



ENVIRONMENTAL DYNAMICS INC.
ATTN: Meghan Marjanovic
2195 - 2nd Ave
Whitehorse YT Y1A 3T8

Date Received: 21-APR-15
Report Date: 30-APR-15 17:41 (MT)
Version: FINAL

Client Phone: 867-393-4882

Certificate of Analysis

Lab Work Order #: L1601887
Project P.O. #: NOT SUBMITTED
Job Reference: MOUNT NANSEN 15-Y-0146
C of C Numbers: 1, 2
Legal Site Desc:

Can Dang
Senior Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

30-APR-15 17:41 (MT)

Version: FINAL

	Sample ID Description Sampled Date Sampled Time Client ID	L1601887-1 Water 20-APR-15 16:35 0146-150420-001	L1601887-2 Water 20-APR-15 18:40 0146-150420-003	L1601887-3 Water 20-APR-15 08:00 0146-150420-007	L1601887-4 Water 20-APR-15 14:55 0146-150420-010	L1601887-5 Water 21-APR-15 13:10 0146-150421-008
Grouping	Analyte					
WATER						
Physical Tests	Conductivity (uS/cm)	201	1200	<2.0	444	1410
	Hardness (as CaCO3) (mg/L)	117	726	<0.50	242	1030
	pH (pH)	8.12	7.89	5.78	8.17	8.18
	Total Suspended Solids (mg/L)	<3.0	96.0	<3.0	<3.0	21.3
	Total Dissolved Solids (mg/L)	125	998	<1.0	284	1270
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	92.1	155	<1.0	108	234
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3) (mg/L)	92.1	155	<1.0	108	234
	Ammonia, Total (as N) (mg/L)	<0.0050	3.20	<0.0050	0.0365	0.0667
	Chloride (Cl) (mg/L)	<0.50	1.6	<0.50	<0.50	<2.5 ^{DLA}
	Fluoride (F) (mg/L)	0.056	0.058	<0.020	0.054	0.10
	Nitrate (as N) (mg/L)	0.0340	0.414	<0.0050	0.0314	<0.025 ^{DLA}
	Nitrite (as N) (mg/L)	<0.0010	0.0154	<0.0010	0.0015	<0.0050 ^{DLA}
	Sulfate (SO4) (mg/L)	25.3	588	<0.30	128	769
	Anion Sum (meq/L)	2.37	15.4	<0.10	4.84	20.7
	Cation Sum (meq/L)	2.48	16.8	<0.10	5.14	21.4
	Cation - Anion Balance (%)	2.1	4.2	0.0	3.0	1.7
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050	0.0107	<0.0050	<0.0050	<0.0050
	Cyanide, Total (mg/L)	<0.0050	0.0696	<0.0050	<0.0050	<0.0050
	Cyanate (mg/L)	<0.20	<0.20	<0.20	<0.20	<0.20
	Thiocyanate (SCN) (mg/L)	<0.50	2.72	<0.50	<0.50	<0.50
Total Metals	Aluminum (Al)-Total (mg/L)	0.802	1.85	<0.0030	0.172	0.293
	Antimony (Sb)-Total (mg/L)	0.00029	0.00764	<0.00010	0.00035	0.00344
	Arsenic (As)-Total (mg/L)	0.00419	0.0948	<0.00010	0.00421	0.0169
	Barium (Ba)-Total (mg/L)	0.0802	0.0935	<0.000050	0.0782	0.0518
	Beryllium (Be)-Total (mg/L)	0.000027	0.000089	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)-Total (mg/L)	<0.000050	0.000559	<0.000050	<0.000050	<0.000050
	Boron (B)-Total (mg/L)	<0.010	0.052	<0.010	<0.010	0.014
	Cadmium (Cd)-Total (mg/L)	0.000104	0.00116	<0.0000050	0.000108	0.000164
	Calcium (Ca)-Total (mg/L)	28.6	203	<0.050	59.2	227
	Chromium (Cr)-Total (mg/L)	0.00100	0.00455	<0.00010	0.00037	0.00071
	Cobalt (Co)-Total (mg/L)	0.00033	0.00785	<0.00010	0.00039	0.00062
	Copper (Cu)-Total (mg/L)	0.00226	0.0186	<0.00050	0.00109	0.00145
	Iron (Fe)-Total (mg/L)	1.02	16.2	<0.010	0.228	4.07
	Lead (Pb)-Total (mg/L)	0.00297	0.0339	<0.000050	0.000543	0.000624
	Lithium (Li)-Total (mg/L)	<0.0010	0.0018	<0.0010	0.0010	0.0064

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

30-APR-15 17:41 (MT)

Version: FINAL

Sample ID Description Sampled Date Sampled Time Client ID	L1601887-6 Water 21-APR-15 11:40 0146-150421-005	L1601887-7 Water 0146-1504 - TRAVEL BLANK	L1601887-8 Water 20-APR-15 13:07 0146-150420-009	L1601887-9 Water 20-APR-15 14:25 0146-150420-011	L1601887-10 Water 20-APR-15 16:55 0146-150420-002	
Grouping	Analyte					
WATER						
Physical Tests	Conductivity (uS/cm)	995	<2.0	461	454	219
	Hardness (as CaCO3) (mg/L)	708		251	242	115
	pH (pH)	8.06	5.37	8.15	8.17	8.07
	Total Suspended Solids (mg/L)	78.7	<3.0	6.0	<3.0	4.0
	Total Dissolved Solids (mg/L)	837	<1.0	295	284	120
Anions and Nutrients	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	265	<1.0	118	103	84.0
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<1.0	<1.0	<1.0	<1.0	<1.0
	Alkalinity, Total (as CaCO3) (mg/L)	265	<1.0	118	103	84.0
	Ammonia, Total (as N) (mg/L)	0.0303	<0.0050	0.0148	0.0330	<0.0050
	Chloride (Cl) (mg/L)	<1.0 ^{DLA}	<0.50	<0.50	<0.50	<0.50
	Fluoride (F) (mg/L)	0.152	<0.020	0.063	0.064	0.055
	Nitrate (as N) (mg/L)	0.013	<0.0050	0.0336	0.0327	0.0315
	Nitrite (as N) (mg/L)	<0.0020 ^{DLA}	<0.0010	0.0014	0.0014	<0.0010
	Sulfate (SO4) (mg/L)	421	<0.30	130	132	25.4
	Anion Sum (meq/L)	14.1	<0.10	5.06	4.79	2.21
	Cation Sum (meq/L)	14.6	<0.10	5.35	5.13	2.45
	Cation - Anion Balance (%)	1.8	0.0	2.8	3.4	5.1
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Cyanide, Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Cyanate (mg/L)	<0.20	<0.20	<0.20	<0.20	<0.20
	Thiocyanate (SCN) (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
Total Metals	Aluminum (Al)-Total (mg/L)	0.393	<0.0030	0.134	0.182	0.876
	Antimony (Sb)-Total (mg/L)	0.0231	<0.00010	0.00038	0.00037	0.00030
	Arsenic (As)-Total (mg/L)	0.137	<0.00010	0.00357	0.00419	0.00450
	Barium (Ba)-Total (mg/L)	0.0236	<0.000050	0.0918	0.0798	0.0804
	Beryllium (Be)-Total (mg/L)	0.000022	<0.000020	<0.000020	<0.000020	0.000027
	Bismuth (Bi)-Total (mg/L)	0.000129	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Cadmium (Cd)-Total (mg/L)	0.00466	<0.000050	0.000111	0.000117	0.000112
	Calcium (Ca)-Total (mg/L)	176	<0.050	57.6	59.3	28.5
	Chromium (Cr)-Total (mg/L)	0.00063	<0.00010	0.00037	0.00088	0.00110
	Cobalt (Co)-Total (mg/L)	0.00134	<0.00010	0.00047	0.00039	0.00036
	Copper (Cu)-Total (mg/L)	0.00571	<0.00050	0.00124	0.00130	0.00216
	Iron (Fe)-Total (mg/L)	2.74	<0.010	0.267	0.247	1.07
	Lead (Pb)-Total (mg/L)	0.0436	<0.000050	0.000331	0.000604	0.00303
	Lithium (Li)-Total (mg/L)	0.0097	<0.0010	0.0011	<0.0010	<0.0010

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1601887-1	L1601887-2	L1601887-3	L1601887-4	L1601887-5
		Description	Water	Water	Water	Water	Water
		Sampled Date	20-APR-15	20-APR-15	20-APR-15	20-APR-15	21-APR-15
		Sampled Time	16:35	18:40	08:00	14:55	13:10
		Client ID	0146-150420-001	0146-150420-003	0146-150420-007	0146-150420-010	0146-150421-008
Grouping	Analyte						
WATER							
Total Metals	Magnesium (Mg)-Total (mg/L)		9.23	44.1	<0.10	21.1	98.8
	Manganese (Mn)-Total (mg/L)		0.162	5.25	<0.00010	0.260	1.46
	Mercury (Hg)-Total (mg/L)		0.0000115	0.0000116	<0.0000050	<0.0000050	0.0000057
	Molybdenum (Mo)-Total (mg/L)		0.000477	0.00117	<0.000050	0.000412	0.000288
	Nickel (Ni)-Total (mg/L)		0.00092	0.00618	<0.00050	0.00061	0.00108
	Phosphorus (P)-Total (mg/L)		<0.050	0.096	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)		1.23	5.66	<0.10	2.04	5.20
	Rubidium (Rb)-Total (mg/L)		0.00183	0.00411	<0.00020	0.00136	0.00391
	Selenium (Se)-Total (mg/L)		0.000053	0.000227	<0.000050	<0.000050	0.000075
	Silicon (Si)-Total (mg/L)		6.95	10.4	<0.050	6.59	7.25
	Silver (Ag)-Total (mg/L)		0.000054	0.000680	<0.000010	0.000013	0.000016
	Sodium (Na)-Total (mg/L)		2.53	25.3	<0.050	5.45	9.74
	Strontium (Sr)-Total (mg/L)		0.269	0.592	<0.00020	0.368	0.770
	Sulfur (S)-Total (mg/L)		8.60	196	<0.50	45.0	249
	Thallium (Tl)-Total (mg/L)		0.000016	0.000059	<0.000010	<0.000010	0.000013
	Tin (Sn)-Total (mg/L)		<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)		0.0209	0.0768	<0.00030	0.00491	0.0154
	Uranium (U)-Total (mg/L)		0.000716	0.00135	<0.000010	0.000807	0.00321
	Vanadium (V)-Total (mg/L)		0.00198	0.00890	<0.00050	0.00064	0.00186
	Zinc (Zn)-Total (mg/L)		0.0099	0.0627	<0.0030	0.0096	0.0229
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)		0.0070	0.0135	<0.0010	0.0038	0.0048
	Antimony (Sb)-Dissolved (mg/L)		<0.00010	0.00127	<0.00010	0.00031	0.00342
	Arsenic (As)-Dissolved (mg/L)		0.00058	0.0285	<0.00010	0.00336	0.0119
	Barium (Ba)-Dissolved (mg/L)		0.0726	0.0632	<0.000050	0.0766	0.0467
	Beryllium (Be)-Dissolved (mg/L)		<0.000020	<0.000020	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)-Dissolved (mg/L)		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Boron (B)-Dissolved (mg/L)		<0.010	0.052	<0.010	<0.010	0.014
	Cadmium (Cd)-Dissolved (mg/L)		0.0000606	0.000543	<0.0000050	0.000105	0.0000712
	Calcium (Ca)-Dissolved (mg/L)		30.7	215	<0.050	61.3	241
	Chromium (Cr)-Dissolved (mg/L)		<0.00010	0.00031	<0.00010	<0.00010	<0.00010
	Cobalt (Co)-Dissolved (mg/L)		<0.00010	0.00664	<0.00010	0.00033	0.00049
	Copper (Cu)-Dissolved (mg/L)		0.00092	0.00150	<0.00020	0.00080	0.00041
	Iron (Fe)-Dissolved (mg/L)		0.019	11.1	<0.010	0.022	2.45
	Lead (Pb)-Dissolved (mg/L)		0.000056	0.000110	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Dissolved (mg/L)		<0.0010	<0.0010	<0.0010	<0.0010	0.0064

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

30-APR-15 17:41 (MT)

Version: FINAL

Sample ID	Description	Sampled Date	Sampled Time	Client ID	L1601887-6	L1601887-7	L1601887-8	L1601887-9	L1601887-10
					L1601887-6 Water 21-APR-15 11:40 0146-150421-005	L1601887-7 Water 0146-1504 - TRAVEL BLANK	L1601887-8 Water 20-APR-15 13:07 0146-150420-009	L1601887-9 Water 20-APR-15 14:25 0146-150420-011	L1601887-10 Water 20-APR-15 16:55 0146-150420-002
Grouping	Analyte								
WATER									
Total Metals	Magnesium (Mg)-Total (mg/L)	59.2	<0.10	20.5	21.2	9.25			
	Manganese (Mn)-Total (mg/L)	1.45	<0.00010	0.231	0.260	0.172			
	Mercury (Hg)-Total (mg/L)	0.0000139	<0.0000050	<0.0000050	0.0000068	0.0000100			
	Molybdenum (Mo)-Total (mg/L)	0.000389	<0.000050	0.000369	0.000402	0.000504			
	Nickel (Ni)-Total (mg/L)	0.00258	<0.00050	0.00084	0.00072	0.00092			
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050			
	Potassium (K)-Total (mg/L)	3.38	<0.10	2.21	1.99	1.22			
	Rubidium (Rb)-Total (mg/L)	0.00567	<0.00020	0.00154	0.00146	0.00193			
	Selenium (Se)-Total (mg/L)	<0.000050	<0.000050	0.000067	<0.000050	<0.000050			
	Silicon (Si)-Total (mg/L)	7.21	<0.050	6.40	6.57	6.89			
	Silver (Ag)-Total (mg/L)	0.000505	<0.000010	<0.000010	0.000015	0.000061			
	Sodium (Na)-Total (mg/L)	4.68	<0.050	5.87	5.66	2.67			
	Strontium (Sr)-Total (mg/L)	0.407	<0.00020	0.369	0.373	0.270			
	Sulfur (S)-Total (mg/L)	145	<0.50	43.2	46.5	8.78			
	Thallium (Tl)-Total (mg/L)	0.000127	<0.000010	<0.000010	<0.000010	0.000015			
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010			
	Titanium (Ti)-Total (mg/L)	0.0180	<0.00030	0.00564	0.00582	0.0220			
	Uranium (U)-Total (mg/L)	0.00383	<0.000010	0.000794	0.000850	0.000699			
	Vanadium (V)-Total (mg/L)	0.00216	<0.00050	0.00072	0.00072	0.00212			
	Zinc (Zn)-Total (mg/L)	1.26	<0.0030	0.0101	0.0101	0.0104			
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD		FIELD	FIELD	FIELD			
	Dissolved Metals Filtration Location	FIELD		FIELD	FIELD	FIELD			
	Aluminum (Al)-Dissolved (mg/L)	0.0027		0.0045	0.0039	0.0066			
	Antimony (Sb)-Dissolved (mg/L)	0.0174		0.00032	0.00030	<0.00010			
	Arsenic (As)-Dissolved (mg/L)	0.0695		0.00282	0.00331	0.00059			
	Barium (Ba)-Dissolved (mg/L)	0.0160		0.0926	0.0772	0.0709			
	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)	<0.010		<0.010	<0.010	<0.010			
	Cadmium (Cd)-Dissolved (mg/L)	0.00125		0.0000998	0.000103	0.0000468			
	Calcium (Ca)-Dissolved (mg/L)	185		63.5	61.1	30.2			
	Chromium (Cr)-Dissolved (mg/L)	<0.00010		0.00010	<0.00010	<0.00010			
	Cobalt (Co)-Dissolved (mg/L)	0.00104		0.00040	0.00032	<0.00010			
	Copper (Cu)-Dissolved (mg/L)	0.00030		0.00099	0.00083	0.00083			
	Iron (Fe)-Dissolved (mg/L)	1.39		0.043	0.021	0.018			
	Lead (Pb)-Dissolved (mg/L)	0.000639		<0.000050	<0.000050	<0.000050			
	Lithium (Li)-Dissolved (mg/L)	0.0092		0.0011	<0.0010	<0.0010			

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

30-APR-15 17:41 (MT)

Version: FINAL

Sample ID Description Sampled Date Sampled Time Client ID		L1601887-1 Water 20-APR-15 16:35 0146-150420-001	L1601887-2 Water 20-APR-15 18:40 0146-150420-003	L1601887-3 Water 20-APR-15 08:00 0146-150420-007	L1601887-4 Water 20-APR-15 14:55 0146-150420-010	L1601887-5 Water 21-APR-15 13:10 0146-150421-008
Grouping	Analyte					
WATER						
Dissolved Metals	Magnesium (Mg)-Dissolved (mg/L)	9.68	45.8	<0.10	21.6	105
	Manganese (Mn)-Dissolved (mg/L)	0.147	5.29	<0.00010	0.255	1.48
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	0.0000068	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)	0.000448	0.000926	<0.000050	0.000372	0.000278
	Nickel (Ni)-Dissolved (mg/L)	<0.00050	0.00254	<0.00050	<0.00050	0.00069
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)	1.08	5.44	<0.10	2.03	5.52
	Selenium (Se)-Dissolved (mg/L)	<0.000050	0.000195	<0.000050	<0.000050	<0.000050
	Silicon (Si)-Dissolved (mg/L)	5.41	6.02	<0.050	6.12	6.91
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	2.59	25.8	<0.050	5.41	10.0
	Strontium (Sr)-Dissolved (mg/L)	0.272	0.593	<0.00020	0.361	0.785
	Sulfur (S)-Dissolved (mg/L)	8.89	196	<0.50	44.1	255
	Thallium (Tl)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.00030	0.00053	<0.00030	<0.00030	<0.00030
	Uranium (U)-Dissolved (mg/L)	0.000685	0.00126	<0.000010	0.000798	0.00328
	Vanadium (V)-Dissolved (mg/L)	<0.00050	0.00101	<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Dissolved (mg/L)	0.0023	0.0200	<0.0010	0.0109	0.0176

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L1601887-6 Water 21-APR-15 11:40 0146-150421-005	L1601887-7 Water 0146-1504 - TRAVEL BLANK	L1601887-8 Water 20-APR-15 13:07 0146-150420-009	L1601887-9 Water 20-APR-15 14:25 0146-150420-011	L1601887-10 Water 20-APR-15 16:55 0146-150420-002	
Grouping	Analyte					
WATER						
Dissolved Metals	Magnesium (Mg)-Dissolved (mg/L)	59.8		22.5	21.7	9.69
	Manganese (Mn)-Dissolved (mg/L)	1.41		0.232	0.249	0.148
	Mercury (Hg)-Dissolved (mg/L)	<0.000050		<0.000050	0.000062	0.000059
	Molybdenum (Mo)-Dissolved (mg/L)	0.000366		0.000359	0.000377	0.000441
	Nickel (Ni)-Dissolved (mg/L)	0.00214		0.00075	<0.00050	<0.00050
	Phosphorus (P)-Dissolved (mg/L)	<0.050		<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)	3.48		2.39	2.01	1.08
	Selenium (Se)-Dissolved (mg/L)	<0.000050		0.000069	<0.000050	<0.000050
	Silicon (Si)-Dissolved (mg/L)	6.49		6.53	6.11	5.28
	Silver (Ag)-Dissolved (mg/L)	<0.000010		<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	4.57		6.03	5.43	2.65
	Strontium (Sr)-Dissolved (mg/L)	0.414		0.379	0.366	0.271
	Sulfur (S)-Dissolved (mg/L)	143		45.2	45.6	8.84
	Thallium (Tl)-Dissolved (mg/L)	0.000088		<0.000010	<0.000010	<0.000010
	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)	0.00379		0.000789	0.000816	0.000671
	Vanadium (V)-Dissolved (mg/L)	<0.00050		<0.00050	<0.00050	<0.00050
	Zinc (Zn)-Dissolved (mg/L)	1.15		0.0089	0.0084	0.0026

* 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	L1601887-1, -10, -2, -3, -4, -5, -6, -8, -9
Duplicate	Boron (B)-Dissolved	DLA	L1601887-1, -10, -2, -3, -4, -5, -6, -8, -9
Duplicate	Chromium (Cr)-Dissolved	DLA	L1601887-1, -10, -2, -3, -4, -5, -6, -8, -9
Duplicate	Cobalt (Co)-Dissolved	DLA	L1601887-1, -10, -2, -3, -4, -5, -6, -8, -9
Duplicate	Lead (Pb)-Dissolved	DLA	L1601887-1, -10, -2, -3, -4, -5, -6, -8, -9
Duplicate	Nickel (Ni)-Dissolved	DLA	L1601887-1, -10, -2, -3, -4, -5, -6, -8, -9
Duplicate	Selenium (Se)-Dissolved	DLA	L1601887-1, -10, -2, -3, -4, -5, -6, -8, -9
Duplicate	Silver (Ag)-Dissolved	DLA	L1601887-1, -10, -2, -3, -4, -5, -6, -8, -9
Duplicate	Tin (Sn)-Dissolved	DLA	L1601887-1, -10, -2, -3, -4, -5, -6, -8, -9
Duplicate	Titanium (Ti)-Dissolved	DLA	L1601887-1, -10, -2, -3, -4, -5, -6, -8, -9
Duplicate	Vanadium (V)-Dissolved	DLA	L1601887-1, -10, -2, -3, -4, -5, -6, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1601887-1, -10, -2, -3, -4, -5, -6, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1601887-1, -10, -2, -3, -4, -5, -6, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1601887-1, -10, -2, -3, -4, -5, -6, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1601887-1, -10, -2, -3, -4, -5, -6, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1601887-1, -10, -2, -3, -4, -5, -6, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1601887-1, -10, -2, -3, -4, -5, -6, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1601887-1, -10, -2, -3, -4, -5, -6, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1601887-1, -10, -2, -3, -4, -5, -6, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1601887-1, -10, -2, -3, -4, -5, -6, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1601887-1, -10, -2, -3, -4, -5, -6, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1601887-1, -10, -2, -3, -4, -5, -6, -8, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit adjusted for required dilution
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-PCT-VA	Water	Alkalinity by Auto. Titration	APHA 2320 "Alkalinity"
This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.			
ALK-PCT-VA	Water	Alkalinity by Auto. Titration	APHA 2320 Alkalinity
This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.			
BE-D-L-CCMS-VA	Water	Diss. Be (low) in Water by CRC ICPMS	APHA 3030B/6020A (mod)
Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.			
Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.			
BE-T-L-CCMS-VA	Water	Total Be (Low) in Water by CRC ICPMS	EPA 200.2/6020A (mod)
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.			
CL-IC-N-WR	Water	Chloride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
CN-CNO-WT	Water	Cyanate	APHA 4500-CN-L
This analysis is carried out using procedures adapted from APHA method 4500-CN "Cyanide". Cyanate is determined by the Cyanate hydrolysis method using an ammonia selective electrode			
CN-SCN-VA	Water	Thiocyanate by Colour	APHA 4500-CN CYANIDE
This analysis is carried out using procedures adapted from APHA Method 4500-CN- M "Thiocyanate" Thiocyanate is determined by the ferric nitrate colourimetric method.			

Reference Information

CN-T-CFA-VA	Water	Total Cyanide in water by CFA	ISO 14403:2002
This analysis is carried out using procedures adapted from ISO Method 14403:2002 "Determination of Total Cyanide using Flow Analysis (FIA and CFA)". Total or strong acid dissociable (SAD) cyanide is determined by in-line UV digestion along with sample distillation and final determination by colourimetric analysis. Method Limitation: This method is susceptible to interference from thiocyanate (SCN). If SCN is present in the sample, there could be a positive interference with this method, but it would be less than 1% and could be as low as zero.			
CN-WAD-CFA-VA	Water	Weak Acid Diss. Cyanide in water by CFA	APHA 4500-CN CYANIDE
This analysis is carried out using procedures adapted from APHA Method 4500-CN I. "Weak Acid Dissociable Cyanide". Weak Acid Dissociable (WAD) cyanide is determined by in-line sample distillation with final determination by colourimetric analysis.			
EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.
This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.			
F-IC-N-WR	Water	Fluoride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
HARDNESS-CALC-VA	Water	Hardness	APHA 2340B
Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO ₃ 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.			
IONBALANCE-VA	Water	Ion Balance Calculation	APHA 1030E
Cation Sum, Anion Sum, and Ion Balance (as % difference) are calculated based on guidance from APHA Standard Methods (1030E Checking Correctness of Analysis). Because all aqueous solutions are electrically neutral, the calculated ion balance (% difference of cations minus anions) should be near-zero.			
Cation and Anion Sums are the total meq/L concentration of major cations and anions. Dissolved species are used where available. Minor ions are included where data is present. Ion Balance is calculated as:			
Ion Balance (%) = [Cation Sum-Anion Sum] / [Cation Sum+Anion Sum]			
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	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.			

Reference Information

NO3-L-IC-N-WR	Water	Nitrate in Water by IC (Low Level)	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
PH-PCT-VA	Water	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 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.			
TDS-CALC-VA	Water	TDS (Calculated)	APHA 1030E (20TH EDITION)
This analysis is carried out using procedures adapted from APHA 1030E "Checking Correctness of Analyses".			
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.			

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

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

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

Chain of Custody Numbers:

1	2
---	---

Reference Information

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.

