#### **APPENDIX 3**

**Garrow Lake Water Column** 

**Minimum Ice Conditions** 

**Hydrolab Data** 

(August 29, 2008)

TABLE 1
2008 HYDROLAB RESULTS - GARROW LAKE - AUGUST 29th 2008

STATION 363-3 (Centre Station)

Depth	262-3 Temp (°C)	262-3 DO (mg/L)	262-3 Cond (mS/cm)	262-3 pH	262-3 Redox (mV)
1	2.59	10.03	11.86	7.92	328
2	2.63	8.72	11.88	7.97	324
3	2.59	8.48	11.87	8.02	320
4	2.59	8.34	11.86	8.06	318
5	2.59	8.28	11.86	8.09	316
6	3.3	8.09	13.62	8.07	314
7	3.98	8.06	16.1	8.03	314
8	3.83	8.22	16.4	8.05	313
9	3.95	8.26	16.6	8.05	311
9.5	4.58	7.62	24.5	7.7	319
10	5.46	5.69	57.6	7.25	325
11	6.96	2.4	82.7	7.23	317
12	7.24	1.03	85.3	7.27	311
13	7.42	0.43	86.9	7.32	281
14	7.25	0.27	87.2	7.38	225
15	6.92	0.23	87.3	7.42	206
16	6.74	0.21	87.3	7.44	195
17	6.66	0.2	87.3	7.45	189
18	6.63	0.17	87.3	7.46	183
19	6.63	0.17	87.4	7.46	176
20	6.63	0.16	87.4	7.47	161
22	6.63	0.15	87.4	7.47	145
30	6.76	0.18	87.5	7.4	50
36	7.3	0.12	88.2	7.24	-29

TABLE 2
2008 HYDROLAB RESULTS - GARROW LAKE - AUGUST 29th 2008
STATION 363-3A (South Station)

Depth	262-3A Temp (°C)	262-3A DO (mg/L)	262-3A Cond (mS/cm)	262-3A pH	262-3A (Redox mV)
1.5	2.63	8.88	11.89	8.09	226
2	2.63	8.65	11.88	8.13	223
3	2.61	8.57	11.89	8.15	222
4	2.61	8.47	11.91	8.17	221
5	2.63	8.38	11.89	8.19	221
6	2.63	8.37	11.91	8.22	221
7	3.25	8.21	15	8.17	225
8	3.77	8.27	16.4	8.15	227
9	3.9	8.31	16.7	8.14	228
9.5	4.23	8.07	19.8	8.01	233
10	5.06	6.12	44.9	7.35	246
11	7.09	2.4	85.3	7.31	240
12	7.24	1.42	86.2	7.34	236
13	7.45	0.6	87.1	7.36	207
14	7.06	0.42	87.4	7.42	192
15	6.89	0.34	87.3	7.45	182
16	6.69	0.29	87.5	7.47	174
17	6.66	0.27	87.4	7.48	169
18	6.65	0.24	87.4	7.48	165
19	6.65	0.22	87.4	7.49	147
20	6.65	0.2	87.4	7.49	121

Figure 1

Garrow Lake August 29th 2008

Centre (262-3) and South (262-3A) Stations - Minimum Ice Thickness Limnology

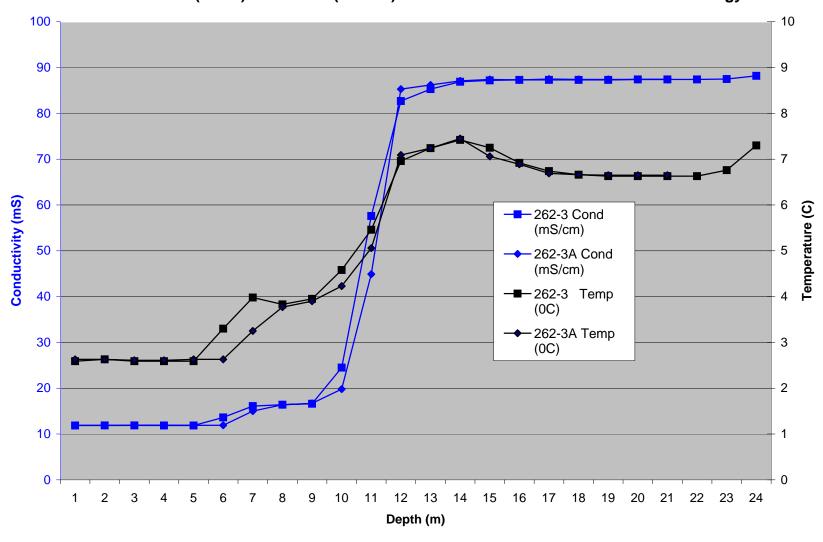
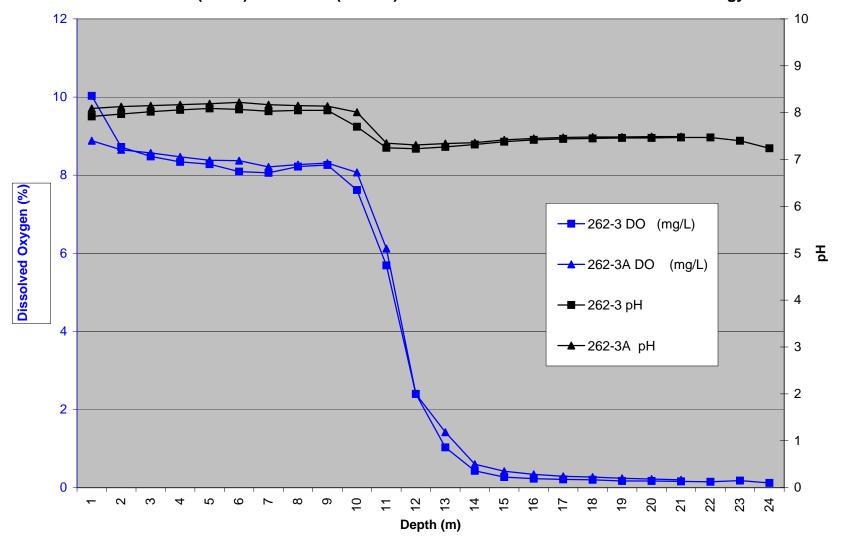


Figure 2
Garrow Lake August 29th, 2008
Centre (262-3) and South (262-3A) Stations - Minimum Ice Thickness Limnology



#### **APPENDIX 4**

Garrow Lake Water Column

Minimum Ice Conditions

Zinc Data and Graphs

(August 29, 2008)

#### TABLE 1 GARROW LAKE WATER COLUMN MONITORING

STATION 262-3: Garrow Lake at Centre

						Zi	nc Concer	ntrations (	mg/L)					
Depth	18-Jan-02	13-Mar-02	4-Feb-03	29-Mar-03	1-Jan-04	3-May-04	13-May-05	25-Aug-05	22-May-06	21-Aug-06	3-Jun-07	25-Aug-07	27-May-08	29-Aug-08
0								0.130	0.227	0.193				
1									0.246	0.186				
1.5								0.131	0.231	0.19	0.235	0.168		0.177
2							0.244	0.136	0.235	0.199	0.23	0.180		0.183
3	0.26	0.30	0.25	0.28	0.236	0.234	0.247	0.134	0.241	0.193	0.244	0.180	0.257	0.180
4				0.28	0.197	0.227	0.244	0.243	0.237	0.192	0.241	0.176	0.250	0.179
5		0.32		0.29	0.209	0.247	0.228	0.267	0.25	0.187	0.234	0.185	0.251	0.179
6				0.29	0.207	0.229	0.239	0.265	0.211	0.186	0.228	0.181	0.270	0.175
7		0.32		0.29	0.197	0.227	0.241	0.284	0.218	0.183	0.245	0.180	0.246	0.228
8				0.29	0.189	0.231	0.248	0.271	0.233	0.186	0.231	0.177	0.250	0.249
9				0.30	0.702	0.816	1.120	0.552	0.359	0.287	0.246	0.218	0.249	0.241
10	0.34	0.37	0.60	0.87	0.932	0.764	0.535	1.250	0.491	0.987	0.917	0.916	0.792	0.252
11	1.40	1.6	1.40	0.96	0.279	0.315	0.134	0.151	0.0721	0.0903	0.0319	0.024	0.046	0.038
12	0.68	0.60	0.585	0.52	0.27	0.262	0.120	0.104	0.0383	0.0578	0.0288	0.020	0.024	0.033
13	0.46	0.48	0.70	0.44	0.251	0.234	0.0812	0.105	0.0226	0.0241	0.0279	0.024	0.019	0.016
14	0.45	0.460	0.52	0.41	0.229	0.211	0.0482	0.0457	0.024	0.0304	0.0204		0.020	
15	0.42	0.47	0.44	0.52	0.256	0.211	0.0378	0.0565	0.021	0.0297	0.0208	0.022	0.020	0.025
16	0.44	0.48	0.44	0.42	0.265	0.201	0.0429	0.0556	0.03	0.0287	0.0589		0.021	0.019
17	0.44	0.48	0.44	0.42	0.267	0.193	0.0435	0.0409	0.0294	0.032	0.0252	0.022	0.020	0.020
18	0.44	0.48	0.44	0.41	0.275	0.204	0.0440	0.0435	0.0314	0.0336	0.0238		0.020	0.017
19	0.44	0.48	0.45	0.42	0.266	0.202	0.0448	0.0425	0.0351	0.034	0.0208	0.021	0.021	0.018
20	0.43	0.50	0.46	0.40	0.260	0.197	0.0425	0.0413	0.0293	0.0346	0.0228	0.025	0.021	0.018
22	0.43	0.49	0.46	0.42	0.260	0.199	0.0407	0.0468	0.0301	0.0351	0.0218	0.024	0.052	0.019
30	0.43	0.50		0.38	0.0514	0.117	0.0310	0.0404		0.092	0.0453	0.035	0.020	0.021
35	0.43	0.54		0.08							0.529			0.015
40	0.44	0.53	0.07	0.06	0.234	0.0301	0.0214	0.0235	0.0558	0.0139	_			

- Note: did not graph the data from 30m depth for May 22/06 as there is clearly a data error. The Zn = 0.561 and the TSS was 111 mg/L. The sample must have been contaminated.

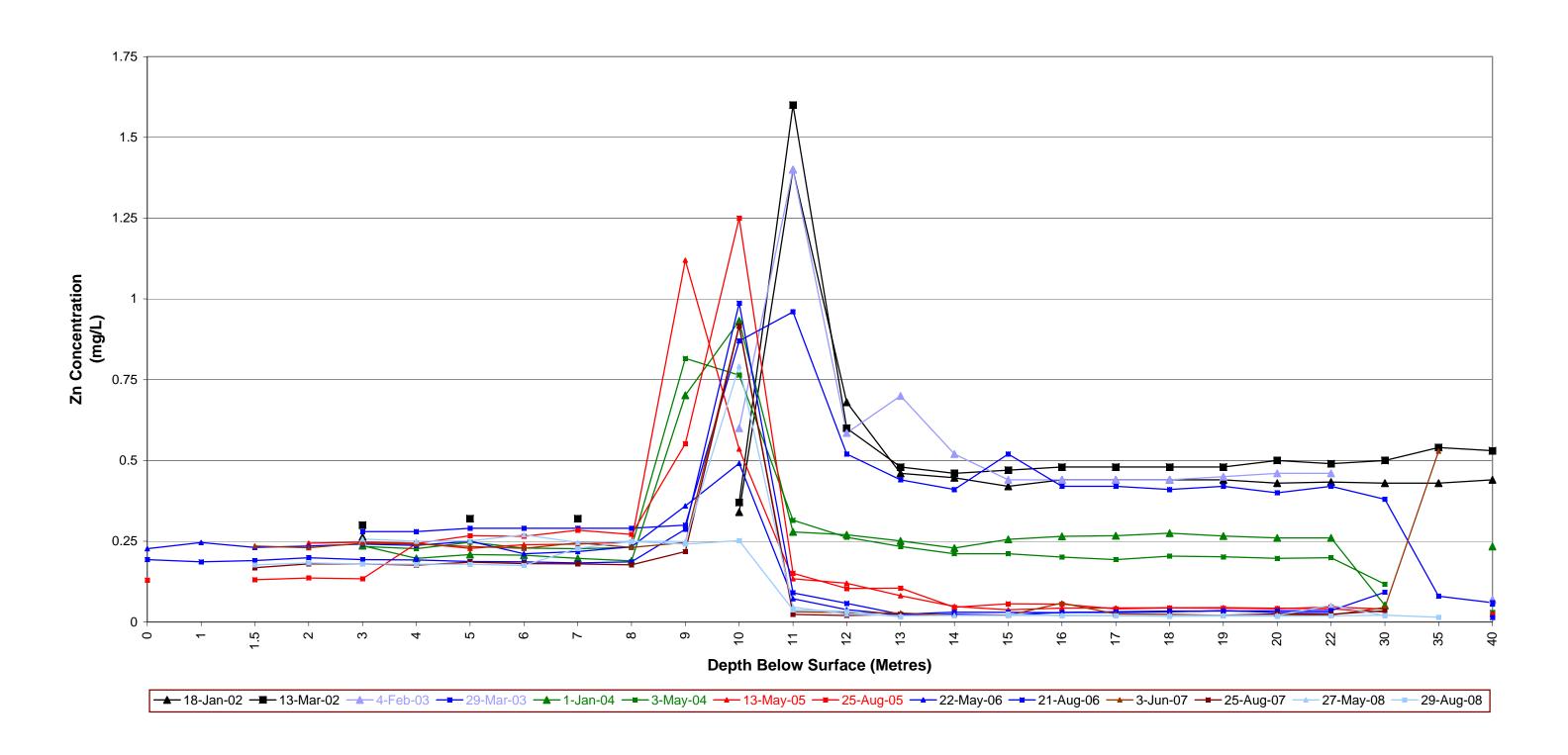
   Jun-07 didn't show the 35 m depth as the sample result was disturbed and incorrect data collected.

   27-May-08 Didn't show the 36M depth sample as zinc was 2.01. Believe that the sample was contaminated by hitting the lake bottom and creating turbidity

FIGURE 1A

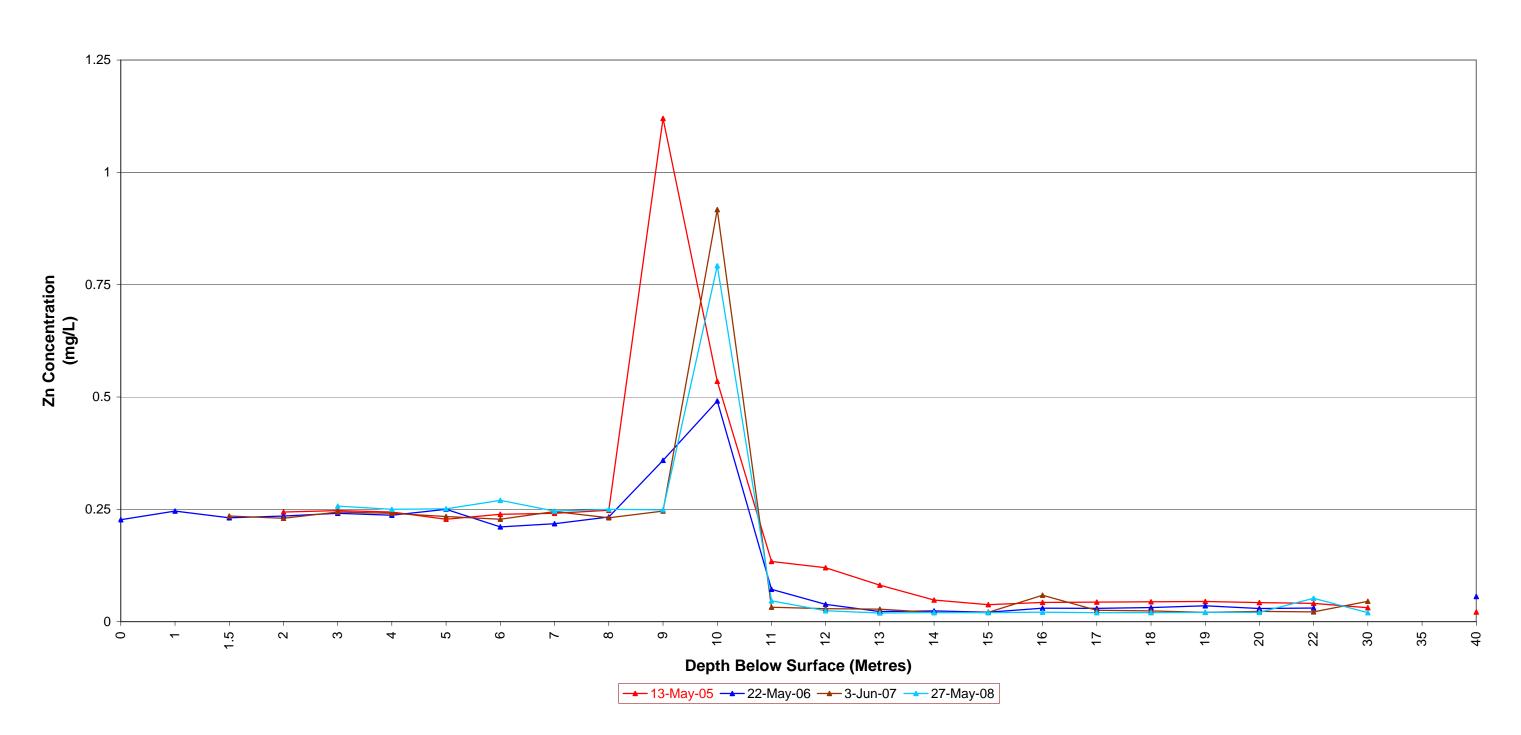
GARROW LAKE - Station 262-3

Trend In Zinc Concentrations In The Water Column 2002 to 2008



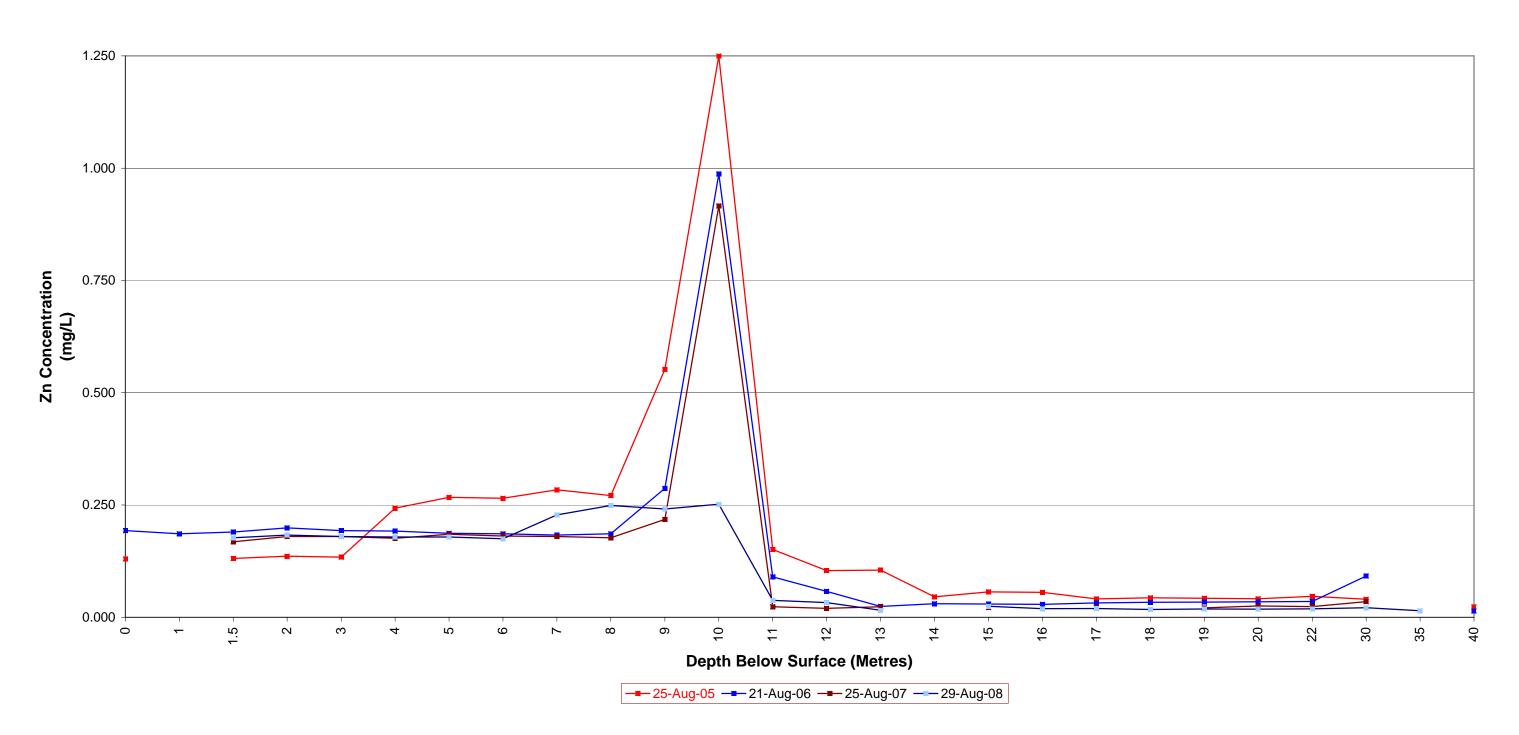
## FIGURE 1B Last 4 YEARS - SPRING GARROW LAKE - Station 262-3

**Trend In Zinc Concentrations In The Water Column 2005 to 2008** 



## FIGURE 1C Last 4 YEARS - SUMMER GARROW LAKE - Station 262-3

**Trend In Zinc Concentrations In The Water Column 2005 to 2008** 



#### TABLE 2 GARROW LAKE

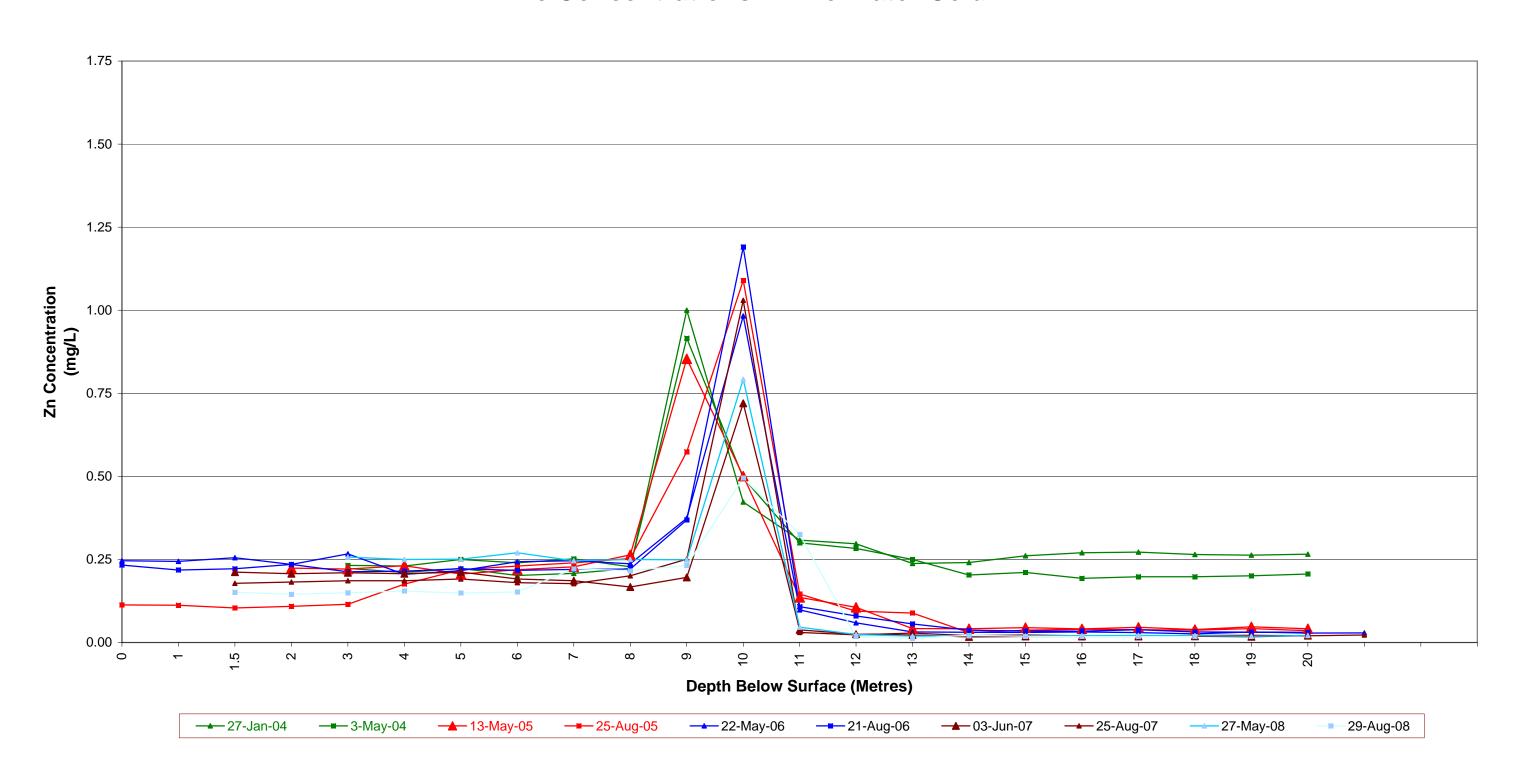
#### WATER COLUMN MONITORING

STATION 262-3A: Garrow Lake Near Discharge

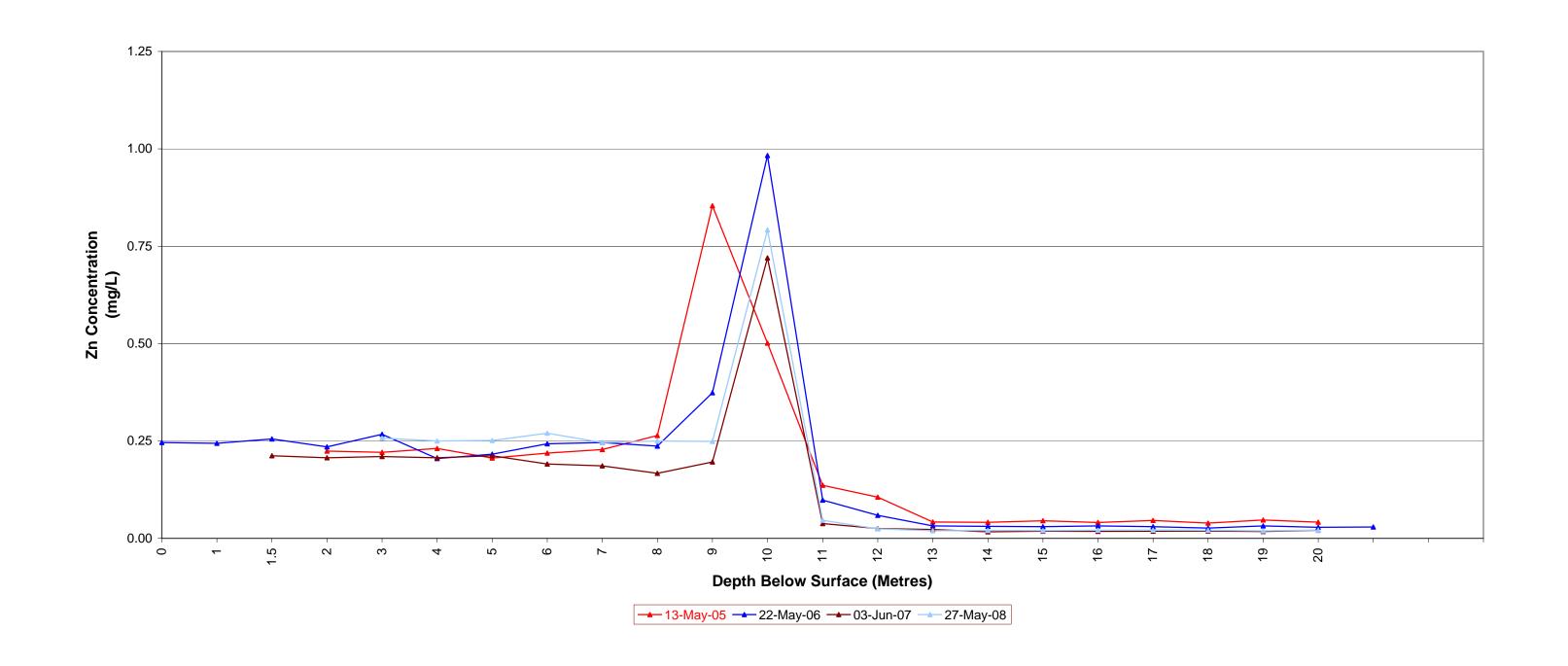
Zinc Concentrations mg/L 27-Jan-04 3-Jun-07 **Depth** 3-May-04 13-May-05 25-Aug-05 22-May-06 21-Aug-06 25-Aug-07 27-May-08 29-Aug-08 0 0.113 0.246 0.233 0.244 0.218 1 0.112 0.104 0.222 0.212 1.5 0.255 0.178 0.151 2 0.224 0.109 0.235 0.235 0.207 0.182 0.145 0.223 0.232 0.221 0.115 0.267 0.213 0.210 0.186 3 0.257 0.150 4 0.211 0.230 0.231 0.176 0.205 0.215 0.207 0.186 0.155 0.250 5 0.223 0.222 0.250 0.206 0.219 0.216 0.212 0.191 0.251 0.149 0.202 0.240 0.219 0.230 0.243 0.217 0.191 0.180 0.270 0.152 6 0.208 0.252 0.228 0.240 0.246 0.220 0.186 0.177 7 0.246 0.222 0.223 0.228 0.264 0.253 0.237 0.221 0.201 8 0.167 0.250 0.216 9 0.854 1.000 0.916 0.574 0.374 0.369 0.196 0.251 0.249 0.232 0.496 10 0.423 0.501 1.090 0.983 1.190 0.720 1.030 0.792 0.495 11 0.308 0.300 0.098 0.108 0.038 0.030 0.136 0.146 0.046 0.325 12 0.297 0.283 0.080 0.025 0.106 0.094 0.059 0.023 0.024 0.018 13 0.238 0.250 0.042 0.089 0.032 0.056 0.023 0.028 0.019 0.013 14 0.203 0.041 0.030 0.031 0.037 0.017 0.021 0.241 0.020 0.022 15 0.261 0.211 0.045 0.037 0.030 0.035 0.018 0.023 0.020 0.019 16 0.270 0.193 0.041 0.040 0.032 0.034 0.018 0.020 0.021 0.018 17 0.272 0.198 0.046 0.038 0.030 0.038 0.018 0.019 0.021 0.018 0.198 0.039 0.037 0.026 0.021 18 0.265 0.032 0.019 0.021 0.018 19 0.263 0.201 0.047 0.042 0.032 0.031 0.018 0.022 0.019 20 0.266 0.206 0.042 0.035 0.029 0.031 0.021 0.020 0.021 22 0.267 0.029 0.023 30 0.076 40 0.075

Note - The Water Licence did not require sampling of this station prior to 2004

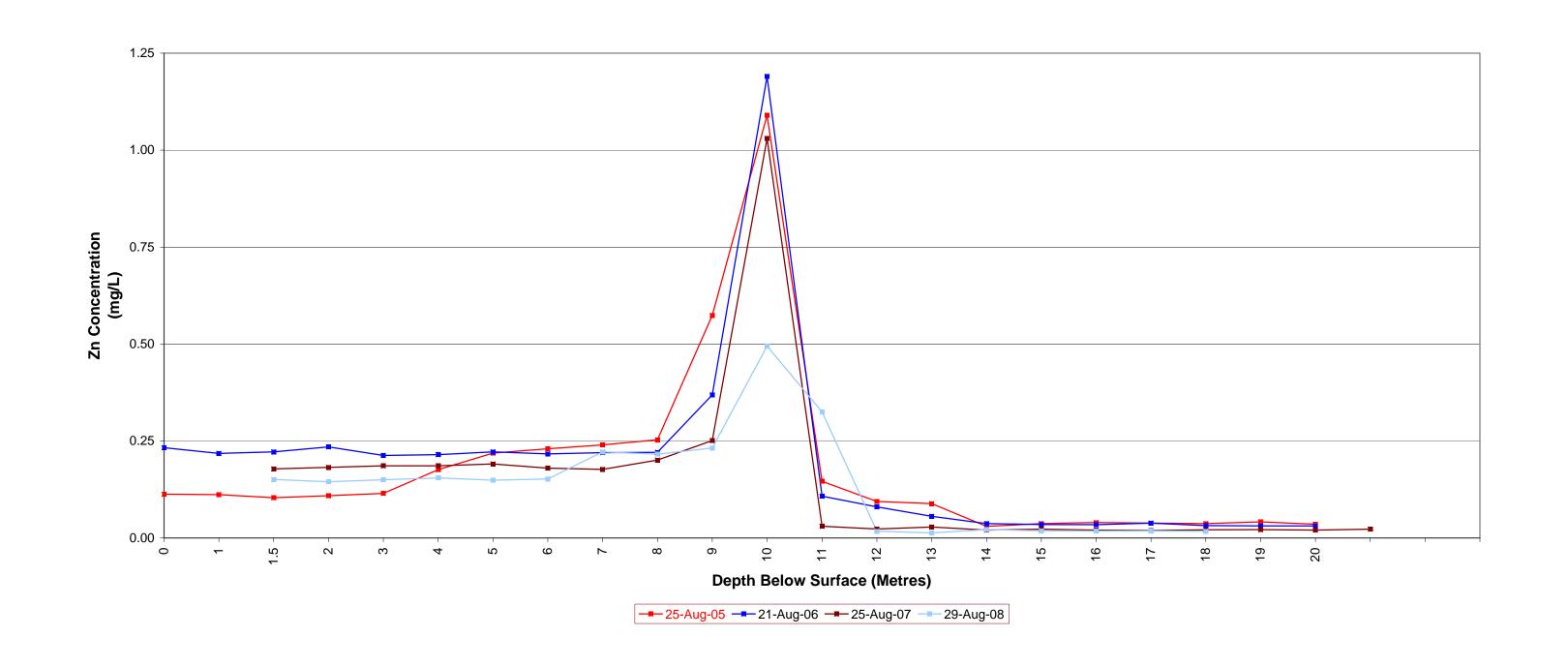
FIGURE 2A
GARROW LAKE - Station 262-3A
Zinc Concentrations In The Water Column



## FIGURE 2B LAST 4 YEARS - SPRING GARROW LAKE - Station 262-3A Zinc Concentrations In The Water Column 2005 to 2008



## FIGURE 2C LAST 4 YEARS - SUMMER GARROW LAKE - Station 262-3A Zinc Concentrations In The Water Column 2005 to 2008



### **TABLE 3**GARROW LAKE

#### 2008 WATER COLUMN MONITORING COMPARE MID AND SOUTH MONITORING STATION DATA

(mg/L Zn)

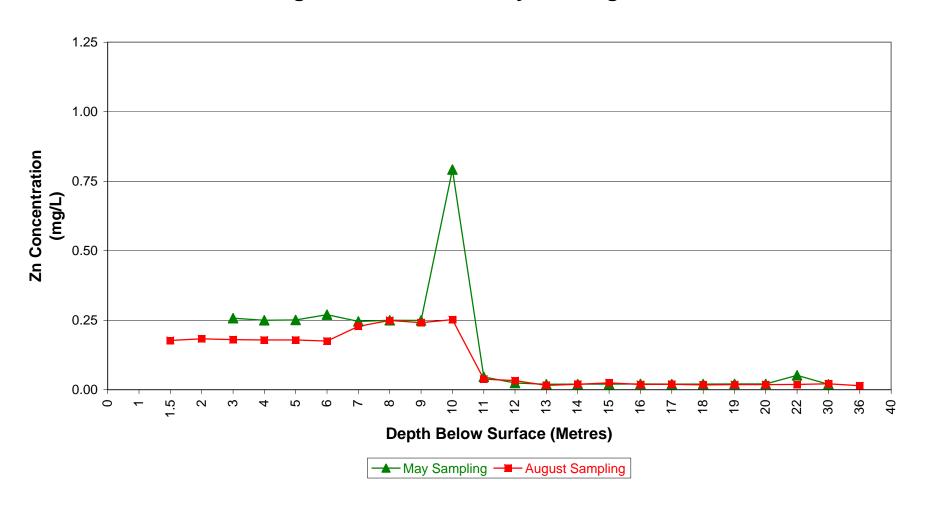
Depth	May S	ampling	August S	ampling
Metres	262-3	262-3A	262-3	262-3A
0				
1				
1.5			0.177	0.151
2			0.183	0.145
3	0.257	0.257	0.180	0.150
4	0.250	0.250	0.179	0.155
5	0.251	0.251	0.179	0.149
6	0.270	0.270	0.175	0.152
7	0.246	0.246	0.228	0.222
8	0.250	0.250	0.249	0.216
9	0.249	0.249	0.241	0.232
10	0.792	0.792	0.252	0.495
11	0.046	0.046	0.038	0.325
12	0.024	0.024	0.033	0.018
13	0.019	0.019	0.016	0.013
14	0.020	0.020	0.019	0.022
15	0.020	0.020	0.025	0.019
16	0.021	0.021	0.019	0.018
17	0.020	0.021	0.020	0.018
18	0.020	0.021	0.017	0.018
19	0.021	0.019	0.018	
20	0.021	0.021	0.018	
22	0.052		0.019	
30	0.020		0.021	
36			0.015	
40				

Note:

<sup>- 27-</sup>May-08 for Station 262-3, didn't show the 36M depth sample as zinc was 2.01. Sampler believed to have hit the bottom contaminating the sample.

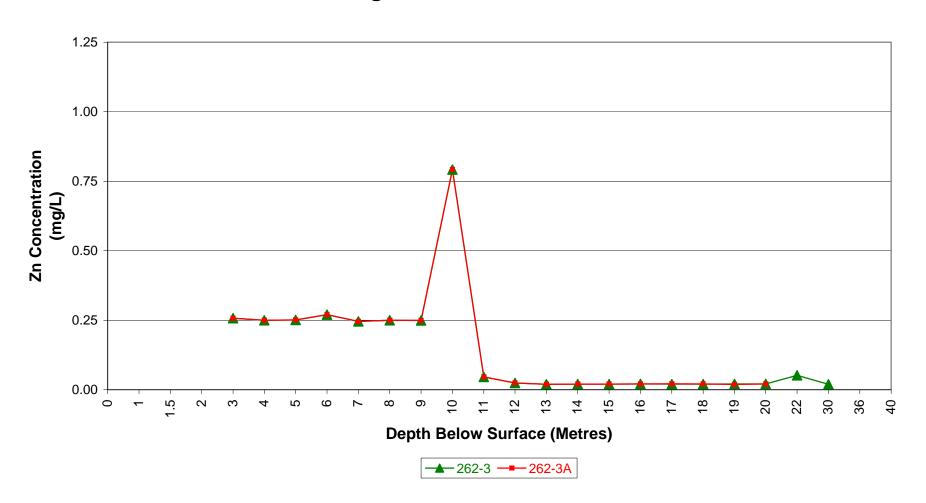
#### FIGURE 3A GARROW LAKE

### Comparision of Zinc Concentrations In The Water Column Between Monitoring Stations 262-3 In May and August of 2008



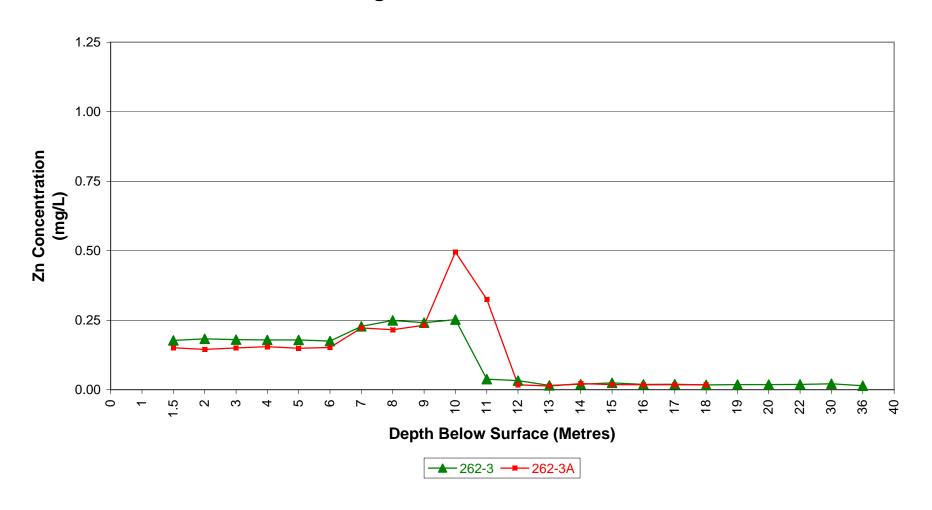
### FIGURE 3B GARROW LAKE - May 2008

#### Comparision of Zinc Concentrations In The Water Column Between Monitoring Stations 262-3 and 262-3A



#### FIGURE 3C GARROW LAKE - August 2008

Comparision of Zinc Concentrations In The Water Column Between Monitoring Stations 262-3 and 262-3A



#### **APPENDIX 5**

# Garrow Lake Water Column Minimum Ice Conditions Monitoring Event Laboratory Data (August 29, 2008)





#### **Environmental Division**

**Certificate of Analysis** 

TECK COMINCO METALS LTD.

**ATTN:** BRUCE DONALD

BAG 2000 Reported On: 15-SEP-08 11:45 AM

KIMBERLEY BC V1A 3E1

Lab Work Order #: L677272 Date Received: 02-SEP-08

**Project P.O. #:** 7397

Job Reference: 2008 AUGUST POLARIS GARROW LAKE

Legal Site Desc: CofC Numbers:

Other Information:

**Comments:** Some of the metals detection limits were increased due to high levels of metals in these samples.

LINDSAY JONES Account Manager

THIS REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN AUTHORITY OF THE LABORATORY. ALL SAMPLES WILL BE DISPOSED OF AFTER 30 DAYS FOLLOWING ANALYSIS. PLEASE CONTACT THE LAB IF YOU REQUIRE ADDITIONAL SAMPLE STORAGE TIME.

	Sample ID Description	L677272-1	L677272-2	L677272-3	L677272-4	L677272-5
	Sampled Date Sampled Time Client ID	29-AUG-08 10:00 GLC-1.5m	29-AUG-08 10:05 GLC-2m	29-AUG-08 10:10 GLC-3m	29-AUG-08 10:15 GLC-4m	29-AUG-08 10:20 GLC-5m
Grouping	Analyte	GLC-1.5III	GLC-ZIII	GLC-3III	GLC-4III	GLC-5III
SEAWATER						
	0	40000	40000	40000	40000	44000
Physical Tests	Conductivity (uS/cm)	12000	12000	12000	12000	11900
	Hardness (as CaCO3) (mg/L)	1460	1470	1370	1440	1450
	pH (pH)	7.87	8.08	8.09	8.04	7.95
	Salinity (EC) (g/L)	6.9	6.9	6.9	6.9	6.9
	Total Suspended Solids (mg/L)	<3.0	3.3	4.0	<3.0	<3.0
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)  Sulphide as S (mg/L)	114	118	114	112	113
Total Metals	Aluminum (Al)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
i Otal Mictals	Arsenic (As)-Total (mg/L)	<0.000	<0.000	0.00029	<0.000	<0.000
	Cadmium (Cd)-Total (mg/L)	0.000443	0.000451	0.00029	0.000453	0.000442
	Calcium (Ca)-Total (mg/L)		127			
		126		118	125	126
	Copper (Cu)-Total (mg/L)	0.000990	0.000917	0.00104	0.00204	0.000916
	Iron (Fe)-Total (mg/L)	0.016	0.017	0.017	0.018	0.017
	Lead (Pb)-Total (mg/L)	0.000130	0.000121	0.000131	0.000142	0.000114
	Magnesium (Mg)-Total (mg/L)	278	279	261	275	276
	Manganese (Mn)-Total (mg/L)	0.00530	0.00550	0.00547	0.00549	0.00539
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Total (mg/L)	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025
	Nickel (Ni)-Total (mg/L)	0.00400	0.00426	0.00430	0.00421	0.00412
	Zinc (Zn)-Total (mg/L)	0.177	0.183	0.180	0.179	0.179

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

	Sample ID Description	L677272-6	L677272-7	L677272-8	L677272-9	L677272-10
	Sampled Date Sampled Time	29-AUG-08 10:25	29-AUG-08 10:30	29-AUG-08 10:35	29-AUG-08 10:40	29-AUG-08 10:45
	Client ID	GLC-6m	GLC-7m	GLC-8m	GLC-9m	GLC-10m
Grouping	Analyte					
SEAWATER						
Physical Tests	Conductivity (uS/cm)	11900	15200	16400	16700	18200
	Hardness (as CaCO3) (mg/L)	1400	1820	2050	2020	2130
	pH (pH)	8.12	8.08	8.03	8.07	8.12
	Salinity (EC) (g/L)	6.9	9.0	9.8	10.0	10.9
	Total Suspended Solids (mg/L)	4.7	3.3	4.7	<3.0	<3.0
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	110	139	152	161	152
	Sulphide as S (mg/L)	<0.020				<0.020
Total Metals	Aluminum (AI)-Total (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Arsenic (As)-Total (mg/L)	<0.00020	<0.00020	0.00021	<0.00020	0.00021
	Cadmium (Cd)-Total (mg/L)	0.000437	0.000553	0.000610	0.000593	0.000633
	Calcium (Ca)-Total (mg/L)	121	155	172	169	179
	Copper (Cu)-Total (mg/L)	0.000969	0.00101	0.00636	0.00112	0.00112
	Iron (Fe)-Total (mg/L)	0.016	0.013	0.011	0.011	0.011
	Lead (Pb)-Total (mg/L)	0.000084	0.000091	0.000236	0.000096	0.000105
	Magnesium (Mg)-Total (mg/L)	268	349	392	387	409
	Manganese (Mn)-Total (mg/L)	0.00535	0.00605	0.00641	0.00619	0.00689
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Total (mg/L)	<0.0025	<0.0025	0.0028	0.0027	0.0027
	Nickel (Ni)-Total (mg/L)	0.00405	0.00497	0.00523	0.00519	0.00536
	Zinc (Zn)-Total (mg/L)	0.175	0.228	0.249	0.241	0.252

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

#### L677272 CONTD.... PAGE 4 of 5 15-SEP-08 11:45

#### **Reference Information**

Methods Listed (if applicable):

ALS Test Code Matrix Test Description Analytical Method Reference(Based On)

ALK-C-COL-VA Seawater Alkalinity by Colourimetric (seawater) APHA 310.2

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange

colourimetric method.

AS-TOT-C-HVAAS-VA Seawater Total Arsenic in Seawater by HVAAS PUGET SOUND PROTOCOLS, EPA 7000 SERIES

This analysis is carried out using procedures adapted from "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment, and Tissue Samples" prepared for the United States Environmental Protection Agency and the Puget Sound Water Quality Authority, 1995. The procedures may involve preliminary sample treatment by acid digestion or filtration (EPA Method 3005A). Instrumental analysis of the seawater

is by atomic absorption/emission spectrophotometry (EPA Method 7000 series).

EC-C-PCT-VA Seawater Conductivity (Automated) (seawater) APHA 2510 Auto. Conduc.

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

HARDNESS-CALC-VA Seawater Hardness APHA 2340B

Hardness is calculated from Calcium and Magnesium concentrations, and is expressed as calcium carbonate equivalents.

HG-TOT-C-CVAFS-VA Seawater Total Mercury in Seawater by CVAFS PUGET SOUND PROTOCOLS, EPA 245.7

This analysis is carried out using procedures adapted from "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment, and Tissue Samples" prepared for the United States Environmental Protection Agency and the Puget Sound Water Quality Authority, 1995. The procedure involves a cold-oxidation of the acidified seawater sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

MET-TOT-C-ICP-VA Seawater Total Metals in Seawater by ICPOES

PUGET SOUND PROTOCOLS, EPA 6010B

This analysis is carried out using procedures adapted from "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment, and Tissue Samples" prepared for the United States Environmental Protection Agency and the Puget Sound Water Quality Authority, 1995. The procedures may involve preliminary sample treatment by acid digestion or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-TOT-C-LOW-MS-VA Seawater Total Metals in Seawater by ICPMS

PUGET SOUND PROTOCOLS, EPA 6020A

This analysis is carried out using procedures adapted from "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment, and Tissue Samples" prepared for the United States Environmental Protection Agency and the Puget Sound Water Quality Authority, 1995. The procedures may involve preliminary sample treatment by acid digestion or filtration (EPA Method 3005A). Instrumental analysis is by atomic inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-SPE-MS-VA Seawater Total Metals in Seawater by SPE ICPMS

PUGET SOUND PROTOCOLS, EPA 6020A

This analysis is carried out using procedures adapted from "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment, and Tissue Samples" prepared for the United States Environmental Protection Agency and the Puget Sound Water Quality Authority, 1995, and with procedures adapted from Cetac Technologies Incorporated. A suspended particulate resin (SPR), consisting of immobilized iminodiacetate (IDA) on a divinylbenzene polymer, is used to chelate and preconcentrate metals in seawater. Instrumental analysis is by inductively coupled plasma mass spectrometry (ICPMS).

PH-C-PCT-VA Seawater pH by Meter (Automated) (seawater) 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

S2-C-T-COL-VA Seawater Tot. Sulphide by Colorimetric (seawater) APHA 4500-S2 "Sulphide"

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

SALINITY-C-EC-VA Seawater Salinity by calc. using EC (seawater) APHA 2520 B

This analysis is carried out using procedures adapted from APHA Method 2520 "Salinity". Salinity is determined using a samples conductivity and the Practical Salinity Scale.

#### **Reference Information**

#### Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)

TSS-C-VA Seawater Solids by Gravimetric (seawater) APHA 2540 Gravimetric

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

\*\* Laboratory Methods employed follow in-house procedures, which are generally based on nationally or internationally accepted methodologies.

The last two letters of the above ALS Test Code column indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA		

#### GLOSSARY OF REPORT TERMS

Surr - A surrogate is an organic compound that is similar to the target analyte(s) in chemical composition and behavior but not normally detected in environmental samples. Prior to sample processing, samples are fortified with one or more surrogate compounds.

The reported surrogate recovery value provides a measure of method efficiency.

mg/kg (units) - unit of concentration based on mass, parts per million

mg/L (units) - unit of concentration based on volume, parts per million

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.

Although test results are generated under strict QA/QC protocols, any unsigned test reports, faxes, or emails are considered preliminary.

ALS Laboratory Group has an extensive QA/QC program where all analytical data reported is analyzed using approved referenced procedures followed by checks and reviews by senior managers and quality assurance personnel. However, since the results are obtained from chemical measurements and thus cannot be guaranteed, ALS Laboratory Group assumes no liability for the use or interpretation of the results.

1988 Triumph Street, Vancouver, BC Canada V5L 1K5 Tel: 604-253-4188 Toll Free: 1-800-665-0243 Fax: 604-253-6700 #2-21 Highfield Circle SE, Calgary, AB Canada T2G·5N6 Tel: 403-214-5431 Toll Free: 1-866-722-6231 Fax: 403-214-5430 #2 - 8820 100th Street, Fort St. John, BC Canada V1J 3W9 Tel: 250-785-8281 Fax: 250-785-8286

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# CHAIN OF CUSTODY FORM

PAGE 1 OF

SEND REPORT TO:	RT TO:							-							
COMPANY:	COMPANY: Teck Cominco Metals Ltd.	als Ltd.					ANAL	YSIS	REGUI	ANALYSIS REQUESTED:					
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CITY:	Kimberley	PROV: BC	, BC		POSTAL CODE: V1A 3E1	V1A 3E1	35 'F		000						
TEL:	250-427-8405	FAX	FAX: 250-427-8451	7-8451	CONTACT:	CONTACT: Bruce Donald	iq ,e								
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J 8A	GLC-6rii			2008-08-29	10:25	seawater	×	×	×						AS.
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CC: alaudr	CC: alaudrum@gartnerlee.com; Total metals have been preserved with IHNO3; No pr parameters; Sulfide has been preserved with NaOH and zinc acetate	; Total meta preserved wit	ils have b	een preserved with	h HNO3; No pre	reservative for general	Tal.	8)	Cooler Seal Intact?	Intact?	THE PERSON	imperature:	Cooling Method?	thod?	a co
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#### **Environmental Division**

**Certificate of Analysis** 

TECK COMINCO METALS LTD.

ATTN: BRUCE DONALD

BAG 2000 Reported On: 16-SEP-08 10:23 AM

KIMBERLEY BC V1A 3E1

Lab Work Order #: L677081 Date Received: 02-SEP-08

**Project P.O. #:** 7397

Job Reference: 2008 AUGUST POLARIS GARROW LAKE

Legal Site Desc: CofC Numbers:

Other Information:

Comments:

LINDSAY JONES, Account Manager

THIS REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN AUTHORITY OF THE LABORATORY. ALL SAMPLES WILL BE DISPOSED OF AFTER 30 DAYS FOLLOWING ANALYSIS. PLEASE CONTACT THE LAB IF YOU REQUIRE ADDITIONAL SAMPLE STORAGE TIME.

A Campbell Brothers Limited Company

	Sample ID Description	L677081-1	L677081-2	L677081-3	L677081-4	L677081-5
	Sampled Date Sampled Time	29-AUG-08 10:50	29-AUG-08 10:55	29-AUG-08 11:00	29-AUG-08 11:05	29-AUG-08 11:10
	Client ID	GLC-11m	GLC-12m	GLC-13m	GLC-14m	GLC-15m
Grouping	Analyte					
SEAWATER						
Physical Tests	Conductivity (uS/cm)	50600	87000	87900	88100	88200
	Hardness (as CaCO3) (mg/L)	12700	12900	13100	13300	12900
	pH (pH)	7.89	7.79	7.76	7.77	7.77
	Salinity (EC) (g/L)	33.9	62.9	63.7	63.8	63.9
	Total Suspended Solids (mg/L)	10.7	10.7	10.7	8.7	13.3
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	239	427	430	432	451
	Sulphide as S (mg/L)		<0.020		<0.020	
<b>Total Metals</b>	Aluminum (AI)-Total (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
	Arsenic (As)-Total (mg/L)	<0.00020	0.00037	0.00044	<0.00020	<0.00020
	Cadmium (Cd)-Total (mg/L)	0.000051	0.000043	<0.000020	0.000022	0.000023
	Calcium (Ca)-Total (mg/L)	825	834	871	889	857
	Copper (Cu)-Total (mg/L)	0.000661	0.000590	0.000320	0.000381	0.000429
	Iron (Fe)-Total (mg/L)	0.061	0.060	0.123	0.417	0.392
	Lead (Pb)-Total (mg/L)	0.000579	0.000515	0.000451	0.000800	0.00102
	Magnesium (Mg)-Total (mg/L)	2590	2620	2660	2680	2620
	Manganese (Mn)-Total (mg/L)	0.127	0.127	0.116	0.103	0.103
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Total (mg/L)	<0.025	<0.025	<0.025	<0.025	<0.025
	Nickel (Ni)-Total (mg/L)	0.00890	0.00870	0.00759	0.00569	0.00583
	Zinc (Zn)-Total (mg/L)	0.0377	0.0328	0.0158	0.0194	0.0246

	Sample ID Description	L677081-6	L677081-7	L677081-8	L677081-9	L677081-10
	Sampled Date Sampled Time	29-AUG-08 11:15	29-AUG-08 11:20	29-AUG-08 11:25	29-AUG-08 11:30	29-AUG-08
	Client ID	GLC-16m	GLC-17m	GLC-18m	GLC-19m	11:35 GLC-20m
Grouping	Analyte					
SEAWATER						
Physical Tests	Conductivity (uS/cm)	88300	88300	88000	88100	88300
	Hardness (as CaCO3) (mg/L)	13100	13000	13200	13200	12600
	pH (pH)	7.77	7.78	7.77	7.76	7.78
	Salinity (EC) (g/L)	64.0	64.0	63.8	63.8	64.0
	Total Suspended Solids (mg/L)	17.3	6.7	15.3	10.0	8.7
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	440	439	441	431	425
	Sulphide as S (mg/L)	<0.020		<0.020		<0.020
Total Metals	Aluminum (Al)-Total (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
	Arsenic (As)-Total (mg/L)	<0.00020	0.00023	<0.00020	<0.00020	<0.00020
	Cadmium (Cd)-Total (mg/L)	<0.000020	0.000021	<0.000020	<0.000020	<0.000020
	Calcium (Ca)-Total (mg/L)	863	863	866	885	787
	Copper (Cu)-Total (mg/L)	0.000370	0.000595	0.000329	0.000341	0.000357
	Iron (Fe)-Total (mg/L)	0.368	0.352	0.348	0.352	0.341
	Lead (Pb)-Total (mg/L)	0.00190	0.00105	0.000772	0.000792	0.000766
	Magnesium (Mg)-Total (mg/L)	2660	2630	2680	2680	2590
	Manganese (Mn)-Total (mg/L)	0.0988	0.102	0.0976	0.100	0.0969
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Total (mg/L)	<0.025	<0.025	<0.025	<0.025	<0.025
	Nickel (Ni)-Total (mg/L)	0.00565	0.00568	0.00552	0.00558	0.00556
	Zinc (Zn)-Total (mg/L)	0.0192	0.0197	0.0174	0.0184	0.0182

	Sample ID	L677081-11	L677081-12	L677081-13	
	Description Sampled Date	29-AUG-08	29-AUG-08	29-AUG-08	
	Sampled Time Client ID	11:40 GLC-22m	11:50 GLC-30m	12:00 GLC-36m	
Grouping	Analyte	OLO-22III	GEO-30III	GEG-30III	
SEAWATER					
Physical Tests	Conductivity (uS/cm)	88200	88700	89500	
	Hardness (as CaCO3) (mg/L)	12600	12900	12900	
	pH (pH)	7.79	7.78	7.73	
	Salinity (EC) (g/L)	63.9	64.4	65.0	
	Total Suspended Solids (mg/L)	20.0	24.0	16.7	
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	432	437	434	
	Sulphide as S (mg/L)	<0.020	0.86	2.37	
Total Metals	Aluminum (Al)-Total (mg/L)	<0.50	<0.50	<0.50	
	Arsenic (As)-Total (mg/L)	<0.00020	0.00023	0.00042	
	Cadmium (Cd)-Total (mg/L)	<0.000020	0.000026	0.000032	
	Calcium (Ca)-Total (mg/L)	808	820	805	
	Copper (Cu)-Total (mg/L)	0.000335	0.000289	0.000326	
	Iron (Fe)-Total (mg/L)	0.358	0.364	0.226	
	Lead (Pb)-Total (mg/L)	0.000819	0.00425	0.00673	
	Magnesium (Mg)-Total (mg/L)	2580	2630	2660	
	Manganese (Mn)-Total (mg/L)	0.0999	0.0926	0.0690	
	Mercury (Hg)-Total (mg/L)	<0.000010	0.000049	<0.000010	
	Molybdenum (Mo)-Total (mg/L)	<0.025	<0.025	<0.025	
	Nickel (Ni)-Total (mg/L)	0.00567	0.00362	0.00130	
	Zinc (Zn)-Total (mg/L)	0.0189	0.0212	0.0146	

L677081 CONTD.... PAGE 5 of 6 16-SEP-08 10:23

#### **Reference Information**

**Additional Comments for Sample Listed:** 

 Samplenum
 Matrix
 Report Remarks
 Sample Comments

 Methods Listed (if applicable):
 ALS Test Code
 Matrix
 Test Description
 Analytical Method Reference(Based On)

ALK-C-COL-VA Seawater Alkalinity by Colourimetric (seawater) APHA 310.2

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.

AS-TOT-C-HVAAS-VA Seawater Total Arsenic in Seawater by HVAAS PUGE

PUGET SOUND PROTOCOLS, EPA 7000 SERIES

This analysis is carried out using procedures adapted from "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment, and Tissue Samples" prepared for the United States Environmental Protection Agency and the Puget Sound Water Quality Authority, 1995. The procedures may involve preliminary sample treatment by acid digestion or filtration (EPA Method 3005A). Instrumental analysis of the seawater is by atomic absorption/emission spectrophotometry (EPA Method 7000 series).

EC-C-PCT-VA Seawater Conductivity (Automated) (seawater) APHA 2510 Auto. Conduct.

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

HARDNESS-CALC-VA Seawater Hardness APHA 2340B

Hardness is calculated from Calcium and Magnesium concentrations, and is expressed as calcium carbonate equivalents.

**HG-TOT-C-CVAFS-VA** Seawater Total Mercury in Seawater by CVAFS

PUGET SOUND PROTOCOLS, EPA 245.7

This analysis is carried out using procedures adapted from "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment, and Tissue Samples" prepared for the United States Environmental Protection Agency and the Puget Sound Water Quality Authority, 1995. The procedure involves a cold-oxidation of the acidified seawater sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

MET-TOT-C-ICP-VA Seawater Total Metals in Seawater by ICPOES

PUGET SOUND PROTOCOLS, EPA 6010B

This analysis is carried out using procedures adapted from "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment, and Tissue Samples" prepared for the United States Environmental Protection Agency and the Puget Sound Water Quality Authority, 1995. The procedures may involve preliminary sample treatment by acid digestion or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-TOT-C-LOW-MS-VA Seawater Total Metals in Seawater by ICPMS

PUGET SOUND PROTOCOLS, EPA 6020A

This analysis is carried out using procedures adapted from "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment, and Tissue Samples" prepared for the United States Environmental Protection Agency and the Puget Sound Water Quality Authority, 1995. The procedures may involve preliminary sample treatment by acid digestion or filtration (EPA Method 3005A). Instrumental analysis is by atomic inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-SPE-MS-VA Seawater Total Metals in Seawater by SPE ICPMS

PUGET SOUND PROTOCOLS, EPA 6020A

This analysis is carried out using procedures adapted from "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment, and Tissue Samples" prepared for the United States Environmental Protection Agency and the Puget Sound Water Quality Authority, 1995, and with procedures adapted from Cetac Technologies Incorporated. A suspended particulate resin (SPR), consisting of immobilized iminodiacetate (IDA) on a divinylbenzene polymer, is used to chelate and preconcentrate metals in seawater. Instrumental analysis is by inductively coupled plasma mass spectrometry (ICPMS).

PH-C-PCT-VA Seawater pH by Meter (Automated) (seawater) 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

S2-C-T-COL-VA Seawater Tot. Sulphide by Colorimetric (seawater) APHA 4500-S2 "Sulphide"

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

#### **Reference Information**

#### Methods Listed (if applicable):

ALS Test Code Matrix Test Description Analytical Method Reference (Based On)

SALINITY-C-EC-VA Seawater Salinity by calc. using EC (seawater) APHA 2520 B

This analysis is carried out using procedures adapted from APHA Method 2520 "Salinity". Salinity is determined using a samples conductivity and the Practical Salinity Scale.

TSS-C-VA Seawater Solids by Gravimetric (seawater) APHA 2540 Gravimetric

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

\*\* Laboratory Methods employed follow in-house procedures, which are generally based on nationally or internationally accepted methodologies.

The last two letters of the above ALS Test Code column indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA		

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The reported surrogate recovery value provides a measure of method efficiency.

mg/kg (units) - unit of concentration based on mass, parts per million

mg/L (units) - unit of concentration based on volume, parts per million 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.

Although test results are generated under strict QA/QC protocols, any unsigned test reports, faxes, or emails are considered preliminary.

ALS Laboratory Group has an extensive QA/QC program where all analytical data reported is analyzed using approved referenced procedures followed by checks and reviews by senior managers and quality assurance personnel. However, since the results are obtained from chemical measurements and thus cannot be guaranteed, ALS Laboratory Group assumes no liability for the use or interpretation of the results.



#2 -21 Highfield Circle SE, Calgary, AB Canada T2G 5N6 Tel: 403-214-5431 Toll Free: 1-866-722-6231 Fax: 403-214-5430 1988 Triumph Street, Vancouver, BC Canada V5L 1K5 Tel: 604-253-4188 Toll Free: 1-800-665-0243 Fax: 604-253-6700 #2 - 8820 100th Street, Fort St. John, BC Canada V1J 3W9 Tel: 250-785-8281 Fax: 250-785-8286

# CHAIN OF CUSTODY FORM

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TEL: 25	250-427-8405	FAX: 25	FAX: 250-427-8451	CONTACT:	Bruce Donald	1q ,		960						
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	GLC-13m		2008-08-29	11:00	seawater	×	×	×						
	GLC-14m		2008-08-29	11:05	seawater	×	×	×						
	GLC-15m		2008-08-29	11:10	seawater	×	×	×						
	GLC-16m		2008-08-29	11:15	seawater	×	×	×						
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ALS Environmental exting

SEND REPORT TO:

1988 Triumph Street, Vancouver, BC Canada V5L 1K5 Tel; 604-253-4188 Toll Free: 1-800-665-0243 Fax: 604-253-6700 #2-21 Highfield Circle SE, Calgary, AB Canada T2G 5N6 Tel; 403-214-5431 Toll Free: 1-866-722-6231 Fax: 403-214-5430 #2 - 8820 100th Street, Fort St. John, BC Canada V1J 3W9 Tel; 250-785-8281 Fax: 250-785-8286

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PAGE OF OF OF WAY

## CHAIN OF CUSTODY FORM

NOTES (sample specific comments, due dates, etc.) TIME: DATE: TIME DATE: RECEIVED BY: RECEIVED BY: 3 pm Aug. 30/08 DATE TIME: DATE: TIME Conductivity, hardness, pH, salinit
TSS, Alkalinity
Total Metals (MS-ICP)
Sulphide unate kilon RELINQUISHED BY: RELINQUISHED BY: × × × × × × × × × × (surcharge may apply) bruce.donald@teckcominco.cc CONTACT: Bruce Donald MATRIX seawater SAMPLER: Curtis Kidd seawater seawater POSTAL CODE: V1A 3E1 ☐ DIFFERENT FROM REPORT (provide details below) ALS CONTACT: DATE / TIME COLLECTED TIME OTHER 11:40 11:50 12:00 O RUSH SPECIFY DATE: FAX YYYY-MM-DD 2008 August Polaris Garrow Lake 2008-08-29 2008-08-29 2008-08-29 ✓ EMAIL - ADDRESS: ✓ PDF FAX: 250-427-8451 PDF ✓ EXCEL PROV: BC SAMPLE IDENTIFICATION PO NO.: SAME AS REPORT ✓ HARDCOPY COMPANY: Teck Cominco Metals Ltd. ✓ HARDCOPY ROUTINE FAX 250-427-8405 PROJECT NAME AND NO. GLC-22m GLC-30m GLC-36m Kimberley ADDRESS: Bag 2000 SEND INVOICE TO: INVOICE FORMAT: REPORT FORMAT: **TURN AROUND** QUOTE NO.: REQUIRED: #OM CIT: Ē. FOR LAB USE ONLY

- all coolers

None

8

Icepacks

ž

Yes

Frozen?

NA

Yes No

Cooler Seal Intact?

Water is hypersaline, for TSS measurement run 1-2L distilled through filters!!!

CC: alaudrum@gartnerlee.com; Total metals have been preserved with HNO3; No preservative for general

parameters; Sulfide has been preserved with NaOH and zinc acetate

SPECIAL INSTRUCTIONS:

Cooling Method?

FOR LAB USE ONLY

Sample Temperature: DCC





#### **Environmental Division**

**Certificate of Analysis** 

TECK COMINCO METALS LTD.

ATTN: BRUCE DONALD

BAG 2000 Reported On: 15-SEP-08 11:48 AM

KIMBERLEY BC V1A 3E1

Lab Work Order #: L677293 Date Received: 02-SEP-08

**Project P.O. #:** 7397

Job Reference: 2008 AUGUST POLARIS GARROW LAKE

Legal Site Desc: CofC Numbers:

Other Information:

Comments: Please note that sample GLS-4m appears twice on the Chain of Custody with two separate sampling times. Only one sample

labellied GLS-4m was received with no sampling time indicated.

Some of the metals detection limits were increased due to high levels of metals in these samples.

LINDSAY JONES Account Manager

THIS REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN AUTHORITY OF THE LABORATORY. ALL SAMPLES WILL BE DISPOSED OF AFTER 30 DAYS FOLLOWING ANALYSIS. PLEASE CONTACT THE LAB IF YOU REQUIRE ADDITIONAL SAMPLE STORAGE TIME.

	Sample ID Description	L677293-1	L677293-2	L677293-3	L677293-4	L677293-5
	Sampled Date Sampled Time	29-AUG-08 02:00	29-AUG-08 02:05	29-AUG-08 02:15	29-AUG-08 02:10	29-AUG-08 02:25
Grouping	Client ID Analyte	GLS-1.5m	GLS-2m	GLS-3M	GLS-4M	GLS-5M
	, and yes					
SEAWATER						
Physical Tests	Conductivity (uS/cm)	11700	11500	11500	11500	11700
	Hardness (as CaCO3) (mg/L)	1480	1460	1460	1460	1480
	pH (pH)	8.07	8.08	8.09	8.10	8.06
	Salinity (EC) (g/L)	6.8	6.7	6.7	6.7	6.8
	Total Suspended Solids (mg/L)	<3.0	<3.0	4.7	<3.0	<3.0
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	117	113	112	108	124
T-4-1 84-4-1-	Sulphide as S (mg/L)	0.050	0.0040	0.050	0.050	0.050
Total Metals	Aluminum (AI)-Total (mg/L)	<0.050	<0.0010	<0.050	<0.050	<0.050
	Arsenic (As)-Total (mg/L)	<0.00020	<0.00020	0.00020	<0.00020	<0.00020
	Cadmium (Cd)-Total (mg/L)	0.000440	0.000435	0.000438	0.000444	0.000450
	Calcium (Ca)-Total (mg/L)	126	125	126	126	126
	Copper (Cu)-Total (mg/L)	0.000819	0.000783	0.000824	0.000806	0.000807
	Iron (Fe)-Total (mg/L)	0.011	0.012	0.012	0.011	0.012
	Lead (Pb)-Total (mg/L)	0.000222	0.000171	0.00127	0.000113	0.000136
	Magnesium (Mg)-Total (mg/L)	282	279	278	278	282
	Manganese (Mn)-Total (mg/L)	0.00485	0.00483	0.00497	0.00505	0.00495
	Mercury (Hg)-Total (mg/L)	<0.000010	0.000015	0.000017	<0.000010	<0.000010
	Molybdenum (Mo)-Total (mg/L)	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025
	Nickel (Ni)-Total (mg/L)	0.00354	0.00349	0.00389	0.00363	0.00356
	Zinc (Zn)-Total (mg/L)	0.151	0.145	0.150	0.155	0.149

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

Physical Tests  Anions and
EAWATER Physical Tests Anions and
EAWATER Physical Tests Anions and
Physical Tests  Anions and
Anions and
otal Metals

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

# L677293 CONTD.... PAGE 4 of 5 15-SEP-08 11:49

# **Reference Information**

Methods Listed (if applicable):

ALS Test Code Matrix Test Description Analytical Method Reference(Based On)

ALK-C-COL-VA Seawater Alkalinity by Colourimetric (seawater) APHA 310.2

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange

colourimetric method.

**HG-TOT-C-CVAFS-VA** 

**MET-TOT-C-ICP-VA** 

AS-TOT-C-HVAAS-VA Seawater Total Arsenic in Seawater by HVAAS

PUGET SOUND PROTOCOLS, EPA 7000 SERIES

This analysis is carried out using procedures adapted from "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment, and Tissue Samples" prepared for the United States Environmental Protection Agency and the Puget Sound Water Quality Authority, 1995. The procedures may involve preliminary sample treatment by acid digestion or filtration (EPA Method 3005A). Instrumental analysis of the seawater is by atomic absorption/emission spectrophotometry (EPA Method 7000 series).

EC-C-PCT-VA Seawater Conductivity (Automated) (seawater) APHA 2510 Auto. Conduc.

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

HARDNESS-CALC-VA Seawater Hardness APHA 2340B

Hardness is calculated from Calcium and Magnesium concentrations, and is expressed as calcium carbonate equivalents.

Total Mercury in Seawater by CVAFS

Total Metals in Seawater by ICPOES

This analysis is carried out using procedures adapted from "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment, and Tissue Samples" prepared for the United States Environmental Protection Agency and the Puget Sound Water Quality Authority, 1995. The procedure involves a cold-oxidation of the acidified seawater sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

Seawater

Seawater

PUGET SOUND PROTOCOLS, EPA 6010B

PUGET SOUND PROTOCOLS, EPA 245.7

This analysis is carried out using procedures adapted from "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment, and Tissue Samples" prepared for the United States Environmental Protection Agency and the Puget Sound Water Quality Authority, 1995. The procedures may involve preliminary sample treatment by acid digestion or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-TOT-C-LOW-MS-VA Seawater Total Metals in Seawater by ICPMS

PUGET SOUND PROTOCOLS, EPA 6020A

This analysis is carried out using procedures adapted from "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment, and Tissue Samples" prepared for the United States Environmental Protection Agency and the Puget Sound Water Quality Authority, 1995. The procedures may involve preliminary sample treatment by acid digestion or filtration (EPA Method 3005A). Instrumental analysis is by atomic inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-SPE-MS-VA Seawater Total Metals in Seawater by SPE ICPMS

PUGET SOUND PROTOCOLS, EPA 6020A

This analysis is carried out using procedures adapted from "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment, and Tissue Samples" prepared for the United States Environmental Protection Agency and the Puget Sound Water Quality Authority, 1995, and with procedures adapted from Cetac Technologies Incorporated. A suspended particulate resin (SPR), consisting of immobilized iminodiacetate (IDA) on a divinylbenzene polymer, is used to chelate and preconcentrate metals in seawater. Instrumental analysis is by inductively coupled plasma mass spectrometry (ICPMS).

PH-C-PCT-VA Seawater pH by Meter (Automated) (seawater) 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

S2-C-T-COL-VA Seawater Tot. Sulphide by Colorimetric (seawater) APHA 4500-S2 "Sulphide"

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

SALINITY-C-EC-VA Seawater Salinity by calc. using EC (seawater) APHA 2520 B

This analysis is carried out using procedures adapted from APHA Method 2520 "Salinity". Salinity is determined using a samples conductivity and the Practical Salinity Scale.

# Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
TSS-C-VA	Seawater	Solids by Gravimetric (seawater)	APHA 2540 Gravimetric

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

\*\* Laboratory Methods employed follow in-house procedures, which are generally based on nationally or internationally accepted methodologies.

The last two letters of the above ALS Test Code column indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA		

# GLOSSARY OF REPORT TERMS

Surr - A surrogate is an organic compound that is similar to the target analyte(s) in chemical composition and behavior but not normally detected in environmental samples. Prior to sample processing, samples are fortified with one or more surrogate compounds.

The reported surrogate recovery value provides a measure of method efficiency.

mg/kg (units) - unit of concentration based on mass, parts per million

mg/L (units) - unit of concentration based on volume, parts per million

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.

Although test results are generated under strict QA/QC protocols, any unsigned test reports, faxes, or emails are considered preliminary.

ALS Laboratory Group has an extensive QA/QC program where all analytical data reported is analyzed using approved referenced procedures followed by checks and reviews by senior managers and quality assurance personnel. However, since the results are obtained from chemical measurements and thus cannot be guaranteed, ALS Laboratory Group assumes no liability for the use or interpretation of the results.

ALS Environmental (AL excellence in analytical testing

SEND REPORT TO:

1988 Triumph Street, Vancouver, BC Canada V5L 1K5 Tel: 604-253-4188 Toll Free: 1-800-665-0243 Fax: 604-253-6700 #2-21 Highfield Circle SE, Calgary, AB Canada T2G 5N6 Tel: 403-214-5431 Toll Free: 1-866-722-6231 Fax: 403-214-5430 #2-8820 100th Street, Fort St. John, BC Canada V1J 3W9 Tel: 250-785-8281 Fax: 250-785-8286

www.alsenviro.com

# CHAIN OF CUSTODY FORM

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Coltant Signature   Colt	COMPANY	r: Teck C	COMPANY: Teck Cominco Metals Ltd.					ANA	LYSI	ANALYSIS REQUESTED:				100
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2008 August Polaris Carrow Lake	TEL:	250-427		AX: 250-42	7-8451	CONTACT:	Bruce Donald	ld 's						
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2008-08-29   2:26   seawater	ארא	GLS-3r	Ε		2008-08-29	2:15	seawater	×	-	×				
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RELINQUISHED BY: DATE: Aug. 30/08 RECEIVED BY: TIME: (O) YEARDCOPY DESCRIPTION FOR THE SHAPE ON THE SH		GLS-8	Е		2008-08-29	2:40	seawater	×	1/2/2	×				
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SAME AS REPORT DIFFERENT FROM REPORT (provide details below)  HARDCOPY  Water is hypersaline, for TSS measurement run 1-2L distilled through filters!!!  Water is hypersaline, for TSS measurement run 1-2L distilled through filters!!!  Cooler Seal Intact?  POTE:  TIME:  TIME:  COOLER DATE:  TIME:  TIME:  FOR LAB USE ONLY  FOR LAB USE ON	TURN AR	OUND	● ROUTINE	ORUSH	SPECIFY DATE:		(surcharge may at	(kldc	2	RELINQUISHED BY:	DATE:	Aug. 30/08	RECEIVED BY:	DATE: SP?
SAME AS REPORT DIFFERENT FROM REPORT (provide details below)  HARDCOPY Water is hypersaline, for TSS measurement run 1-2L distilled through filters!!!  Water is hypersaline, for TSS measurement run 1-2L distilled through filters!!!  Cooler Seal Intact?  Sample Temperature: Co Cooling Method?	REQUIRE	ä							7		TIME:	3 pm	202	(0)
HARDCOPY Doe Time:	SEND INV	OICE TO:	SAME AS REPORT	_	ERENT FROM REPORT	T (provide details be	(wok		(K)	ELINQUISHED BY:	DATE:		RECEIVED BY:	DATE:
Water is hypersaline, for TSS measurement run 1-2L distilled through filters!!!  ee.com; Total metals have been preserved with HNO3; No preservative for general been preserved with NaOH and zinc acetate  Cooler Seal Intact?  Sample Temperature: Color Cooling Method?  Sample Temperature: Color Cooling Method?  Icharacts	INVOICE	FORMAT:	✓ HARDCOPY	PDF	FAX		200				TIME:			TIME:
Cooler Seal Intact? Sample Temperature: COC Cooling Method?	SPECIAL	INSTRUCT		is hypersalii	ne, for TSS measu	rement run 1-2L	distilled through fi	Iters!!!			FOR	LAB USE C	NLY	
	CC: alau paramete	drum@gal ers; Sulfide	Intnerlee.com; Total me a has been preserved	etals have t with NaOH	been preserved with and zinc acetate	h HNO3; No pres	ervative for gene	<u>ra</u>	0 1		Sample Temp	verature: (C)	manale	eg .

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# **Environmental Division**

**Certificate of Analysis** 

TECK COMINCO METALS LTD.

ATTN: BRUCE DONALD

BAG 2000 Reported On: 15-SEP-08 11:57 AM

KIMBERLEY BC V1A 3E1

Lab Work Order #: L677099 Date Received: 03-SEP-08

**Project P.O. #:** 7397

Job Reference: 2008 MAY POLARIS GARROW LAKE

Legal Site Desc: CofC Numbers:

Other Information:

**Comments:** Some of the metals detection limits were increased due to high levels of metals in these samples.

LINDSAY JONES Account Manager

THIS REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN AUTHORITY OF THE LABORATORY. ALL SAMPLES WILL BE DISPOSED OF AFTER 30 DAYS FOLLOWING ANALYSIS. PLEASE CONTACT THE LAB IF YOU REQUIRE ADDITIONAL SAMPLE STORAGE TIME.

	Sample ID Description	L677099-1	L677099-2	L677099-3	L677099-4	L677099-5
	Sampled Date Sampled Time	29-AUG-08 14:50	29-AUG-08 14:55	29-AUG-08 15:00	29-AUG-08 15:05	29-AUG-08 15:10
One	Client ID	GLS-10m	GLS-11m	GLS-12m	GLS-13m	GLS-14m
Grouping	Analyte					
SEAWATER						
Physical Tests	Conductivity (uS/cm)	31500	84900	87200	88200	88200
	Hardness (as CaCO3) (mg/L)	4330	11800	12900	13000	13400
	pH (pH)	7.95	7.80	7.75	7.79	7.78
	Salinity (EC) (g/L)	20.0	61.1	63.1	63.9	63.9
	Total Suspended Solids (mg/L)	4.0	8.0	6.7	12.7	18.0
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	175	423	437	441	436
	Sulphide as S (mg/L)	<0.020		<0.020		<0.020
Total Metals	Aluminum (Al)-Total (mg/L)	<0.10	<0.20	<0.20	<0.20	<0.20
	Arsenic (As)-Total (mg/L)	<0.00020	0.00041	<0.00020	<0.00020	0.00022
	Cadmium (Cd)-Total (mg/L)	0.00111	0.000443	<0.000020	<0.000020	0.000022
	Calcium (Ca)-Total (mg/L)	322	780	812	825	863
	Copper (Cu)-Total (mg/L)	0.00152	0.00131	0.000412	0.000331	0.000438
	Iron (Fe)-Total (mg/L)	<0.010	0.033	0.077	0.220	0.476
	Lead (Pb)-Total (mg/L)	0.000154	0.000696	0.000486	0.000540	0.000817
	Magnesium (Mg)-Total (mg/L)	856	2390	2640	2650	2740
	Manganese (Mn)-Total (mg/L)	0.0304	0.136	0.123	0.104	0.120
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Total (mg/L)	<0.0050	<0.010	<0.010	<0.010	<0.010
	Nickel (Ni)-Total (mg/L)	0.00613	0.00851	0.00792	0.00543	0.00633
	Zinc (Zn)-Total (mg/L)	0.495	0.325	0.0177	0.0131	0.0217

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

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

# L677099 CONTD.... PAGE 4 of 5 15-SEP-08 11:57

# **Reference Information**

Methods Listed (if applicable):

ALS Test Code Matrix Test Description Analytical Method Reference(Based On)

ALK-C-COL-VA Seawater Alkalinity by Colourimetric (seawater) APHA 310.2

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange

colourimetric method.

AS-TOT-C-HVAAS-VA Seawater Total Arsenic in Seawater by HVAAS

PUGET SOUND PROTOCOLS, EPA 7000 SERIES

This analysis is carried out using procedures adapted from "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment, and Tissue Samples" prepared for the United States Environmental Protection Agency and the Puget Sound Water Quality Authority, 1995. The procedures may involve preliminary sample treatment by acid digestion or filtration (EPA Method 3005A). Instrumental analysis of the seawater is by atomic absorption/emission spectrophotometry (EPA Method 7000 series).

EC-C-PCT-VA Seawater Conductivity (Automated) (seawater)

APHA 2510 Auto. Conduc.

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

HARDNESS-CALC-VA Seawater Hardness APHA 2340B

Hardness is calculated from Calcium and Magnesium concentrations, and is expressed as calcium carbonate equivalents.

HG-TOT-C-CVAFS-VA Seawater Total Mercury in Seawater by CVAFS

PUGET SOUND PROTOCOLS, EPA 245.7

This analysis is carried out using procedures adapted from "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment, and Tissue Samples" prepared for the United States Environmental Protection Agency and the Puget Sound Water Quality Authority, 1995. The procedure involves a cold-oxidation of the acidified seawater sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

MET-TOT-C-ICP-VA Seawater Total Metals in Seawater by ICPOES

PUGET SOUND PROTOCOLS, EPA 6010B

This analysis is carried out using procedures adapted from "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment, and Tissue Samples" prepared for the United States Environmental Protection Agency and the Puget Sound Water Quality Authority, 1995. The procedures may involve preliminary sample treatment by acid digestion or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-TOT-C-LOW-MS-VA Seawater Total Metals in Seawater by ICPMS

PUGET SOUND PROTOCOLS, EPA 6020A

This analysis is carried out using procedures adapted from "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment, and Tissue Samples" prepared for the United States Environmental Protection Agency and the Puget Sound Water Quality Authority, 1995. The procedures may involve preliminary sample treatment by acid digestion or filtration (EPA Method 3005A). Instrumental analysis is by atomic inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-SPE-MS-VA S

Seawater

Total Metals in Seawater by SPE ICPMS

PUGET SOUND PROTOCOLS, EPA 6020A

This analysis is carried out using procedures adapted from "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment, and Tissue Samples" prepared for the United States Environmental Protection Agency and the Puget Sound Water Quality Authority, 1995, and with procedures adapted from Cetac Technologies Incorporated. A suspended particulate resin (SPR), consisting of immobilized iminodiacetate (IDA) on a divinylbenzene polymer, is used to chelate and preconcentrate metals in seawater. Instrumental analysis is by inductively coupled plasma mass spectrometry (ICPMS).

PH-C-PCT-VA

Seawater

pH by Meter (Automated) (seawater)

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

S2-C-T-COL-VA

Seawater

Tot. Sulphide by Colorimetric (seawater)

APHA 4500-S2 "Sulphide"

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

SALINITY-C-EC-VA

Seawater

Salinity by calc. using EC (seawater)

APHA 2520 B

This analysis is carried out using procedures adapted from APHA Method 2520 "Salinity". Salinity is determined using a samples conductivity and the Practical Salinity Scale.

# Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
TSS-C-VA	Seawater	Solids by Gravimetric (seawater)	APHA 2540 Gravimetric

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

\*\* Laboratory Methods employed follow in-house procedures, which are generally based on nationally or internationally accepted methodologies.

The last two letters of the above ALS Test Code column indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

L	aboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
	VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA		

# GLOSSARY OF REPORT TERMS

Surr - A surrogate is an organic compound that is similar to the target analyte(s) in chemical composition and behavior but not normally detected in environmental samples. Prior to sample processing, samples are fortified with one or more surrogate compounds.

The reported surrogate recovery value provides a measure of method efficiency.

mg/kg (units) - unit of concentration based on mass, parts per million

mg/L (units) - unit of concentration based on volume, parts per million

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.

Although test results are generated under strict QA/QC protocols, any unsigned test reports, faxes, or emails are considered preliminary.

ALS Laboratory Group has an extensive QA/QC program where all analytical data reported is analyzed using approved referenced procedures followed by checks and reviews by senior managers and quality assurance personnel. However, since the results are obtained from chemical measurements and thus cannot be guaranteed, ALS Laboratory Group assumes no liability for the use or interpretation of the results.

# ALS Environmental excellence in analytical testing

1988 Triumph Stree #2 -21 Highfield Cin #2 - 8820 100th Str

1988 Triumph Street, Vancouver, BC Canada V5L 1K5 Tel: 604-253-4188 Toll Free: 1-800-665-0243 Fax: 604-253-6700 #2 -21 Highfield Circle SE, Calgary, AB Canada T2G 5N6 Tel: 403-214-5431 Toll Free: 1-866-722-6231 Fax: 403-214-5430 #2 - 8820 100th Street, Fort St. John, BC Canada V1J 3W9 Tel: 250-785-8281 Fax: 250-785-8286

www.alsenviro.com

# CHAIN OF CUSTODY FORM

OF

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# **Environmental Division**

**Certificate of Analysis** 

TECK COMINCO METALS LTD.

ATTN: BRUCE DONALD

BAG 2000 Reported On: 15-SEP-08 11:42 AM

KIMBERLEY BC V1A 3E1

Lab Work Order #: L677277 Date Received: 02-SEP-08

**Project P.O. #:** 7397

Job Reference: 2008 AUGUST POLARIS GARROW LAKE

Legal Site Desc: CofC Numbers:

Other Information:

**Comments:** Some of the metals detection limits were increased due to high levels of metals in these samples.

LINDSAY JONES Account Manager

THIS REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN AUTHORITY OF THE LABORATORY. ALL SAMPLES WILL BE DISPOSED OF AFTER 30 DAYS FOLLOWING ANALYSIS. PLEASE CONTACT THE LAB IF YOU REQUIRE ADDITIONAL SAMPLE STORAGE TIME.

	Sample ID Description Sampled Date	L677277-1 29-AUG-08	L677277-2 29-AUG-08	L677277-3 29-AUG-08	L677277-4 29-AUG-08
	Sampled Time	02:30	03:30	10:40	11:35
	Client ID	GLS-6A m	GLS-18A m	GLC-9A m	GLC-20A m
Brouping	Analyte				
SEAWATER					
Physical Tests	Conductivity (uS/cm)	11400	86100	15900	86200
	Hardness (as CaCO3) (mg/L)	1470	13000	2040	13500
	pH (pH)	8.08	7.61	8.07	7.61
	Salinity (EC) (g/L)	6.7	62.3	9.5	62.3
	Total Suspended Solids (mg/L)	<3.0	17.3	3.3	6.7
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	115	449	153	435
	Sulphide as S (mg/L)		<0.020		<0.020
Total Metals	Aluminum (Al)-Total (mg/L)	<0.050	<0.20	<0.050	<0.20
	Arsenic (As)-Total (mg/L)	0.00029	<0.00020	0.00036	<0.00020
	Cadmium (Cd)-Total (mg/L)	0.000443	<0.000020	0.000656	<0.000020
	Calcium (Ca)-Total (mg/L)	127	849	172	843
	Copper (Cu)-Total (mg/L)	0.000839	0.000379	0.00110	0.000314
	Iron (Fe)-Total (mg/L)	0.018	0.355	0.011	0.363
	Lead (Pb)-Total (mg/L)	0.000110	0.000859	0.000116	0.000773
	Magnesium (Mg)-Total (mg/L)	280	2640	391	2770
	Manganese (Mn)-Total (mg/L)	0.00517	0.0893	0.00644	0.0933
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Total (mg/L)	< 0.0025	0.020	0.0028	0.018
	Nickel (Ni)-Total (mg/L)	0.00375	0.00509	0.00505	0.00554
	Zinc (Zn)-Total (mg/L)	0.169	0.0178	0.243	0.0193

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

# L677277 CONTD.... PAGE 3 of 4 15-SEP-08 11:43

# **Reference Information**

Methods Listed (if applicable):

ALS Test Code Matrix Test Description Analytical Method Reference(Based On)

ALK-C-COL-VA Seawater Alkalinity by Colourimetric (seawater) APHA 310.2

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange

colourimetric method.

AS-TOT-C-HVAAS-VA Seawater Total Arsenic in Seawater by HVAAS

PUGET SOUND PROTOCOLS, EPA 7000 SERIES

This analysis is carried out using procedures adapted from "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment, and Tissue Samples" prepared for the United States Environmental Protection Agency and the Puget Sound Water Quality Authority, 1995. The procedures may involve preliminary sample treatment by acid digestion or filtration (EPA Method 3005A). Instrumental analysis of the seawater is by atomic absorption/emission spectrophotometry (EPA Method 7000 series).

EC-C-PCT-VA Seawater Conductivity (Automated) (seawater)

APHA 2510 Auto. Conduc.

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

HARDNESS-CALC-VA Seawater Hardness APHA 2340B

Hardness is calculated from Calcium and Magnesium concentrations, and is expressed as calcium carbonate equivalents.

HG-TOT-C-CVAFS-VA Seawater Total Mercury in Seawater by CVAFS

PUGET SOUND PROTOCOLS, EPA 245.7

This analysis is carried out using procedures adapted from "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment, and Tissue Samples" prepared for the United States Environmental Protection Agency and the Puget Sound Water Quality Authority, 1995. The procedure involves a cold-oxidation of the acidified seawater sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

MET-TOT-C-ICP-VA Seawater Total Metals in Seawater by ICPOES

PUGET SOUND PROTOCOLS, EPA 6010B

This analysis is carried out using procedures adapted from "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment, and Tissue Samples" prepared for the United States Environmental Protection Agency and the Puget Sound Water Quality Authority, 1995. The procedures may involve preliminary sample treatment by acid digestion or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-TOT-C-LOW-MS-VA Seawater Total Metals in Seawater by ICPMS

PUGET SOUND PROTOCOLS, EPA 6020A

This analysis is carried out using procedures adapted from "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment, and Tissue Samples" prepared for the United States Environmental Protection Agency and the Puget Sound Water Quality Authority, 1995. The procedures may involve preliminary sample treatment by acid digestion or filtration (EPA Method 3005A). Instrumental analysis is by atomic inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-SPE-MS-VA

Seawater

Total Metals in Seawater by SPE ICPMS

PUGET SOUND PROTOCOLS, EPA 6020A

This analysis is carried out using procedures adapted from "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment, and Tissue Samples" prepared for the United States Environmental Protection Agency and the Puget Sound Water Quality Authority, 1995, and with procedures adapted from Cetac Technologies Incorporated. A suspended particulate resin (SPR), consisting of immobilized iminodiacetate (IDA) on a divinylbenzene polymer, is used to chelate and preconcentrate metals in seawater. Instrumental analysis is by inductively coupled plasma mass spectrometry (ICPMS).

PH-C-PCT-VA

Seawater

pH by Meter (Automated) (seawater)

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

S2-C-T-COL-VA

Seawater

Tot. Sulphide by Colorimetric (seawater)

APHA 4500-S2 "Sulphide"

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

SALINITY-C-EC-VA

Seawater

Salinity by calc. using EC (seawater)

APHA 2520 B

This analysis is carried out using procedures adapted from APHA Method 2520 "Salinity". Salinity is determined using a samples conductivity and the Practical Salinity Scale.

# Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
TSS-C-VA	Seawater	Solids by Gravimetric (seawater)	APHA 2540 Gravimetric
This analysis is carrie	d out using proce	edures adapted from APHA Method 2540 "Solid	ds". Solids are determined gravimetrically. Total Suspended

Solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

\*\* Laboratory Methods employed follow in-house procedures, which are generally based on nationally or internationally accepted methodologies.

The last two letters of the above ALS Test Code column indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA		

# GLOSSARY OF REPORT TERMS

Surr - A surrogate is an organic compound that is similar to the target analyte(s) in chemical composition and behavior but not normally detected in environmental samples. Prior to sample processing, samples are fortified with one or more surrogate compounds.

The reported surrogate recovery value provides a measure of method efficiency.

mg/kg (units) - unit of concentration based on mass, parts per million

mg/L (units) - unit of concentration based on volume, parts per million

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1988 Triumph Street, Vancouver, BC Canada V5L 1K5 Tel: 604-253-4188 Toll Free: 1-800-665-0243 Fax: 604-253-6700 #2 -21 Highfield Circle SE, Calgary, AB Canada T2G 5N6 Tel: 403-214-5431 Toll Free: 1-866-722-6231 Fax: 403-214-5430 #2 - 8820 100th Street, Fort St. John, BC Canada V1J 3W9 Tel: 250-785-8281 Fax: 250-785-8286

www.alsenviro.com

# **CHAIN OF CUSTODY FORM**

PAGE 1 OF

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# **APPENDIX 6**

**Monitoring of Other** 

**Site Surface Waters** 

&

Soil Samples from Former Concentrate Storage Shed

(July 19, 2008)





# **Environmental Division**

**Certificate of Analysis** 

TECK COMINCO METALS LTD.

ATTN: BRUCE DONALD

BAG 2000 Reported On: 21-AUG-08 12:00 PM

KIMBERLEY BC V1A 3E1

Lab Work Order #: L661124 Date Received: 26-JUL-08

**Project P.O. #**: 7397 **Job Reference**: 80325

Legal Site Desc:

CofC Numbers: C048508

Other Information:

Comments:

Andri bl

Andre Langlais Account Manager

THIS REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN AUTHORITY OF THE LABORATORY. ALL SAMPLES WILL BE DISPOSED OF AFTER 30 DAYS FOLLOWING ANALYSIS. PLEASE CONTACT THE LAB IF YOU REQUIRE ADDITIONAL SAMPLE STORAGE TIME.

A Campbell Brothers Limited Company

	Sample ID Description Sampled Date Sampled Time Client ID	L661124-1 19-JUL-08 08:30 GARROW		
Grouping	Analyte	CREEK		
SEAWATER				
Physical Tests	Hardness (as CaCO3) (mg/L)	678		
	pH (pH)	7.94		
	Salinity (EC) (g/L)	3.3		
	Total Suspended Solids (mg/L)	<3.0		
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	71.0		
Cyanides	Cyanide, Total (mg/L)	<0.0050		
Total Metals	Aluminum (Al)-Total (mg/L)	0.450		
	Arsenic (As)-Total (mg/L)	<0.00020		
	Cadmium (Cd)-Total (mg/L)	0.000094		
	Calcium (Ca)-Total (mg/L)	63.7		
	Copper (Cu)-Total (mg/L)	0.000554		
	Iron (Fe)-Total (mg/L)	<0.015		
	Lead (Pb)-Total (mg/L)	0.000189		
	Magnesium (Mg)-Total (mg/L)	126		
	Manganese (Mn)-Total (mg/L)	0.00208		
	Mercury (Hg)-Total (mg/L)	<0.000010		
	Molybdenum (Mo)-Total (mg/L)	0.00211		
	Nickel (Ni)-Total (mg/L)	0.00235		
	Zinc (Zn)-Total (mg/L)	0.0121		

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

		Sample ID Description Sampled Date Sampled Time Client ID	L661124-2 19-JUL-08 10:00 CSHED NORTH	L661124-3 19-JUL-08 10:00 CSHED MID	L661124-4  19-JUL-08  10:00 CSHED SOUTH	
Grouping	Analyte					
SOIL						
Physical Tests	pH (pH)		8.44	8.89	8.49	
Metals	Lead (Pb) (mg/kg)		282	121	84	
	Zinc (Zn) (mg/kg)		553	351	294	

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

	Sample ID Description Sampled Date	L661124-1 19-JUL-08	L661124-5 19-JUL-08	L661124-6 19-JUL-08	
	Sampled Time	08:30	11:00	11:30	
Grouping	Client ID Analyte	GARROW CREEK	FRUSTRATION LAKE	LRD	
WATER	Allayte				
			0.4.0		
Physical Tests	Hardness (as CaCO3) (mg/L)		84.8		
	Total Suspended Solids (mg/L)		3.5		
Total Metals	Aluminum (Al)-Total (mg/L)			<0.025	
	Antimony (Sb)-Total (mg/L)			<0.0025	
	Arsenic (As)-Total (mg/L)			<0.0025	
	Barium (Ba)-Total (mg/L)			<0.020	
	Beryllium (Be)-Total (mg/L)			<0.0050	
	Boron (B)-Total (mg/L)			0.56	
	Cadmium (Cd)-Total (mg/L)			0.000063	
	Calcium (Ca)-Total (mg/L)			107	
	Chromium (Cr)-Total (mg/L)			<0.0050	
	Cobalt (Co)-Total (mg/L)			<0.0015	
	Copper (Cu)-Total (mg/L)			<0.0050	
	Iron (Fe)-Total (mg/L)			<0.030	
	Lead (Pb)-Total (mg/L)			<0.0025	
	Lithium (Li)-Total (mg/L)			<0.025	
	Magnesium (Mg)-Total (mg/L)			46.6	
	Manganese (Mn)-Total (mg/L)			0.0022	
	Molybdenum (Mo)-Total (mg/L)			0.0087	
	Nickel (Ni)-Total (mg/L)			0.0094	
	Potassium (K)-Total (mg/L)			20.8	
	Selenium (Se)-Total (mg/L)			0.0116	
	Silver (Ag)-Total (mg/L)			<0.00010	
	Sodium (Na)-Total (mg/L)			220	
	Thallium (TI)-Total (mg/L)			<0.0010	
	Tin (Sn)-Total (mg/L)			<0.0025	
	Titanium (Ti)-Total (mg/L)			<0.010	
	Uranium (U)-Total (mg/L)			0.0064	
	Vanadium (V)-Total (mg/L)			<0.0050	
	Zinc (Zn)-Total (mg/L)			0.0269	
Dissolved Metals	Calcium (Ca)-Dissolved (mg/L)		25.3		
,	Magnesium (Mg)-Dissolved (mg/L)		5.25		
Radiological	Radium-226 (Bq/L)	0.020	0.20		
Parameters		3.020			

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

# **Qualifiers for Sample Submission Listed:**

Qualifier	Description		
ISCR:ST	Improper Sa	mple Container Received: Subsamples Taken - San	nple 5 - Dissolved metals
SFPL	Sample was	Filtered and Preserved at the laboratory - Sample 5	5 - Dissolved metals
ISCR:ST	Improper Sa	mple Container Received: Subsamples Taken - San	nple 6 - Total metals
SPL	Sample was	Preserved at the laboratory - Sample 6 - Total meta	ls
Methods Listed (if	applicable):		
ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
ALK-C-COL-VA	Seawater	Alkalinity by Colourimetric (seawater)	АРНА 310.2

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.

### AS-TOT-C-HVAAS-VA Sea

Seawater

Total Arsenic in Seawater by HVAAS

PUGET SOUND PROTOCOLS, EPA 7000 SERIES

This analysis is carried out using procedures adapted from "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment, and Tissue Samples" prepared for the United States Environmental Protection Agency and the Puget Sound Water Quality Authority, 1995. The procedures may involve preliminary sample treatment by acid digestion or filtration (EPA Method 3005A). Instrumental analysis of the seawater is by atomic absorption/emission spectrophotometry (EPA Method 7000 series).

### CN-C-T-MID-HH-COL-VA Seawater

Total Cyanide by HH Distil. (seawater)

APHA 4500-CN "Cyanide"

This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Total or strong acid dissociable (SAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method.

### HARDNESS-CALC-VA

Water

Hardness

**APHA 2340B** 

Hardness is calculated from Calcium and Magnesium concentrations, and is expressed as calcium carbonate equivalents.

# HARDNESS-CALC-VA

Seawater

Hardness

APHA 2340B

Hardness is calculated from Calcium and Magnesium concentrations, and is expressed as calcium carbonate equivalents.

### **HG-TOT-C-CVAFS-VA**

Seawater

Total Mercury in Seawater by CVAFS

PUGET SOUND PROTOCOLS, EPA 245.7

This analysis is carried out using procedures adapted from "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment, and Tissue Samples" prepared for the United States Environmental Protection Agency and the Puget Sound Water Quality Authority, 1995. The procedure involves a cold-oxidation of the acidified seawater sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

# **MET-DIS-ICP-VA**

Water

Dissolved Metals 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 procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma optical emission spectrophotometry (EPA Method 6010B).

# MET-TOT-C-ICP-VA

Seawater

Total Metals in Seawater by ICPOES

PUGET SOUND PROTOCOLS, EPA 6010B

This analysis is carried out using procedures adapted from "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment, and Tissue Samples" prepared for the United States Environmental Protection Agency and the Puget Sound Water Quality Authority, 1995. The procedures may involve preliminary sample treatment by acid digestion or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

### MET-TOT-C-LOW-MS-VA Seawater

Total Metals in Seawater by ICPMS

PUGET SOUND PROTOCOLS, EPA 6020A

This analysis is carried out using procedures adapted from "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment, and Tissue Samples" prepared for the United States Environmental Protection Agency and the Puget Sound Water Quality Authority, 1995. The procedures may involve preliminary sample treatment by acid digestion or filtration (EPA Method 3005A). Instrumental analysis is by atomic inductively coupled plasma - mass spectrometry (EPA Method 6020A).

Methods Listed (if applicable):

ALS Test Code Matrix Test Description Analytical Method Reference(Based On)

MET-TOT-CCME-ICP-VA Water
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).

MET-TOT-CCME-MS-VA Water

Total Metals in Water by ICPMS (CCME)

EPA SW-846 3005A/6020A

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 - mass spectrometry (EPA Method 6020A).

MET-TOT-SPE-MS-VA

Seawater

Total Metals in Seawater by SPE ICPMS

PUGET SOUND PROTOCOLS, EPA 6020A

This analysis is carried out using procedures adapted from "Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment, and Tissue Samples" prepared for the United States Environmental Protection Agency and the Puget Sound Water Quality Authority, 1995, and with procedures adapted from Cetac Technologies Incorporated. A suspended particulate resin (SPR), consisting of immobilized iminodiacetate (IDA) on a divinylbenzene polymer, is used to chelate and preconcentrate metals in seawater. Instrumental analysis is by inductively coupled plasma mass spectrometry (ICPMS).

PB-CSR-ICP-VA

Soil

Pb in Soils by ICPOES (CSR SALM)

BCMELP CSR SALM Method 8

This analysis is carried out using procedures from CSR Analytical Method 8 "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, Lands and Parks, 26 June 2001, and procedures adapted from "Test Methods for Evaluating Solid Waste", SW-846 Method 3050B United States Environmental Protection Agency (EPA). The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 90 degrees Celsius for 2 hours by block digester using a 1:1 ratio of concentrated nitric and hydrochloric acids. Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

PH-1:2-VA

Soil

CSR pH by 1:2 Water Leach

BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (10 mesh /2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

PH-C-PCT-VA

Seawater

pH by Meter (Automated) (seawater)

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

RADIO-RADIUM226-SR

Water

Radium 226

CANMET 1986

SALINITY-C-EC-VA

Seawater

Salinity by calc. using EC (seawater)

APHA 2520 B

This analysis is carried out using procedures adapted from APHA Method 2520 "Salinity". Salinity is determined using a samples conductivity and the Practical Salinity Scale.

TSS-C-VA

Seawater

Solids by Gravimetric (seawater)

APHA 2540 Gravimetric

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

TSS-VA

Water

Solids by Gravimetric

APHA 2540 D - GRAVIMETRIC

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

# Methods Listed (if applicable):

	• • •		
ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
ZN-CSR-ICP-VA	Soil	Zn in Soil by ICPOES (CSR SALM)	BCMELP CSR SALM METHOD 8

**ZN-CSR-ICP-VA**Soil
Zn in Soil by ICPOES (CSR SALM)
BCMELP CSR SALM METHOD 8
This analysis is carried out using procedures from CSR Analytical Method 8 "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of

Environment, Lands and Parks, 26 June 2001, and procedures adapted from "Test Methods for Evaluating Solid Waste", SW-846 Method 3050B United States Environmental Protection Agency (EPA). The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 90 degrees Celsius for 2 hours by block digester using a 1:1 ratio of concentrated nitric and hydrochloric acids. Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

\*\* Laboratory Methods employed follow in-house procedures, which are generally based on nationally or internationally accepted methodologies.

The last two letters of the above ALS Test Code column indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
SR	Saskatchewan Research Council - Saskatoon, Saskatchewan, Can	VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA

### GLOSSARY OF REPORT TERMS

Surr - A surrogate is an organic compound that is similar to the target analyte(s) in chemical composition and behavior but not normally detected in environmental samples. Prior to sample processing, samples are fortified with one or more surrogate compounds.

The reported surrogate recovery value provides a measure of method efficiency.

mg/kg (units) - unit of concentration based on mass, parts per million

mg/L (units) - unit of concentration based on volume, parts per million

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.

Although test results are generated under strict QA/QC protocols, any unsigned test reports, faxes, or emails are considered preliminary.

ALS Laboratory Group has an extensive QA/QC program where all analytical data reported is analyzed using approved referenced procedures followed by checks and reviews by senior managers and quality assurance personnel. However, since the results are obtained from chemical measurements and thus cannot be guaranteed, ALS Laboratory Group assumes no liability for the use or interpretation of the results.

# **SRC ANALYTICAL**

Aug 21, 2008

422 Downey Road Saskatoon, Saskatchewan, Canada S7N 4N1 (306) 933-6932 or 1-800-240-8808 Fax: (306) 933-7922

ALS

Aurora Laboratory Services Ltd. 1988 Triumph Street Vancouver, British Columbia V5L 1K5

Attn: Andre Langlais

Page 1 of 1

Sample #

29612

Client PO #:

L661124

Date Sampled:

Jul 19, 2008 08:30

Sample Matrix:

**WATER** 

Date Received: Jul 29, 2008

Description:

**L661124-1 GARROW CREEK** 

**Date Entered** 

**Analyte** 

Units

Result

DL

**Radio Chemistry** 

Radium-226

Bq/L

0.02

0.005

Aug 20, 2008

# ALS Laboratory Group

CHAIN OF CUSTODY / ANALYTICAL REQUEST FORM CANADA TOLL FREE 1-800-668-9878

www.alsenviro.com

coc#C048508

**Environmental Division** 

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GENF14.00