



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

Date Received: 19-NOV-15  
Report Date: 07-DEC-15 17:08 (MT)  
Version: FINAL

Client Phone: 867-393-4882

## Certificate of Analysis

Lab Work Order #: L1704418  
Project P.O. #: NOT SUBMITTED  
Job Reference: MOUNT NANSEN 15-Y-0146  
C of C Numbers: 1, 2, 3  
Legal Site Desc:

Comments:

Can Dang  
Senior Account Manager

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ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700  
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## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	Description	Sampled Date	Sampled Time	Client ID	L1704418-1	L1704418-2	L1704418-3	L1704418-4	L1704418-5
					Water	Water	Water	Water	Water
		18-NOV-15	12:45	WQ-DC-DX+105	18-NOV-15	17-NOV-15	17-NOV-15	17-NOV-15	16-NOV-15
					12:45	12:45	12:35	10:05	16:30
					WQ-DC-DX+105	WQ-VC-UMN-R	WQ-VC-UMN	WQ-VC-U	WQ-DC-R
Grouping	Analyte								
<b>WATER</b>									
<b>Physical Tests</b>	Conductivity (uS/cm)	1180	237	237	220	1380			
	Hardness (as CaCO3) (mg/L)	745	123	123	116	751			
	pH (pH)	7.69	7.88	7.89	7.88	7.75			
	Total Suspended Solids (mg/L)	6.0	<3.0	<3.0	<3.0	3.3			
	Total Dissolved Solids (mg/L)	858	132	132	121	1020			
<b>Anions and Nutrients</b>	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	283	95.5	95.0	93.6	242			
	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)	283	95.5	95.0	93.6	242			
	Ammonia, Total (as N) (mg/L)	0.0215	<0.0050	<0.0050	<0.0050	2.44			
	Chloride (Cl) (mg/L)	<1.0 <sup>DLA</sup>	<0.50	<0.50	<0.50	1.2			
	Fluoride (F) (mg/L)	0.148	0.038	0.039	0.039	0.089			
	Nitrate (as N) (mg/L)	0.052	0.160	0.160	0.171	0.568			
	Nitrite (as N) (mg/L)	<0.0020 <sup>DLA</sup>	<0.0010	<0.0010	<0.0010	0.0198			
	Sulfate (SO4) (mg/L)	419	27.7	27.8	20.3	572			
	Anion Sum (meq/L)	14.4	2.50	2.49	2.31	16.8			
	Cation Sum (meq/L)	15.3	2.61	2.62	2.46	16.6			
	Cation - Anion Balance (%)	2.9	2.2	2.6	3.3	-0.8			
<b>Cyanides</b>	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	0.0083			
	Cyanate (mg/L)	0.32	<0.20	<0.20	<0.20	<0.20			
	Thiocyanate (SCN) (mg/L)	<0.50	<0.50	<0.50	<0.50	0.68			
<b>Total Metals</b>	Aluminum (Al)-Total (mg/L)	0.136	0.0177	0.0189	0.0115	0.0155			
	Antimony (Sb)-Total (mg/L)	0.0113	0.00023	0.00022	0.00011	0.00059			
	Arsenic (As)-Total (mg/L)	0.138	0.00086	0.00086	0.00031	0.0113			
	Barium (Ba)-Total (mg/L)	0.0134	0.0690	0.0712	0.0724	0.0714			
	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)	<0.010	<0.010	<0.010	<0.010	0.038			
	Cadmium (Cd)-Total (mg/L)	0.00566	0.0000180	0.0000180	0.0000182	0.000136			
	Calcium (Ca)-Total (mg/L)	190	31.8	32.4	30.6	226			
	Chromium (Cr)-Total (mg/L)	0.00023	0.00014	0.00012	0.00012	0.00041			
	Cobalt (Co)-Total (mg/L)	0.00099	<0.00010	<0.00010	<0.00010	0.00451			
	Copper (Cu)-Total (mg/L)	0.00121	0.00104	0.00108	0.00099	0.00119			
	Iron (Fe)-Total (mg/L)	1.54	0.036	0.037	0.023	1.84			
	Lead (Pb)-Total (mg/L)	0.00176	0.000062	0.000063	<0.000050	0.000073			
	Lithium (Li)-Total (mg/L)	0.0087	<0.0010	0.0010	<0.0010	0.0014			

\* 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	L1704418-6	L1704418-7	L1704418-8	L1704418-9	L1704418-10
					Water	Water	Water	Water	Water
		17-NOV-15	16:45	WQ-DC-B	17-NOV-15	17-NOV-15	17-NOV-15	17-NOV-15	17-NOV-15
					16:45	17:30	09:30	15:45	16:30
					WQ-DC-B	WQ-TP	WQ-VC-DBC	WQ-DC-U	WQ-SEEP
Grouping	Analyte								
<b>WATER</b>									
<b>Physical Tests</b>	Conductivity (uS/cm)	2000	1600	222	1390	1600			
	Hardness (as CaCO3) (mg/L)	1330	981	117	843	938			
	pH (pH)	7.62	8.01	7.83	7.80	7.50			
	Total Suspended Solids (mg/L)	<3.0	3.3	<3.0	28.7	21.3			
	Total Dissolved Solids (mg/L)	1650	1310	122	1060	1260			
<b>Anions and Nutrients</b>	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	298	124	95.5	239	268			
	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)	298	124	95.5	239	268			
	Ammonia, Total (as N) (mg/L)	0.456	0.119	<0.0050	2.61	4.40			
	Chloride (Cl) (mg/L)	<2.5 <sup>DLA</sup>	<2.5 <sup>DLA</sup>	<0.50	1.0	<2.5 <sup>DLA</sup>			
	Fluoride (F) (mg/L)	<0.10 <sup>DLA</sup>	0.18	0.040	0.081	<0.10 <sup>DLA</sup>			
	Nitrate (as N) (mg/L)	0.119	0.166	0.170	0.301	0.890			
	Nitrite (as N) (mg/L)	<0.0050 <sup>DLA</sup>	<0.0050 <sup>DLA</sup>	<0.0010	0.0102	0.0172			
	Sulfate (SO4) (mg/L)	1000	844	20.2	577	690			
	Anion Sum (meq/L)	26.8	20.1	2.34	16.9	19.8			
	Cation Sum (meq/L)	27.5	20.9	2.48	18.5	21.6			
	Cation - Anion Balance (%)	1.4	2.1	2.9	4.7	4.4			
	<b>Cyanides</b>	Cyanide, Weak Acid Diss (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	0.0077		
Cyanide, Total (mg/L)		<0.0050	<0.0050	<0.0050	0.0101	0.0216			
Cyanate (mg/L)		<0.20	<0.20	<0.20	<0.20	<0.20			
Thiocyanate (SCN) (mg/L)		<0.50	<0.50	<0.50	0.82	3.75			
<b>Total Metals</b>	Aluminum (Al)-Total (mg/L)	0.0072	0.0260	0.0107	0.184	0.0148			
	Antimony (Sb)-Total (mg/L)	0.00130	0.0414	0.00011	0.00041	0.00049			
	Arsenic (As)-Total (mg/L)	0.00428	0.132	0.00029	0.0954	0.0550			
	Barium (Ba)-Total (mg/L)	0.0578	0.0166	0.0738	0.0757	0.0592			
	Beryllium (Be)-Total (mg/L)	<0.000040 <sup>DLA</sup>	<0.000040 <sup>DLA</sup>	<0.000020	<0.000020	<0.000020			
	Bismuth (Bi)-Total (mg/L)	<0.00010 <sup>DLA</sup>	0.00010	<0.000050	<0.000050	<0.000050			
	Boron (B)-Total (mg/L)	0.020	0.090	<0.010	0.037	0.056			
	Cadmium (Cd)-Total (mg/L)	0.000075	0.00117	0.0000166	0.000285	0.000680			
	Calcium (Ca)-Total (mg/L)	300	296	30.7	227	269			
	Chromium (Cr)-Total (mg/L)	<0.00020 <sup>DLA</sup>	<0.00020 <sup>DLA</sup>	0.00010	0.00073	0.00055			
	Cobalt (Co)-Total (mg/L)	0.00073	0.00069	<0.00010	0.00442	0.00862			
	Copper (Cu)-Total (mg/L)	<0.0010 <sup>DLA</sup>	0.0317	0.00097	0.00227	0.00464			
	Iron (Fe)-Total (mg/L)	2.95	0.251	0.021	12.0	12.5			
	Lead (Pb)-Total (mg/L)	<0.00010 <sup>DLA</sup>	0.0101	<0.000050	0.000317	0.000064			
	Lithium (Li)-Total (mg/L)	0.0054	0.0095	<0.0010	0.0014	0.0014			

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## ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1704418-11	L1704418-12	L1704418-13	L1704418-14	L1704418-15
		Description	Water	Water	Water	Water	Water
		Sampled Date	18-NOV-15	16-NOV-15	17-NOV-15		17-NOV-15
		Sampled Time	12:10	15:13	16:55		16:45
		Client ID	WQ-CH-P-13-01	WQ-VC-R	WQ-DC-B-R	TRAVEL BLANK	FIELD BLANK
Grouping	Analyte						
<b>WATER</b>							
<b>Physical Tests</b>	Conductivity (uS/cm)		1900	238	2020	<2.0	<2.0
	Hardness (as CaCO3) (mg/L)		1260	124	1330	<0.50	<0.50
	pH (pH)		6.19	7.93	7.85	5.37	5.41
	Total Suspended Solids (mg/L)		254	<5.0	4.7	<3.0	<3.0
	Total Dissolved Solids (mg/L)		1660	131	1630	<1.0	<1.0
<b>Anions and Nutrients</b>	Alkalinity, Bicarbonate (as CaCO3) (mg/L)		5.0	92.5	300	<1.0	<1.0
	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)		5.0	92.5	300	<1.0	<1.0
	Ammonia, Total (as N) (mg/L)		0.0268	<0.0050	0.467	0.0133 <sup>RRV</sup>	<0.0050
	Chloride (Cl) (mg/L)		<2.5 <sup>DLA</sup>	<0.50	<2.5 <sup>DLA</sup>	<0.50	<0.50
	Fluoride (F) (mg/L)		<0.10 <sup>DLA</sup>	0.047	<0.10 <sup>DLA</sup>	<0.020	<0.020
	Nitrate (as N) (mg/L)		0.688	0.157	0.221	<0.0050	<0.0050
	Nitrite (as N) (mg/L)		<0.0050 <sup>DLA</sup>	<0.0010	<0.0050 <sup>DLA</sup>	<0.0010	<0.0010
	Sulfate (SO4) (mg/L)		1200	27.4	981	<0.30	<0.30
	Anion Sum (meq/L)		25.2	2.43	26.4	<0.10	<0.10
	Cation Sum (meq/L)		25.7	2.64	27.5	<0.10	<0.10
	Cation - Anion Balance (%)		1.1	4.1	1.9	0.0	0.0
	<b>Cyanides</b>	Cyanide, Weak Acid Diss (mg/L)		<0.0050	<0.0050	<0.0050	<0.0050
Cyanide, Total (mg/L)			<0.0050	<0.0050	<0.0050	<0.0050	<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
<b>Total Metals</b>	Aluminum (Al)-Total (mg/L)		2.74	0.0153	0.0077	<0.0030	<0.0030
	Antimony (Sb)-Total (mg/L)		0.00059	0.00027	0.00135	<0.00010	<0.00010
	Arsenic (As)-Total (mg/L)		0.0134	0.00094	0.00427	<0.00010	<0.00010
	Barium (Ba)-Total (mg/L)		0.0626	0.0717	0.0570	<0.000050	<0.000050
	Beryllium (Be)-Total (mg/L)		0.000102	<0.000020	<0.000040 <sup>DLA</sup>	<0.000020	<0.000020
	Bismuth (Bi)-Total (mg/L)		<0.00010 <sup>DLA</sup>	<0.000050	<0.00010 <sup>DLA</sup>	<0.000050	<0.000050
	Boron (B)-Total (mg/L)		<0.020 <sup>DLA</sup>	<0.010	<0.020 <sup>DLA</sup>	<0.010	<0.010
	Cadmium (Cd)-Total (mg/L)		0.0136	0.0000167	0.000083	<0.000050	<0.000050
	Calcium (Ca)-Total (mg/L)		330	32.3	304	<0.050	<0.050
	Chromium (Cr)-Total (mg/L)		0.00434	0.00017	<0.00020	0.00011 <sup>RRV</sup>	<0.00010
	Cobalt (Co)-Total (mg/L)		0.00183	<0.00010	0.00071	<0.00010	<0.00010
	Copper (Cu)-Total (mg/L)		0.0049	0.00126	<0.0010 <sup>DLA</sup>	<0.00050	<0.00050
	Iron (Fe)-Total (mg/L)		4.60	0.065	2.95	<0.010	<0.010
	Lead (Pb)-Total (mg/L)		0.00471	<0.000050	<0.00010 <sup>DLA</sup>	<0.000050	<0.000050
	Lithium (Li)-Total (mg/L)		0.0036	<0.0010	0.0055	<0.0010	<0.0010

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

## ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1704418-1	L1704418-2	L1704418-3	L1704418-4	L1704418-5
		Description	Water	Water	Water	Water	Water
		Sampled Date	18-NOV-15	17-NOV-15	17-NOV-15	17-NOV-15	16-NOV-15
		Sampled Time	12:45	12:45	12:35	10:05	16:30
		Client ID	WQ-DC-DX+105	WQ-VC-UMN-R	WQ-VC-UMN	WQ-VC-U	WQ-DC-R
Grouping	Analyte						
<b>WATER</b>							
<b>Total Metals</b>	Magnesium (Mg)-Total (mg/L)		62.0	9.82	10.0	9.44	61.7
	Manganese (Mn)-Total (mg/L)		1.43	0.0427	0.0450	0.0469	4.52
	Mercury (Hg)-Total (mg/L)		0.0000059	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Total (mg/L)		0.000371	0.000413	0.000416	0.000403	0.000556
	Nickel (Ni)-Total (mg/L)		0.00188	<0.00050	<0.00050	<0.00050	0.00217
	Phosphorus (P)-Total (mg/L)		<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)		3.50	0.67	0.67	0.61	6.30
	Selenium (Se)-Total (mg/L)		0.000056	<0.000050	<0.000050	<0.000050	0.000169
	Silicon (Si)-Total (mg/L)		6.84	5.98	6.13	6.09	8.03
	Silver (Ag)-Total (mg/L)		0.000028	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)		5.24	3.13	3.20	2.84	27.9
	Strontium (Sr)-Total (mg/L)		0.448	0.316	0.327	0.320	0.695
	Sulfur (S)-Total (mg/L)		146	9.73	9.97	7.27	203
	Thallium (Tl)-Total (mg/L)		0.000112	<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)		0.00660	0.00048	0.00043	<0.00030	<0.0015 <sup>DLM</sup>
	Uranium (U)-Total (mg/L)		0.00452	0.000680	0.000703	0.000685	0.00143
	Vanadium (V)-Total (mg/L)		0.00091	<0.00050	<0.00050	<0.00050	0.00089
	Zinc (Zn)-Total (mg/L)		0.885	<0.0030	<0.0030	<0.0030	0.0238
	Zirconium (Zr)-Total (mg/L)		<0.00030	<0.00030	<0.00030	<0.00030	0.00031
<b>Dissolved Metals</b>	Dissolved Mercury Filtration Location		FIELD	FIELD	FIELD	FIELD	FIELD
	Dissolved Metals Filtration Location		FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)		<0.0010	0.0066	0.0069	0.0069	0.0107
	Antimony (Sb)-Dissolved (mg/L)		0.0103	0.00020	0.00019	<0.00010	0.00050
	Arsenic (As)-Dissolved (mg/L)		0.0119	0.00077	0.00077	0.00025	0.00893
	Barium (Ba)-Dissolved (mg/L)		0.0111	0.0699	0.0698	0.0722	0.0655
	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	<0.010	<0.010	<0.010	0.030
	Cadmium (Cd)-Dissolved (mg/L)		0.000963	0.0000152	0.0000151	0.0000180	0.000117
	Calcium (Ca)-Dissolved (mg/L)		196	32.6	32.8	31.1	209
	Chromium (Cr)-Dissolved (mg/L)		<0.00010	<0.00010	<0.00010	<0.00010	0.00031
	Cobalt (Co)-Dissolved (mg/L)		0.00082	<0.00010	<0.00010	<0.00010	0.00406
	Copper (Cu)-Dissolved (mg/L)		<0.00020	0.00098	0.00096	0.00090	0.00090
	Iron (Fe)-Dissolved (mg/L)		0.093	0.017	0.017	0.013	1.54
	Lead (Pb)-Dissolved (mg/L)		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Dissolved (mg/L)		0.0085	<0.0010	<0.0010	<0.0010	0.0012

\* 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		L1704418-6 Water 17-NOV-15 16:45 WQ-DC-B	L1704418-7 Water 17-NOV-15 17:30 WQ-TP	L1704418-8 Water 17-NOV-15 09:30 WQ-VC-DBC	L1704418-9 Water 17-NOV-15 15:45 WQ-DC-U	L1704418-10 Water 17-NOV-15 16:30 WQ-SEEP
Grouping	Analyte					
<b>WATER</b>						
<b>Total Metals</b>	Magnesium (Mg)-Total (mg/L)	136	54.1	9.39	60.7	58.1
	Manganese (Mn)-Total (mg/L)	1.74	0.311	0.0482	4.68	6.69
	Mercury (Hg)-Total (mg/L)	<0.0000050	0.0000093	<0.0000050	0.0000083	0.0000094
	Molybdenum (Mo)-Total (mg/L)	0.00036	0.00143	0.000402	0.000772	0.000921
	Nickel (Ni)-Total (mg/L)	0.0013	0.0013	<0.00050	0.00249	0.00412
	Phosphorus (P)-Total (mg/L)	<0.050	<0.050	<0.050	0.074	<0.050
	Potassium (K)-Total (mg/L)	3.69	18.2	0.63	4.51	6.13
	Selenium (Se)-Total (mg/L)	<0.00010 <sup>DLA</sup>	<0.00010 <sup>DLA</sup>	0.000051	0.000228	0.000314
	Silicon (Si)-Total (mg/L)	7.88	3.31	6.01	7.22	7.51
	Silver (Ag)-Total (mg/L)	<0.000020 <sup>DLA</sup>	0.000197	<0.000010	0.000027	0.000028
	Sodium (Na)-Total (mg/L)	15.8	19.8	2.82	22.7	34.9
	Strontium (Sr)-Total (mg/L)	1.13	0.742	0.320	0.694	0.752
	Sulfur (S)-Total (mg/L)	342	289	7.41	199	238
	Thallium (Tl)-Total (mg/L)	<0.000020 <sup>DLA</sup>	0.000179	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Total (mg/L)	<0.00020 <sup>DLA</sup>	<0.00020 <sup>DLA</sup>	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	<0.00060 <sup>DLA</sup>	<0.0018	<0.00030	0.0113	<0.0018 <sup>DLM</sup>
	Uranium (U)-Total (mg/L)	0.00490	0.00122	0.000663	0.00141	0.00221
	Vanadium (V)-Total (mg/L)	<0.0010 <sup>DLA</sup>	<0.0010 <sup>DLA</sup>	<0.00050	0.00221	0.00221
	Zinc (Zn)-Total (mg/L)	0.0196	0.127	<0.0030	0.0421	0.103
	Zirconium (Zr)-Total (mg/L)	<0.00060 <sup>DLA</sup>	<0.00060 <sup>DLA</sup>	<0.00030	0.00033	0.00058
<b>Dissolved Metals</b>	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	FIELD	FIELD
	Aluminum (Al)-Dissolved (mg/L)	0.0034	0.0070	0.0070	0.0082	0.0091
	Antimony (Sb)-Dissolved (mg/L)	0.00125	0.0408	<0.00010	0.00027	0.00046
	Arsenic (As)-Dissolved (mg/L)	0.00386	0.0959	0.00025	0.0499	0.0416
	Barium (Ba)-Dissolved (mg/L)	0.0561	0.0151	0.0727	0.0637	0.0579
	Beryllium (Be)-Dissolved (mg/L)	<0.000040 <sup>DLA</sup>	<0.000040 <sup>DLA</sup>	<0.000020	<0.000020	<0.000020
	Bismuth (Bi)-Dissolved (mg/L)	<0.00010 <sup>DLA</sup>	<0.00010 <sup>DLA</sup>	<0.000050	<0.000050	<0.000050
	Boron (B)-Dissolved (mg/L)	<0.020 <sup>DLA</sup>	0.086	<0.010	0.032	0.049
	Cadmium (Cd)-Dissolved (mg/L)	0.000079	0.000986	0.0000165	0.000138	0.000559
	Calcium (Ca)-Dissolved (mg/L)	310	305	31.3	235	280
	Chromium (Cr)-Dissolved (mg/L)	<0.00020 <sup>DLA</sup>	<0.00020 <sup>DLA</sup>	<0.00010	0.00025	0.00038
	Cobalt (Co)-Dissolved (mg/L)	0.00071	0.00064	<0.00010	0.00414	0.00844
	Copper (Cu)-Dissolved (mg/L)	<0.00040 <sup>DLA</sup>	0.0262	0.00092	0.00093	0.00245
	Iron (Fe)-Dissolved (mg/L)	2.72	0.033	0.016	4.17	11.0
	Lead (Pb)-Dissolved (mg/L)	<0.00010 <sup>DLA</sup>	0.00148	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Dissolved (mg/L)	0.0053	0.0091	<0.0010	0.0012	0.0013

\* 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	L1704418-11 Water 18-NOV-15 12:10 WQ-CH-P-13-01	L1704418-12 Water 16-NOV-15 15:13 WQ-VC-R	L1704418-13 Water 17-NOV-15 16:55 WQ-DC-B-R	L1704418-14 Water TRAVEL BLANK	L1704418-15 Water 17-NOV-15 16:45 FIELD BLANK
Grouping	Analyte					
<b>WATER</b>						
<b>Total Metals</b>	Magnesium (Mg)-Total (mg/L)	98.0	9.89	136	<0.10	<0.10
	Manganese (Mn)-Total (mg/L)	1.45	0.0381	1.71	<0.00010	<0.00010
	Mercury (Hg)-Total (mg/L)	0.0000297	<0.0000050	<0.0000050	<0.0000050	<0.0000050
	Molybdenum (Mo)-Total (mg/L)	0.00020	0.000395	0.00036	<0.000050	<0.000050
	Nickel (Ni)-Total (mg/L)	0.0113	<0.00050	0.0014	<0.00050	<0.00050
	Phosphorus (P)-Total (mg/L)	0.144	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Total (mg/L)	1.64	0.72	3.78	<0.10	<0.10
	Selenium (Se)-Total (mg/L)	0.00020	<0.000050	<0.00010 <sup>DLA</sup>	<0.000050	<0.000050
	Silicon (Si)-Total (mg/L)	12.7	6.21	7.97	<0.050	<0.050
	Silver (Ag)-Total (mg/L)	0.000116	<0.000010	<0.000020 <sup>DLA</sup>	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	8.08	3.17	15.2	<0.050	<0.050
	Strontium (Sr)-Total (mg/L)	0.699	0.295	1.16	<0.00020	<0.00020
	Sulfur (S)-Total (mg/L)	394	9.82	339	<0.50	<0.50
	Thallium (Tl)-Total (mg/L)	0.000054	<0.000010	<0.000020 <sup>DLA</sup>	<0.000010	<0.000010
	Tin (Sn)-Total (mg/L)	<0.00020 <sup>DLA</sup>	<0.00010	<0.00020 <sup>DLA</sup>	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	0.0622	0.00032	<0.00060 <sup>DLA</sup>	<0.00030	<0.00030
	Uranium (U)-Total (mg/L)	0.000111	0.000626	0.00501	<0.000010	<0.000010
	Vanadium (V)-Total (mg/L)	0.0078	<0.00050	<0.0010 <sup>DLA</sup>	<0.00050	<0.00050
	Zinc (Zn)-Total (mg/L)	4.60	<0.0030	0.0193	<0.0030	<0.0030
	Zirconium (Zr)-Total (mg/L)	<0.00060 <sup>DLA</sup>	<0.00030	<0.00060 <sup>DLA</sup>	<0.00030	<0.00030
<b>Dissolved Metals</b>	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD		FIELD
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD		FIELD
	Aluminum (Al)-Dissolved (mg/L)	0.159	0.0092	0.0037		<0.0010
	Antimony (Sb)-Dissolved (mg/L)	<0.00020 <sup>DLA</sup>	0.00029	0.00131		<0.00010
	Arsenic (As)-Dissolved (mg/L)	0.00053	0.00085	0.00375		<0.00010
	Barium (Ba)-Dissolved (mg/L)	0.0149	0.0707	0.0570		<0.000050
	Beryllium (Be)-Dissolved (mg/L)	<0.000040 <sup>DLA</sup>	<0.000020	<0.000040 <sup>DLA</sup>		<0.000020
	Bismuth (Bi)-Dissolved (mg/L)	<0.00010 <sup>DLA</sup>	<0.000050	<0.00010 <sup>DLA</sup>		<0.000050
	Boron (B)-Dissolved (mg/L)	<0.020 <sup>DLA</sup>	<0.010	<0.020 <sup>DLA</sup>		<0.010
	Cadmium (Cd)-Dissolved (mg/L)	0.0116	0.0000205	0.000083		<0.0000050
	Calcium (Ca)-Dissolved (mg/L)	342	33.3	308		<0.050
	Chromium (Cr)-Dissolved (mg/L)	0.00052	<0.00010	<0.00020 <sup>DLA</sup>		<0.00010
	Cobalt (Co)-Dissolved (mg/L)	<0.00020 <sup>DLA</sup>	<0.00010	0.00070		<0.00010
	Copper (Cu)-Dissolved (mg/L)	0.00110	0.00116	<0.00040 <sup>DLA</sup>		<0.00020
	Iron (Fe)-Dissolved (mg/L)	0.066	0.036	2.60		<0.010
	Lead (Pb)-Dissolved (mg/L)	<0.00010 <sup>DLA</sup>	<0.000050	<0.00010 <sup>DLA</sup>		<0.000050
	Lithium (Li)-Dissolved (mg/L)	0.0025	0.0010	0.0054		<0.0010

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

## ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L1704418-1	L1704418-2	L1704418-3	L1704418-4	L1704418-5
		Description	Water	Water	Water	Water	Water
		Sampled Date	18-NOV-15	17-NOV-15	17-NOV-15	17-NOV-15	16-NOV-15
		Sampled Time	12:45	12:45	12:35	10:05	16:30
		Client ID	WQ-DC-DX+105	WQ-VC-UMN-R	WQ-VC-UMN	WQ-VC-U	WQ-DC-R
Grouping	Analyte						
<b>WATER</b>							
<b>Dissolved Metals</b>	Magnesium (Mg)-Dissolved (mg/L)		61.8	10.1	10.1	9.46	55.4
	Manganese (Mn)-Dissolved (mg/L)		1.27	0.0411	0.0404	0.0455	4.22
	Mercury (Hg)-Dissolved (mg/L)		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Molybdenum (Mo)-Dissolved (mg/L)		0.000343	0.000366	0.000381	0.000382	0.000496
	Nickel (Ni)-Dissolved (mg/L)		0.00174	<0.00050	<0.00050	<0.00050	0.00198
	Phosphorus (P)-Dissolved (mg/L)		<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)		3.58	0.67	0.66	0.59	5.45
	Selenium (Se)-Dissolved (mg/L)		<0.000050	<0.000050	<0.000050	<0.000050	0.000137
	Silicon (Si)-Dissolved (mg/L)		6.55	6.04	6.05	6.06	7.34
	Silver (Ag)-Dissolved (mg/L)		<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)		5.08	3.06	3.12	2.70	23.6
	Strontium (Sr)-Dissolved (mg/L)		0.433	0.312	0.309	0.313	0.617
	Sulfur (S)-Dissolved (mg/L)		140	9.61	9.62	7.12	177
	Thallium (Tl)-Dissolved (mg/L)		0.000090	<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	<0.00030	<0.00030	<0.00030	0.00096
	Uranium (U)-Dissolved (mg/L)		0.00430	0.000671	0.000670	0.000654	0.00125
	Vanadium (V)-Dissolved (mg/L)		<0.00050	<0.00050	<0.00050	<0.00050	0.00057
	Zinc (Zn)-Dissolved (mg/L)		0.795	<0.0010	<0.0010	<0.0010	0.0263
	Zirconium (Zr)-Dissolved (mg/L)		<0.00030	<0.00030	<0.00030	<0.00030	0.00032

\* 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	L1704418-6	L1704418-7	L1704418-8	L1704418-9	L1704418-10
					Water	Water	Water	Water	Water
		17-NOV-15	16:45	WQ-DC-B	17-NOV-15	17-NOV-15	17-NOV-15	17-NOV-15	17-NOV-15
					16:45	17:30	09:30	15:45	16:30
					WQ-DC-B	WQ-TP	WQ-VC-DBC	WQ-DC-U	WQ-SEEP
Grouping	Analyte								
<b>WATER</b>									
<b>Dissolved Metals</b>	Magnesium (Mg)-Dissolved (mg/L)				135	53.5	9.55	62.0	58.2
	Manganese (Mn)-Dissolved (mg/L)				1.71	0.297	0.0447	4.60	6.73
	Mercury (Hg)-Dissolved (mg/L)				<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Molybdenum (Mo)-Dissolved (mg/L)				0.00033	0.00143	0.000380	0.000726	0.000890
	Nickel (Ni)-Dissolved (mg/L)				0.0014	0.0012	<0.00050	0.00207	0.00407
	Phosphorus (P)-Dissolved (mg/L)				<0.050	<0.050	<0.050	<0.050	<0.050
	Potassium (K)-Dissolved (mg/L)				3.87	18.5	0.62	4.77	6.53
	Selenium (Se)-Dissolved (mg/L)				<0.00010 <sup>DLA</sup>	<0.00010 <sup>DLA</sup>	<0.000050	0.000151	0.000297
	Silicon (Si)-Dissolved (mg/L)				7.88	3.26	6.06	6.70	7.62
	Silver (Ag)-Dissolved (mg/L)				<0.000020 <sup>DLA</sup>	0.000046	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)				15.2	18.8	2.66	22.5	35.1
	Strontium (Sr)-Dissolved (mg/L)				1.12	0.745	0.307	0.680	0.743
	Sulfur (S)-Dissolved (mg/L)				331	281	7.18	196	230
	Thallium (Tl)-Dissolved (mg/L)				<0.000020 <sup>DLA</sup>	0.000177 <sup>DLA</sup>	<0.000010	<0.000010	<0.000010
	Tin (Sn)-Dissolved (mg/L)				<0.00020 <sup>DLA</sup>	<0.00020 <sup>DLA</sup>	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)				<0.00060 <sup>DLA</sup>	<0.00060 <sup>DLA</sup>	<0.00030	<0.0012 <sup>DLM</sup>	<0.0015 <sup>DLM</sup>
	Uranium (U)-Dissolved (mg/L)				0.00487	0.00121	0.000651	0.00136	0.00216
	Vanadium (V)-Dissolved (mg/L)				<0.0010 <sup>DLA</sup>	<0.0010 <sup>DLA</sup>	<0.00050	0.00092	0.00162
	Zinc (Zn)-Dissolved (mg/L)				0.0191	0.111	<0.0010	0.0280	0.0991
	Zirconium (Zr)-Dissolved (mg/L)				<0.00060 <sup>DLA</sup>	<0.00060 <sup>DLA</sup>	<0.00030	0.00030	0.00057

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

	<b>Sample ID</b> <b>Description</b> <b>Sampled Date</b> <b>Sampled Time</b> <b>Client ID</b>	L1704418-11 Water 18-NOV-15 12:10 WQ-CH-P-13-01	L1704418-12 Water 16-NOV-15 15:13 WQ-VC-R	L1704418-13 Water 17-NOV-15 16:55 WQ-DC-B-R	L1704418-14 Water  TRAVEL BLANK	L1704418-15 Water 17-NOV-15 16:45 FIELD BLANK
Grouping	Analyte					
<b>WATER</b>						
<b>Dissolved Metals</b>	Magnesium (Mg)-Dissolved (mg/L)	98.5	10.0	135		<0.10
	Manganese (Mn)-Dissolved (mg/L)	0.266	0.0368	1.70		<0.00010
	Mercury (Hg)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050		<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)	<0.00010 <sup>DLA</sup>	0.000378	0.00034		<0.000050
	Nickel (Ni)-Dissolved (mg/L)	0.0092	<0.00050	0.0013		<0.00050
	Phosphorus (P)-Dissolved (mg/L)	<0.050	<0.050	<0.050		<0.050
	Potassium (K)-Dissolved (mg/L)	1.39	0.80	3.77		<0.10
	Selenium (Se)-Dissolved (mg/L)	<0.00010 <sup>DLA</sup>	<0.000050	<0.00010 <sup>DLA</sup>		<0.000050
	Silicon (Si)-Dissolved (mg/L)	9.44	6.20	7.83		<0.050
	Silver (Ag)-Dissolved (mg/L)	<0.000020 <sup>DLA</sup>	<0.000010	<0.000020 <sup>DLA</sup>		<0.000010
	Sodium (Na)-Dissolved (mg/L)	8.07	3.07	15.1		<0.050
	Strontium (Sr)-Dissolved (mg/L)	0.696	0.293	1.15		<0.00020
	Sulfur (S)-Dissolved (mg/L)	394	9.57	332		<0.50
	Thallium (Tl)-Dissolved (mg/L)	<0.000020 <sup>DLA</sup>	<0.000010	<0.000020 <sup>DLA</sup>		<0.000010
	Tin (Sn)-Dissolved (mg/L)	<0.00020 <sup>DLA</sup>	<0.00010	<0.00020 <sup>DLA</sup>		<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.00060 <sup>DLA</sup>	<0.00030	<0.00060 <sup>DLA</sup>		<0.00030
	Uranium (U)-Dissolved (mg/L)	<0.000020 <sup>DLA</sup>	0.000614	0.00490		<0.000010
	Vanadium (V)-Dissolved (mg/L)	<0.0010 <sup>DLA</sup>	<0.00050	<0.0010 <sup>DLA</sup>		<0.00050
	Zinc (Zn)-Dissolved (mg/L)	4.52	0.0021	0.0199		<0.0010
	Zirconium (Zr)-Dissolved (mg/L)	<0.00060 <sup>DLA</sup>	<0.00030	<0.00060 <sup>DLA</sup>		<0.00030

\* 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)
Matrix Spike	Sulfur (S)-Dissolved	MS-B	L1704418-1, -10, -11, -12, -13, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1704418-1, -10, -11, -12, -13, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1704418-1, -10, -11, -12, -13, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1704418-1, -10, -11, -12, -13, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1704418-1, -10, -11, -12, -13, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1704418-1, -10, -11, -12, -13, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1704418-1, -10, -11, -12, -13, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1704418-1, -10, -11, -12, -13, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1704418-1, -10, -11, -12, -13, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1704418-1, -10, -11, -12, -13, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1704418-1, -10, -11, -12, -13, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1704418-1, -10, -11, -12, -13, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1704418-1, -10, -11, -12, -13, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1704418-1, -10, -11, -12, -13, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Molybdenum (Mo)-Dissolved	MS-B	L1704418-1, -10, -11, -12, -13, -15, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1704418-1, -10, -11, -12, -13, -15, -2, -3, -4, -5, -6, -7, -8, -9

### Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit adjusted for required dilution
DLM	Detection Limit Adjusted due to sample matrix effects.
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**
<b>ALK-TITR-VA</b>	Water	Alkalinity Species by 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.			
<b>BE-D-L-CCMS-VA</b>	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.			
<b>BE-T-L-CCMS-VA</b>	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.			
<b>CL-IC-N-WR</b>	Water	Chloride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
<b>CN-CNO-WT</b>	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			

## Reference Information

method using an ammonia selective electrode

<b>CN-SCN-VA</b>	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.			
<b>CN-T-CFA-VA</b>	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.			
<b>CN-WAD-CFA-VA</b>	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.			
<b>EC-PCT-VA</b>	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.			
<b>F-IC-N-WR</b>	Water	Fluoride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection.			
<b>HARDNESS-CALC-VA</b>	Water	Hardness	APHA 2340B
Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO <sub>3</sub> equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.			
<b>HG-D-CVAA-VA</b>	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.			
<b>HG-T-CVAA-VA</b>	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.			
<b>IONBALANCE-VA</b>	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]			
<b>MET-D-CCMS-VA</b>	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.			
<b>MET-DIS-LOW-ICP-VA</b>	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).			
<b>MET-T-CCMS-VA</b>	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.			
<b>MET-TOT-LOW-ICP-VA</b>	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).			
<b>NH3-F-VA</b>	Water	Ammonia in Water by Fluorescence	APHA 4500 NH3-NITROGEN (AMMONIA)

## Reference Information

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

**NH3-F-VA**                      Water              Ammonia in Water by Fluorescence                      J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

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

**NO2-L-IC-N-WR**              Water              Nitrite in Water by IC (Low Level)                      EPA 300.1 (mod)

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

**NO3-L-IC-N-WR**              Water              Nitrate in Water by IC (Low Level)                      EPA 300.1 (mod)

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

**PH-PCT-VA**                      Water              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
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

**Chain of Custody Numbers:**

1    2    3

## 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.*



# Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com



L1704418-COFC

COC Number: 14 -

Page \_\_\_ of \_\_\_

Report To		Report Format / Distribution			Analysis Request											
Company: EDI		Select Report Format: <input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> EXCEL <input type="checkbox"/> EDD (DIGITAL)			R <input checked="" type="checkbox"/> Regular (Standard TAT if received by 3 pm - business days)											
Contact: Meghan Marjanovic		Quality Control (QC) Report with Report <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			P <input type="checkbox"/> Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT											
Address: 2195 - 2nd Avenue Whitehorse, YT Y1A 3T8		Criteria on Report - provide details below if box checked			E <input type="checkbox"/> Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT											
Phone: 867-393-4882		Select Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX			E2 <input type="checkbox"/> Same day or weekend emergency - contact ALS to confirm TAT and surcharge											
		Email 1 or Fax: mmarianovic@edynamics.com			Specify Date Required for E2, E or P:											
		Email 2: Emilie.Hamm@gov.yk.ca														
		Email 3: erik.pit@gov.yk.ca														
Invoice To: Same as Report To <input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> No		Invoice Distribution			Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below											
Copy of Invoice with Report <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Select Invoice Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX			P P P P P F/P											
Company: EDI		Email 1 or Fax: slenner@edynamics.com			Number of Containers											
Contact: S Jenner		Email 2: mmarianovic@edynamics.com			ALK-PCT-VA, EC-PCT-VA, PH-PCT-VA											
Project Information		Oil and Gas Required Fields (client use)			ANIONS-ALL-IC-WR, TSS-MAN-WR											
ALS Quote #: Q49310		Approver ID:			CN-WAD-CFA-VA, CN-T-CFA-VA											
Job #: MOUNT NANSEN 15-Y-0146		GL Account:			CN-CNO-WT											
PO / AFE:		Activity Code:			CN-SCN-VA											
LSD:		Location:			NH3-F-VA											
ALS Lab Work Order # (lab use only)		ALS Contact: Sean Slugget			MET-T-BCMDG-VA											
		Sampler:			MET-D-BCMDG-VA											
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					
		WQ-DC-B			17 - Nov -15			16:55			Water			9		
		WQ-TP			17 - Nov -15			17:30			Water			9		
		WQ-VC-DBC			17 - Nov -15			0930			Water			9		
		WQ-DC-U			17 - Nov -15			1545			Water			9		
		WQ-SEEP			17 - Nov -15			1630			Water			9		
		WQ-LCSO			17 - Nov -15			1630			Water			9		
		L1704418 WQ-LCSO			17-NOV-2015			1630						R 2		
Drinking Water (DW) Samples (client use)		Special Instructions / Specify Criteria to add on report (client Use)			SAMPLE CONDITION AS RECEIVED (lab use only)											
Are samples taken from a Regulated DW System? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No					Frozen <input type="checkbox"/> SIF Observations Yes <input type="checkbox"/> No <input type="checkbox"/>											
Are samples for human drinking water use? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No					Ice packs Yes <input type="checkbox"/> No <input type="checkbox"/> Custody seal intact Yes <input type="checkbox"/> No <input type="checkbox"/>											
					Cooling Initiated <input checked="" type="checkbox"/>											
					INITIAL COOLER TEMPERATURES °C: 21.33 3.5, 3.4 3.4											
					FINAL COOLER TEMPERATURES °C:											
SHIPMENT RELEASE (client use)		INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)											
Released by: SCOTT DILLING		Date: 18-NOV-2015			Received by: [Signature]			Date: 18-NOV-2015			Received by: Edward			Date: Nov 24 1340		

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L1704418-COFC

COC Number: 14 -

Page \_\_\_\_ of \_\_\_\_

Report To		Report Format / Distribution			Analysis Request																			
Company: EDI		Select Report Format: <input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> EXCEL <input type="checkbox"/> EDD (DIGITAL)			* (Rush Turnaround Time (TAT) is not available for all tests) <b>R</b> <input checked="" type="checkbox"/> Regular (Standard TAT if received by 3 pm - business days) <b>P</b> <input type="checkbox"/> Priority (2-4 bus. days if received by 3pm) 50% surcharge - contact ALS to confirm TAT <b>E</b> <input type="checkbox"/> Emergency (1-2 bus. days if received by 3pm) 100% surcharge - contact ALS to confirm TAT <b>E2</b> <input type="checkbox"/> Same day or weekend emergency - contact ALS to confirm TAT and surcharge																			
Contact: Meghan Marjanovic		Quality Control (QC) Report with Report <input type="checkbox"/> Yes <input type="checkbox"/> No																						
Address: 2195 - 2nd Avenue Whitehorse, YT Y1A 3T8		<input type="checkbox"/> Criteria on Report - provide details below if box checked Select Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX																						
Phone: 867-393-4882		Email 1 or Fax: mmarjanovic@edynamics.com			Specify Date Required for E2,E or P:																			
		Email 2: Emilie.Hamm@gov.yk.ca																						
		Email 3: erik.pit@gov.yk.ca																						
Invoice To: Same as Report To <input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> No		Invoice Distribution			Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below																			
Copy of Invoice with Report <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Select Invoice Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX																						
Company: EDI		Email 1 or Fax: sjenner@edynamics.com																						
Contact: S Jenner		Email 2: mmarjanovic@edynamics.com																						
Project Information		Oil and Gas Required Fields (client use)																						
ALS Quote #: Q49310		Approver ID:																						
Job #: MOUNT NANSEN 15-Y-0146		GL Account:																						
PO / AFE:		Activity Code:																						
LSD:		Location:																						
ALS Lab Work Order # (lab use only)		ALS Contact: Sean Slugget			Sampler:																			
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	ALK-PCT-VA	EC-PCT-VA	PH-PCT-VA	AMIONS-ALL-IC-WR	TSS-MAN-WR	CN-WAD-CFA-VA	CN-T-CFA-VA	CN-CNO-WT	CN-SCN-VA	NH3-F-VA	MET-T-BCMDG-VA	MET-D-BCMDG-VA	IONBALANC-VA	TDS-CALC-VA	Number of Containers			
	WQ-CH-P-13-01			18 - Nov -15	12:10	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R				9
	WQ-VC-R			16 - Nov -15	15:13	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R				9
	WQ-DC-B-R			17 - Nov -15	16:55	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R				9
	TRAVEL BANK			- Nov -15	-	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R				9
	FIELD BLANK			17 - Nov -15	16:45	Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R				9
				- Nov -15		Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R				9
				- Nov -15		Water	R	R	R	R	R	R	R	R	R	R	R	R	R	R				9
Drinking Water (DW) Samples <sup>1</sup> (client use)		Special Instructions / Specify Criteria to add on report (client Use)			<b>SAMPLE CONDITION AS RECEIVED (lab use only)</b> Frozen <input type="checkbox"/> SIF Observations Yes <input type="checkbox"/> No <input type="checkbox"/> Ice packs Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Custody seal intact Yes <input type="checkbox"/> No <input type="checkbox"/> Cooling Initiated <input checked="" type="checkbox"/> INITIAL COOLER TEMPERATURES °C: 3.3, 3.5, 3.6, 3.7 FINAL COOLER TEMPERATURES °C:																			
Are samples taken from a Regulated DW System? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No																								
Are samples for human drinking water use? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No																								
SHIPMENT RELEASE (client use)				INITIAL SHIPMENT RECEPTION (lab use only)				FINAL SHIPMENT RECEPTION (lab use only)																
Released by: SCOTT DILLING		Date: 18 NOV 2015		Time:		Received by: [Signature]		Date: 19 NOV 15		Time: 10:00		Received by: [Signature]		Date: Nov 24		Time: 13:00								

SC out of 4