HEMMERA ENVIROCHEM INC.
ATTN: Natasha Sandys
230 - 2237 2nd Avenue
Whitehorse YK Y1A 0K7

Date Received: 22-JUL-16
Report Date: 16-AUG-16 17:05 (MT)
Version: FINAL REV. 2

Client Phone: 867-456-4865

Certificate of Analysis

Lab Work Order #: L1802392

Project P.O. #: NOT SUBMITTED
Job Reference: 1343-005.18
C of C Numbers: 1
Legal Site Desc:

Comments: ADDITIONAL 12-AUG-16 12:32

16-AUG-2016 Revision 2: This revision includes additional chromium speciation analysis.

Brent Mack, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1802392-1 Water 20-JUL-16 08:05 E3	L1802392-2 Water 19-JUL-16 16:50 R3	L1802392-3 Water 20-JUL-16 13:20 R7	L1802392-4 Water 19-JUL-16 14:30 R11	L1802392-5 Water 20-JUL-16 17:15 GWCC-1
WATER						
Physical Tests	Conductivity (uS/cm)	823	816	293	484	2420
	Hardness (as CaCO3) (mg/L)	484	470	150	227	1680
	pH (pH)	8.20	8.12	7.55	8.01	7.63
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	0.0095	0.0397	0.0794	<0.0050	<0.0050
	Nitrate (as N) (mg/L)	0.189	0.0523	0.0980	0.0904	0.521
	Nitrite (as N) (mg/L)	0.0047	0.0023	<0.0010	<0.0010	<0.0050 DLDS
	Phosphorus (P)-Total (mg/L)	0.0074	0.0596	0.0486	0.0055	<0.0020
	Sulfate (SO4) (mg/L)	265	274	70.9	131	1270
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	12.5	13.4	27.3	14.1	5.33
	Total Organic Carbon (mg/L)					
Total Metals	Aluminum (Al)-Total (mg/L)	0.402	3.08	1.93	0.112	0.157
	Antimony (Sb)-Total (mg/L)	0.00104	0.00041	0.00031	0.00020	0.00137
	Arsenic (As)-Total (mg/L)	0.00159	0.00347	0.00268	0.00061	0.00213
	Barium (Ba)-Total (mg/L)	0.0771	0.172	0.163	0.0661	0.0185
	Beryllium (Be)-Total (mg/L)	0.000023	0.000117	0.000091	<0.000020	<0.000020
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total (mg/L)	0.088	<0.010	<0.010	<0.010	0.301
	Cadmium (Cd)-Total (mg/L)	0.0000222	0.000132	0.0000708	0.0000348	0.000191
	Calcium (Ca)-Total (mg/L)	80.5	83.8	34.4	55.1	191
	Chromium (Cr)-Total (mg/L)	0.00183	0.00666	0.00490	0.00078	0.00283
	Cobalt (Co)-Total (mg/L)	0.00045	0.00261	0.00214	0.00017	<0.00010
	Copper (Cu)-Total (mg/L)	0.00242	0.00942	0.00782	0.00228	0.00120
	Iron (Fe)-Total (mg/L)	0.905	5.98	4.38	0.280	<0.010
	Lead (Pb)-Total (mg/L)	0.000322	0.00262	0.00134	0.000095	<0.000050
	Lithium (Li)-Total (mg/L)	0.0053	0.0066	0.0015	<0.0010	0.0774
	Magnesium (Mg)-Total (mg/L)	65.9	60.7	16.9	26.1	283
	Manganese (Mn)-Total (mg/L)	0.105	0.273	0.422	0.0244	0.00030
	Mercury (Hg)-Total (mg/L)	<0.0000050	0.0000207	<0.000025 DLM	<0.0000050	<0.0000050
	Molybdenum (Mo)-Total (mg/L)	0.00150	0.00164	0.000720	0.00102	0.00285
	Nickel (Ni)-Total (mg/L)	0.00944	0.0112	0.00724	0.00252	0.0711
	Phosphorus (P)-Total (mg/L)	<0.050	0.126	0.101	<0.050	<0.050
	Potassium (K)-Total (mg/L)	1.00	1.21	0.36	0.41	3.21
	Selenium (Se)-Total (mg/L)	0.000838	0.000693	0.000447	0.000631	0.00409
	Silicon (Si)-Total (mg/L)	6.64	11.2	8.32	6.21	6.19
	Silver (Ag)-Total (mg/L)	0.000010	0.000060	0.000025	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	5.35	4.57	2.09	6.29	17.5

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1802392-6 Water 20-JUL-16 16:50 GWCC-2	L1802392-7 Water 20-JUL-16 16:15 GWCC-3	L1802392-8 Water 20-JUL-16 17:45 GWCC-4	L1802392-9 Water TRAVEL BLANK	L1802392-10 Water 20-JUL-16 16:15 DUP1
WATER						
Physical Tests	Conductivity (uS/cm)	1680	1030	822	<2.0	1040
	Hardness (as CaCO3) (mg/L)	1110	612	471		613
	pH (pH)	7.80	7.73	7.69	5.36 RRV	7.69
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	<0.0050	<0.0050	<0.0050	0.0072	<0.0050
	Nitrate (as N) (mg/L)	0.356 DLDS	0.170 DLDS	0.0861	<0.0050	0.171 DLDS
	Nitrite (as N) (mg/L)	<0.0050	<0.0020	<0.0010	<0.0010	<0.0020
	Phosphorus (P)-Total (mg/L)	0.0021	<0.0020	<0.0020	<0.0020	0.0028
	Sulfate (SO4) (mg/L)	790	388	257	<0.30	381
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	7.04	8.95	9.53		8.99
	Total Organic Carbon (mg/L)				<0.50	
Total Metals	Aluminum (Al)-Total (mg/L)	<0.0030	<0.0030	0.0032	<0.0030	<0.0030
	Antimony (Sb)-Total (mg/L)	0.00127	0.00109	0.00123	<0.00010	0.00108
	Arsenic (As)-Total (mg/L)	0.00145	0.00094	0.00125	<0.00010	0.00094
	Barium (Ba)-Total (mg/L)	0.0205	0.0356	0.0368	<0.000050	0.0355
	Beryllium (Be)-Total (mg/L)	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total (mg/L)	0.132	0.078	0.063	<0.010	0.078
	Cadmium (Cd)-Total (mg/L)	0.000158	0.0000693	0.0000532	<0.0000050	0.0000797
	Calcium (Ca)-Total (mg/L)	153	106	86.6	<0.050	107
	Chromium (Cr)-Total (mg/L)	0.00108	0.00051	0.00055	<0.00010	0.00048
	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Total (mg/L)	0.00138	0.00131	0.00132	<0.00050	0.00141
	Iron (Fe)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Total (mg/L)	0.0126	0.0080	0.0074	<0.0010	0.0081
	Magnesium (Mg)-Total (mg/L)	171	84.3	60.7	<0.10	84.9
	Manganese (Mn)-Total (mg/L)	0.00015	0.00018	0.00080	<0.00010	0.00017
	Mercury (Hg)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Total (mg/L)	0.00312	0.00282	0.00261	<0.000050	0.00281
	Nickel (Ni)-Total (mg/L)	0.0389	0.0317	0.0337	<0.00050	0.0315
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)	1.91	1.35	1.21	<0.10	1.39
	Selenium (Se)-Total (mg/L)	0.00324	0.00144	0.000898	<0.000050	0.00147
	Silicon (Si)-Total (mg/L)	5.30	5.50	6.07	<0.050	5.55
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	5.78	3.72	3.30	<0.050	3.73

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1802392-11				
	Description	Water				
	Sampled Date	20-JUL-16				
	Sampled Time	08:05				
	Client ID	FB-1				
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	<2.0				
	Hardness (as CaCO3) (mg/L)	<0.50				
	pH (pH)	5.85				
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	<0.0050				
	Nitrate (as N) (mg/L)	<0.0050				
	Nitrite (as N) (mg/L)	<0.0010				
	Phosphorus (P)-Total (mg/L)	<0.020 DLM				
	Sulfate (SO4) (mg/L)	<0.30				
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	<0.50				
	Total Organic Carbon (mg/L)					
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)	<0.0000050				
	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				
	Magnesium (Mg)-Total (mg/L)	<0.10				
	Manganese (Mn)-Total (mg/L)	0.00011				
	Mercury (Hg)-Total (mg/L)	<0.0000050				
	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)	<0.000010				
	Sodium (Na)-Total (mg/L)	<0.050				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1802392-1 Water 20-JUL-16 08:05 E3	L1802392-2 Water 19-JUL-16 16:50 R3	L1802392-3 Water 20-JUL-16 13:20 R7	L1802392-4 Water 19-JUL-16 14:30 R11	L1802392-5 Water 20-JUL-16 17:15 GWCC-1
WATER						
Total Metals	Strontium (Sr)-Total (mg/L)	0.410	0.416	0.107	0.261	1.87
	Sulfur (S)-Total (mg/L)	98.2	101	25.6	48.1	459
	Thallium (Tl)-Total (mg/L)	<0.000010	0.000044	0.000017	<0.000010	0.000086
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	0.0125	0.0776	0.0585	0.00284	<0.00030
	Uranium (U)-Total (mg/L)	0.00410	0.00579	0.000257	0.00134	0.00641
	Vanadium (V)-Total (mg/L)	0.00196	0.0102	0.00712	0.00085	<0.00050
	Zinc (Zn)-Total (mg/L)	0.0034	0.0219	0.0122	<0.0030	0.0070
	Zirconium (Zr)-Total (mg/L)	0.00069	0.00106	0.00095	0.00075	<0.00030
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)	0.0166	0.0218	0.0760	0.0260	0.0010
	Antimony (Sb)-Dissolved (mg/L)	0.00097	0.00018	0.00021	0.00018	0.00133
	Arsenic (As)-Dissolved (mg/L)	0.00117	0.00076	0.00154	0.00057	0.00209
	Barium (Ba)-Dissolved (mg/L)	0.0639	0.0594	0.115	0.0619	0.0183
	Beryllium (Be)-Dissolved (mg/L)	<0.000020	<0.000020	0.000025	<0.000020	<0.000020
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Dissolved (mg/L)	0.083	<0.010	<0.010	<0.010	0.278
	Cadmium (Cd)-Dissolved (mg/L)	0.0000112	0.0000094	0.0000164	0.0000159	0.000187
	Calcium (Ca)-Dissolved (mg/L)	77.4	83.0	33.5	51.1	194
	Chromium (Cr)-Dissolved (mg/L)	0.00061	0.00040	0.00116	0.00057	0.00257
	Cobalt (Co)-Dissolved (mg/L)	0.00025	0.00041	0.00082	0.00011	<0.00010
	Copper (Cu)-Dissolved (mg/L)	0.00156	0.00167	0.00370	0.00182	0.00095
	Iron (Fe)-Dissolved (mg/L)	0.121	0.210	1.47	0.127	<0.010
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	0.000060	<0.000050	<0.000050
	Lithium (Li)-Dissolved (mg/L)	0.0050	0.0037	<0.0010	<0.0010	0.0764
	Magnesium (Mg)-Dissolved (mg/L)	70.7	63.7	16.2	24.2	291
	Manganese (Mn)-Dissolved (mg/L)	0.0849	0.162	0.383	0.0181	0.00017
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)	0.00119	0.00117	0.000550	0.00104	0.00245
	Nickel (Ni)-Dissolved (mg/L)	0.00805	0.00354	0.00378	0.00218	0.0695
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)	0.86	0.80	0.22	0.35	3.34
	Selenium (Se)-Dissolved (mg/L)	0.000978	0.000522	0.000297	0.000858 DTC	0.00451
	Silicon (Si)-Dissolved (mg/L)	5.73	6.13	5.45	6.26	6.25
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	5.28	4.39	2.04	6.38	17.3

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1802392-6 Water 20-JUL-16 16:50 GWCC-2	L1802392-7 Water 20-JUL-16 16:15 GWCC-3	L1802392-8 Water 20-JUL-16 17:45 GWCC-4	L1802392-9 Water TRAVEL BLANK	L1802392-10 Water 20-JUL-16 16:15 DUP1
WATER						
Total Metals	Strontium (Sr)-Total (mg/L)	0.814	0.541	0.452	<0.00020	0.535
	Sulfur (S)-Total (mg/L)	291	138	96.4	<0.50	142
	Thallium (Tl)-Total (mg/L)	0.000065	0.000073	0.000073	<0.000010	0.000081
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
	Uranium (U)-Total (mg/L)	0.00257	0.00146	0.00110	<0.000010	0.00145
	Vanadium (V)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Total (mg/L)	0.0049	<0.0030	<0.0030	<0.0030	0.0030
	Zirconium (Zr)-Total (mg/L)	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD		FIELD
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD		FIELD
	Aluminum (Al)-Dissolved (mg/L)	0.0011	0.0015	0.0014		0.0014
	Antimony (Sb)-Dissolved (mg/L)	0.00125	0.00106	0.00119		0.00106
	Arsenic (As)-Dissolved (mg/L)	0.00141	0.00091	0.00124		0.00088
	Barium (Ba)-Dissolved (mg/L)	0.0207	0.0349	0.0365		0.0349
	Beryllium (Be)-Dissolved (mg/L)	<0.000020	<0.000020	<0.000020		<0.000020
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		<0.000050
	Boron (B)-Dissolved (mg/L)	0.123	0.073	0.060		0.074
	Cadmium (Cd)-Dissolved (mg/L)	0.000142	0.0000754	0.0000463		0.0000751
	Calcium (Ca)-Dissolved (mg/L)	155	105	85.9		104
	Chromium (Cr)-Dissolved (mg/L)	0.00098	0.00043	0.00042		0.00045
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		<0.00010
	Copper (Cu)-Dissolved (mg/L)	0.00115	0.00114	0.00121		0.00110
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010		<0.010
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		<0.000050
	Lithium (Li)-Dissolved (mg/L)	0.0124	0.0079	0.0074		0.0081
	Magnesium (Mg)-Dissolved (mg/L)	175	85.2	62.2		85.6
	Manganese (Mn)-Dissolved (mg/L)	0.00013	0.00012	0.00057		0.00011
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050		<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)	0.00266	0.00241	0.00217		0.00244
	Nickel (Ni)-Dissolved (mg/L)	0.0376	0.0305	0.0322		0.0306
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050		<0.050
	Potassium (K)-Dissolved (mg/L)	1.97	1.29	1.18		1.32
	Selenium (Se)-Dissolved (mg/L)	0.00339	0.00165	0.000980		0.00154
	Silicon (Si)-Dissolved (mg/L)	5.34	5.37	6.07		5.40
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		<0.000010
	Sodium (Na)-Dissolved (mg/L)	5.60	3.62	3.20		3.64

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1802392-11				
	Description	Water				
	Sampled Date	20-JUL-16				
	Sampled Time	08:05				
	Client ID	FB-1				
Grouping	**Analyte**					
WATER						
Total Metals	Strontium (Sr)-Total (mg/L)	<0.00020				
	Sulfur (S)-Total (mg/L)	<0.50				
	Thallium (Tl)-Total (mg/L)	<0.000010				
	Tin (Sn)-Total (mg/L)	<0.00010				
	Titanium (Ti)-Total (mg/L)	<0.00030				
	Uranium (U)-Total (mg/L)	<0.000010				
	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				
	Dissolved Metals Filtration Location	FIELD				
	Aluminum (Al)-Dissolved (mg/L)	<0.0010				
	Antimony (Sb)-Dissolved (mg/L)	<0.00010				
	Arsenic (As)-Dissolved (mg/L)	<0.00010				
	Barium (Ba)-Dissolved (mg/L)	<0.000050				
	Beryllium (Be)-Dissolved (mg/L)	<0.000020				
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050				
	Boron (B)-Dissolved (mg/L)	<0.010				
	Cadmium (Cd)-Dissolved (mg/L)	<0.0000050				
	Calcium (Ca)-Dissolved (mg/L)	<0.050				
	Chromium (Cr)-Dissolved (mg/L)	<0.00010				
	Cobalt (Co)-Dissolved (mg/L)	<0.00010				
	Copper (Cu)-Dissolved (mg/L)	<0.00020				
	Iron (Fe)-Dissolved (mg/L)	<0.010				
	Lead (Pb)-Dissolved (mg/L)	<0.000050				
	Lithium (Li)-Dissolved (mg/L)	<0.0010				
	Magnesium (Mg)-Dissolved (mg/L)	<0.10				
	Manganese (Mn)-Dissolved (mg/L)	<0.00010				
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050				
	Molybdenum (Mo)-Dissolved (mg/L)	<0.000050				
	Nickel (Ni)-Dissolved (mg/L)	<0.00050				
	Phosphorus (P)-Dissolved (mg/L)	<0.050				
	Potassium (K)-Dissolved (mg/L)	<0.10				
	Selenium (Se)-Dissolved (mg/L)	<0.000050				
	Silicon (Si)-Dissolved (mg/L)	<0.050				
	Silver (Ag)-Dissolved (mg/L)	<0.000010				
	Sodium (Na)-Dissolved (mg/L)	<0.050				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1802392-1 Water 20-JUL-16 08:05 E3	L1802392-2 Water 19-JUL-16 16:50 R3	L1802392-3 Water 20-JUL-16 13:20 R7	L1802392-4 Water 19-JUL-16 14:30 R11	L1802392-5 Water 20-JUL-16 17:15 GWCC-1
WATER						
Dissolved Metals	Strontium (Sr)-Dissolved (mg/L)	0.396	0.410	0.102	0.253	1.81
	Sulfur (S)-Dissolved (mg/L)	96.2	99.8	24.9	41.4	438
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	0.000078
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	0.00053	0.00056	0.00214	0.00059	<0.00030
	Uranium (U)-Dissolved (mg/L)	0.00369	0.00495	0.000117	0.00107	0.00613
	Vanadium (V)-Dissolved (mg/L)	0.00055	0.00077	0.00125	<0.00050	<0.00050
	Zinc (Zn)-Dissolved (mg/L)	0.0013	0.0112	<0.0010	<0.0010	0.0067
	Zirconium (Zr)-Dissolved (mg/L)	0.00046	0.00053	0.00102	0.00080	<0.00030
Speciated Metals	Chromium (III)-Dissolved (mg/L)			0.00116		<0.00058
	Chromium (III)-Total (mg/L)	<0.00074	0.00666	0.00490		<0.00088
	Hexavalent Chromium (mg/L)	0.0012	<0.0010	<0.0010		0.0034
	Hexavalent Chromium-Dissolved (mg/L)			<0.0010		0.0034

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1802392-6 Water 20-JUL-16 16:50 GWCC-2	L1802392-7 Water 20-JUL-16 16:15 GWCC-3	L1802392-8 Water 20-JUL-16 17:45 GWCC-4	L1802392-9 Water TRAVEL BLANK	L1802392-10 Water 20-JUL-16 16:15 DUP1
WATER						
Dissolved Metals	Strontium (Sr)-Dissolved (mg/L)	0.802	0.524	0.432		0.527
	Sulfur (S)-Dissolved (mg/L)	272	131	91.5		131
	Thallium (Tl)-Dissolved (mg/L)	0.000053	0.000059	0.000073		0.000060
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030		<0.00030
	Uranium (U)-Dissolved (mg/L)	0.00239	0.00134	0.000998		0.00135
	Vanadium (V)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050		<0.00050
	Zinc (Zn)-Dissolved (mg/L)	0.0044	0.0020	0.0024		0.0021
	Zirconium (Zr)-Dissolved (mg/L)	<0.00030	<0.00030	<0.00030		<0.00030
Speciated Metals	Chromium (III)-Dissolved (mg/L)					
	Chromium (III)-Total (mg/L)	<0.00072				
	Hexavalent Chromium (mg/L)	0.0017				
	Hexavalent Chromium-Dissolved (mg/L)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1802392-11				
	Description	Water				
	Sampled Date	20-JUL-16				
	Sampled Time	08:05				
	Client ID	FB-1				
Grouping	**Analyte**					
WATER						
Dissolved Metals	Strontium (Sr)-Dissolved (mg/L)	<0.00020				
	Sulfur (S)-Dissolved (mg/L)	<0.50				
	Thallium (Tl)-Dissolved (mg/L)	<0.000010				
	Tin (Sn)-Dissolved (mg/L)	<0.00010				
	Titanium (Ti)-Dissolved (mg/L)	<0.00030				
	Uranium (U)-Dissolved (mg/L)	<0.000010				
	Vanadium (V)-Dissolved (mg/L)	<0.00050				
	Zinc (Zn)-Dissolved (mg/L)	<0.0010				
	Zirconium (Zr)-Dissolved (mg/L)	<0.00030				
Speciated Metals	Chromium (III)-Dissolved (mg/L)					
	Chromium (III)-Total (mg/L)					
	Hexavalent Chromium (mg/L)					
	Hexavalent Chromium-Dissolved (mg/L)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Bismuth (Bi)-Dissolved	DLA	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8
Duplicate	Boron (B)-Dissolved	DLA	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8
Duplicate	Silver (Ag)-Dissolved	DLA	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8
Duplicate	Sodium (Na)-Dissolved	DLA	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8
Duplicate	Tin (Sn)-Dissolved	DLA	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8
Duplicate	Aluminum (Al)-Total	DLA	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Bismuth (Bi)-Total	DLA	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Boron (B)-Total	DLA	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Cadmium (Cd)-Total	DLA	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Chromium (Cr)-Total	DLA	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Copper (Cu)-Total	DLA	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Lead (Pb)-Total	DLA	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Lithium (Li)-Total	DLA	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Nickel (Ni)-Total	DLA	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Selenium (Se)-Total	DLA	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Silver (Ag)-Total	DLA	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Thallium (Tl)-Total	DLA	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Tin (Sn)-Total	DLA	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Titanium (Ti)-Total	DLA	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Vanadium (V)-Total	DLA	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Zinc (Zn)-Total	DLA	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Zirconium (Zr)-Total	DLA	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Sulfate (SO4)	MB-LOR	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Sulfate (SO4)	MS-B	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sulfate (SO4)	MS-B	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sulfate (SO4)	MS-B	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sulfate (SO4)	MS-B	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Aluminum (Al)-Dissolved	MS-B	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Cadmium (Cd)-Dissolved	MS-B	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Cobalt (Co)-Dissolved	MS-B	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Copper (Cu)-Dissolved	MS-B	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Nickel (Ni)-Dissolved	MS-B	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Zinc (Zn)-Dissolved	MS-B	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Boron (B)-Dissolved	MS-B	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Copper (Cu)-Dissolved	MS-B	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Molybdenum (Mo)-Dissolved	MS-B	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8
Matrix Spike	Calcium (Ca)-Total	MS-B	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Magnesium (Mg)-Total	MS-B	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Silicon (Si)-Total	MS-B	L1802392-1, -10, -11, -2, -3, -4, -5, -6, -7, -8, -9

Qualifiers for Individual Parameters Listed:

Reference Information

Qualifier	Description
DLA	Detection Limit adjusted for required dilution
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).
DTC	Dissolved concentration exceeds total. Results were confirmed by re-analysis.
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.
RRV	Reported Result Verified By Repeat Analysis

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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)

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.

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

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)". Dissolved carbon (DOC) fractions are determined by filtering the sample through a 0.45 micron membrane filter prior to analysis.

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

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

CR-CR3-DIS-CALC-ED	Water	Dissolved Trivalent Chromium in Water	CALCULATION

Chromium (III)-Dissolved is calculated as the difference between the dissolved chromium and the dissolved hexavalent chromium (Cr(VI)) results.

CR-CR3-TOT-CALC-ED	Water	Total Trivalent Chromium in Water	CALCULATION

Chromium (III)-Total is calculated as the difference between the total chromium and the hexavalent chromium (Cr(VI)) results.

CR-CR6-ED	Water	Chromium, Hexavalent (Cr +6)	APHA 3500-Cr C (Ion Chromatography)

This analysis is carried out using procedures adapted from method 3500-Cr C in "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from Method 1636 published by the United States Environmental Protection Agency (EPA). The procedure involves analysis for chromium (VI) by ion chromatography using diphenylcarbazide in a sulphuric acid solution.
Results are based on an un-filtered, field-preserved sample.

CR6-D-IC-ED	Water	Chromium, Dissolved Hexavalent (Cr +6)	APHA 3500-Cr C (Ion Chromatography)

This analysis is carried out using procedures adapted from method 3500-Cr C in "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from Method 1636 published by the United States Environmental Protection Agency (EPA). The procedure involves analysis for chromium (VI) by ion chromatography using diphenylcarbazide in a sulphuric acid solution.
Results are based on a field-filtered, field-preserved sample.

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.

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.

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

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

Reference Information

MET-D-CCMS-VA Water Dissolved Metals 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.

MET-DIS-LOW-ICP-VA Water Dissolved 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 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.

P-T-PRES-COL-VA Water Total P in Water by Colour APHA 4500-P Phosphorus

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorus is determined colourimetrically after persulphate digestion of the sample.

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.

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 Water 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

Reference Information

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.

SO4-IC-N-WR Water Sulfate in Water by IC EPA 300.1 (mod)

Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV 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
ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA
WR	ALS ENVIRONMENTAL - WHITEHORSE, YUKON, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

1

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.
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.

Contact:
Company:
Address:

REFERENCE DATA

Project / Location:
PO Number:
ALS Work Order:

TEM Water Narrative: Analysis performed on FEI Tecnai TEM with integrated EDXA capabilities. Morphology, EDXA, and SAED measurements used to determine fiber species. Representative EDXA spectra of each asbestos type detected included. Compliance samples must be received and filtered within 48 hours of collection. Collection is performed outside ALS and is the responsibility of the client. Samples disposed after 60 days. TEM grids archived 3 years. Results apply only to portions analyzed.

TEM Water Methods: "EPA 100.2" refers to drinking water samples filtered on 47mm, 0.22µm pore MCE filters. "EPA 100.1" refers to drinking water samples filtered on 47mm, 0.1µm pore Polycarbonate filters. No standard method for asbestos in nonpotable water exists. All TEM waters (potable and nonpotable) analyzed at >10,000x magnification for asbestos fibers >10µm long. Whenever possible, sufficient volume is analyzed to yield an AS of <0.20 MFL based on the detection of 1 confirmed asbestos fiber in the total area analyzed. However, the volume analyzed is dependent upon a filter loading of <25% particulate. Samples containing excessive suspended solids may not reach the recommended AS of <0.20 MFL. In any case, a minimum of 4 and a maximum of 10 openings are analyzed regardless of the AS reached or asbestos concentration detected. ALS will report results directly to state of origin only when;

a) the Chain of Custody clearly states "drinking water for state compliance",
b) the appropriate state drinking water form is submitted with the samples,
c) the state form is completely filled out by the client prior to submittal, and
d) the address to which the form is to be sent is provided.

NOTES: *NA=Not Applicable, ND=None Detected, AS=Analytical Sensitivity, MFL=Millions of Fibers per Liter. † Act-Tremolite concentrations include Actinolite as well as the Libby Amphiboles; Tremolite, Winchite, & Richterite.*

OH Lab ID: #4077, Ohio Analysts; P. Johnson #2268, A. Sohn #3431

PA Lab ID: #68-01320, Cert. #003

NELAC accredited through New York ELAP, LAB #11371

TEM ANALYSIS DATA

EDXA Resolution (eV): <175
Accelerating Voltage (keV): 100
Prep Start Date: 7/27/2016
Calibration Constant (µm/cm): 0.74
Camera Constant (mm-Å): 129.25
Analysis Start Date: 7/28/2016

Pamela Johnson
ALS TEM Analyst

Shawn Smythe
ALS Project Manager

IDENTIFICATION

Client Sample ID:	L1802392-1 E3	L1802392-2 R3
ALS Sample ID:	1607739-01	1607739-02
Method:	EPA 100.2	EPA 100.2
Date of Collection:	7/20/2016	7/19/2016
Time of Collection:	10:00	10:00

FILTRATION & ANALYSIS

Date of Filtration:	7/26/2016	7/26/2016
Time of Filtration:	16:35	16:35
Volume Filtered (L):	0.005	0.001
Openings Analyzed:	4	10
Avg. Opening Area (mm^2):	0.011	0.011
AS (MFL):	4.89	9.77

ASBESTOS COUNT

Chrysotile:	9	0
Amosite:	0	0
Crocidolite:	0	0
Act-Tremolite†:	0	0
Anthophyllite:	0	0
Total Asbestos:	9	0

ASBESTOS CONCENTRATION (MFL)

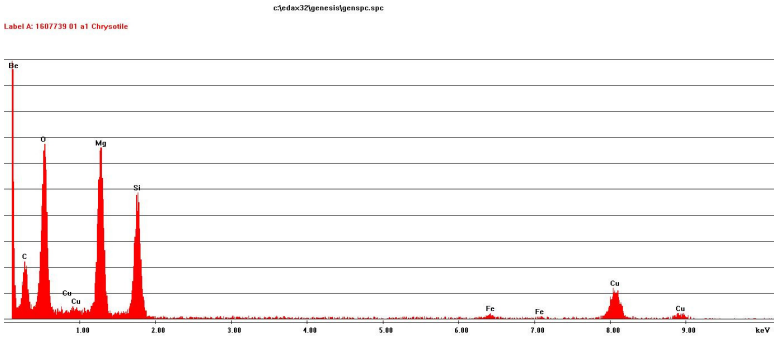
Chrysotile:	43.98	<AS
Amosite:	<AS	<AS
Crocidolite:	<AS	<AS
Act-Tremolite†:	<AS	<AS
Anthophyllite:	<AS	<AS
Total Asbestos:	**43.98**	**<AS**

NOTES

The extremely high concentration of suspended solids in sample L1802392-2 R3 prohibited filtration of sufficient volume to reach the recommended AS of <0.20 MFL.

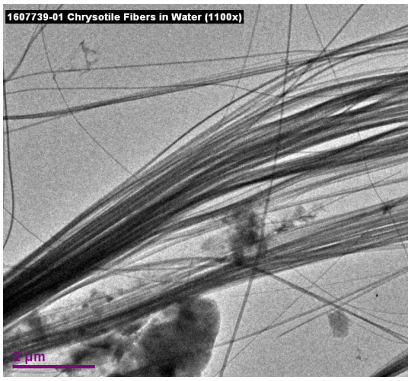
EDXA SPECTRA

NOTE: Spurious peaks may originate from low background sample holder, column pole pieces, TEM grids, prep solutions or matrix materials.



PHOTOMICROGRAPHS

Collected using Gatan Digital Micrograph.



29-Jul-2016

Brent Mack
ALS Environmental
8081 Lougheed HWY
Suite 100
Burnaby, BC V5A1W9

Tel: (604) 253-4188
Fax:

Re: L1802392 Work Order: **1607739**

Dear Brent,

ALS Environmental received 11 samples on 26-Jul-2016 10:00 AM for the analyses presented in the following report.

The analytical data provided relates directly to the samples received by ALS Environmental and for only the analyses requested.

QC sample results for this data met laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Laboratory Group. Samples will be disposed in 30 days unless storage arrangements are made.

The total number of pages in this report is 17.

If you have any questions regarding this report, please feel free to contact me.

Sincerely,

Shawn Smythe

Electronically approved by: Rob Nieman

Shawn Smythe
Project Manager

ALS Environmental

Date: 29-Jul-16

Client: ALS Environmental
Project: L1802392
Work Order: **1607739**

Work Order Sample Summary

Lab Samp ID	Client Sample ID	Matrix	Tag Number	Collection Date	Date Received	Hold
1607739-01	L1802392-1	Water		7/20/2016	7/26/2016 10:00	☐
1607739-02	L1802392-2	Water		7/19/2016	7/26/2016 10:00	☐
1607739-02	L1802392-2	Water		7/19/2016	7/26/2016 10:00	☐
1607739-03	L1802392-3	Water		7/20/2016	7/26/2016 10:00	☐
1607739-04	L1802392-4	Water		7/20/2016	7/26/2016 10:00	☐
1607739-05	L1802392-5	Water		7/20/2016	7/26/2016 10:00	☐
1607739-06	L1802392-6	Water		7/20/2016	7/26/2016 10:00	☐
1607739-07	L1802392-7	Water		7/20/2016	7/26/2016 10:00	☐
1607739-08	L1802392-8	Water		7/20/2016	7/26/2016 10:00	☐
1607739-09	L1802392-9	Water		7/20/2016	7/26/2016 10:00	☐
1607739-10	L1802392-10	Water		7/20/2016	7/26/2016 10:00	☐
1607739-11	L1802392-11	Water		7/20/2016	7/26/2016 10:00	☐

ALS Environmental

Date: 29-Jul-16

Client: ALS Environmental
Project: L1802392
Work Order: 1607739

Case Narrative

The analytical data provided relates directly to the samples received by ALS Laboratory Group and for only the analyses requested.

Results relate only to the items tested and are not blank corrected unless indicated.

QC sample results for this data met laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Laboratory Group. Samples will be disposed in 30 days unless storage arrangements are made.

ALS Environmental

Date: *29-Jul-16*

Client:	ALS Environmental		
Project:	L1802392	**Work Order:**	1607739
Sample ID:	L1802392-1	**Lab ID:**	1607739-01
Collection Date:	7/20/2016	**Matrix:**	WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
TOTAL SUSPENDED SOLIDS BY SM2540 D			**SM2540 D**			Analyst: **rmb**
Total suspended solids	**7.9**		**2.0**	**mg/L**	1	7/27/2016

Note:

ALS Environmental

Date: *29-Jul-16*

Client:	ALS Environmental		
Project:	L1802392	**Work Order:**	1607739
Sample ID:	L1802392-2	**Lab ID:**	1607739-02
Collection Date:	7/19/2016	**Matrix:**	WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
TOTAL SUSPENDED SOLIDS BY SM2540 D			**SM2540 D**			Analyst: **rmb**
Total suspended solids	**140**		**2.0**	**mg/L**	1	7/27/2016

Note:

ALS Environmental

Date: *29-Jul-16*

Client:	ALS Environmental		
Project:	L1802392	**Work Order:**	1607739
Sample ID:	L1802392-3	**Lab ID:**	1607739-03
Collection Date:	7/20/2016	**Matrix:**	WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
TOTAL SUSPENDED SOLIDS BY SM2540 D			**SM2540 D**			Analyst: **rmb**
Total suspended solids	**78**		**2.0**	**mg/L**	1	7/27/2016

Note:

ALS Environmental

Date: *29-Jul-16*

Client:	ALS Environmental		
Project:	L1802392	**Work Order:**	1607739
Sample ID:	L1802392-4	**Lab ID:**	1607739-04
Collection Date:	7/20/2016	**Matrix:**	WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
TOTAL SUSPENDED SOLIDS BY SM2540 D			**SM2540 D**			Analyst: **rmb**
Total suspended solids	**4.8**		**2.0**	**mg/L**	1	7/27/2016

Note:

ALS Environmental

Date: *29-Jul-16*

Client:	ALS Environmental		
Project:	L1802392	**Work Order:**	1607739
Sample ID:	L1802392-5	**Lab ID:**	1607739-05
Collection Date:	7/20/2016	**Matrix:**	WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
TOTAL SUSPENDED SOLIDS BY SM2540 D			**SM2540 D**			Analyst: **rmb**
Total suspended solids	ND		2.0	mg/L	1	7/27/2016

Note:

ALS Environmental

Date: *29-Jul-16*

Client:	ALS Environmental		
Project:	L1802392	**Work Order:**	1607739
Sample ID:	L1802392-6	**Lab ID:**	1607739-06
Collection Date:	7/20/2016	**Matrix:**	WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
TOTAL SUSPENDED SOLIDS BY SM2540 D			**SM2540 D**			Analyst: **rmb**
Total suspended solids	ND		2.0	mg/L	1	7/27/2016

Note:

ALS Environmental

Date: *29-Jul-16*

Client:	ALS Environmental		
Project:	L1802392	**Work Order:**	1607739
Sample ID:	L1802392-7	**Lab ID:**	1607739-07
Collection Date:	7/20/2016	**Matrix:**	WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
TOTAL SUSPENDED SOLIDS BY SM2540 D			**SM2540 D**			Analyst: **rmb**
Total suspended solids	ND		2.0	mg/L	1	7/27/2016

Note:

ALS Environmental

Date: *29-Jul-16*

Client:	ALS Environmental		
Project:	L1802392	**Work Order:**	1607739
Sample ID:	L1802392-8	**Lab ID:**	1607739-08
Collection Date:	7/20/2016	**Matrix:**	WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
TOTAL SUSPENDED SOLIDS BY SM2540 D			**SM2540 D**			Analyst: **rmb**
Total suspended solids	ND		2.0	mg/L	1	7/27/2016

Note:

ALS Environmental

Date: *29-Jul-16*

Client:	ALS Environmental		
Project:	L1802392	**Work Order:**	1607739
Sample ID:	L1802392-9	**Lab ID:**	1607739-09
Collection Date:	7/20/2016	**Matrix:**	WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
TOTAL SUSPENDED SOLIDS BY SM2540 D			**SM2540 D**			Analyst: **rmb**
Total suspended solids	ND		2.0	mg/L	1	7/27/2016

Note:

ALS Environmental

Date: *29-Jul-16*

Client:	ALS Environmental		
Project:	L1802392	**Work Order:**	1607739
Sample ID:	L1802392-10	**Lab ID:**	1607739-10
Collection Date:	7/20/2016	**Matrix:**	WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
TOTAL SUSPENDED SOLIDS BY SM2540 D			**SM2540 D**			Analyst: **rmb**
Total suspended solids	**2.2**		**2.0**	**mg/L**	1	7/27/2016

Note:

ALS Environmental

Date: *29-Jul-16*

Client:	ALS Environmental		
Project:	L1802392	**Work Order:**	1607739
Sample ID:	L1802392-11	**Lab ID:**	1607739-11
Collection Date:	7/20/2016	**Matrix:**	WATER

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
TOTAL SUSPENDED SOLIDS BY SM2540 D			**SM2540 D**			Analyst: **rmb**
Total suspended solids	ND		2.0	mg/L	1	7/27/2016

Note:

ALS Environmental

Date: 29-Jul-16

Client: ALS Environmental
Work Order: 1607739
Project: L1802392

QC BATCH REPORT

Batch ID: **R131436** Instrument ID: **WETCHEM** Method: **SM2540 D**

MBLK Sample ID: **MB-R131436-R131436** Units: **mg/L** Analysis Date: **7/27/2016**
Client ID: Run ID: **WETCHEM_160727A** SeqNo: **1327526** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total suspended solids	ND	2.0								

LCS Sample ID: **LCS-R131436-R131436** Units: **mg/L** Analysis Date: **7/27/2016**
Client ID: Run ID: **WETCHEM_160727A** SeqNo: **1327527** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total suspended solids	1020	2.0	1000	0	102	70-130	0			

DUP Sample ID: **1607739-10A Dup** Units: **mg/L** Analysis Date: **7/27/2016**
Client ID: **L1802392-10** Run ID: **WETCHEM_160727A** SeqNo: **1327538** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total suspended solids	ND	2.0	0	0	0		2.24	0		

DUP Sample ID: **1607739-11A Dup** Units: **mg/L** Analysis Date: **7/27/2016**
Client ID: **L1802392-11** Run ID: **WETCHEM_160727A** SeqNo: **1327540** Prep Date: DF: **1**

Analyte	Result	PQL	SPK Val	SPK Ref Value	%REC	Control Limit	RPD Ref Value	%RPD	RPD Limit	Qual
Total suspended solids	ND	2.0	0	0	0		1.38	0		

The following samples were analyzed in this batch:

1607739-01B	1607739-02B	1607739-03A
1607739-04A	1607739-05A	1607739-06A
1607739-07A	1607739-08A	1607739-09A
1607739-10A	1607739-11A	

Note: See Qualifiers Page for a list of Qualifiers and their explanation.

ALS Environmental

Date: 29-Jul-16

Client: ALS Environmental
Project: L1802392
WorkOrder: **1607739**

QUALIFIERS, ACRONYMS, UNITS

Qualifier	Description
*	Value exceeds Regulatory Limit
a	Not accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte detected below quantitation limit
n	Not offered for accreditation
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL

Acronym	Description
DUP	Method Duplicate
E	EPA Method
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
MBLK	Method Blank
MDL	Method Detection Limit
MQL	Method Quantitation Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PDS	Post Digestion Spike
PQL	Practical Quantitaion Limit
SDL	Sample Detection Limit
SW	SW-846 Method

Units Reported	Description
%	
mg/L	

ALS Environmental

Sample Receipt Checklist

Client Name: **ALS-VANCOUVER** Date/Time Received: **26-Jul-16 10:00**

Work Order: **1607739** Received by: **CEG**

Checklist completed by: Shawn Smythe 27-Jul-16
eSignature | Date

Reviewed by: Shawn Smythe 27-Jul-16
eSignature | Date

Matrices:
Carrier name: FedEx

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☐	No ☑	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time?	Yes ☑	No ☐	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐	
Temperature(s)/Thermometer(s):			
Cooler(s)/Kit(s):			
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☐
Water - pH acceptable upon receipt?	Yes ☐	No ☐	N/A ☐
pH adjusted?	Yes ☐	No ☐	N/A ☐
pH adjusted by:	-		

Login Notes: Samples not relinquished.

Client Contacted: Date Contacted: Person Contacted:

Contacted By: Regarding:

Comments:

CorrectiveAction:

Chain of Custody (COC) / Analytical Request Form

ALS Environmental

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

L1802392-COFC

COC Number: 1

Page 1 of 1

Report To		Report Format	
Company:	Hemmera Environchem Inc.	Select Report Format:	☑ PDF ☐ EXCEL ☐ EDD (DIGITAL)
Contact:	Natasha Sandys	Quality Control (QC) Report with Report	☑ Yes ☐ No
Address:	230 - 2237 2nd Avenue Whitehorse, YT	☐ Criteria on Report - provide details below if box checked	
		Select Distribution:	☑ EMAIL ☐ MAIL ☐ FAX
Phone:	867-456-4865	Email 1 or Fax	nsandys@hemmera.com
		Email 2	chris@elr.ca

Invoice To		Invoice Distribution	
	Same as Report To ☑ Yes ☐ No	Select Invoice Distribution:	☑ EMAIL ☑ MAIL ☐ FAX
	Copy of Invoice with Report ☐ Yes ☑ No	Email 1 or Fax	nsandys@hemmera.com
Company:	Hemmera Environchem Inc.	Email 2	chris@elr.ca
Contact:	Natasha Sandys		

Project Information		Oil and Gas Required Fields (client use)	
ALS Quote #:	Q56044	Approver ID:	Cost Center:
Job #:	1343-005.18	GL Account:	Routing Code:
PO / AFE:		Activity Code:	
LSD:		Location:	

ALS Lab Work Order # (lab use only)		ALS Contact:	Sampler: AN/CH

R ☑ Regular (Standard TAT if received by 3 pm - business days)
P ☐ Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT
E ☐ Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT
E2 ☐ Same day or weekend emergency - contact ALS to confirm TAT and surcharge

Specify Date Required for E2,E or P:

Analysis Request

Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	F/P Low Level Diss. Met (incl. Hg) and Hardness	P Low Level Tot. Met (incl. Hg) and Hardness	P Chromium Speciation (III/VI) - Total	F/P Chromium Speciation (III/VI) - Dissolved	P Ammonia - N	F/P Dissolved Organic Carbon (DOC)	Nitrate-N	Nitrite - N	Total Phosphorus	Sulphate	pH, Conductivity	Asbestos-TEM-AD	Total Suspended Solids	Number of Containers
	E3	20-Jul-16	8:05	Water	R	R			R	R	R	R	R	R	R	R	R	11
	R3	19-Jul-16	16:50	Water	R	R			R	R	R	R	R	R	R	R	R	11
	R7	20-Jul-16	13:20	Water	R	R			R	R	R	R	R	R	R		R	10
	R11	19-Jul-16	14:30	Water	R	R			R	R	R	R	R	R	R		R	10
	GWCC-1	20-Jul-16	17:15	Water	R	R			R	R	R	R	R	R	R		R	10
	GWCC-2	20-Jul-16	16:50	Water	R	R			R	R	R	R	R	R	R		R	10
	GWCC-3	20-Jul-16	16:15	Water	R	R			R	R	R	R	R	R	R		R	10
	GWCC-4	20-Jul-16	17:45	Water	R	R			R	R	R	R	R	R	R		R	10
	Travel Blank					R			R	R	R	R	R	R	R		R	7
	Dup1	20-Jul-16	16:15	Water	R	R			R	R	R	R	R	R	R		R	10
	FB-1	20-Jul-16	8:05	Water	R	R			R	R	R	R	R	R	R		R	10

Drinking Water (DW) Samples[1] (client use)

Are samples taken from a Regulated DW System? ☐ Yes ☑ No

Are samples for human drinking water use? ☐ Yes ☑ No

Special Instructions / Specify Criteria to add on report (client Use)

Please hold samples for total and dissolved Chromium III/VI pending regular metals analysis results. Please supply ELR EQWIN EDD file with results.

SAMPLE CONDITION AS RECEIVED (lab use only)

Frozen	☐		SIF Observations	Yes ☐	No ☐
Ice packs	Yes ☑	No ☐	Custody seal intact	Yes ☐	No ☐
Cooling Initiated	☑				

INITIAL COOLER TEMPERATURES °C		FINAL COOLER TEMPERATURES °C			
0.8	1.0				

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by:	Date: Jul 22	Time: 10:30	Received by:	Date: 22-Jul-16	Time: 10:30	Received by:	Date:	Time:

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

NA-FM-0326e v09 Front/04 January 2014

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.