

HEMMERA ENVIROCHEM INC.

ATTN: Natasha Sandys 230 - 2237 2nd Avenue Whitehorse YK Y1A 0K7 Date Received: 03-JUN-15

Report Date: 16-JUN-15 13:41 (MT)

Version: FINAL

Client Phone: 867-456-4865

## **Certificate of Analysis**

Lab Work Order #: L1620902

Project P.O. #: NOT SUBMITTED

Job Reference: 1343-005.09

C of C Numbers: 1, 2

Legal Site Desc:

1 De l'Inder

Brent Mack, B.Sc. Account Manager

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	Sample ID Description Sampled Date Sampled Time Client ID	L1620902-2 Water 02-JUN-15 13:50 GS1-HA-01A	L1620902-3 Water 02-JUN-15 11:35 MW09-017	L1620902-4 Water 02-JUN-15 10:10 MW09-018	L1620902-5 Water 02-JUN-15 08:30 MW09-019	L1620902-6 Water 02-JUN-15 08:30 FB-2
Grouping	Analyte					
WATER						
Physical Tests	Conductivity (uS/cm)	977	2740	2560	2340	<2.0
	Hardness (as CaCO3) (mg/L)	593	1950	1780	1460	<0.50
	pH (pH)	8.14	8.02	8.05	7.80	5.55
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	257	425	396	403	<1.0
	Ammonia, Total (as N) (mg/L)	0.0669	<0.0050	0.0284	3.23	<0.0050
	Chloride (CI) (mg/L)	<0.50	<5.0 DLA	<5.0 DLA	<5.0 DLA	<0.50
	Fluoride (F) (mg/L)	0.118	<0.20 DLA	<0.20	0.28	<0.020
	Nitrate (as N) (mg/L)	0.0059	0.391	<0.050	<0.050	<0.0050
	Nitrite (as N) (mg/L)	<0.0010	<0.010	<0.010	<0.010	<0.0010
	Total Kjeldahl Nitrogen (mg/L)	0.346	0.093	0.129	4.02	<0.050
	Sulfate (SO4) (mg/L)	312	1540	1440	1230	<0.30
	Sulphide as S (mg/L)	0.133	<0.020	<0.020	0.123	<0.020
	Anion Sum (meq/L)	11.7	40.7	38.0	33.6	<0.10
	Cation Sum (meq/L)	12.4	39.7	36.3	31.7	<0.10
	Cation - Anion Balance (%)	3.0	-1.2	-2.2	-3.0	0.0
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Cyanide, Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Thiocyanate (SCN) (mg/L)	<0.50	<0.50	<0.50	0.53	<0.50
	Cyanide, Free (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Organic / Inorganic Carbon	Total Inorganic Carbon (mg/L)	51.4	95.1	95.6	96.4	<0.50
	Total Organic Carbon (mg/L)	4.27	2.49	2.63	12.6	<0.50
Total Metals	Aluminum (Al)-Total (mg/L)					
	Antimony (Sb)-Total (mg/L)					
	Arsenic (As)-Total (mg/L)					
	Barium (Ba)-Total (mg/L)					
	Beryllium (Be)-Total (mg/L)					
	Bismuth (Bi)-Total (mg/L)					
	Boron (B)-Total (mg/L)					
	Cadmium (Cd)-Total (mg/L)					
	Calcium (Ca)-Total (mg/L)					
	Chromium (Cr)-Total (mg/L)					
	Cobalt (Co)-Total (mg/L)					
	Copper (Cu)-Total (mg/L)					
	Iron (Fe)-Total (mg/L)					
	Lead (Pb)-Total (mg/L)					
	Lithium (Li)-Total (mg/L)					

<sup>\*</sup> Please refer to the Reference Information section for an explanation of any qualifiers detected.

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	Sample ID Description Sampled Date Sampled Time Client ID	L1620902-7 Water 02-JUN-15 14:40 MP09-14	L1620902-8 Water 02-JUN-15 17:00 CH-P-13-05/50	L1620902-9 Water 02-JUN-15 13:50 MW09-004	L1620902-10 Water 02-JUN-15 13:50 DUP-1	L1620902-11 Water 02-JUN-15 13:50 FB1
Grouping	Analyte					
WATER						
Physical Tests	Conductivity (uS/cm)		2860	2670	2660	<2.0
	Hardness (as CaCO3) (mg/L)	372	1940	1630	1630	<0.50
	pH (pH)		7.16	8.09	8.12	5.66
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)		76.8	100	97.0	<1.0
	Ammonia, Total (as N) (mg/L)		0.0395 DLA	6.27 DLA	6.19	<0.0050
	Chloride (CI) (mg/L)		<5.0	<5.0 DLA	<5.0 DLA	<0.50
	Fluoride (F) (mg/L)		0.25	0.64	0.55	<0.020
	Nitrate (as N) (mg/L)		< 0.050	0.269	0.300	<0.0050
	Nitrite (as N) (mg/L)		<0.010	0.040	0.045	<0.0010
	Total Kjeldahl Nitrogen (mg/L)		0.240	7.51	7.21	<0.050
	Sulfate (SO4) (mg/L)		2040	1550	1760	<0.30
	Sulphide as S (mg/L)		<0.020	<0.020	<0.020	<0.020
	Anion Sum (meq/L)		44.1	34.4	38.5	<0.10
	Cation Sum (meq/L)		42.0	35.5	35.4	<0.10
	Cation - Anion Balance (%)		-2.4	1.6	-4.2	0.0
Cyanides	Cyanide, Weak Acid Diss (mg/L)		<0.0050	<0.0050	<0.0050	<0.0050
	Cyanide, Total (mg/L)		<0.0050	<0.0050	<0.0050	<0.0050
	Thiocyanate (SCN) (mg/L)		<0.50	<0.50	<0.50	<0.50
	Cyanide, Free (mg/L)		<0.0050	<0.0050	<0.0050	<0.0050
Organic / Inorganic Carbon	Total Inorganic Carbon (mg/L)		12.0	18.7	19.0	<0.50
	Total Organic Carbon (mg/L)		5.34	6.29	6.23	<0.50
Total Metals	Aluminum (Al)-Total (mg/L)					
	Antimony (Sb)-Total (mg/L)					
	Arsenic (As)-Total (mg/L)					
	Barium (Ba)-Total (mg/L)					
	Beryllium (Be)-Total (mg/L)					
	Bismuth (Bi)-Total (mg/L)					
	Boron (B)-Total (mg/L)					
	Cadmium (Cd)-Total (mg/L)					
	Calcium (Ca)-Total (mg/L)					
	Chromium (Cr)-Total (mg/L)					
	Cobalt (Co)-Total (mg/L)					
	Copper (Cu)-Total (mg/L)					
	Iron (Fe)-Total (mg/L)					
	Lead (Pb)-Total (mg/L)					
	Lithium (Li)-Total (mg/L)					

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	Sample ID Description Sampled Date Sampled Time Client ID	L1620902-12 Water TRAVEL BLANK	L1620902-13 Water 02-JUN-15 15:10 MW09-03	L1620902-14 Water 02-JUN-15 10:20 MW09-02	L1620902-16 Water 01-JUN-15 18:00 MW09-016	L1620902-17 Water 01-JUN-15 18:00 DUP-2
Grouping	Analyte					
WATER						
Physical Tests	Conductivity (uS/cm)	<2.0	2600	2930	1970	1960
	Hardness (as CaCO3) (mg/L)	<0.50	1600	1410	1260	1280
	pH (pH)	5.48	8.01	7.03	7.97	7.98
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	<1.0	137	26.6	224	240
	Ammonia, Total (as N) (mg/L)	0.0071	3.06	14.2	0.0331	0.0321
	Chloride (CI) (mg/L)	<0.50	<5.0 DLA	<5.0	<5.0 DLA	<2.5
	Fluoride (F) (mg/L)	<0.020	0.58	0.82	0.47	0.25
	Nitrate (as N) (mg/L)	<0.0050	0.534	<0.050	<0.050	<0.025
	Nitrite (as N) (mg/L)	<0.0010	0.072	<0.010	<0.010	<0.0050
	Total Kjeldahl Nitrogen (mg/L)	<0.050	3.70	16.1	0.181	0.192
	Sulfate (SO4) (mg/L)	<0.30	1610	2240	1100	1120
	Sulphide as S (mg/L)	<0.020	<0.020	<0.020	<0.020	<0.020
	Anion Sum (meq/L)	<0.10	36.4	47.2	27.5	28.2
	Cation Sum (meq/L)	<0.10	35.2	38.3	26.0	26.4
	Cation - Anion Balance (%)	0.0	-1.6	-10.4	-2.8	-3.4
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050	0.0118	0.0192	<0.0050	<0.0050
	Cyanide, Total (mg/L)	<0.0050	0.0363	0.132	<0.0050	<0.0050
	Thiocyanate (SCN) (mg/L)	<0.50	<0.50	1.34	<0.50	<0.50
	Cyanide, Free (mg/L)	<0.0050	0.0108	<0.0050	<0.0050	<0.0050
Organic / Inorganic Carbon	Total Inorganic Carbon (mg/L)	<0.50	27.8	2.3 RRA	52.2	50.5
	Total Organic Carbon (mg/L)	<0.50	6.60	5.87	3.57	3.56
Total Metals	Aluminum (Al)-Total (mg/L)	<0.0030				
	Antimony (Sb)-Total (mg/L)	<0.00010				
	Arsenic (As)-Total (mg/L)	<0.00010				
	Barium (Ba)-Total (mg/L)	<0.000050				
	Beryllium (Be)-Total (mg/L)	<0.000020				
	Bismuth (Bi)-Total (mg/L)	<0.000050				
	Boron (B)-Total (mg/L)	<0.010				
	Cadmium (Cd)-Total (mg/L)	<0.000050				
	Calcium (Ca)-Total (mg/L)	<0.050				
	Chromium (Cr)-Total (mg/L)	<0.00010				
	Cobalt (Co)-Total (mg/L)	<0.00010				
	Copper (Cu)-Total (mg/L)	<0.00050				
	Iron (Fe)-Total (mg/L)	<0.010				
	Lead (Pb)-Total (mg/L)	<0.000050				
	Lithium (Li)-Total (mg/L)	<0.0010				

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	Sample ID Description Sampled Date Sampled Time Client ID	L1620902-22 Water 02-JUN-15 13:50 GSI-HA-01A FILTERED ALK	L1620902-23 Water 02-JUN-15 11:35 MW09-17 FILTERED ALK	L1620902-24 Water 02-JUN-15 10:10 MW09-18 FILTERED ALK	L1620902-25 Water 02-JUN-15 08:30 MW09-19 FILTERED ALK	L1620902-26 Water 02-JUN-15 08:30 FB-2 FILTERED ALK
Grouping	Analyte					
WATER						
Physical Tests	Conductivity (uS/cm)					
	Hardness (as CaCO3) (mg/L)					
	pH (pH)					
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	242	423	415	409	<1.0
	Ammonia, Total (as N) (mg/L)					
	Chloride (CI) (mg/L)					
	Fluoride (F) (mg/L)					
	Nitrate (as N) (mg/L)					
	Nitrite (as N) (mg/L)					
	Total Kjeldahl Nitrogen (mg/L)					
	Sulfate (SO4) (mg/L)					
	Sulphide as S (mg/L)					
	Anion Sum (meq/L)					
	Cation Sum (meq/L)					
	Cation - Anion Balance (%)					
Cyanides	Cyanide, Weak Acid Diss (mg/L)					
	Cyanide, Total (mg/L)					
	Thiocyanate (SCN) (mg/L)					
	Cyanide, Free (mg/L)					
Organic / Inorganic Carbon	Total Inorganic Carbon (mg/L)					
	Total Organic Carbon (mg/L)					
Total Metals	Aluminum (AI)-Total (mg/L)					
	Antimony (Sb)-Total (mg/L)					
	Arsenic (As)-Total (mg/L)					
	Barium (Ba)-Total (mg/L)					
	Beryllium (Be)-Total (mg/L)					
	Bismuth (Bi)-Total (mg/L)					
	Boron (B)-Total (mg/L)					
	Cadmium (Cd)-Total (mg/L)					
	Calcium (Ca)-Total (mg/L)					
	Chromium (Cr)-Total (mg/L)					
	Cobalt (Co)-Total (mg/L)					
	Copper (Cu)-Total (mg/L)					
	Iron (Fe)-Total (mg/L)					
	Lead (Pb)-Total (mg/L)					
	Lithium (Li)-Total (mg/L)					

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	Sample ID Description Sampled Date Sampled Time Client ID	L1620902-27 Water 02-JUN-15 17:00 CH-P-13-05/50 FILTERED ALK	L1620902-28 Water 02-JUN-15 13:50 MW09-04	L1620902-29 Water 02-JUN-15 13:50 DUP-1 FILTERED ALK	L1620902-30 Water 02-JUN-15 13:50 FB1 FILTERED ALK	L1620902-31 Water 02-JUN-15 15:10 MW09-03 FILTERED ALK
Grouping	Analyte					
WATER						
Physical Tests	Conductivity (uS/cm)					
	Hardness (as CaCO3) (mg/L)					
	pH (pH)					
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	71.0	96.4	96.3	<1.0	121
	Ammonia, Total (as N) (mg/L)					
	Chloride (CI) (mg/L)					
	Fluoride (F) (mg/L)					
	Nitrate (as N) (mg/L)					
	Nitrite (as N) (mg/L)					
	Total Kjeldahl Nitrogen (mg/L)					
	Sulfate (SO4) (mg/L)					
	Sulphide as S (mg/L)					
	Anion Sum (meq/L)					
	Cation Sum (meq/L)					
	Cation - Anion Balance (%)					
Cyanides	Cyanide, Weak Acid Diss (mg/L)					
	Cyanide, Total (mg/L)					
	Thiocyanate (SCN) (mg/L)					
	Cyanide, Free (mg/L)					
Organic / Inorganic Carbon	Total Inorganic Carbon (mg/L)					
	Total Organic Carbon (mg/L)					
Total Metals	Aluminum (Al)-Total (mg/L)					
	Antimony (Sb)-Total (mg/L)					
	Arsenic (As)-Total (mg/L)					
	Barium (Ba)-Total (mg/L)					
	Beryllium (Be)-Total (mg/L)					
	Bismuth (Bi)-Total (mg/L)					
	Boron (B)-Total (mg/L)					
	Cadmium (Cd)-Total (mg/L)					
	Calcium (Ca)-Total (mg/L)					
	Chromium (Cr)-Total (mg/L)					
	Cobalt (Co)-Total (mg/L)					
	Copper (Cu)-Total (mg/L)					
	Iron (Fe)-Total (mg/L)					
	Lead (Pb)-Total (mg/L)					
	Lithium (Li)-Total (mg/L)					

<sup>\*</sup> Please refer to the Reference Information section for an explanation of any qualifiers detected.

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	Sample ID Description Sampled Date Sampled Time Client ID	L1620902-32 Water 02-JUN-15 10:20 MW09-02 FILTERED ALK	L1620902-33 Water 01-JUN-15 18:00 MW09-16 FILTERED ALK	L1620902-34 Water 01-JUN-15 18:00 DUP-2 MW09-16	
Grouping	Analyte				
WATER					
Physical Tests	Conductivity (uS/cm)				
	Hardness (as CaCO3) (mg/L)				
	pH (pH)				
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	25.9	221	241	
	Ammonia, Total (as N) (mg/L)				
	Chloride (CI) (mg/L)				
	Fluoride (F) (mg/L)				
	Nitrate (as N) (mg/L)				
	Nitrite (as N) (mg/L)				
	Total Kjeldahl Nitrogen (mg/L)				
	Sulfate (SO4) (mg/L)				
	Sulphide as S (mg/L)				
	Anion Sum (meq/L)				
	Cation Sum (meq/L)				
	Cation - Anion Balance (%)				
Cyanides	Cyanide, Weak Acid Diss (mg/L)				
	Cyanide, Total (mg/L)				
	Thiocyanate (SCN) (mg/L)				
	Cyanide, Free (mg/L)				
Organic / Inorganic Carbon	Total Inorganic Carbon (mg/L)				
	Total Organic Carbon (mg/L)				
Total Metals	Aluminum (Al)-Total (mg/L)				
	Antimony (Sb)-Total (mg/L)				
	Arsenic (As)-Total (mg/L)				
	Barium (Ba)-Total (mg/L)				
	Beryllium (Be)-Total (mg/L)				
	Bismuth (Bi)-Total (mg/L)				
	Boron (B)-Total (mg/L)				
	Cadmium (Cd)-Total (mg/L)				
	Calcium (Ca)-Total (mg/L)				
	Chromium (Cr)-Total (mg/L)				
	Cobalt (Co)-Total (mg/L)				
	Copper (Cu)-Total (mg/L)				
	Iron (Fe)-Total (mg/L)				
	Lead (Pb)-Total (mg/L)				
	Lithium (Li)-Total (mg/L)				

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## 16-JUN-15 13:41 (MT) Version: FINAL

	Sample ID Description Sampled Date Sampled Time Client ID	L1620902-2 Water 02-JUN-15 13:50 GS1-HA-01A	L1620902-3 Water 02-JUN-15 11:35 MW09-017	L1620902-4 Water 02-JUN-15 10:10 MW09-018	L1620902-5 Water 02-JUN-15 08:30 MW09-019	L1620902-6 Water 02-JUN-15 08:30 FB-2
Grouping	Analyte					
WATER						
Total Metals	Magnesium (Mg)-Total (mg/L)					
	Manganese (Mn)-Total (mg/L)					
	Mercury (Hg)-Total (mg/L)					
	Molybdenum (Mo)-Total (mg/L)					
	Nickel (Ni)-Total (mg/L)					
	Phosphorus (P)-Total (mg/L)					
	Potassium (K)-Total (mg/L)					
	Selenium (Se)-Total (mg/L)					
	Silicon (Si)-Total (mg/L)					
	Silver (Ag)-Total (mg/L)					
	Sodium (Na)-Total (mg/L)					
	Strontium (Sr)-Total (mg/L)					
	Sulfur (S)-Total (mg/L)					
	Thallium (TI)-Total (mg/L)					
	Tin (Sn)-Total (mg/L)					
	Titanium (Ti)-Total (mg/L)					
	Uranium (U)-Total (mg/L)					
	Vanadium (V)-Total (mg/L)					
	Zinc (Zn)-Total (mg/L)					
	Zirconium (Zr)-Total (mg/L)					
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	0.0031	OLA <0.0020	<0.0020	0.0090	<0.0010
	Antimony (Sb)-Dissolved (mg/L)	0.00017	0.00032	0.00034	O.00020	<0.00010
	Arsenic (As)-Dissolved (mg/L)	0.0115	0.0208	0.0518	0.117	<0.00010
	Barium (Ba)-Dissolved (mg/L)	0.161	0.00749	0.00768	0.0460	<0.000050
	Beryllium (Be)-Dissolved (mg/L)	<0.000020	O.000040	OLA <0.00040	OLA <0.00040	<0.000020
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	OLA <0.00010	OLA <0.00010	OLA <0.00010	<0.000050
	Boron (B)-Dissolved (mg/L)	<0.010	0.083	OLA <0.020	0.190	<0.010
	Cadmium (Cd)-Dissolved (mg/L)	0.0000071	0.000017	0.000056	OLA <0.00010	<0.0000050
	Calcium (Ca)-Dissolved (mg/L)	153	337	323	313	<0.050
	Chromium (Cr)-Dissolved (mg/L)	0.00044	ODLA <0.00020	OLA <0.00020	O10 DLA <0.00020	<0.00010
	Cobalt (Co)-Dissolved (mg/L)	0.00019	O.00020	OLA <0.00020	0.00251	<0.00010
	Copper (Cu)-Dissolved (mg/L)	0.00020	0.00061	O.00040	<0.00040	<0.00020
	Iron (Fe)-Dissolved (mg/L)	3.71	<0.010	<0.010	20.5	<0.010
	Lead (Pb)-Dissolved (mg/L)	0.000056	<0.00010	<0.00010	<0.00010	<0.000050
	Lithium (Li)-Dissolved (mg/L)	0.0068	0.0199	0.0212	0.0106	<0.0010

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	Sample ID Description Sampled Date Sampled Time Client ID	L1620902-7 Water 02-JUN-15 14:40 MP09-14	L1620902-8 Water 02-JUN-15 17:00 CH-P-13-05/50	L1620902-9 Water 02-JUN-15 13:50 MW09-004	L1620902-10 Water 02-JUN-15 13:50 DUP-1	L1620902-11 Water 02-JUN-15 13:50 FB1
Grouping	Analyte					
WATER						
Total Metals	Magnesium (Mg)-Total (mg/L)					
	Manganese (Mn)-Total (mg/L)					
	Mercury (Hg)-Total (mg/L)					
	Molybdenum (Mo)-Total (mg/L)					
	Nickel (Ni)-Total (mg/L)					
	Phosphorus (P)-Total (mg/L)					
	Potassium (K)-Total (mg/L)					
	Selenium (Se)-Total (mg/L)					
	Silicon (Si)-Total (mg/L)					
	Silver (Ag)-Total (mg/L)					
	Sodium (Na)-Total (mg/L)					
	Strontium (Sr)-Total (mg/L)					
	Sulfur (S)-Total (mg/L)					
	Thallium (TI)-Total (mg/L)					
	Tin (Sn)-Total (mg/L)					
	Titanium (Ti)-Total (mg/L)					
	Uranium (U)-Total (mg/L)					
	Vanadium (V)-Total (mg/L)					
	Zinc (Zn)-Total (mg/L)					
	Zirconium (Zr)-Total (mg/L)					
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	0.0041	0.0599	OLA <0.0020	OLA <0.0020	<0.0010
	Antimony (Sb)-Dissolved (mg/L)	0.00586	0.00436	0.285	0.283	<0.00010
	Arsenic (As)-Dissolved (mg/L)	3.44	0.00966	3.84	3.85	<0.00010
	Barium (Ba)-Dissolved (mg/L)	0.145	0.00604	0.00758	0.00735	<0.000050
	Beryllium (Be)-Dissolved (mg/L)	<0.000020	0.00015	OLA <0.00040	OLA <0.00040	<0.000020
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	OLA <0.00025	O.00010	O.00010	<0.000050
	Boron (B)-Dissolved (mg/L)	0.025	OLA <0.050	0.307	0.296	<0.010
	Cadmium (Cd)-Dissolved (mg/L)	0.0000311	0.329	0.000029	0.000026	<0.0000050
	Calcium (Ca)-Dissolved (mg/L)	121	455	469	484	<0.050
	Chromium (Cr)-Dissolved (mg/L)	0.00019	OLA <0.00050	OLA <0.00020	OLA <0.00020	<0.00010
	Cobalt (Co)-Dissolved (mg/L)	0.00068	0.0365	0.00089	0.00086	<0.00010
	Copper (Cu)-Dissolved (mg/L)	<0.00020	0.0150	O.00040	O.00040	<0.00020
	Iron (Fe)-Dissolved (mg/L)	7.72	12.8	0.011	0.019	<0.010
	Lead (Pb)-Dissolved (mg/L)	0.000798	0.00573	0.00052	0.00071	<0.00050
	Lithium (Li)-Dissolved (mg/L)	0.0063	0.0394	0.0093	0.0093	<0.0010

<sup>\*</sup> Please refer to the Reference Information section for an explanation of any qualifiers detected.

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	Sample ID Description Sampled Date Sampled Time Client ID	L1620902-12 Water TRAVEL BLANK	L1620902-13 Water 02-JUN-15 15:10 MW09-03	L1620902-14 Water 02-JUN-15 10:20 MW09-02	L1620902-16 Water 01-JUN-15 18:00 MW09-016	L1620902-17 Water 01-JUN-15 18:00 DUP-2
Grouping	Analyte					
WATER						
Total Metals	Magnesium (Mg)-Total (mg/L)	<0.10				
	Manganese (Mn)-Total (mg/L)	<0.00010				
	Mercury (Hg)-Total (mg/L)	<0.000050				
	Molybdenum (Mo)-Total (mg/L)	<0.000050				
	Nickel (Ni)-Total (mg/L)	<0.00050				
	Phosphorus (P)-Total (mg/L)	<0.050				
	Potassium (K)-Total (mg/L)	<0.10				
	Selenium (Se)-Total (mg/L)	<0.000050				
	Silicon (Si)-Total (mg/L)	<0.050				
	Silver (Ag)-Total (mg/L)	<0.00010				
	Sodium (Na)-Total (mg/L)	<0.050				
	Strontium (Sr)-Total (mg/L)	<0.00020				
	Sulfur (S)-Total (mg/L)	<0.50				
	Thallium (TI)-Total (mg/L)	<0.00010				
	Tin (Sn)-Total (mg/L)	<0.00010				
	Titanium (Ti)-Total (mg/L)	<0.00030				
	Uranium (U)-Total (mg/L)	<0.00010				
	Vanadium (V)-Total (mg/L)	<0.00050				
	Zinc (Zn)-Total (mg/L)	<0.0030				
	Zirconium (Zr)-Total (mg/L)	<0.00030				
Dissolved Metals	Dissolved Mercury Filtration Location		FIELD	FIELD	FIELD	FIELD
	Dissolved Metals Filtration Location		FIELD	FIELD	FIELD	FIELD
	Aluminum (AI)-Dissolved (mg/L)		OLA <0.0050	<0.0050	<0.0010	<0.0010
	Antimony (Sb)-Dissolved (mg/L)		0.467	0.00314	0.0801	0.0780
	Arsenic (As)-Dissolved (mg/L)		1.47	20.2	0.0426	0.0420
	Barium (Ba)-Dissolved (mg/L)		0.0316	0.00683	0.0144	0.0147
	Beryllium (Be)-Dissolved (mg/L)		<0.00010	<0.00010	<0.000020	<0.000020
	Bismuth (Bi)-Dissolved (mg/L)		O.00025	<0.00025	<0.000050	<0.000050
	Boron (B)-Dissolved (mg/L)		0.155	<0.050	0.062	0.068
	Cadmium (Cd)-Dissolved (mg/L)		0.000608	0.000447	0.0440	0.0448
	Calcium (Ca)-Dissolved (mg/L)		493	438	297	303
	Chromium (Cr)-Dissolved (mg/L)		OLA <0.00050	<0.00050	<0.00010	<0.00010
	Cobalt (Co)-Dissolved (mg/L)		0.00325	0.0104	0.00295	0.00290
	Copper (Cu)-Dissolved (mg/L)		O.0010	<0.0010	0.00526	0.00513
	Iron (Fe)-Dissolved (mg/L)		0.167	46.4	0.033	0.034
	Lead (Pb)-Dissolved (mg/L)		<0.00025	<0.00025	0.00583	0.00635
	Lithium (Li)-Dissolved (mg/L)		<0.0050	0.0239	0.0097	0.0101

<sup>\*</sup> Please refer to the Reference Information section for an explanation of any qualifiers detected.

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	Sample ID Description Sampled Date Sampled Time Client ID	L1620902-22 Water 02-JUN-15 13:50 GSI-HA-01A FILTERED ALK	L1620902-23 Water 02-JUN-15 11:35 MW09-17 FILTERED ALK	L1620902-24 Water 02-JUN-15 10:10 MW09-18 FILTERED ALK	L1620902-25 Water 02-JUN-15 08:30 MW09-19 FILTERED ALK	L1620902-26 Water 02-JUN-15 08:30 FB-2 FILTERED ALK
Grouping	Analyte					
WATER						
Total Metals	Magnesium (Mg)-Total (mg/L)					
	Manganese (Mn)-Total (mg/L)					
	Mercury (Hg)-Total (mg/L)					
	Molybdenum (Mo)-Total (mg/L)					
	Nickel (Ni)-Total (mg/L)					
	Phosphorus (P)-Total (mg/L)					
	Potassium (K)-Total (mg/L)					
	Selenium (Se)-Total (mg/L)					
	Silicon (Si)-Total (mg/L)					
	Silver (Ag)-Total (mg/L)					
	Sodium (Na)-Total (mg/L)					
	Strontium (Sr)-Total (mg/L)					
	Sulfur (S)-Total (mg/L)					
	Thallium (TI)-Total (mg/L)					
	Tin (Sn)-Total (mg/L)					
	Titanium (Ti)-Total (mg/L)					
	Uranium (U)-Total (mg/L)					
	Vanadium (V)-Total (mg/L)					
	Zinc (Zn)-Total (mg/L)					
	Zirconium (Zr)-Total (mg/L)					
Dissolved Metals	Dissolved Mercury Filtration Location					
	Dissolved Metals Filtration Location					
	Aluminum (Al)-Dissolved (mg/L)					
	Antimony (Sb)-Dissolved (mg/L)					
	Arsenic (As)-Dissolved (mg/L)					
	Barium (Ba)-Dissolved (mg/L)					
	Beryllium (Be)-Dissolved (mg/L)					
	Bismuth (Bi)-Dissolved (mg/L)					
	Boron (B)-Dissolved (mg/L)					
	Cadmium (Cd)-Dissolved (mg/L)					
	Calcium (Ca)-Dissolved (mg/L)					
	Chromium (Cr)-Dissolved (mg/L)					
	Cobalt (Co)-Dissolved (mg/L)					
	Copper (Cu)-Dissolved (mg/L)					
	Iron (Fe)-Dissolved (mg/L)					
	Lead (Pb)-Dissolved (mg/L)					
	Lithium (Li)-Dissolved (mg/L)					

<sup>\*</sup> Please refer to the Reference Information section for an explanation of any qualifiers detected.

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#### ALS ENVIRONMENTAL ANALYTICAL REPORT

L1620902-27 L1620902-28 L1620902-29 L1620902-30 L1620902-31 Sample ID Description Water Water Water Water Water 02-JUN-15 02-JUN-15 02-JUN-15 02-JUN-15 02-JUN-15 Sampled Date 13:50 13:50 15:10 Sampled Time 17:00 13:50 CH-P-13-05/50 MW09-04 **DUP-1 FILTERED** FB1 FILTERED MW09-03 **Client ID** FILTERED ALK ALK FILTERED ALK Grouping **Analyte WATER Total Metals** Magnesium (Mg)-Total (mg/L) Manganese (Mn)-Total (mg/L) Mercury (Hg)-Total (mg/L) Molybdenum (Mo)-Total (mg/L) Nickel (Ni)-Total (mg/L) Phosphorus (P)-Total (mg/L) Potassium (K)-Total (mg/L) Selenium (Se)-Total (mg/L) Silicon (Si)-Total (mg/L) Silver (Ag)-Total (mg/L) Sodium (Na)-Total (mg/L) Strontium (Sr)-Total (mg/L) Sulfur (S)-Total (mg/L) Thallium (TI)-Total (mg/L) Tin (Sn)-Total (mg/L) Titanium (Ti)-Total (mg/L) Uranium (U)-Total (mg/L) Vanadium (V)-Total (mg/L) Zinc (Zn)-Total (mg/L) Zirconium (Zr)-Total (mg/L) **Dissolved Metals** Dissolved Mercury Filtration Location Dissolved Metals Filtration Location Aluminum (Al)-Dissolved (mg/L) Antimony (Sb)-Dissolved (mg/L) Arsenic (As)-Dissolved (mg/L) Barium (Ba)-Dissolved (mg/L) Beryllium (Be)-Dissolved (mg/L) Bismuth (Bi)-Dissolved (mg/L) Boron (B)-Dissolved (mg/L) Cadmium (Cd)-Dissolved (mg/L) Calcium (Ca)-Dissolved (mg/L) Chromium (Cr)-Dissolved (mg/L) Cobalt (Co)-Dissolved (mg/L) Copper (Cu)-Dissolved (mg/L) Iron (Fe)-Dissolved (mg/L) Lead (Pb)-Dissolved (mg/L) Lithium (Li)-Dissolved (mg/L)

<sup>\*</sup> Please refer to the Reference Information section for an explanation of any qualifiers detected.

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	Sample ID Description Sampled Date Sampled Time Client ID	L1620902-32 Water 02-JUN-15 10:20 MW09-02 FILTERED ALK	L1620902-33 Water 01-JUN-15 18:00 MW09-16 FILTERED ALK	L1620902-34 Water 01-JUN-15 18:00 DUP-2 MW09-16	
Grouping	Analyte				
WATER					
Total Metals	Magnesium (Mg)-Total (mg/L)				
	Manganese (Mn)-Total (mg/L)				
	Mercury (Hg)-Total (mg/L)				
	Molybdenum (Mo)-Total (mg/L)				
	Nickel (Ni)-Total (mg/L)				
	Phosphorus (P)-Total (mg/L)				
	Potassium (K)-Total (mg/L)				
	Selenium (Se)-Total (mg/L)				
	Silicon (Si)-Total (mg/L)				
	Silver (Ag)-Total (mg/L)				
	Sodium (Na)-Total (mg/L)				
	Strontium (Sr)-Total (mg/L)				
	Sulfur (S)-Total (mg/L)				
	Thallium (TI)-Total (mg/L)				
	Tin (Sn)-Total (mg/L)				
	Titanium (Ti)-Total (mg/L)				
	Uranium (U)-Total (mg/L)				
	Vanadium (V)-Total (mg/L)				
	Zinc (Zn)-Total (mg/L)				
	Zirconium (Zr)-Total (mg/L)				
Dissolved Metals	Dissolved Mercury Filtration Location				
	Dissolved Metals Filtration Location				
	Aluminum (Al)-Dissolved (mg/L)				
	Antimony (Sb)-Dissolved (mg/L)				
	Arsenic (As)-Dissolved (mg/L)				
	Barium (Ba)-Dissolved (mg/L)				
	Beryllium (Be)-Dissolved (mg/L)				
	Bismuth (Bi)-Dissolved (mg/L)				
	Boron (B)-Dissolved (mg/L)				
	Cadmium (Cd)-Dissolved (mg/L)				
	Calcium (Ca)-Dissolved (mg/L)				
	Chromium (Cr)-Dissolved (mg/L)				
	Cobalt (Co)-Dissolved (mg/L)				
	Copper (Cu)-Dissolved (mg/L)				
	Iron (Fe)-Dissolved (mg/L)				
	Lead (Pb)-Dissolved (mg/L)				
	Lithium (Li)-Dissolved (mg/L)				

<sup>\*</sup> Please refer to the Reference Information section for an explanation of any qualifiers detected.

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	Sample ID Description Sampled Date Sampled Time Client ID	L1620902-2 Water 02-JUN-15 13:50 GS1-HA-01A	L1620902-3 Water 02-JUN-15 11:35 MW09-017	L1620902-4 Water 02-JUN-15 10:10 MW09-018	L1620902-5 Water 02-JUN-15 08:30 MW09-019	L1620902-6 Water 02-JUN-15 08:30 FB-2
Grouping	Analyte					
WATER						
Dissolved Metals	Magnesium (Mg)-Dissolved (mg/L)	51.1	269	237	165	<0.10
	Manganese (Mn)-Dissolved (mg/L)	0.185	<0.00020	0.611	7.05	<0.00010
	Mercury (Hg)-Dissolved (mg/L)	<0.000050	<0.0000050	<0.000050	<0.000050	<0.000050
	Molybdenum (Mo)-Dissolved (mg/L)	0.000406	<0.00010	<0.00010	0.00018	<0.000050
	Nickel (Ni)-Dissolved (mg/L)	0.00251	<0.0010	<0.0010	<0.0010	<0.00050
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	0.145	<0.050
	Potassium (K)-Dissolved (mg/L)	3.38	7.11	6.99	6.76	<0.10
	Selenium (Se)-Dissolved (mg/L)	<0.000050	0.00061	0.00059	0.00021	<0.000050
	Silicon (Si)-Dissolved (mg/L)	6.38	5.10	4.96	8.46	<0.050
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000020	<0.000020	<0.000020	<0.000010
	Sodium (Na)-Dissolved (mg/L)	5.08	12.7	11.1	16.8	<0.050
	Strontium (Sr)-Dissolved (mg/L)	0.341	1.01	0.929	1.07	<0.00020
	Sulfur (S)-Dissolved (mg/L)	103	462	414	345	<0.50
	Thallium (TI)-Dissolved (mg/L)	<0.000010	0.000094	0.000261	<0.000020	<0.000010
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00020	<0.00020	<0.00020	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.00030	<0.00060	<0.00060	0.00079	<0.00030
	Uranium (U)-Dissolved (mg/L)	0.000030	0.00753	0.00652	0.000755	<0.000010
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.0010	<0.0010	<0.0010	<0.00050
	Zinc (Zn)-Dissolved (mg/L)	0.0023	<0.0020	0.0025	<0.0020	<0.0010
	Zirconium (Zr)-Dissolved (mg/L)	<0.00030	<0.00060	<0.00060	<0.00060	<0.00030

<sup>\*</sup> Please refer to the Reference Information section for an explanation of any qualifiers detected.

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	Sample ID Description Sampled Date Sampled Time Client ID		L1620902-8 Water 02-JUN-15 17:00 CH-P-13-05/50	L1620902-9 Water 02-JUN-15 13:50 MW09-004	L1620902-10 Water 02-JUN-15 13:50 DUP-1	L1620902-11 Water 02-JUN-15 13:50 FB1
Grouping	Analyte					
WATER						
Dissolved Metals	Magnesium (Mg)-Dissolved (mg/L)	16.7	194	112	101	<0.10
	Manganese (Mn)-Dissolved (mg/L)	0.363	34.3	6.47	6.32	<0.00010
	Mercury (Hg)-Dissolved (mg/L)	0.0000067	<0.000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)	0.00146	0.00040	0.00573	0.00570	<0.000050
	Nickel (Ni)-Dissolved (mg/L)	0.00146	0.0129	<0.0010	<0.0010	<0.00050
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	0.078	0.074	<0.050
	Potassium (K)-Dissolved (mg/L)	31.5	5.01	35.0	36.7	<0.10
	Selenium (Se)-Dissolved (mg/L)	0.000128	<0.00025	<0.00010	<0.00010	<0.000050
	Silicon (Si)-Dissolved (mg/L)	2.90	7.50	13.4	13.8	<0.050
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000050	<0.000020	<0.000020	<0.00010
	Sodium (Na)-Dissolved (mg/L)	17.7	7.72	30.8	30.3	<0.050
	Strontium (Sr)-Dissolved (mg/L)	0.442	0.584	1.34	1.31	<0.00020
	Sulfur (S)-Dissolved (mg/L)	72.3	621	535	493	<0.50
	Thallium (TI)-Dissolved (mg/L)	<0.000010	0.000564	0.000107	0.000108	<0.000010
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00050	<0.00020	<0.00020	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.00030	<0.0015	<0.00060	<0.00060	<0.00030
	Uranium (U)-Dissolved (mg/L)	0.000355	0.000749	0.000346	0.000332	<0.000010
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.0025	<0.0010	<0.0010	<0.00050
	Zinc (Zn)-Dissolved (mg/L)	0.0018	29.1	0.713	0.705	<0.0010
	Zirconium (Zr)-Dissolved (mg/L)	<0.00030	<0.0015	<0.00060	<0.00060	<0.00030

<sup>\*</sup> Please refer to the Reference Information section for an explanation of any qualifiers detected.

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	Sample ID Description Sampled Date Sampled Time Client ID	L1620902-12 Water TRAVEL BLANK	L1620902-13 Water 02-JUN-15 15:10 MW09-03	L1620902-14 Water 02-JUN-15 10:20 MW09-02	L1620902-16 Water 01-JUN-15 18:00 MW09-016	L1620902-17 Water 01-JUN-15 18:00 DUP-2
Grouping	Analyte					
WATER						
Dissolved Metals	Magnesium (Mg)-Dissolved (mg/L)		89.8	75.7	127	128
	Manganese (Mn)-Dissolved (mg/L)		35.1	38.2	0.803	0.777
	Mercury (Hg)-Dissolved (mg/L)		<0.000050	0.0000051	0.0000175	0.0000165
	Molybdenum (Mo)-Dissolved (mg/L)		0.00511	0.00491	0.000222	0.000228
	Nickel (Ni)-Dissolved (mg/L)		<0.0025	0.0027	0.00535	0.00518
	Phosphorus (P)-Dissolved (mg/L)		0.051	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)		22.1	82.7	6.32	6.49
	Selenium (Se)-Dissolved (mg/L)		<0.00025	<0.00025	0.000097	0.000100
	Silicon (Si)-Dissolved (mg/L)		13.9	5.81	4.53	4.61
	Silver (Ag)-Dissolved (mg/L)		<0.00050	<0.00050	0.000097	0.000103
	Sodium (Na)-Dissolved (mg/L)		27.6	73.5	7.32	6.99
	Strontium (Sr)-Dissolved (mg/L)		1.27	0.933	0.665	0.676
	Sulfur (S)-Dissolved (mg/L)		490	538	317	321
	Thallium (TI)-Dissolved (mg/L)		0.000055	0.000216	0.000459	0.000454
	Tin (Sn)-Dissolved (mg/L)		<0.00050	<0.00050	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)		<0.0015	<0.0015	<0.00030	<0.00030
	Uranium (U)-Dissolved (mg/L)		0.00149	0.000535	0.00301	0.00293
	Vanadium (V)-Dissolved (mg/L)		<0.0025	<0.0025	<0.00050	<0.00050
	Zinc (Zn)-Dissolved (mg/L)		<0.0050	0.178	6.24	6.09
	Zirconium (Zr)-Dissolved (mg/L)		<0.0015	<0.0015	<0.00030	<0.00030

<sup>\*</sup> Please refer to the Reference Information section for an explanation of any qualifiers detected.

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#### Version: FINAL

	Sample ID Description Sampled Date Sampled Time Client ID	L1620902-22 Water 02-JUN-15 13:50 GSI-HA-01A FILTERED ALK	L1620902-23 Water 02-JUN-15 11:35 MW09-17 FILTERED ALK	L1620902-24 Water 02-JUN-15 10:10 MW09-18 FILTERED ALK	L1620902-25 Water 02-JUN-15 08:30 MW09-19 FILTERED ALK	L1620902-26 Water 02-JUN-15 08:30 FB-2 FILTERED ALK
Grouping	Analyte					
WATER						
Dissolved Metals	Magnesium (Mg)-Dissolved (mg/L)					
	Manganese (Mn)-Dissolved (mg/L)					
	Mercury (Hg)-Dissolved (mg/L)					
	Molybdenum (Mo)-Dissolved (mg/L)					
	Nickel (Ni)-Dissolved (mg/L)					
	Phosphorus (P)-Dissolved (mg/L)					
	Potassium (K)-Dissolved (mg/L)					
	Selenium (Se)-Dissolved (mg/L)					
	Silicon (Si)-Dissolved (mg/L)					
	Silver (Ag)-Dissolved (mg/L)					
	Sodium (Na)-Dissolved (mg/L)					
	Strontium (Sr)-Dissolved (mg/L)					
	Sulfur (S)-Dissolved (mg/L)					
	Thallium (TI)-Dissolved (mg/L)					
	Tin (Sn)-Dissolved (mg/L)					
	Titanium (Ti)-Dissolved (mg/L)					
	Uranium (U)-Dissolved (mg/L)					
	Vanadium (V)-Dissolved (mg/L)					
	Zinc (Zn)-Dissolved (mg/L)					
	Zirconium (Zr)-Dissolved (mg/L)					

<sup>\*</sup> Please refer to the Reference Information section for an explanation of any qualifiers detected.

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### ALS ENVIRONMENTAL ANALYTICAL REPORT

L1620902-27 L1620902-28 L1620902-29 L1620902-30 L1620902-31 Sample ID Description Water Water Water Water Water 02-JUN-15 02-JUN-15 02-JUN-15 02-JUN-15 02-JUN-15 Sampled Date 17:00 13:50 13:50 13:50 15:10 Sampled Time CH-P-13-05/50 MW09-04 **DUP-1 FILTERED** FB1 FILTERED MW09-03 Client ID FILTERED ALK ALK FILTERED ALK Grouping Analyte **WATER Dissolved Metals** Magnesium (Mg)-Dissolved (mg/L) Manganese (Mn)-Dissolved (mg/L) Mercury (Hg)-Dissolved (mg/L) Molybdenum (Mo)-Dissolved (mg/L) Nickel (Ni)-Dissolved (mg/L) Phosphorus (P)-Dissolved (mg/L) Potassium (K)-Dissolved (mg/L) Selenium (Se)-Dissolved (mg/L) Silicon (Si)-Dissolved (mg/L) Silver (Ag)-Dissolved (mg/L) Sodium (Na)-Dissolved (mg/L) Strontium (Sr)-Dissolved (mg/L) Sulfur (S)-Dissolved (mg/L) Thallium (TI)-Dissolved (mg/L) Tin (Sn)-Dissolved (mg/L) Titanium (Ti)-Dissolved (mg/L) Uranium (U)-Dissolved (mg/L) Vanadium (V)-Dissolved (mg/L) Zinc (Zn)-Dissolved (mg/L) Zirconium (Zr)-Dissolved (mg/L)

<sup>\*</sup> Please refer to the Reference Information section for an explanation of any qualifiers detected.

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	Sample ID Description Sampled Date Sampled Time Client ID	L1620902-32 Water 02-JUN-15 10:20 MW09-02 FILTERED ALK	L1620902-33 Water 01-JUN-15 18:00 MW09-16 FILTERED ALK	L1620902-34 Water 01-JUN-15 18:00 DUP-2 MW09-16	
Grouping	Analyte				
WATER					
Dissolved Metals	Magnesium (Mg)-Dissolved (mg/L)				
	Manganese (Mn)-Dissolved (mg/L)				
	Mercury (Hg)-Dissolved (mg/L)				
	Molybdenum (Mo)-Dissolved (mg/L)				
	Nickel (Ni)-Dissolved (mg/L)				
	Phosphorus (P)-Dissolved (mg/L)				
	Potassium (K)-Dissolved (mg/L)				
	Selenium (Se)-Dissolved (mg/L)				
	Silicon (Si)-Dissolved (mg/L)				
	Silver (Ag)-Dissolved (mg/L)				
	Sodium (Na)-Dissolved (mg/L)				
	Strontium (Sr)-Dissolved (mg/L)				
	Sulfur (S)-Dissolved (mg/L)				
	Thallium (TI)-Dissolved (mg/L)				
	Tin (Sn)-Dissolved (mg/L)				
	Titanium (Ti)-Dissolved (mg/L)				
	Uranium (U)-Dissolved (mg/L)				
	Vanadium (V)-Dissolved (mg/L)				
	Zinc (Zn)-Dissolved (mg/L)				
	Zirconium (Zr)-Dissolved (mg/L)				

<sup>\*</sup> Please refer to the Reference Information section for an explanation of any qualifiers detected.

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### **Reference Information**

#### QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Total Inorganic Carbon	HTA	L1620902-10, -13, -16, -4, -5, -9
Duplicate	Total Inorganic Carbon	HTA	L1620902-10, -13, -16, -4, -5, -9
Duplicate	Total Inorganic Carbon	HTA	L1620902-10, -13, -16, -4, -5, -9
Matrix Spike	Total Inorganic Carbon	MS-B	L1620902-10, -13, -16, -4, -5, -9
Matrix Spike	Thiocyanate (SCN)	MS-B	L1620902-10, -11, -12, -13, -14, -16, -17, -2, -3, -4, -5, -6, -8, -9
Matrix Spike	Thiocyanate (SCN)	MS-B	L1620902-10, -11, -12, -13, -14, -16, -17, -2, -3, -4, -5, -6, -8, -9
Matrix Spike	Sulfate (SO4)	MS-B	L1620902-10, -11, -12, -13, -14, -16, -17, -2, -3, -4, -5, -6, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1620902-10, -11, -13, -14, -16, -17, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1620902-10, -11, -13, -14, -16, -17, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1620902-10, -11, -13, -14, -16, -17, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1620902-10, -11, -13, -14, -16, -17, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Total Organic Carbon	MS-B	L1620902-8
Matrix Spike	Total Organic Carbon	MS-B	L1620902-8
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L1620902-10, -11, -13, -14, -16, -17, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L1620902-10, -11, -13, -14, -16, -17, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Total Kjeldahl Nitrogen	MS-B	L1620902-10, -11, -12, -13, -14, -16, -17, -2, -3, -4, -5, -6, -8, -9
Matrix Spike	Boron (B)-Dissolved	MS-B	L1620902-10, -11, -13, -14, -16, -17, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1620902-10, -11, -13, -14, -16, -17, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1620902-10, -11, -13, -14, -16, -17, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1620902-10, -11, -13, -14, -16, -17, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Total Inorganic Carbon	MS-B	L1620902-3, -8

#### **Qualifiers for Individual Parameters Listed:**

Qualifier	Description
DLA	Detection Limit adjusted for required dilution
HTA	Analytical holding time was exceeded.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRA	Reported Result Is The Average Of 2 Or More Analyses
RRV	Reported Result Verified By Repeat Analysis

#### **Test Method References:**

Tool Motifica Reference	.o.							
ALS Test Code	Matrix	Test Description	Method Reference**					
ALK-PCT-VA	Water	Alkalinity by Auto. Titration	APHA 2320 "Alkalinity"					
This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.								

ALK-PCT-VA Water Alkalinity by Auto. Titration APHA 2320 Alkalinity

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

BE-D-L-CCMS-VA Water Diss. Be (low) in Water by CRC ICPMS APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

BE-T-L-CCMS-VA Water Total Be (Low) in Water by CRC ICPMS

EPA 200.2/6020A (mod)

#### **Reference Information**

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APHA 5310B TOTAL ORGANIC CARBON (TOC)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Water

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

Total inorganic carbon by CO2 purge

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".

**CARBONS-TOC-VA** Water APHA 5310B TOTAL ORGANIC CARBON (TOC) Total organic carbon by combustion

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".

CL-IC-N-WR Water Chloride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

**CN-FREE-CFA-VA** Water Free Cyanide in water by CFA **ASTM 7237** 

This analysis is carried out using procedures adapted from ASTM Method 7237 "Free Cyanide with Flow Injection Analysis (FIA) Utilizing Gas Diffusion Separation and Amperometric Detection". Free cyanide is determined by in-line gas diffusion at pH 6 with final determination by colourimetric analysis.

**CN-SCN-VA** Thiocyanate by Colour APHA 4500-CN CYANIDE

This analysis is carried out using procedures adapted from APHA Method 4500-CN- M "Thiocyanate" Thiocyanate is determined by the ferric nitrate

colourimetric method.

**CARBONS-TIC-VA** 

CN-T-CFA-VA Total Cyanide in water by CFA Water ISO 14403:2002

This analysis is carried out using procedures adapted from ISO Method 14403;2002 "Determination of Total Cyanide using Flow Analysis (FIA and CFA)". Total or strong acid dissociable (SAD) cyanide is determined by in-line UV digestion along with sample distillation and final determination by colourimetric analysis. Method Limitation: This method is susceptible to interference from thiocyanate (SCN). If SCN is present in the sample, there could be a positive interference with this method, but it would be less than 1% and could be as low as zero.

**CN-WAD-CFA-VA** Water Weak Acid Diss. Cyanide in water by CFA APHA 4500-CN CYANIDE

This analysis is carried out using procedures adapted from APHA Method 4500-CN I. "Weak Acid Dissociable Cyanide". Weak Acid Dissociable (WAD) cyanide is determined by in-line sample distillation with final determination by colourimetric analysis.

**EC-PCT-VA** Water Conductivity (Automated) APHA 2510 Auto. Conduc.

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity

electrode.

F-IC-N-WR Water Fluoride in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

HARDNESS-CALC-VA Water Hardness **APHA 2340B** 

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents, Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

**HG-D-CVAA-VA** Water Diss. Mercury in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

Total Mercury in Water by CVAAS or CVAFS EPA 1631E (mod) **HG-T-CVAA-VA** 

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

**IONBALANCE-VA** Water Ion Balance Calculation **APHA 1030E** 

Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.

Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:

Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]

Dissolved Metals in Water by CRC ICPMS **MET-D-CCMS-VA** Water APHA 3030B/6020A (mod)

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

**MET-DIS-LOW-ICP-VA** EPA 3005A/6010B Water Dissolved Metals in Water by ICPOES

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United

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States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma optical emission spectrophotometry (EPA Method 6010B).

MET-T-CCMS-VA

Water

Total Metals in Water by CRC ICPMS

EPA 200.2/6020A (mod)

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

**MET-TOT-LOW-ICP-VA** 

Water

Total Metals in Water by ICPOES

EPA 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

NH3-F-VA

Water

Ammonia in Water by Fluorescence

APHA 4500 NH3-NITROGEN (AMMONIA)

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NH3-F-VA

Water

Ammonia in Water by Fluorescence

J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO2-L-IC-N-WR

Water

Nitrite in Water by IC (Low Level)

EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

NO3-L-IC-N-WR

Water

Nitrate in Water by IC (Low Level)

EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

PH-PCT-VA

Water

er pH by Meter (Automated)

APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PH-PCT-VA

Water

pH by Meter (Automated)

APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

S-DIS-ICP-VA

Water

Dissolved Sulfur in Water by ICPOES

EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method will not give total sulfur results for all samples. Sulfide or other volatile forms of sulfur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulfur represents all non-volatile forms of sulfur present in a particular sample.

S-TOT-ICP-VA

Wate

Total Sulfur in Water by ICPOES

EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method will not give total sulfur results for all samples. Sulfide or other volatile forms of sulfur that may be present in submitted samples, is often lost during the sampling, preservation and analysis process. The data reported as total and/or dissolved sulfur represents all non-volatile forms of sulfur present in a particular sample.

S2-T-COL-VA

Water

Total Sulphide by Colorimetric

APHA 4500-S2 Sulphide

This analysis is carried out using procedures adapted from APHA Method 4500-S2 "Sulphide". Sulphide is determined using the methlyene blue colourimetric method.

SO4-IC-N-WR

Water

Sulfate in Water by IC

EPA 300.1 (mod)

#### **Reference Information**

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Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.

**TKN-F-VA** Water TKN in Water by Fluorescence APHA 4500-NORG D.

This analysis is carried out using procedures adapted from APHA Method 4500-Norg D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl Nitrogen is determined using block digestion followed by Flow-injection analysis with fluorescence detection.

\*\* ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WR	ALS ENVIRONMENTAL - WHITEHORSE, YUKON, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

#### **Chain of Custody Numbers:**

#### GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

2

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



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#### Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

1620202 0005

COC Number: 1 -

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Report To Report Format . w (Rush Tumaround Time (TAT) is not available for all tests) Select Report Format: Company: Hemmera Environchem Inc. F√PDF **▼EXCEL** ✓EDD (DIGITAL) eceived by 3 pm - business days) Natasha Sandys Quality Control (QC) Report with Report ▼ Yes E No Priority (2-4 bus, days if received by 3pm) 50% surcharge - contact ALS to confirm TAT Contact: Emergency (1-2 bus, days if received by 3pm) 100% surcharge - contact ALS to confirm TAT Address: 230 - 2237 2nd Avenue Criteria on Report - provide details below if box checked Whitehorse, YT Select Distribution: **I**✓EMAIL ☐MAIL FAX E2 Same day or weekend emergency - contact ALS to confirm TAT and surcharge Email 1 or Fax nsandys@hemmera.com, rmartinka@hemmera.cor Phone: 867-456-4865 Specify Date Required for E2,E or P: Email 2 chris@elr.ca **Analysis Request** Yes Yes Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below ☐ No Invoice Distribution Invoice To Same as Report To **▼EMAIL** ☐ Yes IV. No Select Invoice Distribution: **⊘**MAIL FAX F/P F/P Copy of Invoice with Report Company Hemmera Environchem Inc. Email 1 or Fax nsandys@hemmera.com Cation Sum, Cation/Anion Balan Carbon Natasha Sandys Contact Email 2 chris@elr.ca Cyanide - Weak Acid Diss., Total, Free Number of Containers Nitrite, Total Kjeldant N (TKN) **Project Information** Oil and Gas Required Fields (client use) Organic ( ALS Quote #: Q50588 Approver ID: Cost Center: Sulfate, conductivity, pH, Job #: 1343-005 09 GL Account: Routing Code: Total ( PO / AFE: Activity Code: Carbon LSD N (total), Location: Thiocyanate (SCN) Dissolved Alkalinity Dissolved Mercury rotal Inorganic ALS Lab Work Order # (lab use only) RM, JC, AN, M ALS Contact: Sampler: 88 Ammonia Sulphide Vitrate, Sample Identification and/or Coordinates Date Time 료 Anion ALS Sample # Sample Type (lab use only) (This description will appear on the report) ದ (dd-mmm-vv) (hh:mm) GSI-HA-05A 01-Jun-15 16:45 Water R 1 GSI-HA-01A 02-Jun-15 13:50 Water R R R R R R R R R R R R R 9 MW09-17 02-Jun-15 11:35 Water R R R R R R R R R R R R R 9 MW09-18 02-Jun-15 10:10 Water R R R R R R R R R R R R R 9 MW09-19 02-Jun-15 8:30 Water R R R R R R R R R R R R R 9 FB-2 02-Jun-15 8:30 R R R R R R R R R R R R R Water 9 MP09-14 02-Jun-15 14:50 R R Water 2 CH-P-13-05/50 02-Jun-15 17:00 Water R R R R R R R R R R R R R 9 MW09-04 02-Jun-15 13:50 Water R R R R R R R R R R R R R 9 DUP-1 02-Jun-15 13:50 Water R R R R R R R R R R R R R g FB1 02-Jun-15 13:50 Water R R R R R R R R R R R R R 9 Travel Blank Water R R R R R R R 9 SAMPLE CONDITION AS RECEIVED (lab use only) Drinking Water (DW) Samples<sup>1</sup> (client use) Special Instructions / Specify Criteria to add on report (client Use) SIF Observations -Frozen No Are samples taken from a Regulated DW System? ice packs Yes Custody seal intact Yes No See attached parameter sheet for list of full parameters and metals required ☐ Yes IV. No Cooling Initiated Dlease MGS)-HAZA, GS1-HA-OSA, GS1-HA-OSA Are samples for human drinking water use? Bul or hold INITIAL COOLER TEMPERATURES °C FINAL COOLER TEMPERATURES °C Yes 0.5 0.7 SHIPMENT RELEASE (client use) INITIAL SHIPMENT RECEPTION (lab use only) FINAL SHIPMENT RECEPTION (lab use only) Released by: Time: Received by: Received by: Date: Time: 11:48 C. Joi helik 12:00 REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY NA-FM-0326e v09 FrankO4 January 2014

# S) Environmental

#### Request Form

L1620902-COFC

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Canada Toll Free: 1 800 668 9878 www.alsglobal.com

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Report To	rt To					Report Format /				.w (Rush Tumeround Time (TAT) is not available for all tests)												
Company:	Hemmera Environchem Inc.				Select Report Format: PDF FEXCEL FIDD (DIGITAL)				) R Regular (Standard TAT if received by 3 pm - business days)													
Contact:	Natasha Sandys		Quality Control (QC) Report with Report    ✓ Yes    ✓ No																			
Address:	230 - 2237 2nd Avenue			Criteria on Report - provide details below if box checked					Emergency (1-2 bus. days If received by 3pm) 100% surcharge - contact ALS to confirm TAT													
	Whitehorse, YT				Select Distribut	ion: 🛂 EMA	IL MAIL	□FAX	E2	[]San	Same day or weekend emergency - contact ALS to confirm TAT and surcharge											
Phone:	867-456-4865				Email 1 or Fax	nsandys@hemme	ra.com, rmartin	ka@hemmera.co	Spec	Specify Date Required for E2,E or P:												
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Сотрапу:	Hemmera Environchem Inc				Email 1 or Fax	nsandys@hemme	ra.com						Balan									
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ALS Lab Wor	rk Order# (lab use only)				ALS Contact:		Sampler:	RM, JC, AN, M	ed Metal	Dissolved Mercury	Nitrite, T	Sulfate, c	Sum, Cation	- Weak	Ammonia N (total),	Thiocyanate (SCN)	s as S	organic (	Dissolved Alkalinity			Z
ALS Sample # (lab use only)	1		n and/or Coordi appear on the re			Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Dissolve	Dissolve	Nitrate,	CI, Fi, S	Anion S	Cyanide	Ammon	Thiocya	Sulphide	Total Inorganic	Dissolve			
	MW09-03					02-Jun-15	15:10	Water	R	R	R	R	R	R	R	R	R	R	R			9
	MW09-02					02-Jun-15	10:20	Water	R	R	R	R	R	R	R	R	R	R	R			9
	GSI-HA-03A					01-Jun-15	16;15	Water	R	R				_								2
	MW09-16					01-Jun-15	18;00	Water	R	R	R	R	R	R	R	R	R	R	R			9
	DP-2					01-Jun-15	18:00	Water	R	R	R	R	R	R	R	R	R	R	R			9
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Drinking	Water (DW) Samples <sup>1</sup> (cfie	nt use)	s	pecial Ins	tructions / Spec	ify Criteria to add o	n report (client U	se)	SAMPLE CONDITION AS RECEIVED (lab use only) Frozen SIF Observations Yes No							Nó						
=	on from a Regulated DW Syste	em?	- See attached	naramata	r phoat for list of	full parameters	d motals receives		ice pa	acks.	Yes		No						Yes		No	
J™ Ye			- See attached	paramete	i sneet for list of	full parameters and	ı metais required	1.	Cooling Initiated					1 1 <u>1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 </u>								
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