

HEMMERA ENVIROCHEM INC.

ATTN: Natasha Sandys 230 - 2237 2nd Avenue

Whitehorse YK Y1A 0K7

Date Received: 20-JUN-16

Report Date: 15-JUL-16 11:12 (MT)

Version: FINAL REV. 2

Client Phone: 867-456-4865

# Certificate of Analysis

Lab Work Order #: L1785857

Project P.O. #: NOT SUBMITTED Job Reference: 1343-005.17

C of C Numbers: 1, 2

Legal Site Desc:

#### Comments:

15-JUL-2016 This report replaces the previous version and contains additional analyses, as requested.

Brent Mack, B.Sc. Account Manager

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PAGE 2 of 13 15-JUL-16 11:12 (MT)

### ALS ENVIRONMENTAL ANALYTICAL REPORT

Version: FINAL REV. 2 L1785857-1 L1785857-2 L1785857-3 L1785857-4 L1785857-5 Sample ID Description Water Water Water Water Water 17-JUN-16 17-JUN-16 16-JUN-16 16-JUN-16 20-JUN-16 Sampled Date 14:45 10:30 13:30 10:30 Sampled Time R1 TRAVEL BLANK R1 R2 R2 Client ID Grouping **Analyte WATER Physical Tests** Conductivity (uS/cm) 712 659 <2.0 Hardness (as CaCO3) (mg/L) 392 356 < 0.50 pH (pH) 8.17 8.22 5.18 Total Suspended Solids (mg/L) 7.3 7.3 <3.0 RRV Ammonia, Total (as N) (mg/L) Anions and 0.0194 0.0120 0.0401 **Nutrients** Nitrate (as N) (mg/L) 0.119 0.0448 < 0.0050 Nitrite (as N) (mg/L) < 0.0010 <0.0010 < 0.0010 Phosphorus (P)-Total (mg/L) 0.0106 0.0087 < 0.0020 Sulfate (SO4) (mg/L) 222 178 < 0.30 Organic / Dissolved Organic Carbon (mg/L) 11.6 8.99 **Inorganic Carbon** Total Organic Carbon (mg/L) < 0.50 **Total Metals** Aluminum (Al)-Total (mg/L) <0.0030 0.175 0.109 Antimony (Sb)-Total (mg/L) 0.00023 0.00047 < 0.00010 Arsenic (As)-Total (mg/L) 0.00066 0.00091 < 0.00010 Barium (Ba)-Total (mg/L) 0.0505 0.0476 < 0.000050 Beryllium (Be)-Total (mg/L) < 0.000020 < 0.000020 < 0.000020 Bismuth (Bi)-Total (mg/L) < 0.000050 < 0.000050 < 0.000050 Boron (B)-Total (mg/L) < 0.010 < 0.010 0.011 Cadmium (Cd)-Total (mg/L) 0.0000625 0.0000203 < 0.0000050 Calcium (Ca)-Total (mg/L) < 0.050 82.9 59.6 Chromium (Cr)-Total (mg/L) < 0.00070 < 0.00070 < 0.00010 Cobalt (Co)-Total (mg/L) 0.00057 0.00022 < 0.00010 Copper (Cu)-Total (mg/L) <0.00050 0.00151 0.00250 Iron (Fe)-Total (mg/L) 0.503 0.436 < 0.010 Lead (Pb)-Total (mg/L) 0.000258 0.000077 < 0.000050 Lithium (Li)-Total (mg/L) 0.0037 0.0059 < 0.0010 Magnesium (Mg)-Total (mg/L) 37.3 46.7 < 0.10 Manganese (Mn)-Total (mg/L) 0.230 0.0750 < 0.00010 Mercury (Hg)-Total (mg/L) 0.0000051 < 0.0000050 < 0.0000050 Molybdenum (Mo)-Total (mg/L) 0.000648 < 0.000050 0.00134 Nickel (Ni)-Total (mg/L) 0.00299 < 0.00050 0.00431 Phosphorus (P)-Total (mg/L) < 0.050 < 0.050 < 0.050

0.61

0.00246

4.28

< 0.000010

0.81

0.000448

5.29

< 0.000010

< 0.10

< 0.000050

< 0.050

< 0.000010

Potassium (K)-Total (mg/L)

Selenium (Se)-Total (mg/L)

Silicon (Si)-Total (mg/L)

Silver (Ag)-Total (mg/L)

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

PAGE 3 of 13 15-JUL-16 11:12 (MT)

# Version: FINAL REV. 2

	Sample ID Description Sampled Date Sampled Time Client ID  Analyte		L1785857-7 Water 18-JUN-16 11:00 R6	L1785857-8 Water 18-JUN-16 11:00 DUP-3	L1785857-9 Water 17-JUN-16 12:45 R7	L1785857-10 Water 16-JUN-16 12:45 R8
Grouping	Analyte					
WATER						
Physical Tests	Conductivity (uS/cm)	806	189	189	182	
	Hardness (as CaCO3) (mg/L)	461	86.4	87.3	98.6	132
	pH (pH)	8.26	7.86	7.84	7.51	
	Total Suspended Solids (mg/L)	68.7	10.7	8.7	19.3	
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	0.0177	0.0082	0.0102	0.0412	<0.0050
	Nitrate (as N) (mg/L)	0.0558	0.0265	0.0269	0.0885	
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	
	Phosphorus (P)-Total (mg/L)	0.0055	0.0078	0.0075	0.0292	0.0052
	Sulfate (SO4) (mg/L)	261	31.7	31.6	31.6	
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)	12.8	15.2	15.2	28.3	14.7
T-1-1 84-1-1-	Total Organic Carbon (mg/L)					
Total Metals	Antimony (Ch.) Total (mg/L)	1.93	0.149	0.156	0.470	0.0581
	Antimony (Sb)-Total (mg/L)	0.00029	0.00012	0.00012	0.00022	0.00184
	Arsenic (As)-Total (mg/L)	0.00194	0.00061	0.00060	0.00141	0.00040
	Barium (Ba)-Total (mg/L)	0.117	0.0352	0.0345	0.0778	0.0483
	Beryllium (Be)-Total (mg/L)	0.000077	<0.000020	<0.000020	0.000034	<0.000020
	Bismuth (Bi)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Calaium (Cd)-Total (mg/L)	0.0000492	0.0000160	0.0000169	0.0000257	0.0000270
	Calcium (Ca)-Total (mg/L)	82.7	21.0 DLB	21.9 DLB	20.9	31.4
	Chromium (Cr)-Total (mg/L)  Cobalt (Co)-Total (mg/L)	0.00425	<0.00050	<0.00050	0.00227	0.00093
	Copper (Cu)-Total (mg/L)	0.00130	0.00024	0.00027	0.00086	<0.00010
	Iron (Fe)-Total (mg/L)	0.00551	0.00291	0.00305	0.00493	0.00221
	Lead (Pb)-Total (mg/L)	3.31	0.304	0.314	1.93	0.118
	Lithium (Li)-Total (mg/L)	0.00132	0.000063	0.000088	0.000280	<0.000050
	Magnesium (Mg)-Total (mg/L)	0.0057	0.0033	0.0034	<0.0010	<0.0010
	Manganese (Mn)-Total (mg/L)	54.5	7.21	7.56	9.63	11.8
	Mercury (Hg)-Total (mg/L)	0.133	0.0253	0.0268	0.206	0.00425
	Molybdenum (Mo)-Total (mg/L)	<0.0000050	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Nickel (Ni)-Total (mg/L)	0.00137	0.000429	0.000431	0.000529	0.000787
	Phosphorus (P)-Total (mg/L)	0.00880	0.00239	0.00252	0.00445	0.00347
	Potassium (K)-Total (mg/L)	0.060	<0.050	<0.050	<0.050	<0.050
	Selenium (Se)-Total (mg/L)	1.20	0.87	0.91	0.21	<0.10
	Silicon (Si)-Total (mg/L)	0.000570	0.000150	0.000170	0.000290	0.000561
	Silver (Ag)-Total (mg/L)	8.94 0.000029	4.38 <0.000010	4.59 <0.000010	5.11 <0.000010	5.53 <0.000010

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

PAGE 4 of 13 15-JUL-16 11:12 (MT)

# Version: FINAL REV. 2

	Sample ID Description Sampled Date Sampled Time Client ID Grouping Analyte		L1785857-12 Water 17-JUN-16 09:50 R9	L1785857-13 Water 17-JUN-16 17:50 R11	L1785857-14 Water 17-JUN-16 14:40 SL	L1785857-15 Water 17-JUN-16 10:15 R9
Grouping	Analyte					
WATER						
Physical Tests	Conductivity (uS/cm)	260		406	1470	528
	Hardness (as CaCO3) (mg/L)		310	214	967	
	pH (pH)	7.57		7.86	8.25	7.85
	Total Suspended Solids (mg/L)	4.7		38.0	20.7	<3.0
Anions and Nutrients	Ammonia, Total (as N) (mg/L)		0.0396			
	Nitrate (as N) (mg/L)	<0.0050		0.117	0.019	0.170
	Nitrite (as N) (mg/L)	<0.0010		<0.0010	<0.0020	0.0011
	Phosphorus (P)-Total (mg/L)		0.0105			
	Sulfate (SO4) (mg/L)	79.1		109	669	170
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)		23.6			
Tatal Matala	Total Organic Carbon (mg/L)					
Total Metals	Aluminum (Al)-Total (mg/L)		0.0507	0.151	0.215	
	Antimony (Sb)-Total (mg/L)		0.00023	0.00024	0.00281	
	Arsenic (As)-Total (mg/L)		0.00076	0.00061	0.0163	
	Barium (Ba)-Total (mg/L)		0.0713	0.0551	0.0298	
	Beryllium (Be)-Total (mg/L)		<0.000020	<0.000020	<0.000020	
	Bismuth (Bi)-Total (mg/L)		<0.000050	<0.000050	<0.000050	
	Boron (B)-Total (mg/L)		<0.010	<0.010	0.042	
	Cadmium (Cd)-Total (mg/L)		0.0000459	0.0000376	0.0000282	
	Calcium (Ca)-Total (mg/L)		67.2	48.2	210	
	Chromium (Cr)-Total (mg/L)		0.00089	0.00108	0.00725	
	Cobalt (Co)-Total (mg/L)		0.00047	0.00021	0.00075	
	Copper (Cu)-Total (mg/L)		0.00408	0.00280	0.00205	
	Iron (Fe)-Total (mg/L)		0.930	0.315	0.483	
	Lead (Pb)-Total (mg/L)		0.000051	0.000163	0.000244	
	Lithium (Li)-Total (mg/L)		<0.0010	<0.0010	0.0114	
	Magnesium (Mg)-Total (mg/L)		30.5	21.9	98.2	
	Manganese (Mn)-Total (mg/L)		0.300	0.0163	0.0138	
	Mercury (Hg)-Total (mg/L)		0.0000061	<0.0000050	<0.000050	
	Molybdenum (Mo)-Total (mg/L)		0.00143	0.00109	0.00200	
	Nickel (Ni)-Total (mg/L)		0.00387	0.00307	0.0241	
	Phosphorus (P)-Total (mg/L)		<0.050	<0.050	<0.050	
	Potassium (K)-Total (mg/L)		0.54	0.54	1.40	
	Selenium (Se)-Total (mg/L)		0.00109	0.000696	0.0157	
	Silicon (Si)-Total (mg/L)		4.31	5.77	4.74	
	Silver (Ag)-Total (mg/L)		<0.000010	0.000012	<0.000010	

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PAGE 5 of 13 15-JUL-16 11:12 (MT)

# ALS ENVIRONMENTAL ANALYTICAL REPORT

Version: FINAL REV. 2

	Sample ID Description Sampled Date Sampled Time Client ID	L1785857-1 Water 16-JUN-16 14:45 R1	L1785857-2 Water 17-JUN-16 10:30 R1	L1785857-3 Water 16-JUN-16 13:30 R2	L1785857-4 Water 17-JUN-16 10:30 R2	L1785857-5 Water 20-JUN-16 TRAVEL BLANK
Grouping	Analyte					
WATER						
Total Metals	Sodium (Na)-Total (mg/L)	3.34		2.89		<0.050
	Strontium (Sr)-Total (mg/L)	0.381		0.312		<0.00020
	Sulfur (S)-Total (mg/L)	71.4		59.3		<0.50
	Thallium (TI)-Total (mg/L)	0.000010		<0.000010		<0.000010
	Tin (Sn)-Total (mg/L)	<0.00010		<0.00010		<0.00010
	Titanium (Ti)-Total (mg/L)	0.00438		0.00318		<0.00030
	Uranium (U)-Total (mg/L)	0.00259		0.00390		<0.000010
	Vanadium (V)-Total (mg/L)	0.00060		0.00063		<0.00050
	Zinc (Zn)-Total (mg/L)	0.0036		<0.0030		<0.0030
	Zirconium (Zr)-Total (mg/L)	0.00056		0.00038		<0.00030
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD		FIELD		
	Dissolved Metals Filtration Location	FIELD		FIELD		
	Aluminum (AI)-Dissolved (mg/L)	0.0214		0.0244		
	Antimony (Sb)-Dissolved (mg/L)	0.00023		0.00045		
	Arsenic (As)-Dissolved (mg/L)	0.00054		0.00086		
	Barium (Ba)-Dissolved (mg/L)	0.0518		0.0506		
	Beryllium (Be)-Dissolved (mg/L)	<0.000020		<0.000020		
	Bismuth (Bi)-Dissolved (mg/L)	<0.000050		<0.000050		
	Boron (B)-Dissolved (mg/L)	<0.010		0.010		
	Cadmium (Cd)-Dissolved (mg/L)	0.0000607		0.0000180		
	Calcium (Ca)-Dissolved (mg/L)	89.7		63.0		
	Chromium (Cr)-Dissolved (mg/L)	0.00023		0.00050		
	Cobalt (Co)-Dissolved (mg/L)	0.00044		0.00017		
	Copper (Cu)-Dissolved (mg/L)	0.00213		0.00133		
	Iron (Fe)-Dissolved (mg/L)	0.212		0.277		
	Lead (Pb)-Dissolved (mg/L)	<0.000050		<0.000050		
	Lithium (Li)-Dissolved (mg/L)	0.0037		0.0059		
	Magnesium (Mg)-Dissolved (mg/L)	40.8		48.3		
	Manganese (Mn)-Dissolved (mg/L)	0.231		0.0731		
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050		<0.000050		
	Molybdenum (Mo)-Dissolved (mg/L)	0.00130		0.000606		
	Nickel (Ni)-Dissolved (mg/L)	0.00407		0.00302		
	Phosphorus (P)-Dissolved (mg/L)	<0.050		<0.050		
	Potassium (K)-Dissolved (mg/L)	0.63		0.83		
	Selenium (Se)-Dissolved (mg/L)	0.00256		0.000428		
	Silicon (Si)-Dissolved (mg/L)	4.38		5.33		
	Silver (Ag)-Dissolved (mg/L)	<0.000010		<0.000010		

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PAGE 6 of 13 15-JUL-16 11:12 (MT) Version: FINAL REV. 2

### ALS ENVIRONMENTAL ANALYTICAL REPORT

L1785857-7 L1785857-8 L1785857-9 L1785857-10 Sample ID L1785857-6 Description Water Water Water Water Water 17-JUN-16 16-JUN-16 Sampled Date 17-JUN-16 18-JUN-16 18-JUN-16 12:45 12:45 Sampled Time 16:45 11:00 11:00 DUP-3 R3 R7 R8 R6 Client ID Grouping **Analyte** WATER **Total Metals** Sodium (Na)-Total (mg/L) 3.97 3.51 3.69 1.58 3.83 Strontium (Sr)-Total (mg/L) 0.386 0.123 0.124 0.0648 0.120 Sulfur (S)-Total (mg/L) 87.4 11.1 11.2 10.9 27.6 Thallium (TI)-Total (mg/L) 0.000032 < 0.000010 < 0.000010 < 0.000010 < 0.000010 Tin (Sn)-Total (mg/L) < 0.00010 < 0.00010 < 0.00010 < 0.00010 < 0.00010 Titanium (Ti)-Total (mg/L) 0.0515 0.00296 0.00280 0.0133 0.00107 Uranium (U)-Total (mg/L) 0.00582 0.000786 0.000761 0.000103 0.000052 Vanadium (V)-Total (mg/L) 0.00599 0.00088 0.00093 0.00226 < 0.00050 Zinc (Zn)-Total (mg/L) 0.0115 < 0.0030 < 0.0030 0.0031 < 0.0030 Zirconium (Zr)-Total (mg/L) 0.00085 0.00069 0.00070 0.00090 0.00047 **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) 0.0251 0.0997 0.107 0.0296 0.101 Antimony (Sb)-Dissolved (mg/L) 0.00019 0.00012 0.00012 0.00021 0.00188 Arsenic (As)-Dissolved (mg/L) 0.00060 0.00055 0.00056 0.00126 0.00033 Barium (Ba)-Dissolved (mg/L) 0.0566 0.0346 0.0348 0.0732 0.0476 Beryllium (Be)-Dissolved (mg/L) < 0.000020 < 0.000020 < 0.000020 0.000024 < 0.000020 Bismuth (Bi)-Dissolved (mg/L) < 0.000050 < 0.000050 < 0.000050 < 0.000050 < 0.000050 Boron (B)-Dissolved (mg/L) < 0.010 < 0.010 < 0.010 < 0.010 < 0.010 Cadmium (Cd)-Dissolved (mg/L) 0.0000068 0.0000143 0.0000130 0.0000093 0.0000254 Calcium (Ca)-Dissolved (mg/L) 89.3 22.1 22.3 22.5 32.7 Chromium (Cr)-Dissolved (mg/L) 0.00044 0.00037 0.00040 0.00147 0.00070 Cobalt (Co)-Dissolved (mg/L) 0.00025 0.00021 0.00021 0.00068 < 0.00010 Copper (Cu)-Dissolved (mg/L) 0.00167 0.00287 0.00291 0.00454 0.00211 Iron (Fe)-Dissolved (mg/L) 0.143 0.217 0.207 1.36 0.057 Lead (Pb)-Dissolved (mg/L) < 0.000050 0.000051 < 0.000050 0.000057 < 0.000050 Lithium (Li)-Dissolved (mg/L) 0.0042 0.0035 0.0035 <0.0010 < 0.0010 Magnesium (Mg)-Dissolved (mg/L) 57.7 7.60 7.71 10.3 12.2 Manganese (Mn)-Dissolved (mg/L) 0.00336 0.0840 0.0235 0.0239 0.218 Mercury (Hg)-Dissolved (mg/L) < 0.0000050 < 0.0000050 < 0.0000050 < 0.0000050 < 0.0000050 Molybdenum (Mo)-Dissolved (mg/L) 0.00121 0.000397 0.000384 0.000522 0.000726 Nickel (Ni)-Dissolved (mg/L) 0.00309 0.00242 0.00239 0.00422 0.00336 Phosphorus (P)-Dissolved (mg/L) < 0.050 < 0.050 < 0.050 < 0.050 < 0.050 Potassium (K)-Dissolved (mg/L) 0.89 0.95 0.97 0.20 < 0.10 Selenium (Se)-Dissolved (mg/L) 0.000471 0.000161 0.000179 0.000317 0.000518 Silicon (Si)-Dissolved (mg/L) 4.50 5.57 5.71 4.45 4.77 Silver (Ag)-Dissolved (mg/L) < 0.000010 < 0.000010 < 0.000010 < 0.000010 < 0.000010

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

PAGE 7 of 13 15-JUL-16 11:12 (MT) Version: FINAL REV. 2

#### ALS ENVIRONMENTAL ANALYTICAL REPORT

L1785857-11 L1785857-12 L1785857-13 L1785857-14 L1785857-15 Sample ID Description Water Water Water Water Water 17-JUN-16 17-JUN-16 Sampled Date 17-JUN-16 17-JUN-16 17-JUN-16 10:35 14:40 10:15 Sampled Time 09:50 17:50 SL R8 R11 R9 R9 Client ID Grouping **Analyte WATER Total Metals** Sodium (Na)-Total (mg/L) 2.66 5.80 2.42 Strontium (Sr)-Total (mg/L) 0.246 0.213 0.949 Sulfur (S)-Total (mg/L) 61.1 38.8 227 Thallium (TI)-Total (mg/L) < 0.000010 < 0.000010 0.000025 Tin (Sn)-Total (mg/L) < 0.00010 <0.00010 < 0.00010 Titanium (Ti)-Total (mg/L) 0.00165 0.00431 0.00486 Uranium (U)-Total (mg/L) 0.000955 0.00112 0.00305 Vanadium (V)-Total (mg/L) 0.00054 0.00079 0.00075 Zinc (Zn)-Total (mg/L) < 0.0030 0.0047 0.0034 Zirconium (Zr)-Total (mg/L) 0.00098 0.00078 < 0.00030 **Dissolved Metals** Dissolved Mercury Filtration Location **FIELD FIELD FIELD** Dissolved Metals Filtration Location **FIELD FIELD FIELD** Aluminum (Al)-Dissolved (mg/L) 0.0431 0.0374 0.0020 Antimony (Sb)-Dissolved (mg/L) 0.00021 0.00022 0.00270 Arsenic (As)-Dissolved (mg/L) 0.00081 0.00049 0.0168 Barium (Ba)-Dissolved (mg/L) 0.0731 0.0541 0.0288 Beryllium (Be)-Dissolved (mg/L) < 0.000020 < 0.000020 < 0.000020 Bismuth (Bi)-Dissolved (mg/L) < 0.000050 < 0.000050 < 0.000050 Boron (B)-Dissolved (mg/L) < 0.010 < 0.010 0.041 Cadmium (Cd)-Dissolved (mg/L) 0.0000367 0.0000193 0.0000187 Calcium (Ca)-Dissolved (mg/L) 71.6 49.2 220 Chromium (Cr)-Dissolved (mg/L) 0.00078 0.00081 0.00124 Cobalt (Co)-Dissolved (mg/L) 0.00014 0.00047 0.00012 Copper (Cu)-Dissolved (mg/L) 0.00406 0.00239 0.00104 Iron (Fe)-Dissolved (mg/L) 0.884 0.111 < 0.010 Lead (Pb)-Dissolved (mg/L) < 0.000050 < 0.000050 < 0.000050 Lithium (Li)-Dissolved (mg/L) <0.0010 < 0.0010 0.0110 Magnesium (Mg)-Dissolved (mg/L) 22.2 31.9 101 Manganese (Mn)-Dissolved (mg/L) 0.310 0.0102 0.00527 Mercury (Hg)-Dissolved (mg/L) < 0.0000050 < 0.0000050 < 0.0000050 Molybdenum (Mo)-Dissolved (mg/L) 0.00133 0.00100 0.00184 Nickel (Ni)-Dissolved (mg/L) 0.00381 0.00279 0.0156 Phosphorus (P)-Dissolved (mg/L) < 0.050 < 0.050 < 0.050 Potassium (K)-Dissolved (mg/L) 0.59 0.52 1.43 Selenium (Se)-Dissolved (mg/L) 0.00112 0.000692 0.0163 Silicon (Si)-Dissolved (mg/L) 5.59 4.51 4.13

< 0.000010

< 0.000010

< 0.000010

Silver (Ag)-Dissolved (mg/L)

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

PAGE 8 of 13 15-JUL-16 11:12 (MT)

Version: FINAL REV. 2

	Sample ID Description Sampled Date Sampled Time Client ID	L1785857-1 Water 16-JUN-16 14:45 R1	L1785857-2 Water 17-JUN-16 10:30 R1	L1785857-3 Water 16-JUN-16 13:30 R2	L1785857-4 Water 17-JUN-16 10:30 R2	L1785857-5 Water 20-JUN-16 TRAVEL BLANK
Grouping	Analyte					
WATER						
Dissolved Metals	Sodium (Na)-Dissolved (mg/L)	3.56		3.01		
	Strontium (Sr)-Dissolved (mg/L)	0.401		0.318		
	Sulfur (S)-Dissolved (mg/L)	75.0		59.0		
	Thallium (TI)-Dissolved (mg/L)	<0.000010		<0.000010		
	Tin (Sn)-Dissolved (mg/L)	<0.00010		<0.00010		
	Titanium (Ti)-Dissolved (mg/L)	0.00033		0.00038		
	Uranium (U)-Dissolved (mg/L)	0.00263		0.00387		
	Vanadium (V)-Dissolved (mg/L)	<0.00050		<0.00050		
	Zinc (Zn)-Dissolved (mg/L)	0.0023		<0.0010		
	Zirconium (Zr)-Dissolved (mg/L)	0.00063		0.00042		
Speciated Metals	Chromium (III)-Dissolved (mg/L)					
	Chromium (III)-Total (mg/L)					
	Hexavalent Chromium (mg/L)					
	Hexavalent Chromium-Dissolved (mg/L)					

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

PAGE 9 of 13 15-JUL-16 11:12 (MT)

# Version: FINAL REV. 2

	Sample ID Description Sampled Date Sampled Time Client ID	L1785857-6 Water 17-JUN-16 16:45 R3	L1785857-7 Water 18-JUN-16 11:00 R6	L1785857-8 Water 18-JUN-16 11:00 DUP-3	L1785857-9 Water 17-JUN-16 12:45 R7	L1785857-10 Water 16-JUN-16 12:45 R8
Grouping	Analyte					
WATER						
Dissolved Metals	Sodium (Na)-Dissolved (mg/L)	4.01	3.70	3.69	1.70	3.90
	Strontium (Sr)-Dissolved (mg/L)	0.397	0.124	0.123	0.0674	0.121
	Sulfur (S)-Dissolved (mg/L)	91.8	11.2	11.2	11.4	27.8
	Thallium (TI)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.00010	<0.000010
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	0.00021
	Titanium (Ti)-Dissolved (mg/L)	0.00041	0.00102	0.00098	0.00246	0.00043
	Uranium (U)-Dissolved (mg/L)	0.00571	0.000730	0.000731	0.000084	0.000043
	Vanadium (V)-Dissolved (mg/L)	0.00063	0.00072	0.00072	0.00115	<0.00050
	Zinc (Zn)-Dissolved (mg/L)	0.0013	0.0077	0.0068	0.0017	0.0024
	Zirconium (Zr)-Dissolved (mg/L)	0.00053	0.00072	0.00073	0.00115	0.00049
Speciated Metals	Chromium (III)-Dissolved (mg/L)				0.00147	
	Chromium (III)-Total (mg/L)	0.00325			0.00127	
	Hexavalent Chromium (mg/L)	0.0010			0.0010	
	Hexavalent Chromium-Dissolved (mg/L)				<0.0010	

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

PAGE 10 of 13 15-JUL-16 11:12 (MT)

# Version: FINAL REV. 2

um (Na)-Dissolved (mg/L) ntium (Sr)-Dissolved (mg/L) ur (S)-Dissolved (mg/L) lium (Tl)-Dissolved (mg/L) Sn)-Dissolved (mg/L) nium (Ti)-Dissolved (mg/L) nium (U)-Dissolved (mg/L) adium (V)-Dissolved (mg/L) (Zn)-Dissolved (mg/L) onium (Zr)-Dissolved (mg/L) onium (III)-Dissolved (mg/L) onium (III)-Dissolved (mg/L) onium (III)-Total (mg/L) avalent Chromium (mg/L)	2.70 0.243 61.3 <0.000010 <0.00012 0.00124 0.000926 0.00051 0.0015	5.83 0.212 38.3 <0.000010 <0.00010 0.00060 0.00107 <0.00050 0.0033 0.00080 <0.00072	2.39 0.946 230 0.000016 <0.00030 0.00299 <0.00050 0.0021 <0.00030 <0.00042 0.00535	
ntium (Sr)-Dissolved (mg/L)  ur (S)-Dissolved (mg/L)  lium (TI)-Dissolved (mg/L)  Sn)-Dissolved (mg/L)  nium (Ti)-Dissolved (mg/L)  nium (U)-Dissolved (mg/L)  adium (V)-Dissolved (mg/L)  conium (Zr)-Dissolved (mg/L)  omium (III)-Dissolved (mg/L)  omium (III)-Total (mg/L)	0.243 61.3 <0.000010 <0.00010 0.00124 0.000926 0.00051 0.0015	0.212 38.3 <0.000010 <0.00010 0.00060 0.00107 <0.00050 0.0033 0.00080	0.946 230 0.000016 <0.00010 <0.00030 0.00299 <0.00050 0.0021 <0.00030 <0.00042 0.00535	
ntium (Sr)-Dissolved (mg/L)  ur (S)-Dissolved (mg/L)  lium (TI)-Dissolved (mg/L)  Sn)-Dissolved (mg/L)  nium (Ti)-Dissolved (mg/L)  nium (U)-Dissolved (mg/L)  adium (V)-Dissolved (mg/L)  conium (Zr)-Dissolved (mg/L)  omium (III)-Dissolved (mg/L)  omium (III)-Total (mg/L)	0.243 61.3 <0.000010 <0.00010 0.00124 0.000926 0.00051 0.0015	0.212 38.3 <0.000010 <0.00010 0.00060 0.00107 <0.00050 0.0033 0.00080	0.946 230 0.000016 <0.00010 <0.00030 0.00299 <0.00050 0.0021 <0.00030 <0.00042 0.00535	
lium (TI)-Dissolved (mg/L) Sn)-Dissolved (mg/L) Sn)-Dissolved (mg/L) nium (Ti)-Dissolved (mg/L) nium (U)-Dissolved (mg/L) adium (V)-Dissolved (mg/L) (Zn)-Dissolved (mg/L) onium (Zr)-Dissolved (mg/L) omium (III)-Dissolved (mg/L)	0.243 61.3 <0.000010 <0.00010 0.00124 0.000926 0.00051 0.0015	0.212 38.3 <0.000010 <0.00010 0.00060 0.00107 <0.00050 0.0033 0.00080	0.946 230 0.000016 <0.00010 <0.00030 0.00299 <0.00050 0.0021 <0.00030 <0.00042 0.00535	
lium (TI)-Dissolved (mg/L) Sn)-Dissolved (mg/L) nium (Ti)-Dissolved (mg/L) nium (U)-Dissolved (mg/L) adium (V)-Dissolved (mg/L) (Zn)-Dissolved (mg/L) onium (Zr)-Dissolved (mg/L) omium (III)-Dissolved (mg/L) omium (III)-Total (mg/L)	61.3 <0.000010 <0.00010 0.00124 0.000926 0.00051 0.0015	38.3 <0.000010 <0.00010 0.00060 0.00107 <0.00050 0.0033 0.00080	230 0.000016 <0.00010 <0.00030 0.00299 <0.00050 0.0021 <0.00030 <0.00042 0.00535	
Sn)-Dissolved (mg/L) nium (Ti)-Dissolved (mg/L) nium (U)-Dissolved (mg/L) adium (V)-Dissolved (mg/L) (Zn)-Dissolved (mg/L) onium (Zr)-Dissolved (mg/L) omium (III)-Dissolved (mg/L) omium (III)-Total (mg/L)	<0.000010 <0.00010 0.00124 0.000926 0.00051 0.0015	<0.000010 <0.00010 0.00060 0.00107 <0.00050 0.0033 0.00080	0.000016 <0.00010 <0.00030 0.00299 <0.00050 0.0021 <0.00030 <0.00042 0.00535	
nium (Ti)-Dissolved (mg/L) nium (U)-Dissolved (mg/L) adium (V)-Dissolved (mg/L) (Zn)-Dissolved (mg/L) onium (Zr)-Dissolved (mg/L) omium (III)-Dissolved (mg/L) omium (III)-Total (mg/L)	<0.00010 0.00124 0.000926 0.00051 0.0015	<0.00010 0.00060 0.00107 <0.00050 0.0033 0.00080	<0.00010 <0.00030 0.00299 <0.00050 0.0021 <0.00030 <0.00042 0.00535	
nium (U)-Dissolved (mg/L) adium (V)-Dissolved (mg/L) (Zn)-Dissolved (mg/L) onium (Zr)-Dissolved (mg/L) omium (III)-Dissolved (mg/L) omium (III)-Total (mg/L)	0.00124 0.000926 0.00051 0.0015	0.00060 0.00107 <0.00050 0.0033 0.00080	<0.00030 0.00299 <0.00050 0.0021 <0.00030 <0.00042 0.00535	
adium (V)-Dissolved (mg/L) (Zn)-Dissolved (mg/L) pnium (Zr)-Dissolved (mg/L) pmium (III)-Dissolved (mg/L) pmium (III)-Total (mg/L)	0.000926 0.00051 0.0015	0.00107 <0.00050 0.0033 0.00080	0.00299 <0.00050 0.0021 <0.00030 <0.00042 0.00535	
(Zn)-Dissolved (mg/L)  onium (Zr)-Dissolved (mg/L)  omium (III)-Dissolved (mg/L)  omium (III)-Total (mg/L)	0.00051 0.0015	<0.00050 0.0033 0.00080	<0.00050 0.0021 <0.00030 <0.00042 0.00535	
onium (Zr)-Dissolved (mg/L) omium (III)-Dissolved (mg/L) omium (III)-Total (mg/L)	0.0015	0.0033 0.00080	0.0021 <0.00030 <0.00042 0.00535	
omium (III)-Dissolved (mg/L)		0.00080	<0.00030 <0.00042 0.00535	
omium (III)-Total (mg/L)	0.00.00		<0.00042 0.00535	
		<0.00072	0.00535	
avalent Chromium (mg/L)		10.000.2		
		0.0010	0.0019	
avalent Chromium-Dissolved (mg/L)		0.00.0		
			0.0010	0.0010

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

Version: FINAL REV. 2

PAGE 11 of 13 15-JUL-16 11:12 (MT)

#### **Reference Information**

QC Samples with Qualifiers & Comments:

·			
QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Chromium (Cr)-Total	DLB	L1785857-1, -10, -12, -13, -14, -3, -5, -6, -7, -8, -9
Method Blank	Chromium (Cr)-Total	MB-LOR	L1785857-1, -10, -12, -13, -14, -3, -5, -6, -7, -8, -9
Matrix Spike	Sulfate (SO4)	MS-B	L1785857-11, -13, -14, -15, -2, -4, -5, -6, -7, -8, -9
Matrix Spike	Phosphorus (P)-Total	MS-B	L1785857-1, -10, -12, -3, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Total	MS-B	L1785857-1, -10, -12, -13, -14, -3, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Total	MS-B	L1785857-1, -10, -12, -13, -14, -3, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Total	MS-B	L1785857-1, -10, -12, -13, -14, -3, -5, -6, -7, -8, -9
Matrix Spike	Dissolved Organic Carbon	MS-B	L1785857-12, -9

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

Qualifier	Description
DLB	Detection Limit Raised. Analyte detected at comparable level in Method Blank.
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
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

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.

#### **Reference Information**

L1785857 CONTD.... PAGE 12 of 13 15-JUL-16 11:12 (MT)

Version: FINAL REV. 2

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.

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

#### **Reference Information**

L1785857 CONTD.... PAGE 13 of 13 15-JUL-16 11:12 (MT)

Version: FINAL REV. 2

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 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.

**TSS-MAN-WR** 

Water

Total Suspended Solids by Gravimetric

APHA 2540 D

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Suspended Solids are determined by filtering a sample through a glass fibre filter and drying the filter at 104 degrees celsius.

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:

<b>Laboratory Definition Code</b>	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:**

#### **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.

<sup>\*\*</sup> ALS test methods may incorporate modifications from specified reference methods to improve performance.



Contact: Brent Mack

Company: ALS Environmental

Address: 8081 Lougheed HWY, Suite 100

Burnaby, BC V5A1W9

#### REFERENCE DATA

Project / Location: L1785857 PO Number: L1785857 ALS Work Order: 1606852

TEM Water Narrative: Analysis performed on FEI Tecnai TEM with integrated EDXA capabilities. Morph-

ology, 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 >10um 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: 6/27/2016 Calibration Constant (µm/cm): 0.74 Camera Constant (mm-Å): 129.25 Analysis Start Date: 6/28/2016

Pamela Iohnson

Shawn Smithe

Pamela Johnson ALS TEM Analyst Shawn Smythe ALS Project Manager

#### **IDENTIFICATION**

IDENTIFICATION			
Client Sample ID:	L1785857-2 R1	L1785857-6 R3	
ALS Sample ID:	1606852-01	1606852-02	
Method:	EPA 100.2	EPA 100.2	
Date of Collection:	6/17/2016	6/17/2016	
Time of Collection:	9:56	9:56	
FILTRATION & ANALYSIS			
Date of Filtration:	6/23/2016	6/23/2016	
Time of Filtration:	15:35	15:35	
Volume Filtered (L):	0.01	0.005	
Openings Analyzed:	10	10	
Avg. Opening Area (mm <sup>2</sup> ):	0.011	0.011	
AS (MFL):	0.98	1.95	
ASBESTOS COUNT			
Chrysotile:	0	0	
Amosite:	0	0	
Crocidolite:	0	0	
Act-Tremolite <sup>†</sup> :	0	0	
Anthophyllite:	0	0	
Total Asbestos:	0	0	
ASBESTOS CONCENTRA	ΓΙΟΝ (MFL)		
Chrysotile:	<as< td=""><td><as< td=""><td></td></as<></td></as<>	<as< td=""><td></td></as<>	
Amosite:	<as< td=""><td><as< td=""><td></td></as<></td></as<>	<as< td=""><td></td></as<>	
Crocidolite:	<as< td=""><td><as< td=""><td></td></as<></td></as<>	<as< td=""><td></td></as<>	
Act-Tremolite <sup>†</sup> :	<as< td=""><td><as< td=""><td></td></as<></td></as<>	<as< td=""><td></td></as<>	
Anthophyllite:	<as< td=""><td><as< td=""><td></td></as<></td></as<>	<as< td=""><td></td></as<>	
Total Asbestos:	<as< td=""><td><as< td=""><td></td></as<></td></as<>	<as< td=""><td></td></as<>	

#### **NOTES**

Samples L1785857-2 R1 and L1785857-6 R3 were received past the method hold time of 48 hours from time and date of sample collection written on sample bottle labels.

#### **EDXA SPECTRA**

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

NONE: No asbestos detected.

#### **PHOTOMICROGRAPHS**

Collected using Gatan Digital Micrograph.
NONE: No asbestos detected.

# ALS Environmental

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# Chain of Custody (COC) / Analytical Request Form

Canada Toli Free: 1 800 668 9878

L1785857-COFC

COC Number: 1

age 1 of 2

	www.alsglobal.com										1								
Report To		_]	Report Format	/ Distribution		Select Service Level Below (Rush Tumaround Time (TAT) is not available for all fests)													
Company:	Hemmera Environchem Inc.	Select Report	Format: [7]PDF	Ø≐xæ. ☑	EDD (DIGITAL)	R ☑Regular (Standard TAT if received by 3 pm - business days)													
Contact:	Natasha Sandys	Quality Contro	(QC) Report with F	Report 📝 🗷 Ye	s 🖺 No		Thronity (2-4 bus, days if received by 3pm) 50% surcharge - contact ALS to confirm TAT  Emergency (1-2 bus, days if received by 3pm) 100% surcharge - contact ALS to confirm TAT												
Address:	230 - 2237 2nd Avenue	☐Critteria on Rep	ort - provide details belo			E	<u></u> Eme	rgency	(1-2 bus	. days il	receive	ed by 3	pm) 10	0% su	charge	- cont	act ALS	to confi	m TAT
	Whitehorse, YT	Select Distribu			□FAX	E2	□Same	e day o	weeke	nd eme	gency -	contac	t ALS t	o confi	TAT III	and st	urcharg	e	_
Phone:	867-456-4865		nsandys@nemme	ra.com		Spec	ify Dat	e Req	uired f	or E2,			<u> </u>						
		Email 2	chris@elr.ca	. <del></del>		Ь.						nalys	_	•					
Invoice To	Same as Report To		Invoice Di			<u> </u>		Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below											
	Copy of Invoice with Report	Select Invoice			□FAX	F/P	Р	Р	F/P	Р	F/P		<u> </u>						
Company:	Hemmera Environchem Inc.		nsandys@hemme	ra.com		quess	ŞŞ.					l						i	
Contact:	Natasha Sandys	Email 2	chris@elr.ca											ē.					
	Project Information		il and Gas Require	· · · · · · · · · · · · · · · · · · ·		] <del>_</del> =	뿙	Total	ssol		~			ĺ		Solids			aine
ALS Quote #:	Q56044		o de como de c Como de como d	<del></del>	5 - 6 1	Hg) &	i ii	Ľ	٦		(DOC)	}	1			Sol			ju '
Job #:	1343-005.17		74				] ਵੈ	<u>\</u>	[≦	İ	8					dsng			ofC
PO / AFE:						f (ind	j j	, <del>,</del>	<del> </del> }		Carbon			ĺ		l Egi			þer
LSD:		Location:				≸et	Met (incl.	i g	Speciation (III/VI) - Dissolved		, je			2		, T	Ą		Number of Containers
ALS Lab Wo	rk Order# (lab use only)	ALS Contact:		Sampler:	AN/CH	el Diss.	ᇦ	adS w		z	d Organic	_	_	Total Phosphorus		pH, Conductivity, Total Susp	Asbestos-TEM-AD		_
ALS Sample #	Sample identification and/or Coordinates	<u> </u>	Date	Time	Commit Torre	Low Level	Level	Ę	Chromium	Ammonia	Dissolved	Nitrate-N	Nitrite - N	橿	Sulphate	S	l g		
(lab use only)	(This description will appear on the report)		(dd-mmm-yy)	(hh:mm)	Sample Type	Š	Low	Chromi	£	₹	SS	Ę	ž	Total	Sulf	표	A SB	i	
	R1		16-Jun-16	14:45	Water	R	R			R	R							į	8
2	R1	· · · · · · · · · · · · · · · · · · ·	17-Jun-16	10:50	Water							R	R	R	R	R	R		2
3	R2		16-Jun-16	13:30	Water	R	R			R	R	<del>                                     </del>							8
4	R2	-	17-Jun-16	10:30	Water							R	R	R	R	R			1
5	Travel Blank				Water	<del>                                     </del>	R			R	R	R	R	R	R	R	 I		6
6	R3		17-Jun-16	16:45	Water	R	R			R	R	R	R	R	R	R	R		10
7	R6		18-Jun-16	11:00	Water	R	R			R	R	R	R	R	R	R			9
8	DUP-3		18-Jun-16	11:00	Water	R	R			R	R	R	R	R	R	R			9
91.60	R7		17-Jun-16	12:45	Water	R	R			R	R	R	R	R	R	R			9
1000	R8		16-Jun-16	12:45	Water	R	R			R	R	<u> </u>							8
<b>图 1/</b> 图 2	R8		17-Jun-16	10:35	Water							R	R	R	R	R			1
31/23/	R9		17-Jun-16	9:50	Water	R	R			R	R					_			8
Drinking	Water (DW) Samples <sup>1</sup> (client use) Specia	Instructions / Spe	cify Criteria to add o	n report (client Us	3e)		778												TABINES
Are samples tak	en from a Regulated DW System? Please hold samples	for total and disso	lved Chromium III/V	I pending regula	r metals analysis	Froz	en acks	V				OIL	UDSE Salari	VBUO	IS	V		NO NO	
Are samples taken from a Regulated DW System?  Please hold samples for total and dissolved Chromium III/VI pending regular metals analysis results. Please supply ELR EQWIN EDD file with results.				Coci	ing Initi	oted	M	NO	الناز	CUST	July 8	COI III	aul s	103	ات	NO			
Are samples for	human drinking water use?					-≉ INII	TIAL CO	OLER	TEMPF	RATUR	ES °C =	95 <b>设备选</b> 1953年 1	garaetal Geografia	FINAL	COOI	ER TEN	MPERA	TURES	Capather.
ΓY	- · · · · · · · · · · · · · · · · · · ·					216	T 56	25	0	3,400	TOTAL C			59	75	13Q	W	921	5.21
	SHIPMENT RELEASE (client use)	/ INITIAL S	SHIPMENT RECEP	TION (lab use or	ılv)	\$6.4 m		2 (1 ·	FIN	AL SH	(IPMF			ì	ै <u>/</u>   (leh	ijse ∩	nlv\	1 1 2	
Released by:	Date: Time: Rece	ved by:		Date:	Time;		eived b		, , , , ,	22.0			Dat			Time			9// 1 -9
<u>All</u>	Jun. 20   9/13   1			20 JWH				· .			$\mathfrak{I}$			JU			3:2	5	
REFER TO BACK	K PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION	<del>/</del>	WH	TE - LABORATOR		LOW -	CLIEN	T COP	Y					NA-FM-0	128e v00 F	ionM04 Jan	USTY 2014		

# ALS Environmental

# Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

L1785857-COFC

COC Number: 1

Page 2 of 2

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Report To				Report Format / Distribution					Select Service Level Below (Rush Tumaround Time (TAT) is not available for all tests)															
Company:	пралу: Hemmera Environchem Inc.				Select Report	R	☑Regu	ılar (Sta	ndard T	AT if re	ceived b	y 3 pm	• busi	ness da	ıys)									
Contact:	Natasha Sandys		Quality Control (QC) Report with Report 🖙 Yes 🗀 No 👂 🕮 Priority (2-4 bus, days if received by 3pm) 50% surcharge - contact ALS to confirm TA												T.									
Address: 230 - 2237 2nd Avenue					□Criteria on Report - provide details below if box checked						E Emergency (1-2 bus, days if received by 3pm) 100% surcharge - contact ALS to confirm TAT													
Whitehorse, YT					Select Distribution:     Select Distribution:   DEMAIL   DEMAIL						E2 DSame day or weekend emergency - contact ALS to confirm TAT and surcharge													
Phone: 867-456-4865				Email 1 or Fax nsandys@hemmera.com						Specify Date Required for E2,E or P:														
				Email 2 chris@elr.ca					Analysis Request															
nvoice To	To Same as Report To Yes No				Invoice Distribution					Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below														
	Copy of Invoice with Report	Yes	I No		Select Invoice	Distribution:	MAIL IMAIL	□FAX	F/P	Р	Р	F/P	Р	F/P			Ï				$\neg$			
Company:	Hemmera Environchem Inc				Email 1 or Fax	nsandys@hemme	era.com	-	Şe	SSS						T								
Contact: Natasha Sandys				[	Email 2 chris@elr.ca							ved									1	ъ		
Project information					Oll and Gas Required Fields (client use)						Total	Dissolved		٦				'	Solids		1 1	ij.		
ALS Quote #:	Quote #: Q56044 /				Approver ID: Cost Center:					and		1 1		Carbon (DOC)					Susp So		Number of Containers	囂		
lob #:	1343-005.17				GL'Account					<u> 훈</u>	(III)	€										ဋ		
PO / AFE:					Activity Code					힐	E	5		ļ ģ					Total §		1	e c		
.\$D:	D:				Location					Met	iai	ig i	1	ا ا			<u></u>	'	6	Ą	- 1	톁		
ALS Lab Work Order# (lab use only)				ALS Contact:		Sampler:	der: AN/CH			nm Spec	rm Speciation (III/VI)	2 -	ed Organic	2	z	Phosphorus		pH, Conductivity,			ž			
ALS Sample # Sample Identification and/or Coordinates (Introduce only); (This description will appear on the report)					Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Low Level	Low Les	Сһтотіит	Chromium	Ammonia	Dissolved	Nitrate-N	Nitrite - N	Total Pt	Sulphate	PH, Con	Asbestos-TEM					
13:00	R11			***		17-Jun-16	17:50	Water	R	R			R	R	R	R	R	R	R			9		
14	SL					17-Jun-16	14:40	Water	R	R			R	R	R	R	R	R	R		_	9		
15	R9	<del></del>	<del></del> -		<del></del> -	17-Jun-16	10:15	Water	<u> </u>	···	_	_	<del>  ``-</del>	+ ``	R	R	R	R	R	_		1		
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MATERIAL SECTION	<u> </u>		-			<u> </u>										<u> </u>	L							
					structions / Specify Criteria to add on report (client Use)					Frozen  SAMPLE CONDITION AS RECEIVED (lab use only)  Frozen  SIF Observations Yes														
TYes FNo results. Please supply E					total and dissolved Chromium III/VI pending regular metals analysis LR EQWIN EDD file with results.					Cooling Initiated a														
ure samples for human drinking water use? ਿ Yes ਾ No										© INITIAL COOLER TEMPERATURES ℃ 2 MANUAL COOLER TEMPERATURES ℃ 2000 FINAL COOLER TEMPERATURES € 2000 FINAL COOLER FINAL COOLER FINAL COOLER FINAL COOLER FINAL COOLER FINAL COOLER FINAL COOLER FINAL COOLER FINAL COOLER FINAL COOLER FINAL COOLER FINAL COOLER FINAL														
										10/4/0 X/60 000 10/4/53 55/10 2 9/5/2														
SHIPMENT RELEASE (client use)					INITIAL SHIPMENT RECEPTION (lab use only)					y generally	ere in		IAL SI	IIPME	NT R	ECEF	TION	l (lab i	use or	ily) 🎫	51888 <b>5</b>	<b>Property</b>		
Released by:	ased by:  Date: Time: Receiv  9:/5  R TO BACK PACE FOR ALS LOCATIONS AND SAMPLING INFORMATION					ed by Date: Jun-16 Times, 30					y:			JC		Date 2	ાં તુ	N)	Time	/3:>	25			
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