



# CERTIFICATE OF ANALYSIS

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**Date:** November 16, 2005  
**ALS File No.** W7054  
**Report On:** AMP 50642 Water Analysis  
**Report To:** **Gartner Lee Ltd.**  
2251 2nd Ave  
Whitehorse, YT  
Y1A 5W1  
**Attention:** **Mr. Martin Guilbeault**  
**Received:** November 4, 2005

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**ALS ENVIRONMENTAL**

per:

Heather A. Ross-Easton, B.Sc. - Project Chemist  
Leanne Harris, B.Sc. - Project Chemist

**RESULTS OF ANALYSIS - Water**



Sample ID	X25A	X25A-R	X25B	X24A	X24C
Sample Date	05-10-31	05-10-31	05-10-31	05-10-31	05-10-31
Sample Time	13:26	13:26	13:28	11:28	11:41
ALS ID	1	2	3	4	5

**Physical Tests**

Conductivity	(uS/cm)	943	942	1110	2090	2210
Hardness	CaCO3	481	474	542	1250	1310
pH		7.73	7.74	7.92	7.34	7.27

**Dissolved Anions**

Alkalinity-Total		CaCO3	248	253	272	326	325
Sulphate	SO4		288	287	331	929	981

Results are expressed as milligrams per litre except where noted.  
 < = Less than the detection limit indicated.

**RESULTS OF ANALYSIS - Water**

Sample ID	X25A	X25A-R	X25B	X24A	X24C
Sample Date	05-10-31	05-10-31	05-10-31	05-10-31	05-10-31
Sample Time	13:26	13:26	13:28	11:28	11:41
ALS ID	1	2	3	4	5

**Dissolved Metals**

Aluminum	D-Al	<0.20	<0.20	<0.20	<0.20	<0.20
Antimony	D-Sb	<0.20	<0.20	<0.20	<0.20	<0.20
Arsenic	D-As	<0.20	<0.20	<0.20	<0.20	<0.20
Barium	D-Ba	0.036	0.036	0.025	0.018	0.015
Beryllium	D-Be	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Bismuth	D-Bi	<0.20	<0.20	<0.20	<0.20	<0.20
Boron	D-B	<0.10	<0.10	<0.10	<0.10	<0.10
Cadmium	D-Cd	<0.010	<0.010	<0.010	<0.010	<0.010
Calcium	D-Ca	140	138	170	367	382
Chromium	D-Cr	<0.010	<0.010	<0.010	<0.010	<0.010
Cobalt	D-Co	<0.010	<0.010	<0.010	0.037	0.047
Copper	D-Cu	<0.010	<0.010	<0.010	<0.010	<0.010
Iron	D-Fe	<0.030	<0.030	0.585	0.706	0.137
Lead	D-Pb	<0.050	<0.050	<0.050	<0.050	<0.050
Lithium	D-Li	<0.010	<0.010	0.016	0.030	0.030
Magnesium	D-Mg	31.6	31.4	28.5	82.2	87.0
Manganese	D-Mn	4.33	4.35	0.157	29.2	34.9
Molybdenum	D-Mo	<0.030	<0.030	<0.030	<0.030	<0.030
Nickel	D-Ni	<0.050	<0.050	<0.050	0.067	0.096
Phosphorus	D-P	<0.30	<0.30	<0.30	<0.30	<0.30
Potassium	D-K	4.0	3.9	3.2	5.5	5.6
Selenium	D-Se	<0.20	<0.20	<0.20	<0.20	<0.20
Silicon	D-Si	6.18	6.12	5.05	8.25	8.46
Silver	D-Ag	<0.010	<0.010	<0.010	<0.010	<0.010
Sodium	D-Na	25.2	25.0	47.7	32.1	32.6
Strontium	D-Sr	0.355	0.353	0.394	0.934	0.952
Thallium	D-Tl	<0.20	<0.20	<0.20	<0.20	<0.20
Tin	D-Sn	<0.030	<0.030	<0.030	<0.030	<0.030
Titanium	D-Ti	<0.010	<0.010	<0.010	<0.010	<0.010
Vanadium	D-V	<0.030	<0.030	<0.030	<0.030	<0.030
Zinc	D-Zn	0.0160	0.0150	<0.0050	0.0110	0.0147

Results are expressed as milligrams per litre except where noted.  
 < = Less than the detection limit indicated.

**RESULTS OF ANALYSIS - Water**



Sample ID	X24D	P03-04-04	P03-04-06	P03-04-02	P03-09-02
Sample Date	05-10-31	05-10-31	05-10-31	05-10-31	05-11-01
Sample Time	11:39	10:55	11:07	10:33	12:50
ALS ID	6	7	8	9	10

**Physical Tests**

Conductivity	(uS/cm)	2710	1120	12000	1450	1200
Hardness	CaCO3	1650	407	1730	748	594
pH		7.28	7.58	3.68	6.60	7.49

**Dissolved Anions**

Alkalinity-Total		CaCO3	366	216	50.5	111	344
Sulphate	SO4		1340	361	11700	679	324

Results are expressed as milligrams per litre except where noted.  
 < = Less than the detection limit indicated.

**RESULTS OF ANALYSIS - Water**

Sample ID	X24D	P03-04-04	P03-04-06	P03-04-02	P03-09-02
Sample Date	05-10-31	05-10-31	05-10-31	05-10-31	05-11-01
Sample Time	11:39	10:55	11:07	10:33	12:50
ALS ID	6	7	8	9	10

**Dissolved Metals**

Aluminum	D-Al	<0.20	<0.20	<2.0	<0.20	<0.20
Antimony	D-Sb	<0.20	<0.20	<2.0	<0.20	<0.20
Arsenic	D-As	<0.20	<0.20	<2.0	<0.20	<0.20
Barium	D-Ba	0.021	0.052	<0.10	0.017	0.036
Beryllium	D-Be	<0.0050	<0.0050	<0.050	<0.0050	<0.0050
Bismuth	D-Bi	<0.20	<0.20	<2.0	<0.20	<0.20
Boron	D-B	<0.10	<0.10	<1.0	<0.10	<0.10
Cadmium	D-Cd	<0.010	<0.010	<0.10	<0.010	<0.010
Calcium	D-Ca	488	135	440	216	158
Chromium	D-Cr	<0.010	<0.010	<0.10	<0.010	<0.010
Cobalt	D-Co	0.031	<0.010	<0.30	0.078	<0.010
Copper	D-Cu	<0.010	<0.010	<0.50	<0.010	<0.010
Iron	D-Fe	<0.030	3.57	6690	0.127	6.09
Lead	D-Pb	<0.050	<0.050	<0.50	<0.050	<0.050
Lithium	D-Li	0.048	0.014	<0.10	0.026	0.043
Magnesium	D-Mg	105	16.8	154	50.9	48.7
Manganese	D-Mn	40.2	2.55	60.5	29.5	0.346
Molybdenum	D-Mo	<0.030	<0.030	<0.30	<0.030	<0.030
Nickel	D-Ni	0.133	<0.050	<0.50	0.120	<0.050
Phosphorus	D-P	<0.30	<0.30	<3.0	<0.30	<0.30
Potassium	D-K	7.0	2.9	<20	3.8	3.5
Selenium	D-Se	<0.20	<0.20	<2.0	<0.20	<0.20
Silicon	D-Si	9.07	5.74	9.99	12.0	6.50
Silver	D-Ag	<0.010	<0.010	<0.10	<0.010	<0.010
Sodium	D-Na	45.0	92.0	37	34.0	43.0
Strontium	D-Sr	1.29	0.319	1.26	0.534	0.767
Thallium	D-Tl	<0.20	<0.20	<2.0	<0.20	<0.20
Tin	D-Sn	<0.030	<0.030	<0.30	<0.030	<0.030
Titanium	D-Ti	<0.010	<0.010	<0.10	<0.010	<0.010
Vanadium	D-V	<0.030	<0.030	<0.50	<0.030	<0.030
Zinc	D-Zn	0.0482	0.0078	7.92	0.0503	<0.0050

Results are expressed as milligrams per litre except where noted.  
 < = Less than the detection limit indicated.

**RESULTS OF ANALYSIS - Water**



Sample ID	P03-09-04	P03-09-06	P03-09-07-R	P03-09-07	P03-09-09
Sample Date	05-11-01	05-11-01	05-11-01	05-11-01	05-11-01
Sample Time	12:55	13:00	13:25	13:26	13:40
ALS ID	11	12	13	14	15

**Physical Tests**

Conductivity	(uS/cm)	1180	1200	1290	1280	1280
Hardness	CaCO3	601	586	654	620	656
pH		7.45	7.62	7.70	7.71	7.71

**Dissolved Anions**

Alkalinity-Total		CaCO3	263	274	263	274	276
Sulphate	SO4		374	385	437	427	425

Results are expressed as milligrams per litre except where noted.  
 < = Less than the detection limit indicated.

**RESULTS OF ANALYSIS - Water**

Sample ID	P03-09-04	P03-09-06	P03-09-07-R	P03-09-07	P03-09-09
Sample Date	05-11-01	05-11-01	05-11-01	05-11-01	05-11-01
Sample Time	12:55	13:00	13:25	13:26	13:40
ALS ID	11	12	13	14	15

**Dissolved Metals**

Aluminum	D-Al	<0.20	<0.20	<0.20	<0.20	<0.20
Antimony	D-Sb	<0.20	<0.20	<0.20	<0.20	<0.20
Arsenic	D-As	<0.20	<0.20	<0.20	<0.20	<0.20
Barium	D-Ba	0.044	0.060	0.062	0.060	0.068
Beryllium	D-Be	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Bismuth	D-Bi	<0.20	<0.20	<0.20	<0.20	<0.20
Boron	D-B	<0.10	<0.10	<0.10	<0.10	<0.10
Cadmium	D-Cd	<0.010	<0.010	<0.010	<0.010	<0.010
Calcium	D-Ca	183	174	200	189	201
Chromium	D-Cr	<0.010	<0.010	<0.010	<0.010	<0.010
Cobalt	D-Co	<0.010	<0.010	<0.010	<0.010	<0.010
Copper	D-Cu	<0.010	<0.010	<0.010	<0.010	<0.010
Iron	D-Fe	0.092	0.062	0.439	0.133	0.146
Lead	D-Pb	<0.050	<0.050	<0.050	<0.050	<0.050
Lithium	D-Li	0.020	0.025	0.021	0.024	0.022
Magnesium	D-Mg	35.0	36.7	37.7	36.2	37.5
Manganese	D-Mn	5.87	5.55	6.75	6.31	6.90
Molybdenum	D-Mo	<0.030	<0.030	<0.030	<0.030	<0.030
Nickel	D-Ni	<0.050	<0.050	<0.050	<0.050	<0.050
Phosphorus	D-P	<0.30	<0.30	<0.30	<0.30	<0.30
Potassium	D-K	4.0	3.9	4.1	4.0	4.2
Selenium	D-Se	<0.20	<0.20	<0.20	<0.20	<0.20
Silicon	D-Si	6.24	6.08	6.25	6.26	6.34
Silver	D-Ag	<0.010	<0.010	<0.010	<0.010	<0.010
Sodium	D-Na	30.3	31.5	31.8	31.3	32.0
Strontium	D-Sr	0.468	0.539	0.520	0.502	0.514
Thallium	D-Tl	<0.20	<0.20	<0.20	<0.20	<0.20
Tin	D-Sn	<0.030	<0.030	<0.030	<0.030	<0.030
Titanium	D-Ti	<0.010	<0.010	<0.010	<0.010	<0.010
Vanadium	D-V	<0.030	<0.030	<0.030	<0.030	<0.030
Zinc	D-Zn	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050

Results are expressed as milligrams per litre except where noted.  
 < = Less than the detection limit indicated.

**RESULTS OF ANALYSIS - Water**



Sample ID	P03-08-02	P03-08-03	P03-08-04	P03-08-04-R	P03-08-05
Sample Date	05-11-01	05-11-01	05-11-01	05-11-01	05-11-01
Sample Time	15:13	15:17	15:30	15:31	15:50
ALS ID	16	17	18	19	20

**Physical Tests**

Conductivity	(uS/cm)	613	758	1400	1410	2370
Hardness	CaCO3	318	393	691	726	1120
pH		7.79	7.89	7.58	7.73	7.40

**Dissolved Anions**

Alkalinity-Total		CaCO3	259	292	312	310	247
Sulphate	SO4		83.2	136	461	477	1150

Results are expressed as milligrams per litre except where noted.  
 < = Less than the detection limit indicated.



**RESULTS OF ANALYSIS - Water**

Sample ID	P03-08-02	P03-08-03	P03-08-04	P03-08-04-R	P03-08-05
Sample Date	05-11-01	05-11-01	05-11-01	05-11-01	05-11-01
Sample Time	15:13	15:17	15:30	15:31	15:50
ALS ID	16	17	18	19	20

**Dissolved Metals**

Aluminum	D-Al	<0.20	<0.20	<0.20	<0.20	<0.20
Antimony	D-Sb	<0.20	<0.20	<0.20	<0.20	<0.20
Arsenic	D-As	<0.20	<0.20	<0.20	<0.20	<0.20
Barium	D-Ba	0.208	0.124	0.029	0.031	0.013
Beryllium	D-Be	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Bismuth	D-Bi	<0.20	<0.20	<0.20	<0.20	<0.20
Boron	D-B	<0.10	<0.10	<0.10	<0.10	<0.10
Cadmium	D-Cd	<0.010	<0.010	<0.010	<0.010	<0.010
Calcium	D-Ca	90.3	112	200	211	314
Chromium	D-Cr	<0.010	<0.010	<0.010	<0.010	<0.010
Cobalt	D-Co	<0.010	<0.010	<0.010	<0.010	<0.010
Copper	D-Cu	<0.010	<0.010	<0.010	<0.010	<0.010
Iron	D-Fe	<0.030	0.056	31.7	31.3	51.1
Lead	D-Pb	<0.050	<0.050	<0.050	<0.050	<0.050
Lithium	D-Li	<0.010	<0.010	0.015	0.019	0.030
Magnesium	D-Mg	22.6	27.4	46.7	48.7	81.6
Manganese	D-Mn	4.35	6.17	2.79	2.91	6.87
Molybdenum	D-Mo	<0.030	<0.030	<0.030	<0.030	<0.030
Nickel	D-Ni	<0.050	<0.050	<0.050	<0.050	<0.050
Phosphorus	D-P	<0.30	<0.30	<0.30	<0.30	<0.30
Potassium	D-K	<2.0	<2.0	3.8	3.9	13.8
Selenium	D-Se	<0.20	<0.20	<0.20	<0.20	<0.20
Silicon	D-Si	4.08	5.09	5.68	5.89	8.30
Silver	D-Ag	<0.010	<0.010	<0.010	<0.010	<0.010
Sodium	D-Na	9.2	11.5	41.8	43.9	130
Strontium	D-Sr	0.281	0.369	0.470	0.488	0.674
Thallium	D-Tl	<0.20	<0.20	<0.20	<0.20	<0.20
Tin	D-Sn	<0.030	<0.030	<0.030	<0.030	<0.030
Titanium	D-Ti	<0.010	<0.010	<0.010	<0.010	<0.010
Vanadium	D-V	<0.030	<0.030	<0.030	<0.030	<0.030
Zinc	D-Zn	0.0053	0.0072	0.0123	0.0164	0.0149

Results are expressed as milligrams per litre except where noted.  
 < = Less than the detection limit indicated.

File No. W7054

**RESULTS OF ANALYSIS - Water**



Sample ID	P03-08-06
Sample Date	05-11-01
Sample Time	15:55
ALS ID	21

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**Physical Tests**

Conductivity	(uS/cm)	-
Hardness	CaCO3	1040
pH		-

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Results are expressed as milligrams per litre except where noted.  
< = Less than the detection limit indicated.

**RESULTS OF ANALYSIS - Water**

Sample ID P03-08-06  
 Sample Date 05-11-01  
 Sample Time 15:55  
 ALS ID 21

**Dissolved Metals**

Aluminum	D-Al	<0.20
Antimony	D-Sb	<0.20
Arsenic	D-As	<0.20
Barium	D-Ba	<0.010
Beryllium	D-Be	<0.0050
Bismuth	D-Bi	<0.20
Boron	D-B	<0.10
Cadmium	D-Cd	<0.010
Calcium	D-Ca	398
Chromium	D-Cr	<0.010
Cobalt	D-Co	<0.010
Copper	D-Cu	<0.010
Iron	D-Fe	2.27
Lead	D-Pb	<0.050
Lithium	D-Li	0.072
Magnesium	D-Mg	11.9
Manganese	D-Mn	0.573
Molybdenum	D-Mo	<0.030
Nickel	D-Ni	<0.050
Phosphorus	D-P	<0.30
Potassium	D-K	12.0
Selenium	D-Se	<0.20
Silicon	D-Si	1.11
Silver	D-Ag	<0.010
Sodium	D-Na	156
Strontium	D-Sr	0.121
Thallium	D-Tl	<0.20
Tin	D-Sn	<0.030
Titanium	D-Ti	<0.010
Vanadium	D-V	<0.030
Zinc	D-Zn	0.0056

Results are expressed as milligrams per litre except where noted.  
 < = Less than the detection limit indicated.

**Appendix 1 - QUALITY CONTROL - Replicates**



Water			X24A	X24A	X24D	X24D
			05-10-31 11:28	QC # 473735	05-10-31 11:39	QC # 473736
<b>Physical Tests</b>						
Conductivity	(uS/cm)		2090	2100	2710	2700
pH			7.34	7.32	7.28	7.28
<b>Dissolved Anions</b>						
Alkalinity-Total		CaCO3	326	319	366	366
Sulphate	SO4		929	922	1340	1450

Results are expressed as milligrams per litre except where noted.  
 < = Less than the detection limit indicated.

## Appendix 2 - METHODOLOGY



Outlines of the methodologies utilized for the analysis of the samples submitted are as follows

### Conductivity in Water

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

Recommended Holding Time:

Sample: 28 days

Reference: APHA

Laboratory Location: ALS Environmental, Vancouver

### pH in Water

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.

Recommended Holding Time:

Sample: 2 hours

Reference: APHA

Laboratory Location: ALS Environmental, Vancouver

### Alkalinity in Water by Colourimetry

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

Recommended Holding Time:

Sample: 14 days

Reference: APHA

Laboratory Location: ALS Environmental, Vancouver

### Sulphate in Water

This analysis is carried out using procedures adapted from APHA Method 4500-SO4 "Sulphate". Sulphate is determined using the turbidimetric method.

Recommended Holding Time:

Sample: 28 days

Reference: APHA

Laboratory Location: ALS Environmental, Vancouver



**Metals in Water**

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" 20th Edition 1998 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 hotplate or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by atomic absorption/emission spectrophotometry (EPA Method 7000 series), inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B), and/or inductively coupled plasma - mass spectrometry (EPA Method 6020).

Recommended Holding Time:  
Sample: 6 months  
Reference: EPA

Laboratory Location: ALS Environmental, Vancouver

**Results contained within this certificate relate only to the samples as submitted.**

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**End of Report**