	1.0	9208165
Cobalt (Co)	ug/L	-	-	-	< 0.20	0.20	9208165
Copper (Cu)	ug/L	-	1000	-	8.37	0.50	9208165
Iron (Fe)	ug/L	-	300	-	241	10	9208165
Lead (Pb)	ug/L	10	-	-	1.83	0.20	9208165
Manganese (Mn)	ug/L	-	50	-	37.2	1.0	9208165
Molybdenum (Mo)	ug/L	-	-	-	< 1.0	1.0	9208165
Nickel (Ni)	ug/L	-	-	-	< 1.0	1.0	9208165
Selenium (Se)	ug/L	50	-	-	< 0.10	0.10	9208165
Silicon (Si)	ug/L	-	-	-	4,390	100	9208165
Silver (Ag)	ug/L	-	-	-	< 0.020	0.020	9208165
Strontium (Sr)	ug/L	-	-	-	3,720	1.0	9208165
Thallium (Tl)	ug/L	-	-	-	< 0.010	0.010	9208165
Tin (Sn)	ug/L	-	-	-	< 5.0	5.0	9208165
Titanium (Ti)	ug/L	-	-	-	< 5.0	5.0	9208165
Uranium (U)	ug/L	20	-	-	< 0.10	0.10	9208165
Vanadium (V)	ug/L	-	-	-	< 5.0	5.0	9208165
Zinc (Zn)	ug/L	-	5000	-	< 5.0	5.0	9208165
Zirconium (Zr)	ug/L	-	-	-	< 0.10	0.10	9208165

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit

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Site Location: SPECT CT

VIHA PKG, WELLS/SPRINGS - VICTORIA (DRINKING WATER)

Maxxam ID					UQ8252		
Sampling Date					2018/10/29 11:15		
COC Number					568449-04-01		
	UNITS	MAC	AO	OG	COWICHAN RIVER PRO.PARK HORSESHOE BAND GROUP	RDL	QC Batch
Misc. Inorganics							
UV absorbance (254nm)	AU/cm	-	-	-	0.026	0.010	9208674
ANIONS							
Nitrite (N)	mg/L	1	-	-	< 0.0050	0.0050	9211409
Calculated Parameters							
Hardness (CaCO3)	mg/L	-	-	-	97.9	0.50	9204970
Nitrate (N)	mg/L	10	-	-	< 0.020	0.020	9205565
Organic Nitrogen (N)	mg/L	-	-	-	0.053	0.020	9205567
Transmittance at 254nm	%T/cm	-	-	-	94.3	N/A	9205241
Misc. Inorganics							
Fluoride (F)	mg/L	1.5	-	-	0.180	0.020	9214163
Alkalinity (Total as CaCO3)	mg/L	-	-	-	67.3	1.0	9209818
Organic Carbon (C)	mg/L	-	-	-	< 0.50	0.50	9208687
Alkalinity (PP as CaCO3)	mg/L	-	-	-	< 1.0	1.0	9209818
Bicarbonate (HCO3)	mg/L	-	-	-	82.1	1.0	9209818
Carbonate (CO3)	mg/L	-	-	-	< 1.0	1.0	9209818
Hydroxide (OH)	mg/L	-	-	-	< 1.0	1.0	9209818
Anions							
Sulphate (SO4)	mg/L	-	500	-	< 1.0	1.0	9210872
Chloride (Cl)	mg/L	-	250	-	**570 (1)**	10	9210870
MISCELLANEOUS							
Colour	Col. Unit	-	15	-	< 5	5	9211388
Nutrients							
Ammonia (N)	mg/L	-	-	-	0.52	0.020	9209803
Nitrate plus Nitrite (N)	mg/L	-	-	-	< 0.020	0.020	9211407
Nitrogen (N)	mg/L	-	-	-	0.569	0.020	9210005
Physical Properties							
Conductivity	uS/cm	-	-	-	2,080	2.0	9209816
pH	pH	-	-	7.0:10.5	7.85	N/A	9209815

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.

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K2 Parks Services Ltd
Site Location: SPECT CT

VIHA PKG, WELLS/SPRINGS - VICTORIA (DRINKING WATER)

Maxxam ID					UQ8252		
Sampling Date					2018/10/29 11:15		
COC Number					568449-04-01		
	UNITS	MAC	AO	OG	COWICHAN RIVER PRO.PARK HORSESHOE BAND GROUP	RDL	QC Batch
Physical Properties							
Total Dissolved Solids	mg/L	-	500	-	**1,100**	20	9207696
Elements							
Mercury (Hg)	ug/L	1	-	-	0.0030	0.0020	9210268
Total Metals by ICPMS							
Calcium (Ca)	mg/L	-	-	-	33.9	0.050	9205563
Magnesium (Mg)	mg/L	-	-	-	3.23	0.050	9205563
Potassium (K)	mg/L	-	-	-	0.729	0.050	9205563
Sodium (Na)	mg/L	-	200	-	**336**	0.050	9205563
Sulphur (S)	mg/L	-	-	-	< 3.0	3.0	9205563
Microbiological Param.							
Heterotrophic Plate Count	CFU/mL	-	-	-	SEENOTE (1)	1	9212790
Iron Bacteria	CFU/mL	-	-	-	2,200	25	9215129
Sulphate reducing bacteria	CFU/mL	-	-	-	330	75	9215133
Total Coliforms	CFU/100mL	0	-	-	0	N/A	9209762
E. coli	CFU/100mL	0	-	-	0	N/A	9209762
Calculated Parameters							
Langelier Index (@ 4.4C)	N/A	-	-	-	-0.795	N/A	9205570
Langelier Index (@ 60C)	N/A	-	-	-	0.246	N/A	9205572
Saturation pH (@ 4.4C)	N/A	-	-	-	8.65	N/A	9205570
Saturation pH (@ 60C)	N/A	-	-	-	7.60	N/A	9205572
Sulphide (as H2S)	mg/L	-	0.05	-	0.029	0.0050	9204969
MISCELLANEOUS							
Sulphide	mg/L	-	0.05	-	0.0273	0.0050	9209213

No Fill	No Exceedance
Grey	Exceeds 1 criteria policy/level
Black	Exceeds both criteria/levels

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Due to confluent growth a calculated estimate of 1000 CFU/100mL is given.

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GENERAL COMMENTS

MAC,AO,OG: The guidelines that have been included in this report have been taken from the Canadian Drinking Water Quality Summary Table, February 2017.

Criteria A = Maximum Acceptable Concentration (MAC) / Criteria B = Aesthetic Objectives (AO) / Criteria C = Operational Guidance Values (OG)
It is recommended to consult these guidelines when interpreting your data since there are non-numerical guidelines that are not included on this report.

Turbidity Guidelines:
1. Chemically assisted filtration: less than or equal to 0.3 NTU in 95% of the measurements or 95% of the time each month. Shall not exceed 1.0 NTU at any time.
2. Slow sand / diatomaceous earth filtration: less than or equal to 1.0 NTU in 95% of the measurements or 95% of the time each month. Shall not exceed 3.0 NTU at any time.
3. Membrane filtration: less than or equal to 0.1 NTU in 99% of the measurements made or at least 99% of the time each calendar month. Shall not exceed 0.3 NTU at any time.
4. To ensure effectiveness of disinfection and for good operation of the distribution system, it is recommended that water entering the distribution system have turbidity levels of 1.0 NTU or less.
Measurement of Uncertainty has not been accounted for when stating conformity to the selected criteria, where applicable.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
9207696	OMA	Spiked Blank	Total Dissolved Solids	2018/10/31		98	%	80 - 120
9207696	OMA	Method Blank	Total Dissolved Solids	2018/10/31	<10		mg/L	
9207848	EL7	Spiked Blank	Turbidity	2018/10/30		98	%	80 - 120
9207848	EL7	Method Blank	Turbidity	2018/10/30	<0.10		NTU	
9207848	EL7	RPD	Turbidity	2018/10/30	NC		%	20
9208165	JLP	Matrix Spike	Aluminum (Al)	2018/10/31		103	%	80 - 120
			Antimony (Sb)	2018/10/31		104	%	80 - 120
			Arsenic (As)	2018/10/31		103	%	80 - 120
			Barium (Ba)	2018/10/31		101	%	80 - 120
			Beryllium (Be)	2018/10/31		102	%	80 - 120
			Bismuth (Bi)	2018/10/31		100	%	80 - 120
			Boron (B)	2018/10/31		NC	%	80 - 120
			Cadmium (Cd)	2018/10/31		102	%	80 - 120
			Chromium (Cr)	2018/10/31		100	%	80 - 120
			Cobalt (Co)	2018/10/31		99	%	80 - 120
			Copper (Cu)	2018/10/31		98	%	80 - 120
			Iron (Fe)	2018/10/31		102	%	80 - 120
			Lead (Pb)	2018/10/31		102	%	80 - 120
			Manganese (Mn)	2018/10/31		102	%	80 - 120
			Molybdenum (Mo)	2018/10/31		107	%	80 - 120
			Nickel (Ni)	2018/10/31		99	%	80 - 120
			Selenium (Se)	2018/10/31		100	%	80 - 120
			Silicon (Si)	2018/10/31		NC	%	80 - 120
			Silver (Ag)	2018/10/31		102	%	80 - 120
			Strontium (Sr)	2018/10/31		NC	%	80 - 120
			Thallium (Tl)	2018/10/31		102	%	80 - 120
			Tin (Sn)	2018/10/31		104	%	80 - 120
			Titanium (Ti)	2018/10/31		102	%	80 - 120
			Uranium (U)	2018/10/31		106	%	80 - 120
			Vanadium (V)	2018/10/31		102	%	80 - 120
			Zinc (Zn)	2018/10/31		102	%	80 - 120
			Zirconium (Zr)	2018/10/31		105	%	80 - 120
9208165	JLP	Spiked Blank	Aluminum (Al)	2018/10/31		102	%	80 - 120
			Antimony (Sb)	2018/10/31		100	%	80 - 120
			Arsenic (As)	2018/10/31		100	%	80 - 120
			Barium (Ba)	2018/10/31		99	%	80 - 120
			Beryllium (Be)	2018/10/31		100	%	80 - 120
			Bismuth (Bi)	2018/10/31		100	%	80 - 120
			Boron (B)	2018/10/31		97	%	80 - 120
			Cadmium (Cd)	2018/10/31		99	%	80 - 120
			Chromium (Cr)	2018/10/31		99	%	80 - 120
			Cobalt (Co)	2018/10/31		98	%	80 - 120
			Copper (Cu)	2018/10/31		98	%	80 - 120
			Iron (Fe)	2018/10/31		101	%	80 - 120
			Lead (Pb)	2018/10/31		101	%	80 - 120
			Manganese (Mn)	2018/10/31		101	%	80 - 120
			Molybdenum (Mo)	2018/10/31		101	%	80 - 120
			Nickel (Ni)	2018/10/31		100	%	80 - 120
			Selenium (Se)	2018/10/31		96	%	80 - 120
			Silicon (Si)	2018/10/31		106	%	80 - 120
			Silver (Ag)	2018/10/31		100	%	80 - 120
			Strontium (Sr)	2018/10/31		100	%	80 - 120
			Thallium (Tl)	2018/10/31		101	%	80 - 120
			Tin (Sn)	2018/10/31		100	%	80 - 120

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K2 Parks Services Ltd
Site Location: SPECT CT

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Titanium (Ti)	2018/10/31		98	%	80 - 120
			Uranium (U)	2018/10/31		102	%	80 - 120
			Vanadium (V)	2018/10/31		98	%	80 - 120
			Zinc (Zn)	2018/10/31		101	%	80 - 120
			Zirconium (Zr)	2018/10/31		99	%	80 - 120
9208165	JLP	Method Blank	Aluminum (Al)	2018/10/31	<3.0		ug/L	
			Antimony (Sb)	2018/10/31	<0.50		ug/L	
			Arsenic (As)	2018/10/31	<0.10		ug/L	
			Barium (Ba)	2018/10/31	<1.0		ug/L	
			Beryllium (Be)	2018/10/31	<0.10		ug/L	
			Bismuth (Bi)	2018/10/31	<1.0		ug/L	
			Boron (B)	2018/10/31	<50		ug/L	
			Cadmium (Cd)	2018/10/31	<0.010		ug/L	
			Chromium (Cr)	2018/10/31	<1.0		ug/L	
			Cobalt (Co)	2018/10/31	<0.20		ug/L	
			Copper (Cu)	2018/10/31	<0.50		ug/L	
			Iron (Fe)	2018/10/31	<10		ug/L	
			Lead (Pb)	2018/10/31	<0.20		ug/L	
			Manganese (Mn)	2018/10/31	<1.0		ug/L	
			Molybdenum (Mo)	2018/10/31	<1.0		ug/L	
			Nickel (Ni)	2018/10/31	<1.0		ug/L	
			Selenium (Se)	2018/10/31	<0.10		ug/L	
			Silicon (Si)	2018/10/31	<100		ug/L	
			Silver (Ag)	2018/10/31	<0.020		ug/L	
			Strontium (Sr)	2018/10/31	<1.0		ug/L	
			Thallium (Tl)	2018/10/31	<0.010		ug/L	
			Tin (Sn)	2018/10/31	<5.0		ug/L	
			Titanium (Ti)	2018/10/31	<5.0		ug/L	
			Uranium (U)	2018/10/31	<0.10		ug/L	
			Vanadium (V)	2018/10/31	<5.0		ug/L	
			Zinc (Zn)	2018/10/31	<5.0		ug/L	
			Zirconium (Zr)	2018/10/31	<0.10		ug/L	
9208165	JLP	RPD	Arsenic (As)	2018/10/31	1.5		%	20
9208674	MCU	Method Blank	UV absorbance (254nm)	2018/10/31	<0.010		AU/cm	
9208674	MCU	RPD	UV absorbance (254nm)	2018/10/31	3.3		%	20
9208687	IC4	Matrix Spike	Organic Carbon (C)	2018/10/31		98	%	80 - 120
9208687	IC4	Spiked Blank	Organic Carbon (C)	2018/10/31		100	%	80 - 120
9208687	IC4	Method Blank	Organic Carbon (C)	2018/10/31	<0.50		mg/L	
9208687	IC4	RPD	Organic Carbon (C)	2018/10/31	NC		%	20
9209213	MCU	Matrix Spike	Sulphide	2018/11/01		94	%	80 - 120
9209213	MCU	Spiked Blank	Sulphide	2018/11/01		99	%	80 - 120
9209213	MCU	Method Blank	Sulphide	2018/11/01	<0.0050		mg/L	
9209213	MCU	RPD	Sulphide	2018/11/01	1.2		%	20
9209803	KAB	Matrix Spike	Ammonia (N)	2018/10/31		100	%	80 - 120
9209803	KAB	Spiked Blank	Ammonia (N)	2018/10/31		108	%	80 - 120
9209803	KAB	Method Blank	Ammonia (N)	2018/10/31	<0.020		mg/L	
9209803	KAB	RPD	Ammonia (N)	2018/10/31	0.71		%	20
9209815	CGP	Spiked Blank	pH	2018/10/31		101	%	97 - 103
9209816	CGP	Spiked Blank	Conductivity	2018/10/31		98	%	80 - 120
9209816	CGP	Method Blank	Conductivity	2018/10/31	<2.0		uS/cm	
9209818	CGP	Spiked Blank	Alkalinity (Total as CaCO3)	2018/10/31		95	%	80 - 120
9209818	CGP	Method Blank	Alkalinity (Total as CaCO3)	2018/10/31	<1.0		mg/L	
			Alkalinity (PP as CaCO3)	2018/10/31	<1.0		mg/L	
			Bicarbonate (HCO3)	2018/10/31	<1.0		mg/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Carbonate (CO3)	2018/10/31	<1.0		mg/L	
			Hydroxide (OH)	2018/10/31	<1.0		mg/L	
9210005	IC4	Matrix Spike	Nitrogen (N)	2018/11/01		91	%	80 - 120
9210005	IC4	Spiked Blank	Nitrogen (N)	2018/11/01		95	%	80 - 120
9210005	IC4	Method Blank	Nitrogen (N)	2018/11/01	<0.020		mg/L	
9210005	IC4	RPD	Nitrogen (N)	2018/11/01	3.6		%	20
9210268	EL2	Matrix Spike	Mercury (Hg)	2018/11/01		112	%	80 - 120
9210268	EL2	Spiked Blank	Mercury (Hg)	2018/11/01		106	%	80 - 120
9210268	EL2	Method Blank	Mercury (Hg)	2018/11/01	<0.0020		ug/L	
9210268	EL2	RPD	Mercury (Hg)	2018/11/01	NC		%	20
9210870	VT1	Matrix Spike	Chloride (Cl)	2018/10/31		100	%	80 - 120
9210870	VT1	Spiked Blank	Chloride (Cl)	2018/10/31		97	%	80 - 120
9210870	VT1	Method Blank	Chloride (Cl)	2018/10/31	<1.0		mg/L	
9210870	VT1	RPD	Chloride (Cl)	2018/10/31	1.6		%	20
9210872	VT1	Matrix Spike	Sulphate (SO4)	2018/10/31		95	%	80 - 120
9210872	VT1	Spiked Blank	Sulphate (SO4)	2018/10/31		91	%	80 - 120
9210872	VT1	Method Blank	Sulphate (SO4)	2018/10/31	<1.0		mg/L	
9210872	VT1	RPD	Sulphate (SO4)	2018/10/31	2.3		%	20
9211388	OMA	Spiked Blank	Colour	2018/11/01		95	%	80 - 120
9211388	OMA	Method Blank	Colour	2018/11/01	<5		Col. Unit	
9211388	OMA	RPD	Colour	2018/11/01	NC		%	10
9211407	MO5	Matrix Spike	Nitrate plus Nitrite (N)	2018/11/01		99	%	80 - 120
9211407	MO5	Spiked Blank	Nitrate plus Nitrite (N)	2018/11/01		106	%	80 - 120
9211407	MO5	Method Blank	Nitrate plus Nitrite (N)	2018/11/01	<0.020		mg/L	
9211407	MO5	RPD	Nitrate plus Nitrite (N)	2018/11/01	NC		%	25
9211409	MO5	Matrix Spike	Nitrite (N)	2018/11/01		93	%	80 - 120
9211409	MO5	Spiked Blank	Nitrite (N)	2018/11/01		101	%	80 - 120
9211409	MO5	Method Blank	Nitrite (N)	2018/11/01	<0.0050		mg/L	
9211409	MO5	RPD	Nitrite (N)	2018/11/01	NC		%	20
9214163	BO3	Matrix Spike	Fluoride (F)	2018/11/03		110	%	80 - 120
9214163	BO3	Spiked Blank	Fluoride (F)	2018/11/03		104	%	80 - 120
9214163	BO3	Method Blank	Fluoride (F)	2018/11/03	<0.020		mg/L	
9214163	BO3	RPD	Fluoride (F)	2018/11/03	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.

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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