9. BATCH QC RESULTS – REFRENCE SAMPLES

☒ Reference sample analysis results reported.

☐ All % Recovery meet EPA criteria (between 80 and 120%).

☒ All % Recovery meet lab criteria.

Comments/Qualified Results:

- No dissolved metal reference material QA/QC provided.
- Two of four total boron reference analyses by ICP-OES failed to meet EPA criteria.

10. LABORATORY FOLLOW-UP

- Inquire regarding higher RLs than originally provided for ICP-OES.
- Inquire regarding omission of dissolved metal reference materials.

11. ADDITIONAL COMMENTS

- Supporting documentation provided in *Phase I Kinetic Testing – QAQC.xls*.

C. Ross
Validator

05/05/04
Date

SAMPLE VR71100A
Analysis Kinetic Testing Week 2 - Column 1
Date 2-Mar-04

Analyte	Result	Target	Units	DL	Method	QA/QC RPD
Aluminum	0.22	0.21	mg/L	0.2	ICP-OES	+/-MDL
Antimony	<0.20	<0.20	mg/L	0.2	ICP-OES	0%
Arsenic	<0.20	<0.20	mg/L	0.2	ICP-OES	0%
Barium	<0.010	<0.010	mg/L	0.01	ICP-OES	0%
Beryllium	<0.0050	<0.0050	mg/L	0.005	ICP-OES	0%
Bismuth	<0.20	<0.20	mg/L	0.2	ICP-OES	0%
Boron	0.18	0.16	mg/L	0.1	ICP-OES	+/-MDL
Cadmium	<0.010	<0.010	mg/L	0.01	ICP-OES	0%
Calcium	1.5	1.45	mg/L	0.05	ICP-OES	3%
Chromium	<0.010	<0.010	mg/L	0.01	ICP-OES	0%
Cobalt	<0.010	<0.010	mg/L	0.01	ICP-OES	0%
Copper	<0.010	<0.010	mg/L	0.01	ICP-OES	0%
Iron	<0.030	<0.030	mg/L	0.03	ICP-OES	0%
Lead	<0.050	<0.050	mg/L	0.05	ICP-OES	0%
Lithium	<0.010	<0.010	mg/L	0.01	ICP-OES	0%
Magnesium	0.89	0.86	mg/L	0.1	ICP-OES	3%
Manganese	<0.0050	<0.0050	mg/L	0.005	ICP-OES	0%
Molybdenum	<0.030	<0.030	mg/L	0.03	ICP-OES	0%
Nickel	<0.050	<0.050	mg/L	0.05	ICP-OES	0%
Phosphorous	<0.30	<0.30	mg/L	0.3	ICP-OES	0%
Potassium	7.7	8.1	mg/L	2	ICP-OES	+/-MDL
Selenium	<0.20	<0.20	mg/L	0.2	ICP-OES	0%
Silicon	2.31	2.28	mg/L	0.05	ICP-OES	1%
Silver	<0.010	<0.010	mg/L	0.01	ICP-OES	0%
Sodium	15.7	15.3	mg/L	2	ICP-OES	3%
Strontium	0.0371	0.0365	mg/L	0.005	ICP-OES	2%
Thallium	<0.20	<0.20	mg/L	0.2	ICP-OES	0%
Tin	<0.030	<0.030	mg/L	0.03	ICP-OES	0%
Titanium	<0.010	<0.010	mg/L	0.01	ICP-OES	0%
Vanadium	<0.030	<0.030	mg/L	0.03	ICP-OES	0%
Zinc	<0.0050	<0.0050	mg/L	0.005	ICP-OES	0%

Number of Parameters Failing Criteria	0
%	0.0%

RPD = relative percent difference

Shaded and bolded QA/QC RPD values identify samples that fail QA/QC criteria.

LABORATORY REPLICATE SAMPLES

Analysis Kinetic Testing - Week 2
Column 3

QA/QC Report

Analyte		Result	Target	Units	DL	ALSQC#	Method	QA/QC RPD
Aluminum	D-Al	<0.20	<0.20	mg/L	0.2	377903	ICP-OES	0%
Antimony	D-Sb	<0.20	<0.20	mg/L	0.2	377903	ICP-OES	0%
Arsenic	D-As	<0.20	<0.20	mg/L	0.2	377903	ICP-OES	0%
Barium	D-Ba	0.035	0.035	mg/L	0.01	377903	ICP-OES	0%
Beryllium	D-Be	<0.0050	<0.0050	mg/L	0.005	377903	ICP-OES	0%
Bismuth	D-Bi	<0.20	<0.20	mg/L	0.2	377903	ICP-OES	0%
Boron	D-B	<0.10	<0.10	mg/L	0.1	377903	ICP-OES	0%
Cadmium	D-Cd	<0.010	<0.010	mg/L	0.01	377903	ICP-OES	0%
Calcium	D-Ca	9.75	9.82	mg/L	0.05	377903	ICP-OES	1%
Chromium	D-Cr	<0.010	<0.010	mg/L	0.01	377903	ICP-OES	0%
Cobalt	D-Co	<0.010	<0.010	mg/L	0.01	377903	ICP-OES	0%
Copper	D-Cu	<0.010	<0.010	mg/L	0.01	377903	ICP-OES	0%
Iron	D-Fe	<0.030	<0.030	mg/L	0.03	377903	ICP-OES	0%
Lead	D-Pb	<0.050	<0.050	mg/L	0.05	377903	ICP-OES	0%
Lithium	D-Li	<0.010	<0.010	mg/L	0.01	377903	ICP-OES	0%
Magnesium	D-Mg	26.3	26.6	mg/L	0.1	377903	ICP-OES	1%
Manganese	D-Mn	0.0052	<0.0050	mg/L	0.005	377903	ICP-OES	+/-MDL
Molybdenum	D-Mo	<0.030	<0.030	mg/L	0.03	377903	ICP-OES	0%
Nickel	D-Ni	<0.050	<0.050	mg/L	0.05	377903	ICP-OES	0%
Phosphorus	D-P	<0.30	<0.30	mg/L	0.3	377903	ICP-OES	0%
Potassium	D-K	22.9	23.5	mg/L	2	377903	ICP-OES	3%
Selenium	D-Se	<0.20	<0.20	mg/L	0.2	377903	ICP-OES	0%
Silicon	D-Si	4.23	4.27	mg/L	0.05	377903	ICP-OES	1%
Silver	D-Ag	<0.010	<0.010	mg/L	0.01	377903	ICP-OES	0%
Sodium	D-Na	14.6	14.6	mg/L	2	377903	ICP-OES	0%
Strontium	D-Sr	0.0631	0.0649	mg/L	0.005	377903	ICP-OES	3%
Thallium	D-Tl	<0.20	<0.20	mg/L	0.2	377903	ICP-OES	0%
Tin	D-Sn	<0.030	<0.030	mg/L	0.03	377903	ICP-OES	0%
Titanium	D-Ti	<0.010	<0.010	mg/L	0.01	377903	ICP-OES	0%
Vanadium	D-V	<0.030	<0.030	mg/L	0.03	377903	ICP-OES	0%
Zinc	D-Zn	<0.0050	<0.0050	mg/L	0.005	377903	ICP-OES	0%

Number of Parameters Failing Criteria	0
%	0.0%

RPD = relative percent difference
Shaded and bolded QA/QC RPD values identify samples that fail QA/QC criteria.

LABORATORY REFERENCE SAMPLES
Analysis Kinetic Testing - Week 2

QA/QC Report

Analyte		Result	Target	Units	DL	ALSQC#	Method	% Recovery
Bismuth	T-Bi	1.04	1	mg/L	0.1	378031	ICP-OES	104%
Bismuth	T-Bi	1.06	1	mg/L	0.1	378385	ICP-OES	106%
Lithium	T-Li	0.205	0.2	mg/L	0.01	378031	ICP-OES	103%
Lithium	T-Li	0.204	0.2	mg/L	0.01	378385	ICP-OES	102%
Phosphorus	T-P	2.05	2	mg/L	0.3	378031	ICP-OES	103%
Phosphorus	T-P	2.01	2	mg/L	0.3	378385	ICP-OES	101%
Silicon	T-Si	1.02	1	mg/L	0.05	378031	ICP-OES	102%
Silicon	T-Si	1	1	mg/L	0.05	378385	ICP-OES	100%
Tin	T-Sn	1.04	1	mg/L	0.03	378031	ICP-OES	104%
Tin	T-Sn	0.995	1	mg/L	0.03	378385	ICP-OES	100%
Titanium	T-Ti	0.199	0.2	mg/L	0.01	378031	ICP-OES	100%
Titanium	T-Ti	0.197	0.2	mg/L	0.01	378385	ICP-OES	99%
Aluminum	T-Al	1.02	1	mg/L	0.2	378032	ICP-OES	102%
Aluminum	T-Al	1.03	1	mg/L	0.2	378386	ICP-OES	103%
Antimony	T-Sb	0.29	0.28	mg/L	0.2	378032	ICP-OES	104%
Antimony	T-Sb	0.28	0.28	mg/L	0.2	378386	ICP-OES	100%
Arsenic	T-As	0.49	0.49	mg/L	0.2	378032	ICP-OES	100%
Arsenic	T-As	0.49	0.49	mg/L	0.2	378386	ICP-OES	100%
Barium	T-Ba	0.528	0.525	mg/L	0.01	378032	ICP-OES	101%
Barium	T-Ba	0.528	0.525	mg/L	0.01	378386	ICP-OES	101%
Beryllium	T-Be	0.399	0.397	mg/L	0.005	378032	ICP-OES	101%
Beryllium	T-Be	0.396	0.397	mg/L	0.005	378386	ICP-OES	100%
Boron	T-B	0.36	0.28	mg/L	0.1	378032	ICP-OES	**129%**
Boron	T-B	0.35	0.28	mg/L	0.1	378386	ICP-OES	**125%**
Cadmium	T-Cd	0.355	0.353	mg/L	0.01	378032	ICP-OES	101%
Cadmium	T-Cd	0.355	0.353	mg/L	0.01	378386	ICP-OES	101%
Chromium	T-Cr	0.169	0.167	mg/L	0.01	378032	ICP-OES	101%
Chromium	T-Cr	0.167	0.167	mg/L	0.01	378386	ICP-OES	100%
Cobalt	T-Co	0.245	0.24	mg/L	0.01	378032	ICP-OES	102%
Cobalt	T-Co	0.242	0.24	mg/L	0.01	378386	ICP-OES	101%
Copper	T-Cu	0.397	0.391	mg/L	0.01	378032	ICP-OES	102%
Copper	T-Cu	0.389	0.391	mg/L	0.01	378386	ICP-OES	99%
Iron	T-Fe	1.02	1.01	mg/L	0.03	378032	ICP-OES	101%
Iron	T-Fe	1.01	1.01	mg/L	0.03	378386	ICP-OES	100%
Lead	T-Pb	0.886	0.857	mg/L	0.05	378032	ICP-OES	103%
Lead	T-Pb	0.885	0.857	mg/L	0.05	378386	ICP-OES	103%
Manganese	T-Mn	2.27	2.26	mg/L	0.005	378032	ICP-OES	100%
Manganese	T-Mn	2.29	2.26	mg/L	0.005	378386	ICP-OES	101%
Molybdenum	T-Mo	0.099	0.097	mg/L	0.03	378032	ICP-OES	102%
Molybdenum	T-Mo	0.098	0.097	mg/L	0.03	378386	ICP-OES	101%
Nickel	T-Ni	0.62	0.611	mg/L	0.05	378032	ICP-OES	101%
Nickel	T-Ni	0.643	0.611	mg/L	0.05	378386	ICP-OES	105%
Selenium	T-Se	0.22	*0.2*	mg/L	0.2	378032	ICP-OES	110%
Selenium	T-Se	*0.2*	*0.2*	mg/L	0.2	378386	ICP-OES	100%
Silver	T-Ag	0.211	0.21	mg/L	0.01	378032	ICP-OES	100%
Silver	T-Ag	0.209	0.21	mg/L	0.01	378386	ICP-OES	100%
Strontium	T-Sr	0.112	0.104	mg/L	0.005	378032	ICP-OES	108%
Strontium	T-Sr	0.105	0.104	mg/L	0.005	378386	ICP-OES	101%
Thallium	T-Tl	0.39	0.38	mg/L	0.2	378032	ICP-OES	103%
Thallium	T-Tl	0.37	0.38	mg/L	0.2	378386	ICP-OES	97%
Titanium	T-Ti	0.195	0.192	mg/L	0.01	378032	ICP-OES	102%
Titanium	T-Ti	0.192	0.192	mg/L	0.01	378386	ICP-OES	100%
Vanadium	T-V	1.52	1.5	mg/L	0.03	378032	ICP-OES	101%
Vanadium	T-V	1.49	1.5	mg/L	0.03	378386	ICP-OES	99%
Zinc	T-Zn	0.123	0.121	mg/L	0.005	378032	ICP-OES	102%
Zinc	T-Zn	0.121	0.121	mg/L	0.005	378386	ICP-OES	100%
Calcium	T-Ca	15.6	15.6	mg/L	0.05	378030	ICP-OES	100%
Calcium	T-Ca	15.8	15.6	mg/L	0.05	378384	ICP-OES	101%
Magnesium	T-Mg	5.59	5.85	mg/L	0.1	378030	ICP-OES	96%

Magnesium	T-Mg	5.76	5.85	mg/L	0.1	378384	ICP-OES	98%
Potassium	T-K	35.3	33.1	mg/L	2	378030	ICP-OES	107%
Potassium	T-K	33.5	33.1	mg/L	2	378384	ICP-OES	101%
Sodium	T-Na	40.8	39.1	mg/L	2	378030	ICP-OES	104%
Sodium	T-Na	39.8	39.1	mg/L	2	378384	ICP-OES	102%
Aluminum	T-Al	*0.2*	*0.2*	mg/L	0.2	378029	ICP-OES	100%
Aluminum	T-Al	*0.2*	*0.2*	mg/L	0.2	378383	ICP-OES	100%
Antimony	T-Sb	*0.2*	*0.2*	mg/L	0.2	378029	ICP-OES	100%
Antimony	T-Sb	*0.2*	*0.2*	mg/L	0.2	378383	ICP-OES	100%
Arsenic	T-As	*0.2*	*0.2*	mg/L	0.2	378029	ICP-OES	100%
Arsenic	T-As	*0.2*	*0.2*	mg/L	0.2	378383	ICP-OES	100%
Barium	T-Ba	0.34	0.338	mg/L	0.01	378029	ICP-OES	101%
Barium	T-Ba	0.348	0.338	mg/L	0.01	378383	ICP-OES	103%
Beryllium	T-Be	0.0774	0.0751	mg/L	0.005	378029	ICP-OES	103%
Beryllium	T-Be	0.0786	0.0751	mg/L	0.005	378383	ICP-OES	105%
Boron	T-B	0.21	0.23	mg/L	0.1	378029	ICP-OES	91%
Boron	T-B	0.19	0.23	mg/L	0.1	378383	ICP-OES	83%
Cadmium	T-Cd	0.091	0.088	mg/L	0.01	378029	ICP-OES	103%
Cadmium	T-Cd	0.09	0.088	mg/L	0.01	378383	ICP-OES	102%
Chromium	T-Cr	0.221	0.218	mg/L	0.01	378029	ICP-OES	101%
Chromium	T-Cr	0.23	0.218	mg/L	0.01	378383	ICP-OES	106%
Cobalt	T-Co	0.288	0.28	mg/L	0.01	378029	ICP-OES	103%
Cobalt	T-Co	0.295	0.28	mg/L	0.01	378383	ICP-OES	105%
Copper	T-Cu	0.297	0.287	mg/L	0.01	378029	ICP-OES	103%
Copper	T-Cu	0.297	0.287	mg/L	0.01	378383	ICP-OES	103%
Iron	T-Fe	0.383	0.368	mg/L	0.03	378029	ICP-OES	104%
Iron	T-Fe	0.394	0.368	mg/L	0.03	378383	ICP-OES	107%
Lead	T-Pb	0.268	0.264	mg/L	0.05	378029	ICP-OES	102%
Lead	T-Pb	0.242	0.264	mg/L	0.05	378383	ICP-OES	92%
Manganese	T-Mn	0.489	0.479	mg/L	0.005	378029	ICP-OES	102%
Manganese	T-Mn	0.505	0.479	mg/L	0.005	378383	ICP-OES	105%
Molybdenum	T-Mo	0.156	0.149	mg/L	0.03	378029	ICP-OES	105%
Molybdenum	T-Mo	0.156	0.149	mg/L	0.03	378383	ICP-OES	105%
Nickel	T-Ni	0.07	0.078	mg/L	0.05	378029	ICP-OES	90%
Nickel	T-Ni	0.071	0.078	mg/L	0.05	378383	ICP-OES	91%
Selenium	T-Se	*0.2*	*0.2*	mg/L	0.2	378029	ICP-OES	100%
Selenium	T-Se	*0.2*	*0.2*	mg/L	0.2	378383	ICP-OES	100%
Silver	T-Ag	0.061	0.063	mg/L	0.01	378029	ICP-OES	97%
Silver	T-Ag	0.063	0.063	mg/L	0.01	378383	ICP-OES	100%
Strontium	T-Sr	0.375	0.367	mg/L	0.005	378029	ICP-OES	102%
Strontium	T-Sr	0.371	0.367	mg/L	0.005	378383	ICP-OES	101%
Thallium	T-Tl	*0.2*	*0.2*	mg/L	0.2	378029	ICP-OES	100%
Thallium	T-Tl	*0.2*	*0.2*	mg/L	0.2	378383	ICP-OES	100%
Tin	T-Sn	0.9	0.89	mg/L	0.03	378029	ICP-OES	101%
Tin	T-Sn	0.916	0.89	mg/L	0.03	378383	ICP-OES	103%
Titanium	T-Ti	0.093	0.093	mg/L	0.01	378029	ICP-OES	100%
Titanium	T-Ti	0.095	0.093	mg/L	0.01	378383	ICP-OES	102%
Vanadium	T-V	0.095	0.097	mg/L	0.03	378029	ICP-OES	98%
Vanadium	T-V	0.104	0.097	mg/L	0.03	378383	ICP-OES	107%
Zinc	T-Zn	0.156	0.148	mg/L	0.005	378029	ICP-OES	105%
Zinc	T-Zn	0.15	0.148	mg/L	0.005	378383	ICP-OES	101%

Non-detect values shown at the detection limit in italics.

Number of Parameters Failing EPA Criteria	2
%	1.8%

Number of Parameters Failing ALS Criteria	0
%	0.0%

Inorganic Data Validation Summary

1. PROJECT INFORMATION

Project	Eagle Mine - Kennecott	**Project No.**	043-1055
Date	May 2, 2004		
Laboratory	ALS Environmental		
SDG	ALS File No. U1467		
Description of Analysis	Phase I Kinetic Testing – Week 3		
Report Date	March 22, 2004		
Validator	Cheryl Ross		

2. CHAIN OF CUSTODY

No. of Samples: __5___
No. of Duplicates: __1___

☐ Sample preservation documented on COC.

☐ Samples preserved correctly. ☐ Not Applicable.

☐ Sample temperature documented on COC.

☐ Samples maintained at 4 °C.

Comments:

- Have requested a copy of COC (April 19, 2004 – telecom).

3. SUMMARY OF ANALYSES

Check all analyses included in SDG.

ANALYSIS		NOTES
Metals by ICP-OES		
Metals by ICP-MS	x	
Metals by HVASS	x	As x Sb x Se x
TDS	x	
Chloride (APHA 4500)	x	
Fluoride (APHA 4500)	x	
Ammonia (APHA 4500)	x	
Nitrate/Nitrite (APHA 4500)	x	
Mercury (EPA 7470A/7471/245.7)	x	

☒ All requested analyses conducted.

Comments:

- Redox measurements not provided. Follow-up with CEMI.
- HVAAS As for 18768 not possible due to insufficient sample volume (Column 3).

4. LABORATORY REMARKS

☒ Detection limits increased due to matrix interferences.

Comments:

- Dissolved metal detection limits increased due to sample matrix interferences.
- Samples 19767 and 18771 increased due to elevated nickel.
- Sample 18768 increased due to elevated chloride.

5. HOLDING TIME EVALUATION

ANALYSIS	HOLDING TIME (Days)	APPLICABLE	HT EXCEEDED	NOTES
Metals by ICP-OES	6 months			
Metals by ICP-MS	6 months	x		
Metals by HVASS	6 months	x		
TDS	7	x		cannot verify
Chloride	28	x		
Fluoride	28	x		
Ammonia	28	x		
Nitrate/Nitrite	2	x		cannot verify
Mercury	28	x		

☐ All analyses conducted within acceptable holding times.

Comments/Qualified Results:

- Carolyn at CEMI has confirmed that analyses are conducted within applicable holding times unless noted otherwise. Because date of analysis is not reported on ALS reports, holding times cannot be independently verified.

6. FIELD DUPLICATE SAMPLE RESULTS

☒ Duplicate sample submitted. ☐ No duplicate sample.

☒ All RPDs < 20% (samples above 5 times the reporting limit (RL)).

☒ All results +/- 1 RL (samples below 5 times the RL).

Comments/Qualified Results:

7. BATCH QC RESULTS – BLANK SAMPLE

☒ Blank analysis results reported.

☒ All constituents non-detect in the blank sample.

☒ Reporting limits equivalent to project reporting limits.

Constituents detected in blank sample:

Comments/Qualified Results:

8. BATCH QC RESULTS – LABORATORY REPLICATE SAMPLES

☒ Replicate analysis results reported.

☒ All RPDs < 20% (samples above 5 times the reporting limit (RL)).

☐ All results +/- 1 RL (samples below 5 times the RL).

Comments/Qualified Results:

- Total aluminum replicate analysis by ICP-MS failed to meet EPA criteria (+/- MDL) but ALS DQO was met.
- No replicate analysis for the following parameters: TDS, nitrate/nitrite.
- No replicate analysis of metals by HVAAS.

9. BATCH QC RESULTS – REFRENCE SAMPLES

☒ Reference sample analysis results reported.

☐ All % Recovery meet EPA criteria (between 80 and 120%).

☐ All % Recovery meet lab criteria.

Comments/Qualified Results:

- No antimony reference for HVAAS.
- Only ICP-OES for some metals (i.e., Fe) and only total (not dissolved for some metals (i.e., Ti).
- The total aluminum reference analysis by ICP-MS failed to meet EPA and ALS criteria. The dissolved reference sample was acceptable.
- Three of five total boron reference analyses failed to meet EPA criteria.

10. LABORATORY FOLLOW-UP

- Aluminum non-compliant reference analysis.
- No reference for HVAAS antimony.
- Total vs. dissolved references (are both applicable?)
- Absence of ICP-MS for some metals.
- Request COC.
- No replicate analyses for some parameters (i.e., TDS, nitrate/nitrite, HVAAS metals).
- Redox measurements missing.

11. ADDITIONAL COMMENTS

- Supporting documentation provided in *Phase I Kinetic Testing – QAQC.*
- Good reproducibility between As, Se and Sb by HVAAS and ICP-MS.

C. Ross
Validator

05/05/04
Date

Kinetic Testing Duplicate Analysis

043-1055

SAMPLE VR71120A
Analysis Kinetic Testing Week 3 - Column 2
Date 9-Mar-04

Analyte		Result	Target	Units	DL	Method	QA/QC RPD
Aluminum	Aluminum	0.12	<0.10	mg/L	0.1	ICP-MS	+/- MDL
Antimony	Antimony	<0.010	<0.010	mg/L	0.01	ICP-MS	0%
Arsenic	Arsenic	<0.010	<0.010	mg/L	0.01	ICP-MS	0%
Barium	Barium	0.0214	0.0196	mg/L	0.005	ICP-MS	+/-MDL
Beryllium	Beryllium	<0.050	<0.050	mg/L	0.05	ICP-MS	0%
Bismuth	Bismuth	<0.050	<0.050	mg/L	0.05	ICP-MS	0%
Boron	Boron	<1.0	<1.0	mg/L	1	ICP-MS	0%
Cadmium	Cadmium	0.0612	0.0533	mg/L	0.005	ICP-MS	14%
Calcium	Calcium	4.08	4.11	mg/L	0.1	ICP-MS	1%
Chromium	Chromium	<0.050	<0.050	mg/L	0.05	ICP-MS	0%
Cobalt	Cobalt	8.21	7.57	mg/L	0.01	ICP-MS	8%
Copper	Copper	0.818	0.754	mg/L	0.01	ICP-MS	8%
Iron	Iron	290	293	mg/L	0.06	ICP-MS	1%
Lead	Lead	0.0525	0.0462	mg/L	0.005	ICP-MS	13%
Lithium	Lithium	<0.50	<0.50	mg/L	0.5	ICP-MS	0%
Magnesium	Magnesium	9.42	9.57	mg/L	0.2	ICP-MS	2%
Manganese	Manganese	9.2	8.47	mg/L	0.005	ICP-MS	8%
Mercury	Mercury	<0.000050	<0.000050	mg/L	0.00005	ICP-MS	0%
Molybdenum	Molybdenum	0.006	<0.0050	mg/L	0.005	ICP-MS	+/- MDL
Nickel	Nickel	405	377	mg/L	0.05	ICP-MS	7%
Phosphorous	Phosphorous	<0.60	<0.60	mg/L	0.6	ICP-MS	0%
Potassium	Potassium	<4.0	<4.0	mg/L	4	ICP-MS	0%
Selenium	Selenium	<0.10	<0.10	mg/L	0.1	ICP-MS	0%
Silicon	Silicon	1.95	1.99	mg/L	0.1	ICP-MS	2%
Silver	Silver	<0.0010	<0.0010	mg/L	0.001	ICP-MS	0%
Sodium	Sodium	<4.0	<4.0	mg/L	4	ICP-MS	0%
Strontium	Strontium	0.029	0.026	mg/L	0.01	ICP-MS	+/-MDL
Thallium	Thallium	<0.010	<0.010	mg/L	0.01	ICP-MS	0%
Tin	Tin	<0.010	<0.010	mg/L	0.01	ICP-MS	0%
Titanium	Titanium	<0.020	<0.020	mg/L	0.02	ICP-MS	0%
Uranium	Uranium	<0.0010	<0.0010	mg/L	0.001	ICP-MS	0%
Vanadium	Vanadium	<0.10	<0.10	mg/L	0.1	ICP-MS	0%
Zinc	Zinc	0.89	0.84	mg/L	0.1	ICP-MS	6%
Antimony	Antimony	0.00252	0.00254	mg/L	0.0002	HVAAS	1%
Arsenic	Arsenic	0.012	0.0123	mg/L	0.0002	HVAAS	2%
Selenium	Selenium	0.0497	0.0503	mg/L	0.0005	HVAAS	1%

Number of Parameters Failing Criteria	0
%	0.0%

RPD = relative percent difference

Shaded and bolded QA/QC RPD values identify samples that fail QA/QC criteria.

Metals analysis by ICP-MS assumed for all metals.

LABORATORY REPLICATE SAMPLES

Analysis Kinetic Testing - Week 3
Column 3

QA/QC Report

Analyte	Result	Target	Units	DL	ALSQC#	Method	QA/QC RPD
Chloride	54.9	54.9	mg/L	0.5	378883	Ion Chromatography	0%
Fluoride	<0.020	<0.020	mg/L	0.02	378883	Ion Chromatography or Ion Selective Electrode	0%
Ammonia Nitrogen	0.022	<0.020	mg/L-N	0.02	378883	Selective Ion Electrode	+/-MDL
Aluminum	0.0031	0.0018	mg/L	0.001	378883	ICM-MS	>+/-MDL
Antimony	0.001	0.00099	mg/L	0.0001	378883	ICM-MS	1%
Arsenic	0.00323	0.00327	mg/L	0.0001	378883	ICM-MS	1%
Barium	0.036	0.0365	mg/L	0.00005	378883	ICM-MS	1%
Beryllium	<0.00050	<0.00050	mg/L	0.0005	378883	ICM-MS	0%
Bismuth	<0.00050	<0.00050	mg/L	0.0005	378883	ICM-MS	0%
Boron	0.012	0.012	mg/L	0.01	378883	ICM-MS	0%
Cadmium	<0.000050	<0.000050	mg/L	0.00005	378883	ICM-MS	0%
Calcium	9.87	9.84	mg/L	0.05	378883	ICM-MS	0%
Chromium	<0.00050	<0.00050	mg/L	0.0005	378883	ICM-MS	0%
Cobalt	0.00014	0.00013	mg/L	0.0001	378883	ICM-MS	+/-MDL
Copper	0.00104	0.00105	mg/L	0.0001	378883	ICM-MS	1%
Iron	<0.030	<0.030	mg/L	0.03	378883	ICM-MS	0%
Lead	0.000156	0.000124	mg/L	0.00005	378883	ICM-MS	+/-MDL
Lithium	<0.0050	<0.0050	mg/L	0.005	378883	ICM-MS	0%
Magnesium	19.2	19.3	mg/L	0.1	378883	ICM-MS	1%
Manganese	0.00336	0.00338	mg/L	0.00005	378883	ICM-MS	1%
Mercury	<0.000050	<0.000050	mg/L	0.00005	378883	ICM-MS	0%
Molybdenum	0.00106	0.00107	mg/L	0.00005	378883	ICM-MS	1%
Nickel	0.00401	0.00332	mg/L	0.0005	378883	ICM-MS	19%
Phosphorus	<0.30	<0.30	mg/L	0.3	378883	ICM-MS	0%
Potassium	18.7	19.2	mg/L	2	378883	ICM-MS	3%
Selenium	<0.0010	<0.0010	mg/L	0.001	378883	ICM-MS	0%
Silicon	4.07	4.05	mg/L	0.05	378883	ICM-MS	0%
Silver	<0.000010	<0.000010	mg/L	0.00001	378883	ICM-MS	0%
Sodium	10.7	10.5	mg/L	2	378883	ICM-MS	2%
Strontium	0.0518	0.0521	mg/L	0.0001	378883	ICM-MS	1%
Thallium	<0.00010	0.0001	mg/L	0.0001	378883	ICM-MS	+/-MDL
Tin	0.00039	0.00039	mg/L	0.0001	378883	ICM-MS	0%
Titanium	<0.010	<0.010	mg/L	0.01	378883	ICM-MS	0%
Uranium	<0.000010	<0.000010	mg/L	0.00001	378883	ICM-MS	0%
Vanadium	<0.0010	<0.0010	mg/L	0.001	378883	ICM-MS	0%
Zinc	<0.0010	<0.0010	mg/L	0.001	378883	ICM-MS	0%

Number of Parameters Failing Criteria	1
%	2.8%

RPD = relative percent difference
Shaded and bolded QA/QC RPD values identify samples that fail QA/QC criteria.
Metals analysis by ICP-MS assumed for all metals.
Aluminum analysis failed EPA criteria but met ALS criteria.

LABORATORY REFERENCE SAMPLES
Analysis Kinetic Testing - Week 3

QA/QC Report

Analyte		Result	Target	Units	DL	ALSQC#	Method	% Recovery
Bismuth	T-Bi	0.99	1	mg/L	0.1	379216	ICP-OES	99%
Bismuth	T-Bi	1	1	mg/L	0.1	379293	ICP-OES	100%
Bismuth	T-Bi	1.02	1	mg/L	0.05	379413	ICP-MS	102%
Lithium	T-Li	0.201	0.2	mg/L	0.01	379216	ICP-OES	101%
Lithium	T-Li	0.198	0.2	mg/L	0.01	379293	ICP-OES	99%
Lithium	T-Li	*0.5*	*0.5*	mg/L	0.5	379413	ICP-MS	100%
Phosphorus	T-P	2.05	2	mg/L	0.3	379216	ICP-OES	103%
Phosphorus	T-P	1.95	2	mg/L	0.3	379293	ICP-OES	98%
Silicon	T-Si	1.01	1	mg/L	0.05	379216	ICP-OES	101%
Silicon	T-Si	1	1	mg/L	0.05	379293	ICP-OES	100%
Tin	T-Sn	1.03	1	mg/L	0.03	379216	ICP-OES	103%
Tin	T-Sn	1.04	1	mg/L	0.03	379293	ICP-OES	104%
Tin	T-Sn	1.04	1	mg/L	0.01	379413	ICP-MS	104%
Titanium	T-Ti	0.192	0.2	mg/L	0.01	379216	ICP-OES	96%
Titanium	T-Ti	0.195	0.2	mg/L	0.01	379293	ICP-OES	98%
Aluminum	D-Al	0.0568	0.054	mg/L	0.001	379412	ICP-MS	105%
Antimony	D-Sb	0.000259	0.00023	mg/L	0.00005	379412	ICP-MS	113%
Arsenic	D-As	0.00073	0.00068	mg/L	0.0001	379412	ICP-MS	107%
Barium	D-Ba	0.0131	0.0122	mg/L	0.00005	379412	ICP-MS	107%
Beryllium	D-Be	*0.0005*	*0.0005*	mg/L	0.0005	379412	ICP-MS	100%
Cadmium	D-Cd	*0.00005*	*0.00005*	mg/L	0.00005	379412	ICP-MS	100%
Calcium	D-Ca	6.02	6.2	mg/L	0.02	379412	ICP-MS	97%
Chromium	D-Cr	*0.0005*	*0.0005*	mg/L	0.0005	379412	ICP-MS	100%
Cobalt	D-Co	*0.0001*	*0.0001*	mg/L	0.0001	379412	ICP-MS	100%
Copper	D-Cu	0.00188	0.00181	mg/L	0.0001	379412	ICP-MS	104%
Lead	D-Pb	0.000086	0.000086	mg/L	0.00005	379412	ICP-MS	100%
Magnesium	D-Mg	1.69	1.6	mg/L	0.005	379412	ICP-MS	106%
Manganese	D-Mn	0.00319	0.00337	mg/L	0.00005	379412	ICP-MS	95%
Molybdenum	D-Mo	0.000206	0.00021	mg/L	0.00005	379412	ICP-MS	98%
Nickel	D-Ni	0.0007	0.00067	mg/L	0.0001	379412	ICP-MS	104%
Potassium	D-K	0.663	0.68	mg/L	0.01	379412	ICP-MS	98%
Strontium	D-Sr	0.0287	0.0263	mg/L	0.0001	379412	ICP-MS	109%
Uranium	D-U	0.000049	0.00005	mg/L	0.00001	379412	ICP-MS	98%
Vanadium	D-V	*0.001*	*0.001*	mg/L	0.001	379412	ICP-MS	100%
Zinc	D-Zn	0.0011	*0.001*	mg/L	0.001	379412	ICP-MS	110%
Chloride	Cl	15.2	15	mg/L	0.5	379004	Ion Chromatography	101%
Fluoride	F	2.06	2	mg/L	0.02	379004	Ion Chromatography	103%
Nitrite/Nitrate	N	7.04	6.8	mg/L	0.005	379004	Ion Chromatography	104%
Nitrite/Nitrate	N	7.02	6.8	mg/L	0.005	379397	Colourimetry	103%
Aluminum	T-Al	0.205	0.152	mg/L	0.01	379414	ICP-MS	**135%**
Antimony	T-Sb	0.278	0.262	mg/L	0.001	379414	ICP-MS	106%
Arsenic	T-As	0.152	0.152	mg/L	0.001	379414	ICP-MS	100%
Barium	T-Ba	0.447	0.438	mg/L	0.0005	379414	ICP-MS	102%
Beryllium	T-Be	0.038	0.0367	mg/L	0.005	379414	ICP-MS	104%
Boron	T-B	0.13	0.1	mg/L	0.1	379414	ICP-MS	**130%**
Cadmium	T-Cd	0.0766	0.0767	mg/L	0.0005	379414	ICP-MS	100%
Chromium	T-Cr	0.126	0.125	mg/L	0.005	379414	ICP-MS	101%
Cobalt	T-Co	0.224	0.225	mg/L	0.001	379414	ICP-MS	100%
Copper	T-Cu	0.309	0.309	mg/L	0.001	379414	ICP-MS	100%
Lead	T-Pb	0.397	0.402	mg/L	0.0005	379414	ICP-MS	99%
Manganese	T-Mn	0.314	0.339	mg/L	0.0005	379414	ICP-MS	93%
Molybdenum	T-Mo	0.095	0.095	mg/L	0.0005	379414	ICP-MS	100%
Nickel	T-Ni	0.211	0.203	mg/L	0.005	379414	ICP-MS	104%
Selenium	T-Se	0.0367	0.0365	mg/L	0.005	379414	ICP-MS	101%
Silver	T-Ag	0.0722	0.0733	mg/L	0.0001	379414	ICP-MS	98%
Strontium	T-Sr	0.353	0.354	mg/L	0.001	379414	ICP-MS	100%
Thallium	T-Tl	0.109	0.111	mg/L	0.001	379414	ICP-MS	98%
Vanadium	T-V	0.199	0.194	mg/L	0.01	379414	ICP-MS	103%
Zinc	T-Zn	0.151	0.151	mg/L	0.01	379414	ICP-MS	100%
Aluminum	T-Al	0.99	1	mg/L	0.2	379217	ICP-OES	99%
Aluminum	T-Al	1.01	1	mg/L	0.2	379294	ICP-OES	101%
Antimony	T-Sb	0.26	0.28	mg/L	0.2	379217	ICP-OES	93%

Antimony	T-Sb	0.28	0.28	mg/L	0.2	379294	ICP-OES	100%
Arsenic	T-As	0.48	0.49	mg/L	0.2	379217	ICP-OES	98%
Arsenic	T-As	0.48	0.49	mg/L	0.2	379294	ICP-OES	98%
Barium	T-Ba	0.525	0.525	mg/L	0.01	379217	ICP-OES	100%
Barium	T-Ba	0.527	0.525	mg/L	0.01	379294	ICP-OES	100%
Beryllium	T-Be	0.398	0.397	mg/L	0.005	379217	ICP-OES	100%
Beryllium	T-Be	0.395	0.397	mg/L	0.005	379294	ICP-OES	99%
Boron	T-B	0.36	0.28	mg/L	0.1	379217	ICP-OES	**129%**
Boron	T-B	0.35	0.28	mg/L	0.1	379294	ICP-OES	**125%**
Cadmium	T-Cd	0.353	0.353	mg/L	0.01	379217	ICP-OES	100%
Cadmium	T-Cd	0.352	0.353	mg/L	0.01	379294	ICP-OES	100%
Chromium	T-Cr	0.17	0.167	mg/L	0.01	379217	ICP-OES	102%
Chromium	T-Cr	0.166	0.167	mg/L	0.01	379294	ICP-OES	99%
Cobalt	T-Co	0.24	0.24	mg/L	0.01	379217	ICP-OES	100%
Cobalt	T-Co	0.243	0.24	mg/L	0.01	379294	ICP-OES	101%
Copper	T-Cu	0.393	0.391	mg/L	0.01	379217	ICP-OES	101%
Copper	T-Cu	0.394	0.391	mg/L	0.01	379294	ICP-OES	101%
Iron	T-Fe	1	1.01	mg/L	0.03	379217	ICP-OES	99%
Iron	T-Fe	1	1.01	mg/L	0.03	379294	ICP-OES	99%
Lead	T-Pb	0.84	0.857	mg/L	0.05	379217	ICP-OES	98%
Lead	T-Pb	0.894	0.857	mg/L	0.05	379294	ICP-OES	104%
Manganese	D-Mn	2.26	2.26	mg/L	0.005	379217	ICP-OES	100%
Manganese	D-Mn	2.27	2.26	mg/L	0.005	379294	ICP-OES	100%
Molybdenum	D-Mo	0.101	0.097	mg/L	0.03	379217	ICP-OES	104%
Molybdenum	D-Mo	0.101	0.097	mg/L	0.03	379294	ICP-OES	104%
Nickel	T-Ni	0.623	0.611	mg/L	0.05	379217	ICP-OES	102%
Nickel	T-Ni	0.616	0.611	mg/L	0.05	379294	ICP-OES	101%
Selenium	T-Se	*0.2*	*0.2*	mg/L	0.2	379217	ICP-OES	100%
Selenium	T-Se	0.2	*0.2*	mg/L	0.2	379294	ICP-OES	100%
Silver	T-Ag	0.211	0.21	mg/L	0.01	379217	ICP-OES	100%
Silver	T-Ag	0.21	0.21	mg/L	0.01	379294	ICP-OES	100%
Strontium	T-Sr	0.105	0.104	mg/L	0.005	379217	ICP-OES	101%
Strontium	T-Sr	0.103	0.104	mg/L	0.005	379294	ICP-OES	99%
Thallium	T-Tl	0.31	0.38	mg/L	0.2	379217	ICP-OES	82%
Thallium	T-Tl	0.34	0.38	mg/L	0.2	379294	ICP-OES	89%
Titanium	T-Ti	0.194	0.192	mg/L	0.01	379217	ICP-OES	101%
Titanium	T-Ti	0.195	0.192	mg/L	0.01	379294	ICP-OES	102%
Vanadium	T-V	1.5	1.5	mg/L	0.03	379217	ICP-OES	100%
Vanadium	T-V	1.51	1.5	mg/L	0.03	379294	ICP-OES	101%
Zinc	T-Zn	0.122	0.121	mg/L	0.005	379217	ICP-OES	101%
Zinc	T-Zn	0.119	0.121	mg/L	0.005	379294	ICP-OES	98%
Mercury	T-Hg	0.00983	0.01	mg/L	0.00001	379209	CVAFS	98%
Fluoride	F	1.07	1.02	mg/L	0.02	379189	Electrode	105%
Calcium	T-Ca	15.6	15.6	mg/L	0.05	379215	ICP-OES	100%
Calcium	T-Ca	15.4	15.6	mg/L	0.05	379292	ICP-OES	99%
Calcium	T-Ca	15.5	15.6	mg/L	0.04	379411	ICP-MS	99%
Magnesium	T-Mg	5.73	5.85	mg/L	0.1	379215	ICP-OES	98%
Magnesium	T-Mg	5.76	5.85	mg/L	0.1	379292	ICP-OES	98%
Magnesium	T-Mg	5.94	5.85	mg/L	0.01	379411	ICP-MS	102%
Potassium	T-K	34.3	33.1	mg/L	2	379215	ICP-OES	104%
Potassium	T-K	33.9	33.1	mg/L	2	379292	ICP-OES	102%
Potassium	T-K	34.5	33.1	mg/L	0.1	379411	ICP-MS	104%
Sodium	T-Na	40.2	39.1	mg/L	2	379215	ICP-OES	103%
Sodium	T-Na	40	39.1	mg/L	2	379292	ICP-OES	102%
Sodium	T-Na	40.2	39.1	mg/L	0.02	379411	ICP-MS	103%
Ammonia Nitrogen	N	11.8	11.4	mg/L	0.02	379386	Electrode	104%
Aluminum	T-Al	*0.2*	*0.2*	mg/L	0.2	379214	ICP-OES	100%
Aluminum	T-Al	*0.2*	*0.2*	mg/L	0.2	379291	ICP-OES	100%
Antimony	T-Sb	*0.2*	*0.2*	mg/L	0.2	379214	ICP-OES	100%
Antimony	T-Sb	*0.2*	*0.2*	mg/L	0.2	379291	ICP-OES	100%
Arsenic	T-As	*0.2*	*0.2*	mg/L	0.2	379214	ICP-OES	100%
Arsenic	T-As	*0.2*	*0.2*	mg/L	0.2	379291	ICP-OES	100%
Arsenic	T-As	0.125	0.128	mg/L	0.0002	379387	HVAAS	98%
Barium	T-Ba	0.339	0.338	mg/L	0.01	379214	ICP-OES	100%
Barium	T-Ba	0.34	0.338	mg/L	0.01	379291	ICP-OES	101%
Beryllium	T-Be	0.076	0.0751	mg/L	0.005	379214	ICP-OES	101%
Beryllium	T-Be	0.0782	0.0751	mg/L	0.005	379291	ICP-OES	104%
Boron	T-B	0.2	0.23	mg/L	0.1	379214	ICP-OES	87%
Boron	T-B	0.21	0.23	mg/L	0.1	379291	ICP-OES	91%

Cadmium	T-Cd	0.091	0.088	mg/L	0.01	379214	ICP-OES	103%
Cadmium	T-Cd	0.089	0.088	mg/L	0.01	379291	ICP-OES	101%
Chromium	T-Cr	0.215	0.218	mg/L	0.01	379214	ICP-OES	99%
Chromium	T-Cr	0.228	0.218	mg/L	0.01	379291	ICP-OES	105%
Cobalt	T-Co	0.276	0.28	mg/L	0.01	379214	ICP-OES	99%
Cobalt	T-Co	0.285	0.28	mg/L	0.01	379291	ICP-OES	102%
Copper	T-Cu	0.285	0.287	mg/L	0.01	379214	ICP-OES	99%
Copper	T-Cu	0.294	0.287	mg/L	0.01	379291	ICP-OES	102%
Iron	T-Fe	0.378	0.368	mg/L	0.03	379214	ICP-OES	103%
Iron	T-Fe	0.381	0.368	mg/L	0.03	379291	ICP-OES	104%
Lead	T-Pb	0.242	0.264	mg/L	0.05	379214	ICP-OES	92%
Lead	T-Pb	0.278	0.264	mg/L	0.05	379291	ICP-OES	105%
Manganese	T-Mn	0.482	0.479	mg/L	0.005	379214	ICP-OES	101%
Manganese	T-Mn	0.495	0.479	mg/L	0.005	379291	ICP-OES	103%
Molybdenum	T-Mo	0.141	0.149	mg/L	0.03	379214	ICP-OES	95%
Molybdenum	T-Mo	0.156	0.149	mg/L	0.03	379291	ICP-OES	105%
Nickel	T-Ni	0.076	0.078	mg/L	0.05	379214	ICP-OES	97%
Nickel	T-Ni	0.073	0.078	mg/L	0.05	379291	ICP-OES	94%
Selenium	T-Se	0.0325	0.0307	mg/L	0.0005	379073	HVAAS	106%
Selenium	T-Se	*0.2*	*0.2*	mg/L	0.2	379214	ICP-OES	100%
Selenium	T-Se	*0.2*	*0.2*	mg/L	0.2	379291	ICP-OES	100%
Silver	T-Ag	0.061	0.063	mg/L	0.01	379214	ICP-OES	97%
Silver	T-Ag	0.06	0.063	mg/L	0.01	379291	ICP-OES	95%
Strontium	T-Sr	0.367	0.367	mg/L	0.005	379214	ICP-OES	100%
Strontium	T-Sr	0.382	0.367	mg/L	0.005	379291	ICP-OES	104%
Thallium	T-Tl	*0.2*	*0.2*	mg/L	0.2	379214	ICP-OES	100%
Thallium	T-Tl	*0.2*	*0.2*	mg/L	0.2	379291	ICP-OES	100%
Tin	T-Sn	0.873	0.89	mg/L	0.03	379214	ICP-OES	98%
Tin	T-Sn	0.897	0.89	mg/L	0.03	379291	ICP-OES	101%
Titanium	T-Ti	0.096	0.093	mg/L	0.01	379214	ICP-OES	103%
Titanium	T-Ti	0.099	0.093	mg/L	0.01	379291	ICP-OES	106%
Vanadium	T-V	0.085	0.097	mg/L	0.03	379214	ICP-OES	88%
Vanadium	T-V	0.101	0.097	mg/L	0.03	379291	ICP-OES	104%
Zinc	T-Zn	0.147	0.148	mg/L	0.005	379214	ICP-OES	99%
Zinc	T-Zn	0.15	0.148	mg/L	0.005	379291	ICP-OES	101%
Total Dissolved Solids	TDS	303	314	mg/L	10	379734	Gravimetry	96%

Non-detect values shown at the detection limit in italics.

Number of Parameters Failing EPA Criteria	4
%	2.4%

Number of Parameters Failing ALS Criteria	1
%	0.6%

Inorganic Data Validation Summary

1. PROJECT INFORMATION

Project	Eagle Mine - Kennecott	**Project No.**	043-1055
Date	May 2, 2004		
Laboratory	ALS Environmental		
SDG	ALS File No. U1605		
Description of Analysis	Phase I Kinetic Testing – Week 4		
Report Date	March 23, 2004		
Validator	Cheryl Ross		

2. CHAIN OF CUSTODY

No. of Samples: __5__
No. of Duplicates: __0__

☐ Sample preservation documented on COC.

☐ Samples preserved correctly. ☐ Not Applicable.

☐ Sample temperature documented on COC.

☐ Samples maintained at 4 °C.

Comments:

- Have requested a copy of COC (April 19, 2004 – telecom).

3. SUMMARY OF ANALYSES

Check all analyses included in SDG.

ANALYSIS		NOTES
Metals by ICP-OES	x	
Metals by ICP-MS		
Metals by HVASS		As Sb Se
TDS		
Chloride (APHA 4500)		
Fluoride (APHA 4500)		
Ammonia (APHA 4500)		
Nitrate/Nitrite (APHA 4500)		
Mercury (EPA 7470A/7471/245.7)		

☒ All requested analyses conducted.

Comments:

- Redox measurements not provided. Follow-up with CEMI.

4. LABORATORY REMARKS

☒ Detection limits increased due to matrix interferences.

Comments:

- Dissolved metal detection limits increased due to sample matrix interferences.
- Sample 18824 increased due to elevated nickel.

5. HOLDING TIME EVALUATION

ANALYSIS	HOLDING TIME (Days)	APPLICABLE	HT EXCEEDED	NOTES
Metals by ICP-OES	6 months	x		
Metals by ICP-MS	6 months			
Metals by HVASS	6 months			
TDS	7			
Chloride	28			
Fluoride	28			
Ammonia	28			
Nitrate/Nitrite	2			
Mercury	28			

☒ All analyses conducted within acceptable holding times.

Comments/Qualified Results:

6. FIELD DUPLICATE SAMPLE RESULTS

☐ Duplicate sample submitted. ☒ No duplicate sample.

☐ All RPDs < 20% (samples above 5 times the reporting limit (RL)).

☐ All results +/- 1 RL (samples below 5 times the RL).

Comments/Qualified Results:

7. BATCH QC RESULTS – BLANK SAMPLE

☒ Blank analysis results reported.

☒ All constituents non-detect in the blank sample.

☐ Reporting limits equivalent to project reporting limits.

Constituents detected in blank sample:

Comments/Qualified Results:

- Some detection limits increased above standard ICP-OES.
- Calcium and magnesium reporting limits OK.

8. BATCH QC RESULTS – LABORATORY REPLICATE SAMPLES

☒ Replicate analysis results reported.

☒ All RPDs < 20% (samples above 5 times the reporting limit (RL)).

☒ All results +/- 1 RL (samples below 5 times the RL).

Comments/Qualified Results:

9. BATCH QC RESULTS – REFRENCE SAMPLES

☒ Reference sample analysis results reported.

☐ All % Recovery meet EPA criteria (between 80 and 120%).

☒ All % Recovery meet lab criteria.

Comments/Qualified Results:

- All reference samples for total metals.
- One of two total boron reference samples failed to meet EPA criteria.
- One of two total nickel reference samples failed to meet EPA criteria.

10. LABORATORY FOLLOW-UP

- Copies of COCs.
- Missing redox measurements.

11. ADDITIONAL COMMENTS

- Supporting documentation provided in *Kinetic Testing Phase I – QAQC.xls.*

C Rim
Validator

05/05/04
Date

LABORATORY REPLICATE SAMPLES

Analysis Kinetic Testing - Week 4
Column 4

QA/QC Report

Analyte		Result	Target	Units	DL	ALSQC#	Method	QA/QC RPD
Aluminum	D-Al	<0.20	<0.20	mg/L	0.2	379447	ICP-OES	0%
Antimony	D-Sb	<0.20	<0.20	mg/L	0.2	379447	ICP-OES	0%
Arsenic	D-As	<0.20	<0.20	mg/L	0.2	379447	ICP-OES	0%
Barium	D-Ba	0.023	0.023	mg/L	0.01	379447	ICP-OES	0%
Beryllium	D-Be	<0.0050	<0.0050	mg/L	0.005	379447	ICP-OES	0%
Bismuth	D-Bi	<0.20	<0.20	mg/L	0.2	379447	ICP-OES	0%
Boron	D-B	1.76	1.77	mg/L	0.1	379447	ICP-OES	1%
Cadmium	D-Cd	<0.010	<0.010	mg/L	0.01	379447	ICP-OES	0%
Calcium	D-Ca	20.7	20.6	mg/L	0.05	379447	ICP-OES	0%
Chromium	D-Cr	<0.010	<0.010	mg/L	0.01	379447	ICP-OES	0%
Cobalt	D-Co	<0.010	<0.010	mg/L	0.01	379447	ICP-OES	0%
Copper	D-Cu	0.022	0.019	mg/L	0.01	379447	ICP-OES	+/-MDL
Iron	D-Fe	<0.030	<0.030	mg/L	0.03	379447	ICP-OES	0%
Lead	D-Pb	<0.050	<0.050	mg/L	0.05	379447	ICP-OES	0%
Lithium	D-Li	<0.010	0.014	mg/L	0.01	379447	ICP-OES	+/-MDL
Magnesium	D-Mg	38.4	38.4	mg/L	0.1	379447	ICP-OES	0%
Manganese	D-Mn	0.0135	0.0145	mg/L	0.005	379447	ICP-OES	+/-MDL
Molybdenum	D-Mo	<0.030	<0.030	mg/L	0.03	379447	ICP-OES	0%
Nickel	D-Ni	0.07	<0.050	mg/L	0.05	379447	ICP-OES	+/-MDL
Phosphorus	D-P	<0.30	<0.30	mg/L	0.3	379447	ICP-OES	0%
Potassium	D-K	27.1	25.7	mg/L	2	379447	ICP-OES	5%
Selenium	D-Se	<0.20	<0.20	mg/L	0.2	379447	ICP-OES	0%
Silicon	D-Si	2.59	2.58	mg/L	0.05	379447	ICP-OES	0%
Silver	D-Ag	<0.010	<0.010	mg/L	0.01	379447	ICP-OES	0%
Sodium	D-Na	19.8	20.2	mg/L	2	379447	ICP-OES	2%
Strontium	D-Sr	0.138	0.138	mg/L	0.005	379447	ICP-OES	0%
Thallium	D-Tl	<0.20	<0.20	mg/L	0.2	379447	ICP-OES	0%
Tin	D-Sn	<0.030	<0.030	mg/L	0.03	379447	ICP-OES	0%
Titanium	D-Ti	<0.010	<0.010	mg/L	0.01	379447	ICP-OES	0%
Vanadium	D-V	<0.030	<0.030	mg/L	0.03	379447	ICP-OES	0%
Zinc	D-Zn	0.0124	0.0124	mg/L	0.005	379447	ICP-OES	0%

Number of Parameters Failing Criteria	0
%	0.0%

RPD = relative percent difference
Shaded and bolded QA/QC RPD values identify samples that fail QA/QC criteria.

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PREPARED AT DIRECTION OF COUNSEL IN ANTICIPATION OF LITIGATION

LABORATORY REFERENCE SAMPLES
Analysis Kinetic Testing - Week 4

QA/QC Report

Analyte		Result	Target	Units	DL	ALSQC#	Method	% Recovery
Bismuth	T-Bi	1.02	1	mg/L	0.1	379763	ICP-OES	102%
Lithium	T-Li	0.2	0.2	mg/L	0.01	379763	ICP-OES	100%
Phosphorus	T-Pb	2.11	2	mg/L	0.3	379763	ICP-OES	106%
Silicon	T-Si	1.02	1	mg/L	0.05	379763	ICP-OES	102%
Tin	T-Sn	1.05	1	mg/L	0.03	379763	ICP-OES	105%
Titanium	T-Ti	0.2	0.2	mg/L	0.01	379763	ICP-OES	100%
Aluminum	T-Al	1.05	1	mg/L	0.2	379764	ICP-OES	105%
Antimony	T-Sb	0.28	0.28	mg/L	0.2	379764	ICP-OES	100%
Arsenic	T-As	0.46	0.49	mg/L	0.2	379764	ICP-OES	94%
Barium	T-Ba	0.524	0.525	mg/L	0.01	379764	ICP-OES	100%
Beryllium	T-Be	0.398	0.397	mg/L	0.005	379764	ICP-OES	100%
Boron	T-B	0.35	0.28	mg/L	0.1	379764	ICP-OES	**125%**
Cadmium	T-Cd	0.355	0.353	mg/L	0.01	379764	ICP-OES	101%
Chromium	T-Cr	0.169	0.167	mg/L	0.01	379764	ICP-OES	101%
Cobalt	T-Co	0.241	0.24	mg/L	0.01	379764	ICP-OES	100%
Copper	T-Cu	0.39	0.391	mg/L	0.01	379764	ICP-OES	100%
Iron	T-Fe	1.02	1.01	mg/L	0.03	379764	ICP-OES	101%
Lead	T-Pb	0.852	0.857	mg/L	0.05	379764	ICP-OES	99%
Manganese	T-Mn	2.26	2.26	mg/L	0.005	379764	ICP-OES	100%
Molybdenum	T-Mo	0.099	0.097	mg/L	0.03	379764	ICP-OES	102%
Nickel	T-Nl	0.628	0.611	mgiL	0.05	379784	ICP-OES	103%
Selenium	T-Se	*0.2*	*0.2*	mg/L	0.2	379764	ICP-OES	100%
Silver	T-Ag	0.211	0.21	mg/L	0.01	379764	ICP-OES	100%
Strontium	T-Sr	0.105	0.104	mg/L	0.005	379764	ICP-OES	101%
Thallium	T-Tl	0.37	0.38	mg/L	0.2	379764	ICP-OES	97%
Titanium	T-Ti	0.195	0.192	mg/L	0.01	379764	ICP-OES	102%
Vanadium	T-V	1.5	1.5	mg/L	0.03	379764	ICP-OES	100%
Zinc	T-Zn	0.122	0.121	mg/L	0.005	379764	ICP-OES	101%
Calcium	T-Ca	15.5	15.6	mg/L	0.05	379762	ICP-OES	99%
Magnesium	T-Mg	5.79	5.85	mg/L	0.1	379762	ICP-OES	99%
Potassium	T-K	34.4	33.1	mg/L	2	379762	ICP-OES	104%
Sodium	T-Na	39.3	39.1	mg/L	2	379762	ICP-OES	101%
Aluminum	T-Al	*0.2*	*0.2*	mg/L	0.2	379761	ICP-OES	100%
Antimony	T-Sb	*0.2*	*0.2*	mg/L	0.2	379761	ICP-OES	100%
Arsenic	T-As	*0.2*	*0.2*	mg/L	0.2	379761	ICP-OES	100%
Barium	T-Ba	0.343	0.338	mg/L	0.01	379761	ICP-OES	101%
Beryllium	T-Be	0.0762	0.0751	mg/L	0.005	379761	ICP-OES	101%
Boron	T-B	0.19	0.23	mg/L	0.1	379761	ICP-OES	83%
Cadmium	T-Cd	0.092	0.088	mg/L	0.01	379761	ICP-OES	105%
Chromium	T-Cr	0.223	0.218	mg/L	0.01	379761	ICP-OES	102%
Cobalt	T-Co	0.288	0.28	mg/L	0.01	379761	ICP-OES	103%
Copper	T-Cu	0.294	0.287	mg/L	0.01	379761	ICP-OES	102%
Iron	T-Fe	0.388	0.368	mg/L	0.03	379761	ICP-OES	105%
Lead	T-Pb	0.258	0.264	mg/L	0.05	379761	ICP-OES	98%
Manganese	T-Mn	0.49	0.479	mg/L	0.005	379761	ICP-OES	102%
Molybdenum	T-Mo	0.142	0.149	mg/L	0.03	379761	ICP-OES	95%
Nickel	T-Ni	0.061	0.078	mg/L	0.05	379761	ICP-OES	**78%**
Selenium	T-Se	*0.2*	*0.2*	mg/L	0.2	379761	ICP-OES	100%
Silver	T-Ag	0.062	0.063	mg/L	0.01	379761	ICP-OES	98%
Strontium	T-Sr	0.374	0.367	mg/L	0.005	379761	ICP-OES	102%
Thallium	T-Tl	*0.2*	*0.2*	mg/L	0.2	379761	ICP-OES	100%
Tin	T-Sn	0.908	0.89	mg/L	0.03	379761	ICP-OES	102%
Titanium	T-Ti	0.099	0.093	mg/L	0.01	379761	ICP-OES	106%
Vanadium	T-V	0.103	0.097	mg/L	0.03	379761	ICP-OES	106%
Zinc	T-Zn	0.15	0.148	mg/L	0.005	379761	ICP-OES	101%

Non-detect values shown at the detection limit in italics.

Number of Parameters Failing EPA Criteria	2
%	3.6%
Number of Parameters Failing ALS Criteria	0
%	0.0%

Inorganic Data Validation Summary

1. PROJECT INFORMATION

Project	Eagle Mine - Kennecott	**Project No.**	043-1055
Date	May 2, 2004		
Laboratory	ALS Environmental		
SDG	ALS File No. U1828		
Description of Analysis	Phase I Kinetic Testing – Week 5		
Report Date	April 7, 2004		
Validator	Cheryl Ross		

2. CHAIN OF CUSTODY

No. of Samples: __5___
No. of Duplicates: __0___

☐ Sample preservation documented on COC.

☐ Samples preserved correctly. ☐ Not Applicable.

☐ Sample temperature documented on COC.

☐ Samples maintained at 4 °C.

Comments:

- Have requested a copy of COC (April 19, 2004 – telecom).

3. SUMMARY OF ANALYSES

Check all analyses included in SDG.

ANALYSIS		NOTES
Metals by ICP-OES		
Metals by ICP-MS	x	
Metals by HVASS	x	As x Sb x Se x
TDS	x	
Chloride (APHA 4500)	x	
Fluoride (APHA 4500)	x	
Ammonia (APHA 4500)	x	
Nitrate/Nitrite (APHA 4500)	x	
Mercury (EPA 7470A/7471/245.7)	x	

☒ All requested analyses conducted.

Comments:

4. LABORATORY REMARKS

☒ Detection limits increased due to matrix interferences.

Comments:

- Dissolved metal detection limits increased due to sample matrix interferences.
- Sample 18891 increased due to elevated nickel.
- Detection limits for As by HVAAS increased due to unusual matrix interferences.

5. HOLDING TIME EVALUATION

ANALYSIS	HOLDING TIME (Days)	APPLICABLE	HT EXCEEDED	NOTES
Metals by ICP-OES	6 months			
Metals by ICP-MS	6 months	x		
Metals by HVASS	6 months	x		
TDS	7	x		cannot verify
Chloride	28	x		
Fluoride	28	x		
Ammonia	28	x		
Nitrate/Nitrite	2	x		cannot verify
Mercury	28	x		

☐ All analyses conducted within acceptable holding times.

Comments/Qualified Results:

- Carolyn at CEMI has confirmed that analyses are conducted within applicable holding times unless noted otherwise. Because date of analysis is not reported on ALS reports, holding times cannot be independently verified.

6. FIELD DUPLICATE SAMPLE RESULTS

☐ Duplicate sample submitted. ☒ No duplicate sample.

☐ All RPDs < 20% (samples above 5 times the reporting limit (RL)).

☐ All results +/- 1 RL (samples below 5 times the RL).

Comments/Qualified Results:

7. BATCH QC RESULTS – BLANK SAMPLE

☒ Blank analysis results reported.

☒ All constituents non-detect in the blank sample.

☒ Reporting limits equivalent to project reporting limits.

Constituents detected in blank sample:

Comments/Qualified Results:

8. BATCH QC RESULTS – LABORATORY REPLICATE SAMPLES

☐ Replicate analysis results reported.

☐ All RPDs < 20% (samples above 5 times the reporting limit (RL)).

☐ All results +/- 1 RL (samples below 5 times the RL).

Comments/Qualified Results:

- Inquire why replicate analysis not reported.

BATCH QC RESULTS – REFRENCE SAMPLES

☒ Reference sample analysis results reported.

☐ All % Recovery meet EPA criteria (between 80 and 120%).

☒ All % Recovery meet lab criteria.

Comments/Qualified Results:

- Total aluminum reference analysis by ICP-MS failed to meet EPA criteria. Dissolved zinc reference was acceptable.
- Two of three total boron reference analyses failed to meet EPA criteria.
- One of two total antimony reference analyses by ICP-OES failed to meet EPA criteria.

9. LABORATORY FOLLOW-UP

- Missing laboratory replicate analysis.
- Redox measurements by CEMI.

10. ADDITIONAL COMMENTS

- Poor reproducibility for As by ICP-MS and HVAAS (3 out of 5 samples failed QA/QC criteria).
- Supporting documentation provided in *Phase I Kinetic Testing – QAQC.*

C. Ross
Validator

05/05/04
Date

LABORATORY REFERENCE SAMPLES
Analysis Kinetic Testing - Week 5

QA/QC Report

Analyte		Result	Target	Units	DL	ALSQC#	Method	% Recovery
Bismuth	T-Bi	1.02	1	mg/L	0.1	380488	ICP-OES	102%
Bismuth	T-Bi	1.04	1	mg/L	0.05	381034	ICP-MS	104%
Lithium	T-Li	0.203	0.2	mg/L	0.01	380488	ICP-OES	102%
Lithium	T-Li	*0.5*	*0.5*	mg/L	0.5	381034	ICP-MS	100%
Phosphorus	T-P	1.97	2	mg/L	0.3	380488	ICP-OES	99%
Silicon	T-Si	1.01	1	mg/L	0.05	380488	ICP-OES	101%
Tin	T-Sn	1.03	1	mg/L	0.03	380488	ICP-OES	103%
Tin	T-Sn	1.07	1	mg/L	0.01	381034	ICP-MS	107%
Titanium	T-Ti	0.195	0.2	mg/L	0.01	380488	ICP-OES	98%
Aluminum	D-Al	0.0538	0.054	mg/L	0.001	381033	ICP-MS	100%
Antimony	D-Sb	0.000261	0.00023	mg/L	0.00005	381033	ICP-MS	113%
Arsenic	D-As	0.00072	0.00068	mg/L	0.0001	381033	ICP-MS	106%
Barium	D-Ba	0.0131	0.0122	mg/L	0.00005	381033	ICP-MS	107%
Beryllium	D-Be	*0.0005*	*0.0005*	mg/L	0.0005	381033	ICP-MS	100%
Cadmium	D-Cd	*0.00005*	*0.00005*	mg/L	0.00005	381033	ICP-MS	100%
Calcium	D-Ca	5.63	6.2	mg/L	0.02	381033	ICP-MS	91%
Chromium	D-Cr	*0.0005*	*0.0005*	mg/L	0.0005	381033	ICP-MS	100%
Cobalt	D-Co	*0.0001*	*0.0001*	mg/L	0.0001	381033	ICP-MS	100%
Copper	D-Cu	0.00182	0.00181	mg/L	0.0001	381033	ICP-MS	101%
Lead	D-Pb	0.000079	0.000086	mg/L	0.00005	381033	ICP-MS	92%
Magnesium	D-Mg	1.54	1.6	mg/L	0.005	381033	ICP-MS	96%
Manganese	D-Mn	0.00342	0.00337	mg/L	0.00005	381033	ICP-MS	101%
Molybdenum	D-Mo	0.000207	0.00021	mg/L	0.00005	381033	ICP-MS	99%
Nickel	D-Ni	0.00064	0.00067	mg/L	0.0001	381033	ICP-MS	96%
Potassium	D-K	0.668	0.68	mg/L	0.01	381033	ICP-MS	98%
Strontium	D-Sr	0.0282	0.0263	mg/L	0.0001	381033	ICP-MS	107%
Uranium	D-U	0.000049	0.00005	mg/L	0.00001	381033	ICP-MS	98%
Vanadium	D-V	*0.001*	*0.001*	mg/L	0.001	381033	ICP-MS	100%
Zinc	D-Zn	0.0011	*0.001*	mg/L	0.001	381033	ICP-MS	110%
Nitrite/Nitrate	N	7.27	6.8	mg/L	0.005	381133	Colorimetry	107%
Aluminum	T-Al	0.189	0.152	mg/L	0.01	381035	ICP-MS	**124%**
Antimony	T-Sb	0.283	0.262	mg/L	0.001	381035	ICP-MS	108%
Arsenic	T-As	0.155	0.152	mg/L	0.001	381035	ICP-MS	102%
Barium	T-Ba	0.444	0.438	mg/L	0.0005	381035	ICP-MS	101%
Beryllium	T-Be	0.0388	0.0367	mg/L	0.005	381035	ICP-MS	106%
Boron	T-B	0.14	0.1	mg/L	0.1	381035	ICP-MS	**140%**
Cadmium	T-Cd	0.0756	0.0767	mg/L	0.0005	381035	ICP-MS	99%
Chromium	T-Cr	0.121	0.125	mg/L	0.005	381035	ICP-MS	97%
Cobalt	T-Co	0.221	0.225	mg/L	0.001	381035	ICP-MS	98%
Copper	T-Cu	0.299	0.309	mg/L	0.001	381035	ICP-MS	97%
Lead	T-Pb	0.401	0.402	mg/L	0.0005	381035	ICP-MS	100%
Manganese	D-Mn	0.327	0.339	mg/L	0.0005	381035	ICP-MS	96%
Molybdenum	D-Mo	0.1	0.095	mg/L	0.0005	381035	ICP-MS	105%
Nickel	T-Ni	0.204	0.203	mg/L	0.005	381035	ICP-MS	100%
Selenium	T-Se	0.038	0.0365	mg/L	0.005	381035	ICP-MS	104%
Silver	T-Ag	0.0739	0.0733	mg/L	0.0001	381035	ICP-MS	101%
Strontium	T-Sr	0.355	0.354	mg/L	0.001	381035	ICP-MS	100%
Thallium	T-Tl	0.11	0.111	*mg/L*	0.001	381035	ICP-MS	99%
Vanadium	T-V	0.194	0.194	mg/L	0.01	381035	ICP-MS	100%
Zinc	T-Zn	0.162	0.151	mg/L	0.01	381035	ICP-MS	107%
Aluminum	T-Al	1	1	mg/L	0.2	380489	ICP-OES	100%
Antimony	T-Sb	*0.2*	0.28	mg/L	0.2	380489	ICP-OES	**71%**
Arsenic	T-As	0.5	0.49	mg/L	0.2	380489	ICP-OES	102%
Barium	T-Ba	0.537	0.525	mg/L	0.01	380489	ICP-OES	102%
Beryllium	T-Be	0.399	0.397	mg/L	0.005	380489	ICP-OES	101%
Boron	T-B	0.35	0.28	mg/L	0.1	380489	ICP-OES	**125%**
Cadmium	T-Cd	0.362	0.353	mg/L	0.01	380489	ICP-OES	103%
Chromium	T-Cr	0.17	0.167	mg/L	0.01	380489	ICP-OES	102%
Cobalt	T-Co	0.247	0.24	mg/L	0.01	380489	ICP-OES	103%

Copper	T-Cu	0.397	0.391	mg/L	0.01	380489	ICP-OES	102%
Iron	T-Fe	1.02	1.01	mg/L	0.03	380489	ICP-OES	101%
Lead	T-Pb	0.884	0.857	mg/L	0.05	380489	ICP-OES	103%
Manganese	D-Mn	2.31	2.26	mg/L	0.005	380489	ICP-OES	102%
Molybdenum	D-Mo	0.106	0.097	mg/L	0.03	380489	ICP-OES	109%
Nickel	T-Ni	0.636	0.611	mg/L	0.05	380489	ICP-OES	104%
Selenium	T-Se	*0.2*	*0.2*	mg/L	0.2	380489	ICP-OES	100%
Silver	T-Ag	0.212	0.21	mg/L	0.01	380489	ICP-OES	101%
Strontium	T-Sr	0.105	0.104	mg/L	0.005	380489	ICP-OES	101%
Thallium	T-Tl	0.4	0.38	mg/L	0.2	380489	ICP-OES	105%
Titanium	T-Ti	0.197	0.192	mg/L	0.01	380489	ICP-OES	103%
Vanadium	T-V	1.52	1.5	mg/L	0.03	380489	ICP-OES	101%
Zinc	T-Zn	0.123	0.121	mg/L	0.005	380489	ICP-OES	102%
Mercury	T-Hg	0.0102	0.01	mg/L	0.00001	380644	CVAFS	102%
Fluoride	F	0.988	1.02	mg/L	0.02	380581	Electrode	97%
Calcium	T-Ca	15.6	15.6	mg/L	0.05	380487	ICP-OES	100%
Calcium	T-Ca	14.4	15.6	mg/L	0.04	381032	ICP-MS	92%
Magnesium	T-Mg	5.77	5.85	mg/L	0.1	380487	ICP-OES	99%
Magnesium	T-Mg	5.63	5.85	mg/L	0.01	381032	ICP-MS	96%
Potassium	T-K	34	33.1	mg/L	2	380487	ICP-OES	103%
Potassium	T-K	35.8	33.1	mg/L	0.1	381032	ICP-MS	108%
Sodium	T-Na	41.3	39.1	mg/L	2	380487	ICP-OES	106%
Sodium	T-Na	39.7	39.1	mg/L	0.02	381032	ICP-MS	102%
Ammonia Nitrogen	N	11.5	11.4	mg/L	0.02	380452	Electrode	101%
Aluminum	T-Al	*0.2*	*0.2*	mg/L	0.2	380486	ICP-OES	100%
Antimony	T-Sb	*0.2*	*0.2*	mg/L	0.2	380486	ICP-OES	100%
Antimony	T-Sb	0.0292	0.0272	mg/L	0.0002	380865	HVAAS	107%
Arsenic	T-As	*0.2*	*0.2*	mg/L	0.2	380486	ICP-OES	100%
Arsenic	T-As	0.13	0.128	mg/L	0.0002	381157	HVAAS	102%
Barium	T-Ba	0.348	0.338	mg/L	0.01	380486	ICP-OES	103%
Beryllium	T-Be	0.0778	0.0751	mg/L	0.005	380486	ICP-OES	104%
Boron	T-B	0.22	0.23	mg/L	0.1	380486	ICP-OES	96%
Cadmium	T-Cd	0.094	0.088	mg/L	0.01	380486	ICP-OES	107%
Chromium	T-Cr	0.222	0.218	mg/L	0.01	380486	ICP-OES	102%
Cobalt	T-Co	0.29	0.28	mg/L	0.01	380486	ICP-OES	104%
Copper	T-Cu	0.296	0.287	mg/L	0.01	380486	ICP-OES	103%
Iron	T-Fe	0.375	0.368	mg/L	0.03	380486	ICP-OES	102%
Lead	T-Pb	0.263	0.264	mg/L	0.05	380486	ICP-OES	100%
Manganese	D-Mn	0.495	0.479	mg/L	0.005	380486	ICP-OES	103%
Molybdenum	D-Mo	0.155	0.149	mg/L	0.03	380486	ICP-OES	104%
Nickel	T-Ni	0.092	0.078	mg/L	0.05	380486	ICP-OES	118%
Selenium	T-Se	*0.2*	*0.2*	mg/L	0.2	380486	ICP-OES	100%
Selenium	T-Se	0.0303	0.0307	mg/L	0.0005	380541	HVAAS	99%
Silver	T-Ag	0.067	0.063	mg/L	0.01	380486	ICP-OES	106%
Strontium	T-Sr	0.375	0.367	mg/L	0.005	380486	ICP-OES	102%
Thallium	T-Tl	*0.2*	*0.2*	mg/L	0.2	380486	ICP-OES	100%
Tin	T-Sn	0.88	0.89	mg/L	0.03	380486	ICP-OES	99%
Titanium	T-Ti	0.097	0.093	mg/L	0.01	380486	ICP-OES	104%
Vanadium	T-V	0.102	0.097	mg/L	0.03	380486	ICP-OES	105%
Zinc	T-Zn	0.15	0.148	mg/L	0.005	380486	ICP-OES	101%
Chloride	Cl	79.7	77.9	mg/L	0.5	380989	Colourimetry	102%
Chloride	Cl	8.42	7.79	mg/L	0.5	380988	Colourimetry	108%
Chloride	Cl	160	156	mg/L	0.5	380990	Colourimetry	103%
Total Dissolved Solids		308	314	mg/L	10	381424	Gravimetry	98%

Non-detect values shown at the detection limit in italics.

Number of Parameters Failing EPA Criteria	4
%	3.5%

Number of Parameters Failing ALS Criteria	0
%	0.0%

Inorganic Data Validation Summary

1. PROJECT INFORMATION

Project	Eagle Mine - Kennecott	**Project No.**	043-1055
Date	May 2, 2004		
Laboratory	ALS Environmental		
SDG	ALS File No. U2129		
Description of Analysis	Phase I Kinetic Testing – Week 6		
Report Date	March 31, 2004		
Validator	Cheryl Ross		

2. CHAIN OF CUSTODY

No. of Samples: __5___
No. of Duplicates: __1___

☐ Sample preservation documented on COC.

☐ Samples preserved correctly. ☐ Not Applicable.

☐ Sample temperature documented on COC.

☐ Samples maintained at 4 °C.

Comments:

- Have requested a copy of COC (April 19, 2004 – telecom).

3. SUMMARY OF ANALYSES

Check all analyses included in SDG.

ANALYSIS		NOTES
Metals by ICP-OES	x	
Metals by ICP-MS		
Metals by HVASS		As Sb Se
TDS		
Chloride (APHA 4500)		
Fluoride (APHA 4500)		
Ammonia (APHA 4500)		
Nitrate/Nitrite (APHA 4500)		
Mercury (EPA 7470A/7471/245.7)		

☒ All requested analyses conducted.

Comments:

- Sulphate analysis also requested to compare to CEMI values.
- Redox measurements not provided. Follow-up with CEMI.

4. LABORATORY REMARKS

☒ Detection limits increased due to matrix interferences.

Comments:

- Dissolved metal detection limits increased due to sample matrix interferences.
- Sample 18945 increased due to elevated nickel.

5. HOLDING TIME EVALUATION

ANALYSIS	HOLDING TIME (Days)	APPLICABLE	HT EXCEEDED	NOTES
Metals by ICP-OES	6 months	x		
Metals by ICP-MS	6 months			
Metals by HVASS	6 months			
TDS	7			
Chloride	28			
Fluoride	28			
Ammonia	28			
Nitrate/Nitrite	2			
Mercury	28			

☒ All analyses conducted within acceptable holding times.

Comments/Qualified Results:

- Sulphate analysis by turbidimetric method, holding time of 28 days.

6. FIELD DUPLICATE SAMPLE RESULTS

☒ Duplicate sample submitted. ☐ No duplicate sample.

☒ All RPDs < 20% (samples above 5 times the reporting limit (RL)).

☒ All results +/- 1 RL (samples below 5 times the RL).

Comments/Qualified Results:

7. BATCH QC RESULTS – BLANK SAMPLE

☒ Blank analysis results reported.

☒ All constituents non-detect in the blank sample.

☐ Reporting limits equivalent to project reporting limits.

Constituents detected in blank sample:

Comments/Qualified Results:

- Some detection limits increased above standard ICP-OES.
- Calcium and magnesium reporting limits OK.

8. BATCH QC RESULTS – LABORATORY REPLICATE SAMPLES

☐ Replicate analysis results reported.

☐ All RPDs < 20% (samples above 5 times the reporting limit (RL)).

☐ All results +/- 1 RL (samples below 5 times the RL).

Comments/Qualified Results:

- No laboratory replicate results reported.

9. BATCH QC RESULTS – REFRENCE SAMPLES

☒ Reference sample analysis results reported.

☐ All % Recovery meet EPA criteria (between 80 and 120%).

☒ All % Recovery meet lab criteria.

Comments/Qualified Results:

- One of two total boron reference samples by ICP-OES failed to meet EPA criteria.

10. LABORATORY FOLLOW-UP

- No laboratory replicate analyses reported.
- Copies of COCs.
- Missing redox measurements.

11. ADDITIONAL COMMENTS

- Inter-laboratory comparison of sulphate analysis by CEMI and ALS showed poor correlation for two out of five samples.
- Sulphate reproducibility needs to be addressed.
- Supporting documentation provided in *Phase I Kinetic Testing - QAQC.xls*

C. Rm
Validator

05/05/04
Date

SAMPLE VR71213A
Analysis Kinetic Testing Week 6 - Column 3
Date 30-Mar-04

Analyte	Result	Target	Units	DL	Method	QA/QC RPD
Aluminum	<0.20	<0.20	mg/L	0.2	ICP-OES	0%
Antimony	<0.20	<0.20	mg/L	0.2	ICP-OES	0%
Arsenic	<0.20	<0.20	mg/L	0.2	ICP-OES	0%
Barium	0.033	0.039	mg/L	0.01	ICP-OES	+/-MDL
Beryllium	<0.0050	<0.0050	mg/L	0.005	ICP-OES	0%
Bismuth	<0.20	<0.20	mg/L	0.2	ICP-OES	0%
Boron	<0.10	<0.10	mg/L	0.1	ICP-OES	0%
Cadmium	<0.010	<0.010	mg/L	0.01	ICP-OES	0%
Calcium	10.9	10.8	mg/L	0.05	ICP-OES	1%
Chromium	<0.010	<0.010	mg/L	0.01	ICP-OES	0%
Cobalt	<0.010	<0.010	mg/L	0.01	ICP-OES	0%
Copper	<0.010	<0.010	mg/L	0.01	ICP-OES	0%
Iron	<0.030	<0.030	mg/L	0.03	ICP-OES	0%
Lead	<0.050	<0.050	mg/L	0.05	ICP-OES	0%
Lithium	<0.010	<0.010	mg/L	0.01	ICP-OES	0%
Magnesium	14.7	14.6	mg/L	0.1	ICP-OES	1%
Manganese	<0.0050	<0.0050	mg/L	0.005	ICP-OES	0%
Molybdenum	<0.030	<0.030	mg/L	0.03	ICP-OES	0%
Nickel	<0.050	<0.050	mg/L	0.05	ICP-OES	0%
Phosphorous	<0.30	<0.30	mg/L	0.3	ICP-OES	0%
Potassium	15.4	14.1	mg/L	2	ICP-OES	9%
Selenium	<0.20	<0.20	mg/L	0.2	ICP-OES	0%
Silicon	4.04	4.01	mg/L	0.05	ICP-OES	1%
Silver	<0.010	<0.010	mg/L	0.01	ICP-OES	0%
Sodium	7.4	7.3	mg/L	2	ICP-OES	+/-MDL
Strontium	0.0511	0.05	mg/L	0.005	ICP-OES	2%
Thallium	<0.20	<0.20	mg/L	0.2	ICP-OES	0%
Tin	<0.030	<0.030	mg/L	0.03	ICP-OES	0%
Titanium	<0.010	<0.010	mg/L	0.01	ICP-OES	0%
Vanadium	<0.030	<0.030	mg/L	0.03	ICP-OES	0%
Zinc	0.0114	0.0104	mg/L	0.005	ICP-OES	+/-MDL

Number of Parameters Failing Criteria	0
%	0.0%

RPD = relative percent difference

Shaded and bolded QA/QC RPD values identify samples that fail QA/QC criteria.

Kinetic Testing Duplicate Analysis

043-1055

SAMPLE All Kinetic Testing Samples
Analysis Kinetic Testing Week 6 - Sulphate
Date 30-Mar-04

Analyte		Result (CEMI)	Result (ALS)	Units	Highest DL	Method	QA/QC RPD
Sulphate	Column 1	26	29.7	mg/L	3	Turbidimetric	13%
Sulphate	Column 2	942	1060	mg/L	3	Turbidimetric	12%
Sulphate	Column 3	4	7.5	mg/L	3	Turbidimetric	**>+/-MDL**
Sulphate	Column 4	116	121	mg/L	3	Turbidimetric	4%
Sulphate	Column 5	17	22	mg/L	3	Turbidimetric	**26%**

Number of Parameters Failing Criteria	2
%	40.0%

RPD = relative percent difference

Shaded and bolded QA/QC RPD values identify samples that fail QA/QC criteria.

LABORATORY REFERENCE SAMPLES
Analysis Kinetic Testing - Week 6

QA/QC Report

Analyte		Result	Target	Units	DL	ALSQC#	Method	% Recovery
Bismuth	T-Bi	1.01	1	mg/L	0.1	381833	ICP-OES	101%
Lithium	T-Li	0.213	0.2	mg/L	0.01	381833	ICP-OES	107%
Phosphorus	T-Pb	1.86	2	mg/L	0.3	381833	ICP-OES	93%
Silicon	T-Si	0.999	1	mg/L	0.05	381833	ICP-OES	100%
Tin	T-Sn	1.06	1	mg/L	0.03	381833	ICP-OES	106%
Titanium	T-Ti	0.197	0.2	mg/L	0.01	381833	ICP-OES	99%
Aluminum	T-Al	0.97	1	mg/L	0.2	381834	ICP-OES	97%
Antimony	T-Sb	0.26	0.28	mg/L	0.2	381834	ICP-OES	93%
Arsenic	T-As	0.45	0.49	mg/L	0.2	381834	ICP-OES	92%
Barium	T-Ba	0.502	0.525	mg/L	0.01	381834	ICP-OES	96%
Beryllium	T-Be	0.38	0.397	mg/L	0.005	381834	ICP-OES	96%
Boron	T-B	0.35	0.28	mg/L	0.1	381834	ICP-OES	125%
Cadmium	T-Cd	0.34	0.353	mg/L	0.01	381834	ICP-OES	96%
Chromium	T-Cr	0.165	0.167	mg/L	0.01	381834	ICP-OES	99%
Cobalt	T-Co	0.235	0.24	mg/L	0.01	381834	ICP-OES	98%
Copper	T-Cu	0.383	0.391	mg/L	0.01	381834	ICP-OES	98%
Iron	T-Fe	0.979	1.01	mg/L	0.03	381834	ICP-OES	97%
Lead	T-Pb	0.797	0.857	mg/L	0.05	381834	ICP-OES	93%
Manganese	T-Mn	2.17	2.26	mg/L	0.005	381834	ICP-OES	96%
Molybdenum	T-Mo	0.099	0.097	mg/L	0.03	381834	ICP-OES	102%
Nickel	T-Ni	0.613	0.611	mg/L	0.05	381834	ICP-OES	100%
Selenium	T-Se	0.22	*0.2*	mg/L	0.2	381834	ICP-OES	110%
Silver	T-Ag	0.201	0.210	mg/L	0.01	381834	ICP-OES	96%
Strontium	T-Sr	0.0981	0.104	mg/L	0.005	381834	ICP-OES	94%
Thallium	T-Tl	0.38	0.38	mg/L	0.2	381834	ICP-OES	100%
Titanium	T-Ti	0.194	0.192	mg/L	0.01	381834	ICP-OES	101%
Vanadium	T-V	1.45	1.50	mg/L	0.03	381834	ICP-OES	97%
Zinc	T-Zn	0.119	0.121	mg/L	0.005	381834	ICP-OES	98%
Calcium	T-Ca	15.2	15.6	mg/L	0.05	381832	ICP-OES	97%
Magnesium	T-Mg	5.74	5.85	mg/L	0.1	381832	ICP-OES	98%
Potassium	T-K	34.4	33.1	mg/L	2	381832	ICP-OES	104%
Sodium	T-Na	42.8	39.1	mg/L	2	381832	ICP-OES	109%
Aluminum	T-Al	*0.2*	*0.2*	mg/L	0.2	381831	ICP-OES	100%
Antimony	T-Sb	*0.2*	*0.2*	mg/L	0.2	381831	ICP-OES	100%
Arsenic	T-As	*0.2*	*0.2*	mg/L	0.2	381831	ICP-OES	100%
Barium	T-Ba	0.329	0.338	mg/L	0.01	381831	ICP-OES	97%
Beryllium	T-Be	0.0759	0.0751	mg/L	0.005	381831	ICP-OES	101%
Boron	T-B	0.25	0.23	mg/L	0.1	381831	ICP-OES	109%
Cadmium	T-Cd	0.081	0.088	mg/L	0.01	381831	ICP-OES	92%
Chromium	T-Cr	0.215	0.218	mg/L	0.01	381831	ICP-OES	99%
Cobalt	T-Co	0.281	0.280	mg/L	0.01	381831	ICP-OES	100%
Copper	T-Cu	0.289	0.287	mg/L	0.01	381831	ICP-OES	101%
Iron	T-Fe	0.378	0.368	mg/L	0.03	381831	ICP-OES	103%
Lead	T-Pb	0.255	0.264	mg/L	0.05	381831	ICP-OES	97%
Manganese	T-Mn	0.473	0.479	mg/L	0.005	381831	ICP-OES	99%
Molybdenum	T-Mo	0.149	0.149	mg/L	0.03	381831	ICP-OES	100%
Nickel	T-Ni	0.074	0.078	mg/L	0.05	381831	ICP-OES	95%
Selenium	T-Se	*0.2*	*0.2*	mg/L	0.2	381831	ICP-OES	100%
Silver	T-Ag	0.063	0.063	mg/L	0.01	381831	ICP-OES	100%
Strontium	T-Sr	0.363	0.367	mg/L	0.005	381831	ICP-OES	99%
Thallium	T-Tl	*0.2*	*0.2*	mg/L	0.2	381831	ICP-OES	100%
Tin	T-Sn	0.919	0.89	mg/L	0.03	381831	ICP-OES	103%
Titanium	T-Ti	0.1	0.093	mg/L	0.01	381831	ICP-OES	108%
Vanadium	T-V	0.1	0.097	mg/L	0.03	381831	ICP-OES	103%
Zinc	T-Zn	0.147	0.148	mg/L	0.005	381831	ICP-OES	99%
Sulphate	S04	32.6	31.6	mg/L	1	381548	Turbidimetry	103%
Sulphate	S04	64	63	mg/L	1	381549	Turbidimetry	102%
Sulphate	S04	165	158	mg/L	1	381550	Turbidimetry	104%

Non-detect values shown at the detection limit in italics.

Number of Parameters Failing EPA Criteria	1
%	3.2%
Number of Parameters Failing ALS Criteria	0
%	0.0%

Inorganic Data Validation Summary

1. PROJECT INFORMATION

Project	Eagle Mine - Kennecott	**Project No.**	043-1055
Date	May 2, 2004		
Laboratory	ALS Environmental		
SDG	ALS File No. U2297		
Description of Analysis	Phase I Kinetic Testing – Week 7		
Report Date	April 7, 2004		
Validator	Cheryl Ross		

2. CHAIN OF CUSTODY

No. of Samples: ___5__
No. of Duplicates: ___0__

☐ Sample preservation documented on COC.

☐ Samples preserved correctly. ☐ Not Applicable.

☐ Sample temperature documented on COC.

☐ Samples maintained at 4 °C.

Comments:

- Have requested a copy of COC (April 19, 2004 – telecom).

3. SUMMARY OF ANALYSES

Check all analyses included in SDG.

ANALYSIS		NOTES
Metals by ICP-OES	x	
Metals by ICP-MS		
Metals by HVASS		As Sb Se
TDS		
Chloride (APHA 4500)		
Fluoride (APHA 4500)		
Ammonia (APHA 4500)		
Nitrate/Nitrite (APHA 4500)		
Mercury (EPA 7470A/7471/245.7)		

☒ All requested analyses conducted.

Comments:

- Redox measurements not provided. Follow-up with CEMI.

4. LABORATORY REMARKS

☒ Detection limits increased due to matrix interferences.

Comments:

- Dissolved metal detection limits increased due to sample matrix interferences.

5. HOLDING TIME EVALUATION

ANALYSIS	HOLDING TIME (Days)	APPLICABLE	HT EXCEEDED	NOTES
Metals by ICP-OES	6 months	x		
Metals by ICP-MS	6 months			
Metals by HVASS	6 months			
TDS	7			
Chloride	28			
Fluoride	28			
Ammonia	28			
Nitrate/Nitrite	2			
Mercury	28			

☒ All analyses conducted within acceptable holding times.

Comments/Qualified Results:

6. FIELD DUPLICATE SAMPLE RESULTS

☐ Duplicate sample submitted. ☒ No duplicate sample.

☐ All RPDs < 20% (samples above 5 times the reporting limit (RL)).

☐ All results +/- 1 RL (samples below 5 times the RL).

Comments/Qualified Results:

7. BATCH QC RESULTS – BLANK SAMPLE

☒ Blank analysis results reported.

☒ All constituents non-detect in the blank sample.

☐ Reporting limits equivalent to project reporting limits.

Constituents detected in blank sample:

Comments/Qualified Results:

- Some detection limits increased above standard ICP-OES.
- Calcium and magnesium reporting limits OK.
- Detection limits equivalent to Weeks 4 and 6.

8. BATCH QC RESULTS – LABORATORY REPLICATE SAMPLES

☒ Replicate analysis results reported.

☒ All RPDs < 20% (samples above 5 times the reporting limit (RL)).

☒ All results +/- 1 RL (samples below 5 times the RL).

Comments/Qualified Results:

9. BATCH QC RESULTS – REFRENCE SAMPLES

☒ Reference sample analysis results reported.

☐ All % Recovery meet EPA criteria (between 80 and 120%).

☒ All % Recovery meet lab criteria.

Comments/Qualified Results:

- One of two total boron analyses by ICP-OES failed to meet EPA criteria.

10. LABORATORY FOLLOW-UP

- Redox measurements.
- COCs.

11. ADDITIONAL COMMENTS

- Supporting documentation provided in *Phase I Kinetic Testing – QAQC.xls.*

C. Lom — 05/05/04

Validator **Date**

LABORATORY REPLICATE SAMPLES

Analysis Kinetic Testing - Week 7
Column 3

QA/QC Report

Analyte		Result	Target	Units	DL	ALSQC#	Method	QA/QC RPD
Aluminum	D-Al	<0.20	<0.20	mg/L	0.2	382109	ICP-OES	0%
Antimony	D-Sb	<0.20	<0.20	mg/L	0.2	382109	ICP-OES	0%
Arsenic	D-As	<0.20	<0.20	mg/L	0.2	382109	ICP-OES	0%
Barium	D-Ba	0.044	0.044	mg/L	0.01	382109	ICP-OES	0%
Beryllium	D-Be	<0.0050	<0.0050	mg/L	0.005	382109	ICP-OES	0%
Bismuth	D-Bi	<0.20	<0.20	mg/L	0.2	382109	ICP-OES	0%
Boron	D-B	<0.01	<0.01	mg/L	0.01	382109	ICP-OES	0%
Cadmium	D-Cd	<0.010	<0.010	mg/L	0.01	382109	ICP-OES	0%
Calcium	D-Ca	12	11.9	mg/L	0.05	382109	ICP-OES	1%
Chromium	D-Cr	<0.010	<0.010	mg/L	0.01	382109	ICP-OES	0%
Cobalt	D-Co	<0.010	<0.010	mg/L	0.01	382109	ICP-OES	0%
Copper	D-Cu	<0.010	<0.010	mg/L	0.01	382109	ICP-OES	0%
Iron	D-Fe	<0.030	<0.030	mg/L	0.03	382109	ICP-OES	0%
Lead	D-Pb	<0.050	<0.050	mg/L	0.05	382109	ICP-OES	0%
Lithium	D-Li	<0.010	<0.010	mg/L	0.01	382109	ICP-OES	0%
Magnesium	D-Mg	14	14	mg/L	0.1	382109	ICP-OES	0%
Manganese	D-Mn	<0.0050	<0.0050	mg/L	0.005	382109	ICP-OES	0%
Molybdenum	D-Mo	<0.030	<0.030	mg/L	0.03	382109	ICP-OES	0%
Nickel	D-Ni	<0.050	<0.050	mg/L	0.05	382109	ICP-OES	0%
Phosphorus	D-P	<0.30	<0.30	mg/L	0.3	382109	ICP-OES	0%
Potassium	D-K	12.9	14.2	mg/L	2	382109	ICP-OES	10%
Selenium	D-Se	<0.20	<0.20	mg/L	0.2	382109	ICP-OES	0%
Silicon	D-Si	4.27	4.24	mg/L	0.05	382109	ICP-OES	1%
Silver	D-Ag	<0.010	<0.010	mg/L	0.01	382109	ICP-OES	0%
Sodium	D-Na	6.2	6.2	mg/L	2	382109	ICP-OES	0%
Strontium	D-Sr	0.0503	0.0512	mg/L	0.005	382109	ICP-OES	2%
Thallium	D-Tl	<0.20	<0.20	mg/L	0.2	382109	ICP-OES	0%
Tin	D-Sn	<0.030	<0.030	mg/L	0.03	382109	ICP-OES	0%
Titanium	D-Ti	<0.010	<0.010	mg/L	0.01	382109	ICP-OES	0%
Vanadium	D-V	<0.030	<0.030	mg/L	0.03	382109	ICP-OES	0%
Zinc	D-Zn	0.0096	0.0096	mg/L	0.005	382109	ICP-OES	0%

Number of Parameters Failing Criteria	0
%	0.0

RPD = relative percent difference
Shaded and bolded QA/QC RPD values identify samples that fail QA/QC criteria.

LABORATORY REFERENCE SAMPLES
Analysis Kinetic Testing - Week 7

QA/QC Report

Analyte		Result	Target	Units	DL	ALSQC#	Method	% Recovery
Bismuth	T-Bi	1.00	1.00	mg/L	0.1	382404	ICP-OES	100%
Lithium	T-Li	0.199	0.200	mg/L	0.01	382404	ICP-OES	100%
Phosphorus	T-P	1.94	2.00	mg/L	0.3	382404	ICP-OES	97%
Silicon	T-Si	1.02	1.00	mg/L	0.05	382404	ICP-OES	102%
Tin	T-Sn	0.995	1.00	mg/L	0.03	382404	ICP-OES	100%
Titanium	T-Ti	0.194	0.200	mg/L	0.01	382404	ICP-OES	97%
Aluminum	T-Al	1.00	1.00	mg/L	0.2	382405	ICP-OES	100%
Antimony	T-Sb	0.28	0.28	mg/L	0.2	382405	ICP-OES	100%
Arsenic	T-As	0.49	0.49	mg/L	0.2	382405	ICP-OES	100%
Barium	T-Ba	0.524	0.525	mg/L	0.01	382405	ICP-OES	100%
Beryllium	T-Be	0.397	0.397	mg/L	0.005	382405	ICP-OES	100%
Boron	T-B	0.34	0.28	mg/L	0.1	382405	ICP-OES	**121%**
Cadmium	T-Cd	0.354	0.353	mg/L	0.01	382405	ICP-OES	100%
Chromium	T-Cr	0.168	0.167	mg/L	0.01	382405	ICP-OES	101%
Cobalt	T-Co	0.241	0.24	mg/L	0.01	382405	ICP-OES	100%
Copper	T-Cu	0.39	0.391	mg/L	0.01	382405	ICP-OES	100%
Iron	T-Fe	1.01	1.01	mg/L	0.03	382405	ICP-OES	100%
Lead	T-Pb	0.892	0.857	mg/L	0.05	382405	ICP-OES	104%
Manganese	T-Mn	2.28	2.26	mg/L	0.005	382405	ICP-OES	101%
Molybdenum	T-Mo	0.101	0.097	mg/L	0.03	382405	ICP-OES	104%
Nickel	T-Ni	0.602	0.611	mg/L	0.05	382405	ICP-OES	99%
Selenium	T-Se	0.21	*0.2*	mg/L	0.2	382405	ICP-OES	105%
Silver	T-Ag	0.212	0.210	mg/L	0.01	382405	ICP-OES	101%
Strontium	T-Sr	0.103	0.104	mg/L	0.005	382405	ICP-OES	99%
Thallium	T-Tl	0.41	0.38	mg/L	0.2	382405	ICP-OES	108%
Titanium	T-Ti	0.194	0.192	mg/L	0.01	382405	ICP-OES	101%
Vanadium	T-V	1.49	1.50	mg/L	0.03	382405	ICP-OES	99%
Zinc	T-Zn	0.121	0.121	mg/L	0.005	382405	ICP-OES	100%
Calcium	T-Ca	16.2	15.6	mg/L	0.05	382403	ICP-OES	104%
Magnesium	T-Mg	5.87	5.85	mg/L	0.1	382403	ICP-OES	100%
Potassium	T-K	33.5	33.1	mg/L	2	382403	ICP-OES	101%
Sodium	T-Na	40.3	39.1	mg/L	2	382403	ICP-OES	103%
Aluminum	T-Al	*0.2*	*0.2*	mg/L	0.2	382402	ICP-OES	100%
Antimony	T-Sb	*0.2*	*0.2*	mg/L	0.2	382402	ICP-OES	100%
Arsenic	T-As	*0.2*	*0.2*	mg/L	0.2	382402	ICP-OES	100%
Barium	T-Ba	0.344	0.338	mg/L	0.01	382402	ICP-OES	102%
Beryllium	T-Be	0.0764	0.0751	mg/L	0.005	382402	ICP-OES	102%
Boron	T-B	0.23	0.23	mg/L	0.1	382402	ICP-OES	100%
Cadmium	T-Cd	0.085	0.088	mg/L	0.01	382402	ICP-OES	97%
Chromium	T-Cr	0.217	0.218	mg/L	0.01	382402	ICP-OES	100%
Cobalt	T-Co	0.284	0.28	mg/L	0.01	382402	ICP-OES	101%
Copper	T-Cu	0.291	0.287	mg/L	0.01	382402	ICP-OES	101%
Iron	T-Fe	0.372	0.368	mg/L	0.03	382402	ICP-OES	101%
Lead	T-Pb	0.258	0.264	mg/L	0.05	382402	ICP-OES	98%
Manganese	T-Mn	0.488	0.479	mg/L	0.005	382402	ICP-OES	102%
Molybdenum	T-Mo	0.154	0.149	mg/L	0.03	382402	ICP-OES	103%
Nickel	T-Ni	0.602	0.611	mg/L	0.05	382405	ICP-OES	99%
Selenium	T-Se	*0.2*	*0.2*	mg/L	0.2	382402	ICP-OES	100%
Silver	T-Ag	0.065	0.063	mg/L	0.01	382402	ICP-OES	103%
Strontium	T-Sr	0.366	0.367	mg/L	0.005	382402	ICP-OES	100%
Thallium	T-Tl	*0.2*	*0.2*	mg/L	0.2	382402	ICP-OES	100%
Tin	T-Sn	0.857	0.890	mg/L	0.03	382402	ICP-OES	96%
Titanium	T-Ti	0.092	0.093	mg/L	0.01	382402	ICP-OES	99%
Vanadium	T-V	0.100	0.097	mg/L	0.03	382402	ICP-OES	103%
Zinc	T-Zn	0.148	0.148	mg/L	0.005	382402	ICP-OES	100%

Non-detect values shown at the detection limit in italics.

Number of Parameters Failing EPA Criteria	1
%	2.1%

Number of Parameters Failing ALS Criteria	0
%	0.0%

APPENDIX B-2

ARSENIC, ANTIMONY AND SELENIUM - HVAAS VERSUS ICP-MS ANALYSIS

TECHNICAL MEMORANDUM

TO:	Eugene Smary – Warner Norcross & Judd	**DATE:**	March 19, 2004
FR:	Cheryl Ross, Rens Verburg – Golder Associates Inc. Mark Logsdon – Geochimica, Inc.	**OUR REF:**	043-1055
CC:	Ian Graham, Steven Coombes – Kennecott Canada Exploration Inc. Jon Cherry – Kennecott Minerals Company Steve Atkin John Jambor - Leslie Research and Consulting		
RE:	Analytical Comparison – As, Se and Sb Analysis by ICP-MS and HVAAS		

1.0 INTRODUCTION

The Phase I Acid Rock Drainage (ARD) Sampling and Analysis Plan (SAP) stipulated that during the initial stages of kinetic testing, arsenic (As), antimony (Sb) and selenium (Se) analysis would be performed by both inductively coupled plasma mass spectrometry (ICP-MS) and hydride vapour atomic absorption spectrometry (HVAAS). It was anticipated that better reporting limits would be achievable using HVAAS due to anticipated matrix interferences in ICP-MS analysis. A determination regarding the continuation of HVAAS analysis beyond week 3 is to be made based on the results of weeks 0, 1 and 3 analyses.

This Technical Memorandum presents a comparison of As, Se and Sb analytical results for weeks 0, 1 and 3. The minimum reporting limits (RL) for each analyte are listed below. Because of matrix interferences, these limits may not always be achievable.

Analyte	Minimum Reporting Limits (mg/L)	
	ICP-MS	HVAAS
Antimony (Sb)	0.0001	0.0002
Arsenic (As)	0.0001	0.0002
Selenium (Se)	0.001	0.0005

The results of analysis by ICP-MS and HVAAS were reviewed to evaluate the following:

- Analytical precision by comparison of ICP-MS and HVAAS results; and,
- Differences in achievable reporting limits.

The comparability (or precision) of results by ICP-MS and HVAAS was assessed by applying guidelines from the *The USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (USEPA, 2002). This guidance document outlines the following acceptability criteria (referred to as control limits) for the evaluation of laboratory replicates by ICP-MS.

- For laboratory replicate analyses, a control limit of 20% for the Relative Percent Difference (RPD) is applied to original and duplicate sample values that are greater than or equal to five times the Contract Required Quantitation Limit (CRQL) (referred to as the reporting limit (RL) in the current study).

- If either the original or duplicate sample is less than five times the CRQL (RL), a control limit of one times the CRQL is applied.

These data quality objectives (DQOs) are slightly different than those outlined by ALS Environmental (ALS). Consistent with the EPA guidelines, ALS also stipulates that the RPD for duplicate analyses should be less than 20%. However, when two results are near the detection limit ("near" is not defined in their documentation), the following DQO is applied:

$$DQO = (RDP\% * Mean) + (\sqrt{2} x RL)$$

This criterion is less stringent than the EPA guidelines.

For the current study, analytical results were first assessed against the EPA criteria. If the analytical results failed to meet the EPA criteria, the results were assessed against the ALS criteria.

2.0 KINETIC TESTING RESULTS EVALUATION

Arsenic, antimony, and selenium results for weeks 0, 1 and 3 are shown in Table 1. For each analysis, the reporting limit is also shown. Analytical results are presented graphically in Figures 1 through 3. Due to insufficient sample volume, arsenic was not analyzed by HVAAS in column 3, week 3 leachate.

The following observations are made following review of the data:

Analytical Precision

- Good agreement is observed for Sb and Se analysis by ICP-MS and HVAAS. All results passed the EPA guidelines for acceptable duplicate analysis.

- Three out of fourteen arsenic results failed the EPA criteria (these samples are identified in Figure 1). For these three samples, analytical results were close to the reporting limit. When the less restrictive ALS precision criterion was applied, only one out of the three samples failed to pass the ALS DQO.

Reporting Limits

- Selenium analysis by HVAAS consistently achieved lower reporting limits than analysis by ICP-MS. Due to matrix interferences, selenium reporting limits by ICP-MS for the massive sulphide sample (column 2) were consistently above the lowest regulatory criterion.

- Reporting limits for arsenic analysis by ICP-MS and HVAAS were at or below the lowest regulatory limit of 0.01 mg/L for all samples. Arsenic reporting limits for columns 1 and 5 (the siltstone samples) were typically marginally lower for ICP-MS than HVAAS. Due to matrix interferences, sample dilution for analysis by ICP-MS was required for columns 2 and

4 (the massive sulphide and semi massive sulphide), resulting in higher detection limits than those achievable by HVAAS.

- The antimony reporting limit for HVAAS analysis of week 1 samples was increased from 0.0002 mg/L to 0.002 mg/L. This reporting limit is above the lowest regulatory limit of 0.017 mg/L. For these samples, the reporting limits achieved by ICP-MS were lower than the regulatory limit. When sample dilutions were required for ICP-MS (for example for all column 2 leachates), lower reporting limits were typically achieved by HVAAS.

3.0 RECOMMENDATION

Sample dilution due to matrix interferences results in an increase in the reporting limits by ICP-MS. To date, leachates from column 2 (massive sulfide sample) have experienced the greatest dilutions. Similar dilutions will likely be required in the future for column 4 (the semi massive sulphide sample) and column 3 (the peridotite sample).

To achieve method detection limits below the lowest regulatory limit, it is recommended that selenium analysis by HVAAS be continued beyond week 3 for all columns. For selenium analysis by ICP-MS, a sample dilution by a factor of five is all that is required for the ICP-MS reporting limit to be equivalent to the lowest regulatory limit.

A 100-fold sample dilution is required to raise the ICP-MS reporting limit for arsenic to the lowest regulatory limit. This degree of dilution has been applied to column 2 leachates. It is therefore recommended that HVAAS analysis be continued for column 2 leachates. HVAAS analysis for the remaining columns could be continued whenever the ICP-MS reporting limit is above 0.001 mg/L (a 10-fold dilution).

Continuation of antimony analysis by HVAAS is also recommended for column 2 leachates. At a minimum, HVAAS analysis for the remaining cells should be continued whenever the ICP-MS reporting limit rises above 0.001 mg/L (a 10 fold dilution).

The drawbacks of continuing HVAAS analysis are as follows:

- Increased analytical costs; and,

- Reduction in sample volume available for replicate analysis may result in omission of this quality assurance quality control (QA/QC) analysis. Inadequate sample volume precluded replicate analyses in week 0 leachates.

4.0 REFERENCES

U.S. Environmental Protection Agency, 2002. USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review – Final, EPA 540-R-01-008, July 2002.

APPENDIX B-3

STATIC TESTING (ABA AND WHOLE ROCK ANALYSIS) - DATA VALIDATION REPORTS AND SUPPORTING DOCUMENTATION

Kinetic Testing Duplicate Analysis
Arsenic ICP-MS versus HVAAS

043-1055

Sample All Kinetic Testing Columns
Analysis Arsenic Analysis (ICP-MS vs. HVAAS)
Date Various

Column	Sample	Analyte	ICP-MS Result	ICP-MS DL	HVAAS Result	HVAAS DL	Units	QA/QC RPD
1-SLST	Week 0	As	0.0486	0.0001	0.0528	0.002	mg/L	8%
1-SLST	Week 1	As	0.0237	0.0002	0.0266	0.0002	mg/L	12%
1-SLST	Week 3	As	0.0257	0.0001	0.0243	0.0002	mg/L	6%
1-SLST	Week 5	As	0.0233	0.0001	0.0329	0.0002	mg/L	**34%**
2-MSU	Week 0	As	<0.0050	0.005	0.00527	0.0002	mg/L	+/- MDL
2-MSU	Week 1	As	<0.0050	0.005	0.0184	0.0002	mg/L	**> +/- MDL**
2-MSU	Week 3	As	<0.010	0.01	0.012	0.0002	mg/L	+/- MDL
2-MSU	Week 5	As	<0.010	0.01	0.00635	0.0002	mg/L	+/- MDL
3-PER	Week 0	As	<0.0020	0.002	<0.00020	0.0002	mg/L	+/- MDL
3-PER	Week 1	As	0.00135	0.0002	0.0009	0.0002	mg/L	**> +/- MDL**
3-PER	Week 3	As	0.00323	0.0001			mg/L	
3-PER	Week 5	As	0.00048	0.0001	0.0006	0.0002	mg/L	+/-MDL
4-SMSU	Week 0	As	0.00071	0.0005	0.00156	0.0002	mg/L	**> +/- MDL**
4-SMSU	Week 1	As	0.00111	0.0005	0.0015	0.0002	mg/L	+/-MDL
4-SMSU	Week 3	As	<0.0020	0.002	0.00242	0.0002	mg/L	+/- MDL
4-SMSU	Week 5	As	0.00053	0.0001	0.0012	0.0002	mg/L	**77%**
5-SLST	Week 0	As	0.024	0.0001	0.0269	0.002	mg/L	11%
5-SLST	Week 1	As	0.0132	0.0001	0.0132	0.0002	mg/L	0%
5-SLST	Week 3	As	0.0253	0.0001	0.0233	0.0002	mg/L	8%
5-SLST	Week 5	As	0.02	0.0001	0.0264	0.0002	mg/L	**28%**

Number of Analyses Failing Criteria	6
%	31.6%

RPD = relative percent difference

Shaded and bolded QA/QC RPD values identify samples that fail QA/QC criteria.

Kinetic Testing Duplicate Analysis
Antimony ICP-MS versus HVAAS

043-1055

Sample All Kinetic Testing Columns
Analysis Antimony Analysis (ICP-MS vs. HVAAS)
Date Various

Column	Sample	Analyte	ICP-MS Result	ICP-MS DL	HVAAS Result	HVAAS DL	Units	QA/QC RPD
1-SLST	Week 0	Sb	0.0117	0.0001	0.0112	0.0002	mg/L	4%
1-SLST	Week 1	Sb	0.00783	0.0002	0.0085	0.002	mg/L	+/- MDL
1-SLST	Week 3	Sb	0.00596	0.0001	0.00594	0.0002	mg/L	0%
1-SLST	Week 5	Sb	0.00487	0.0001	0.0044	0.002	mg/L	+/-MDL
2-MSU	Week 0	Sb	<0.0050	0.005	<0.00020	0.0002	mg/L	+/- MDL
2-MSU	Week 1	Sb	<0.0050	0.005	<0.0020	0.002	mg/L	+/- MDL
2-MSU	Week 3	Sb	<0.010	0.01	0.00252	0.0002	mg/L	+/- MDL
2-MSU	Week 5	Sb	<0.010	0.01	<0.0020	0.002	mg/L	+/- MDL
3-PER	Week 0	Sb	0.00101	0.0001	0.001	0.0002	mg/L	+/-MDL
3-PER	Week 1	Sb	0.00145	0.0002	<0.0020	0.002	mg/L	+/- MDL
3-PER	Week 3	Sb	0.001	0.0001	0.0008	0.0002	mg/L	+/- MDL
3-PER	Week 5	Sb	0.00064	0.0001	<0.0020	0.002	mg/L	+/- MDL
4-SMSU	Week 0	Sb	0.00086	0.0005	0.001	0.0002	mg/L	+/-MDL
4-SMSU	Week 1	Sb	0.00129	0.0005	<0.0020	0.002	mg/L	+/- MDL
4-SMSU	Week 3	Sb	<0.0010	0.001	0.0013	0.0002	mg/L	+/- MDL
4-SMSU	Week 5	Sb	0.00059	0.0001	<0.0020	0.002	mg/L	+/- MDL
5-SLST	Week 0	Sb	0.0179	0.0001	0.0165	0.0002	mg/L	8%
5-SLST	Week 1	Sb	0.0094	0.0001	0.0095	0.002	mg/L	+/-MDL
5-SLST	Week 3	Sb	0.0053	0.0001	0.0053	0.0002	mg/L	0%
5-SLST	Week 5	Sb	0.00332	0.0001	0.0024	0.002	mg/L	+/-MDL

Number of Analyses Failing Criteria	0
%	0.0%

RPD = relative percent difference

Shaded and bolded QA/QC RPD values identify samples that fail QA/QC criteria.

Kinetic Testing Duplicate Analysis
Selenium ICP-MS versus HVAAS

Sample All Kinetic Testing Columns
Analysis Selenium Analysis (ICP-MS vs. HVAAS)
Date Various

Column	Sample	Analyte	ICP-MS Result	ICP-MS DL	HVAAS Result	HVAAS DL	Units	QA/QC RPD
1-SLST	Week 0	Se	0.0021	0.001	0.00199	0.0005	mg/L	+/-MDL
1-SLST	Week 1	Se	<0.0020	0.002	0.001	0.0005	mg/L	+/- MDL
1-SLST	Week 3	Se	<0.0010	0.001	<0.00050	0.0005	mg/L	+/- MDL
1-SLST	Week 5	Se	<0.0010	0.001	0.00066	0.0005	mg/L	+/- MDL
2-MSU	Week 0	Se	<0.050	0.05	0.00553	0.0005	mg/L	+/- MDL
2-MSU	Week 1	Se	<0.025	0.025	0.017	0.0005	mg/L	+/- MDL
2-MSU	Week 3	Se	<0.10	0.1	0.0497	0.0005	mg/L	+/- MDL
2-MSU	Week 5	Se	<0.10	0.1	0.0365	0.0005	mg/L	+/- MDL
3-PER	Week 0	Se	<0.0020	0.002	<0.00050	0.0005	mg/L	+/- MDL
3-PER	Week 1	Se	<0.0020	0.002	<0.00050	0.0005	mg/L	+/- MDL
3-PER	Week 3	Se	<0.0010	0.001	<0.00050	0.0005	mg/L	+/- MDL
3-PER	Week 5	Se	<0.0010	0.001	<0.00050	0.0005	mg/L	+/- MDL
4-SMSU	Week 0	Se	<0.0050	0.005	0.00129	0.0005	mg/L	+/- MDL
4-SMSU	Week 1	Se	<0.0050	0.005	0.0023	0.0005	mg/L	+/- MDL
4-SMSU	Week 3	Se	<0.0050	0.005	0.00216	0.0005	mg/L	+/- MDL
4-SMSU	Week 5	Se	0.0025	0.001	0.00236	0.0005	mg/L	+/-MDL
5-SLST	Week 0	Se	0.0022	0.001	0.002	0.0005	mg/L	+/-MDL
5-SLST	Week 1	Se	0.00097	0.0005	0.001	0.0005	mg/L	+/-MDL
5-SLST	Week 3	Se	0.0014	0.001	0.00137	0.0005	mg/L	+/-MDL
5-SLST	Week 5	Se	<0.0010	0.001	0.00126	0.0005	mg/L	+/- MDL

Number of Analyses Failing Criteria	0
%	0.0%

RPD = relative percent difference

Shaded and bolded QA/QC RPD values identify samples that fail QA/QC criteria.

SPLP Testing Duplicate Analysis
Arsenic ICP-MS versus HVAAS

043-1055

Sample SPLP Leachates
Analysis Arsenic Analysis (ICP-MS vs. HVAAS)
Date 22-Apr-04

Sample	Analyte	ICP-MS Result	ICP-MS DL	HVAAS Result	HVAAS DL	Units	QA/QC RPD
VR90425A	As	0.00858	0.0001	0.00823	0.0002	mg/L	4%
VR91625A	As	0.00843	0.0001	0.00838	0.0002	mg/L	1%
VR91620A	As	0.0065	0.0001	0.00671	0.0002	mg/L	3%
VR71109A	As	0.00741	0.0001	0.00707	0.0002	mg/L	5%
VR91306A	As	0.0103	0.0001	0.0108	0.0002	mg/L	5%
VR71275A	As	0.00057	0.0001	0.00061	0.0002	mg/L	+/-MDL
VR91267A	As	0.00033	0.0001	0.00033	0.0002	mg/L	0%
VR71373A	As	0.00029	0.0001	0.00035	0.0002	mg/L	+/-MDL
VR90181A	As	<0.00050	0.0005	<0.00020	0.0002	mg/L	+/-MDL
VR90125A	As	0.00044	0.0001	0.00063	0.0002	mg/L	+/-MDL
BLANK	As	0.00065	0.0001	0.00068	0.0002	mg/L	+/-MDL

Number of Analyses Failing Criteria	0
%	0.0%

RPD = relative percent difference
Shaded and bolded QA/QC RPD values identify samples that fail QA/QC criteria.

SPLP Testing Duplicate Analysis
Antimony ICP-MS versus HVAAS

Sample SPLP Leachates
Analysis Antimony Analysis (ICP-MS vs. HVAAS)
Date 22-Apr-04

Sample	Analyte	ICP-MS Result	ICP-MS DL	HVAAS Result	HVAAS DL	Units	QA/QC RPD
VR90425A	Sb	0.00084	0.0001	0.0008	0.0002	mg/L	+/-MDL
VR91625A	Sb	0.00324	0.0001	0.0032	0.0002	mg/L	1%
VR91620A	Sb	0.00067	0.0001	0.00078	0.0002	mg/L	+/-MDL
VR71109A	Sb	0.00067	0.0001	0.00072	0.0002	mg/L	+/-MDL
VR91306A	Sb	0.00522	0.0001	0.0054	0.0002	mg/L	3%
VR71275A	Sb	<0.00010	0.0001	<0.00020	0.0002	mg/L	+/-MDL
VR91267A	Sb	<0.00010	0.0001	<0.00020	0.0002	mg/L	+/-MDL
VR71373A	Sb	0.00015	0.0001	<0.00020	0.0002	mg/L	+/-MDL
VR90181A	Sb	<0.00050	0.0005	<0.00020	0.0002	mg/L	+/-MDL
VR90125A	Sb	0.0004	0.0001	0.00048	0.0002	mg/L	+/-MDL
BLANK	Sb	0.00106	0.0001	0.00102	0.0002	mg/L	4%

Number of Analyses Failing Criteria	0
%	0.0%

RPD = relative percent difference

Shaded and bolded QA/QC RPD values identify samples that fail QA/QC criteria.

SPLP Testing Duplicate Analysis
Selenium ICP-MS versus HVAAS

043-1055

Sample SPLP Leachates
Analysis Selenium Analysis (ICP-MS vs. HVAAS)
Date 22-Apr-04

Sample	Analyte	ICP-MS Result	ICP-MS DL	HVAAS Result	HVAAS DL	Units	QA/QC RPD
VR90425A	Se	<0.0010	0.001	<0.00050	0.0005	mg/L	+/-MDL
VR91625A	Se	<0.0010	0.001	<0.00050	0.0005	mg/L	+/-MDL
VR91620A	Se	<0.0010	0.001	<0.00050	0.0005	mg/L	+/-MDL
VR71109A	Se	<0.0010	0.001	<0.00050	0.0005	mg/L	+/-MDL
VR91306A	Se	<0.0010	0.001	0.00065	0.0005	mg/L	+/-MDL
VR71275A	Se	<0.0010	0.001	0.00086	0.0005	mg/L	+/-MDL
VR91267A	Se	<0.0010	0.001	0.00059	0.0005	mg/L	+/-MDL
VR71373A	Se	<0.0010	0.001	<0.00050	0.0005	mg/L	+/-MDL
VR90181A	Se	<0.0050	0.005	0.00187	0.0005	mg/L	+/-MDL
VR90125A	Se	<0.0010	0.001	<0.00050	0.0005	mg/L	+/-MDL
BLANK	Se	<0.0010	0.001	<0.00050	0.0005	mg/L	+/-MDL

Number of Analyses Failing Criteria	0
%	0.0%

RPD = relative percent difference
Shaded and bolded QA/QC RPD values identify samples that fail QA/QC criteria.

Solids Duplicate Analysis

SAMPLE VR91623A
Analysis Trace Metal Analysis
Date 23-Mar-04

Analyte	Result	Duplicate	Units	DL	Method	QA/QC RPD
Ag	0.09	0.1	ppm	0.01	ME-MS41	10.5%
Al	1.83	1.8	%	0.01	ME-MS41	1.7%
As	16.4	15.1	ppm	0.1	ME-MS41	8.3%
B	<10	<10	ppm	10	ME-MS41	0%
Ba	30	30	ppm	10	ME-MS41	0%
Be	0.27	0.28	ppm	0.05	ME-MS41	3.6%
Bi	0.17	0.17	ppm	0.01	ME-MS41	0%
Ca	2.69	2.62	%	0.01	ME-MS41	2.6%
Cd	0.13	0.1	ppm	0.01	ME-MS41	26.1%
Ce	44.9	45.5	ppm	0.02	ME-MS41	1.3%
Co	14.8	13.7	ppm	0.1	ME-MS41	7.7%
Cr	166	152	ppm	1	ME-MS41	8.8%
Cs	0.46	0.46	ppm	0.05	ME-MS41	0%
Cu	37.1	38.2	ppm	0.2	ME-MS41	2.9%
Fe	3.64	3.58	%	0.01	ME-MS41	1.7%
Ga	5.71	5.36	ppm	0.05	ME-MS41	6.3%
Ge	0.09	0.09	ppm	0.05	ME-MS41	0%
Hf	0.39	0.4	ppm	0.02	ME-MS41	2.5%
Hg	0.1	0.1	ppm	0.01	ME-MS41	0%
In	0.013	0.012	ppm	0.005	ME-MS41	+/- 2 MDL
K	0.18	0.17	%	0.01	ME-MS41	5.7%
La	22.5	21.7	ppm	0.2	ME-MS41	3.6%
Li	28.1	27.5	ppm	0.1	ME-MS41	2.2%
Mg	0.96	0.96	%	0.01	ME-MS41	0%
Mn	510	497	ppm	5	ME-MS41	2.6%
Mo	2.78	2.64	ppm	0.05	ME-MS41	5.2%
Na	0.02	0.02	%	0.01	ME-MS41	0%
Nb	<0.05	<0.05	ppm	0.05	ME-MS41	0%
Ni	62	62.5	ppm	0.2	ME-MS41	0.8%
P	450	430	ppm	10	ME-MS41	4.5%
Pb	15.1	15.8	ppm	0.2	ME-MS41	4.5%
Rb	9.1	8.6	ppm	0.1	ME-MS41	5.6%
Re	<0.001	<0.001	ppm	0.001	ME-MS41	0%
S	0.36	0.37	%	0.01	ME-MS41	2.7%
Sb	0.68	0.63	ppm	0.05	ME-MS41	7.6%
Sc	3.8	3.8	ppm	0.1	ME-MS41	0%
Se	0.4	0.4	ppm	0.2	ME-MS41	0%
Sn	0.2	0.3	ppm	0.2	ME-MS41	+/- 2 MDL
Sr	182	178	ppm	0.2	ME-MS41	2.2%
Ta	<0.01	<0.01	ppm	0.01	ME-MS41	0%
Te	0.01	0.02	ppm	0.01	ME-MS41	+/- 2 MDL
Th	4.9	4.3	ppm	0.2	ME-MS41	13.0%
Ti	0.005	0.005	%	0.005	ME-MS41	0%
Tl	0.1	0.09	ppm	0.02	ME-MS41	+/- 2 MDL
U	0.9	0.85	ppm	0.05	ME-MS41	5.7%
V	28	26	ppm	1	ME-MS41	7.4%
W	0.15	0.06	ppm	0.05	ME-MS41	+/- 2 MDL
Y	6.84	6.44	ppm	0.05	ME-MS41	6.0%
Zn	87	78	ppm	2	ME-MS41	10.9%
Zr	14.8	14.7	ppm	0.5	ME-MS41	0.7%

Number of Parameters Failing Criteria	0
%	0.0%

RPD = relative percent difference

Shaded and bolded QA/QC RPD values identify samples that fail QA/QC criteria.

SAMPLE VR90181A
Analysis Trace Metal Analysis
Date 23-Mar-04

Analyte	Result	Duplicate	Units	DL	Method	QA/QC RPD
Ag	27.7	28.4	ppm	0.01	ME-MS41	2.5%
Al	0.02	0.02	%	0.01	ME-MS41	0%
As	5.9	5.3	ppm	0.1	ME-MS41	10.7%
B	<10	<10	ppm	10	ME-MS41	0%
Ba	<10	<10	ppm	10	ME-MS41	0%
Be	<0.05	<0.05	ppm	0.05	ME-MS41	0%
Bi	5.73	6.12	ppm	0.01	ME-MS41	6.6%
Ca	<0.01	<0.01	%	0.01	ME-MS41	0%
Cd	9.93	10.3	ppm	0.01	ME-MS41	3.7%
Ce	0.48	0.42	ppm	0.02	ME-MS41	13.3%
Co	1110	1120	ppm	0.1	ME-MS41	0.9%
Cr	<1	<1	ppm	1	ME-MS41	0%
Cs	0.05	0.05	ppm	0.05	ME-MS41	0%
Cu	>10000	>10000	ppm	0.2	ME-MS41	0%
Fe	>15	>15	%	0.01	ME-MS41	0%
Ga	1.03	0.96	ppm	0.05	ME-MS41	7.0%
Ge	1.99	2.06	ppm	0.05	ME-MS41	3.5%
Hf	0.02	0.05	ppm	0.02	ME-MS41	+/- 2 MDL
Hg	0.25	0.27	ppm	0.01	ME-MS41	7.7%
In	0.653	0.659	ppm	0.005	ME-MS41	0.9%
K	0.01	<0.01	%	0.01	ME-MS41	+/- 2 MDL
La	0.2	0.2	ppm	0.2	ME-MS41	0%
Li	1.1	2	ppm	0.1	ME-MS41	**58.1%**
Mg	0.04	0.03	%	0.01	ME-MS41	+/- 2 MDL
Mn	286	255	ppm	5	ME-MS41	11.5%
Mo	3.19	3.29	ppm	0.05	ME-MS41	3.1%
Na	<0.01	<0.01	%	0.01	ME-MS41	0%
Nb	0.39	0.33	ppm	0.05	ME-MS41	16.7%
Ni	>10000	>10000	ppm	0.2	ME-MS41	0%
P	<10	10	ppm	10	ME-MS41	+/- 2 MDL
Pb	64.4	62.3	ppm	0.2	ME-MS41	3.3%
Rb	0.3	0.3	ppm	0.1	ME-MS41	0%
Re	0.058	0.061	ppm	0.001	ME-MS41	5.0%
S	6.89	7.26	%	0.01	ME-MS41	5.2%
Sb	0.46	0.38	ppm	0.05	ME-MS41	19.0%
Sc	1	1.1	ppm	0.1	ME-MS41	9.5%
Se	83.9	86.8	ppm	0.2	ME-MS41	3.4%
Sn	12.2	11.7	ppm	0.2	ME-MS41	4.2%
Sr	1.4	1.4	ppm	0.2	ME-MS41	0%
Ta	<0.01	<0.01	ppm	0.01	ME-MS41	0%
Te	11.6	11.85	ppm	0.01	ME-MS41	2.1%
Th	<0.2	<0.2	ppm	0.2	ME-MS41	0%
Ti	0.009	0.007	%	0.005	ME-MS41	+/- 2 MDL
Tl	0.7	0.57	ppm	0.02	ME-MS41	20.5%
U	<0.05	<0.05	ppm	0.05	ME-MS41	0%
V	62	55	ppm	1	ME-MS41	12.0%
W	0.21	0.13	ppm	0.05	ME-MS41	+/- 2 MDL
Y	0.11	0.12	ppm	0.05	ME-MS41	+/- 2 MDL
Zn	186	184	ppm	2	ME-MS41	1.1%
Zr	0.9	1.8	ppm	0.5	ME-MS41	+/- 2 MDL

Number of Parameters Failing Criteria	1
%	2.0%

RPD = relative percent difference
Shaded and bolded QA/QC RPD values identify samples that fail QA/QC criteria.

Solids Duplicate Analysis

043-1055

SAMPLE VR91627A
Analysis Trace Metal Analysis
Date 23-Mar-04

Analyte	Result	Duplicate	Units	DL	Method	QA/QC RPD
Ag	0.25	0.2	ppm	0.01	ME-MS41	22.2%
Al	2.54	2.48	%	0.01	ME-MS41	2.4%
As	14.4	14.6	ppm	0.1	ME-MS41	1.4%
Ba	40	30	ppm	10	ME-MS41	+/- 2 MDL
Be	0.42	0.35	ppm	0.05	ME-MS41	18.2%
Bi	0.57	0.54	ppm	0.01	ME-MS41	5.4%
Cd	0.88	0.89	ppm	0.01	ME-MS41	1.1%
Ce	59.8	59	ppm	0.02	ME-MS41	1.3%
Co	25.3	22.8	ppm	0.1	ME-MS41	10.4%
Cr	85	75	ppm	1	ME-MS41	12.5%
Cs	0.49	0.41	ppm	0.05	ME-MS41	17.8%
Cu	192	86.5	ppm	0.2	ME-MS41	**75.8%**
Fe	5.72	5.76	%	0.01	ME-MS41	0.7%
Ga	6.73	6.58	ppm	0.05	ME-MS41	2.3%
Ge	0.12	0.14	ppm	0.05	ME-MS41	+/- 2 MDL
Hf	0.86	0.81	ppm	0.02	ME-MS41	6.0%
Hg	0.19	0.17	ppm	0.01	ME-MS41	11.1%
In	0.049	0.042	ppm	0.005	ME-MS41	15.4%
K	0.27	0.2	%	0.01	ME-MS41	29.8%
La	29.4	29.6	ppm	0.2	ME-MS41	0.7%
Li	45.8	45.1	ppm	0.1	ME-MS41	1.5%
Mg	1.62	1.58	%	0.01	ME-MS41	2.5%
Mn	269	270	ppm	5	ME-MS41	0.4%
Mo	7.23	7.17	ppm	0.05	ME-MS41	0.8%
Ni	219	122	ppm	0.2	ME-MS41	**56.9%**
P	580	590	ppm	10	ME-MS41	1.7%
Pb	32.6	33.7	ppm	0.2	ME-MS41	3.3%
Rb	12.8	10	ppm	0.1	ME-MS41	24.6%
S	1.41	1.39	%	0.01	ME-MS41	1.4%
Sb	1.71	1.75	ppm	0.05	ME-MS41	2.3%
Sc	3.8	3.3	ppm	0.1	ME-MS41	14.1%
Se	0.8	0.7	ppm	0.2	ME-MS41	+/- 2 MDL
Sn	0.3	0.2	ppm	0.2	ME-MS41	+/- 2 MDL
Sr	15.4	15.2	ppm	0.2	ME-MS41	1.3%
Te	0.06	0.05	ppm	0.01	ME-MS41	+/- 2 MDL
Th	6.5	6	ppm	0.2	ME-MS41	8.0%
Tl	0.16	0.13	ppm	0.02	ME-MS41	20.7%
U	2.34	2.06	ppm	0.05	ME-MS41	12.7%
V	32	30	ppm	1	ME-MS41	6.5%
W	0.07	<0.05	ppm	0.05	ME-MS41	+/- 2 MDL
Y	9.97	9.3	ppm	0.05	ME-MS41	7.0%
Zn	210	209	ppm	2	ME-MS41	0.5%
Zr	34.6	33.1	ppm	0.5	ME-MS41	4.4%

Number of Parameters Failing Criteria	2
%	4.0%

RPD = relative percent difference

Shaded and bolded QA/QC RPD values identify samples that fail QA/QC criteria.

Solids Duplicate Analysis

043-1055

SAMPLE VR91623A
Analysis Whole Rock
Date 22-Mar-04

Analyte	Result	Duplicate	Units	DL	Method	QA/QC RPD
SiO2	64.52	64.25	%	0.01	ME-XRF06	0.4%
Al2O3	13.24	12.99	%	0.01	ME-XRF06	1.9%
Fe2O3	5.95	5.86	%	0.01	ME-XRF06	1.5%
CaO	3.84	3.81	%	0.01	ME-XRF06	0.8%
MgO	1.93	1.9	%	0.01	ME-XRF06	1.6%
Na2O	2.47	2.49	%	0.01	ME-XRF06	0.8%
K2O	1.73	1.73	%	0.01	ME-XRF06	0%
Cr2O3	0.09	0.03	%	0.01	ME-XRF06	**> +/- 2 MDL**
TiO2	0.62	0.63	%	0.01	ME-XRF06	1.6%
MnO	0.06	0.06	%	0.01	ME-XRF06	0%
P2O5	0.09	0.11	%	0.01	ME-XRF06	20.0%
SrO	0.04	0.04	%	0.01	ME-XRF06	0%
BaO	0.03	0.04	%	0.01	ME-XRF06	+/- 2 MDL
LOI	3.8	4.29	%	0.01	ME-XRF06	12.1%
Total	98.41	98.21	%		ME-XRF06	0.2%

Number of Parameters Failing Criteria		1
	%	7.1%

RPD = relative percent difference

Shaded and bolded QA/QC RPD values identify samples that fail QA/QC criteria.

SAMPLE VR90181A
Analysis Whole Rock
Date 22-Mar-04

Analyte	Result	Duplicate	Units	DL	Method	QA/QC RPD
SiO2	0.61	0.57	%	0.01	ME-XRF06	6.8%
Al2O3	0.13	0.12	%	0.01	ME-XRF06	8.0%
Fe2O3	73.77	73.67	%	0.01	ME-XRF06	0.1%
CaO	0.02	0.02	%	0.01	ME-XRF06	0%
MgO	0.2	0.18	%	0.01	ME-XRF06	10.5%
Na2O	<0.01	<0.01	%	0.01	ME-XRF06	0%
K2O	0.04	0.04	%	0.01	ME-XRF06	0%
Cr2O3	<0.01	<0.01	%	0.01	ME-XRF06	0%
TiO2	0.05	0.07	%	0.01	ME-XRF06	+/- 2 MDL
MnO	0.04	0.04	%	0.01	ME-XRF06	0%
P2O5	0.01	0.02	%	0.01	ME-XRF06	+/- 2 MDL
SrO	<0.01	0.02	%	0.01	ME-XRF06	+/- 2 MDL
BaO	0.01	0.01	%	0.01	ME-XRF06	0%
LOI	11.8	11.8	%	0.01	ME-XRF06	0%
Total	86.68	86.57	%		ME-XRF06	0.1%

Number of Parameters Failing Criteria	0
%	0.0%

RPD = relative percent difference
Shaded and bolded QA/QC RPD values identify samples that fail QA/QC criteria.

SAMPLE VR91627A
Analysis Whole Rock
Date 22-Mar-04

Analyte	Result	Duplicate	Units	DL	Method	QA/QC RPD
SiO2	57.5	57.79	%	0.01	ME-XRF06	0.5%
Al2O3	17.49	17.63	%	0.01	ME-XRF06	0.8%
Fe2O3	9.5	8.97	%	0.01	ME-XRF06	5.7%
CaO	0.25	0.24	%	0.01	ME-XRF06	4.1%
MgO	3.43	3.25	%	0.01	ME-XRF06	5.4%
Na2O	1.19	1.23	%	0.01	ME-XRF06	3.3%
K2O	3.73	3.78	%	0.01	ME-XRF06	1.3%
Cr2O3	0.03	0.02	%	0.01	ME-XRF06	+/- 2 MDL
TiO2	0.91	0.92	%	0.01	ME-XRF06	1.1%
MnO	0.03	0.03	%	0.01	ME-XRF06	0%
P2O5	0.13	0.14	%	0.01	ME-XRF06	7.4%
SrO	0.01	0.02	%	0.01	ME-XRF06	+/- 2 MDL
BaO	0.07	0.05	%	0.01	ME-XRF06	+/- 2 MDL
LOI	4.85	4.72	%	0.01	ME-XRF06	2.7%
Total	99.12	98.78	%		ME-XRF06	0.3%

Number of Parameters Failing Criteria	0
%	0.0%

RPD = relative percent difference

Shaded and bolded QA/QC RPD values identify samples that fail QA/QC criteria.

Solids Duplicate Analysis

043-1055

SAMPLE VR91623A
Analysis Acid Base Accounting
Date 15-Mar-04

Analyte	Result	Duplicate	Units	DL	Method	QA/QC RPD
Paste pH	9.44	9.5	%	0.1		0.6%
S(T)	0.35	0.36	%	0.01	S-IR08	2.8%
S(SO4)	0.01	0.03	%	0.01	S-GRA06a	+/- 2 MDL
TIC	0.83	0.79	%	0.05	C-GAS05	4.9%

Number of Parameters Failing Criteria	0
%	0.0%

RPD = relative percent difference

Shaded and bolded QA/QC RPD values identify samples that fail QA/QC criteria.

Solids Duplicate Analysis

043-1055

SAMPLE VR90181A
Analysis Acid Base Accounting
Date 15-Mar-04

Analyte	Result	Duplicate	Units	DL	Method	QA/QC RPD
Paste pH	4.64	4.52	%	0.1		2.6%
S(T)	32.4	31.7	%	0.01	S-IR08	2.2%
S(SO4)	<0.01	0.01	%	0.01	S-GRA06a	+/- 2 MDL
TIC	<0.05	<0.05	%	0.05	C-GAS05	0%

Number of Parameters Failing Criteria	0
%	0.0%

RPD = relative percent difference

Shaded and bolded QA/QC RPD values identify samples that fail QA/QC criteria.

Solids Duplicate Analysis

043-1055

SAMPLE VR91627A
Analysis Acid Base Accounting
Date 15-Mar-04

Analyte	Result	Duplicate	Units	DL	Method	QA/QC RPD
Paste pH	9.07	8.96	%	0.1		1.2%
S(T)	1.4	1.37	%	0.01	S-IR08	2.2%
S(SO4)	0.03	0.01	%	0.01	S-GRA06a	+/- 2 MDL
TIC	<0.05	<0.05	%	0.05	C-GAS05	0%

Number of Parameters Failing Criteria	0
%	0.0%

RPD = relative percent difference

Shaded and bolded QA/QC RPD values identify samples that fail QA/QC criteria.

APPENDIX B-4

SHORT-TERM LEACH TESTING -
DATA VALIDATION REPORTS AND SUPPORTING DOCUMENTATION

Inorganic Data Validation Summary

1. PROJECT INFORMATION

Project	Eagle Mine - Kennecott	**Project No.**	043-1055
Date	May 4, 2004		
Laboratory	ALS Environmental		
SDG	ALS File No. U2390		
Description of Analysis	Phase I SPLP Testing (Partial Report)		
Report Date	May 3, 2004		
Validator	Cheryl Ross		

2. CHAIN OF CUSTODY

No. of Samples: __10___
No. of Duplicates: ___1__

☐ Sample preservation documented on COC.

☐ Samples preserved correctly. ☐ Not Applicable.

☐ Sample temperature documented on COC.

☐ Samples maintained at 4 °C.

Comments:

- Have requested copy of COC from CEMI.

3. SUMMARY OF ANALYSES

Check all analyses included in SDG.

ANALYSIS		NOTES
Metals by ICP-OES		
Metals by ICP-MS	x	
Metals by HVASS	x	As x Sb x Se x
TDS	x	
Chloride (APHA 4500)	x	
Fluoride (APHA 4500)	x	
Ammonia (APHA 4500)	x	
Nitrate/Nitrite (APHA 4500)	x	
Mercury (EPA 7470A/7471/245.7)	x	

☐ All requested analyses conducted.

Comments:

- TDS and nitrate/nitrite results are pending.

4. LABORATORY REMARKS

☒ Detection limits increased due to matrix interferences.

Comments:

- Detection limits of some metals have been increased for some samples due to matrix interferences.
- Detection limits for sample 19004 increased due to elevated nickel.

5. HOLDING TIME EVALUATION

ANALYSIS	HOLDING TIME (Days)	APPLICABLE	HT EXCEEDED	NOTES
Metals by ICP-OES	6 months			
Metals by ICP-MS	6 months	x		
Metals by HVASS	6 months	x		
TDS	7	x		
Chloride	28	x		
Fluoride	28	x		
Ammonia	28	x		
Nitrate/Nitrite	2	x		
Mercury	28	x		

☐ All analyses conducted within acceptable holding times.

Comments/Qualified Results:

- Unable to assess holding times since ALS does not provide date of analysis. CEMI has indicated that if holding times are exceeded, a remark will be added to the report.

6. FIELD DUPLICATE SAMPLE RESULTS

☒ Duplicate sample submitted. ☐ No duplicate sample.

☐ All RPDs < 20% (samples above 5 times the reporting limit (RL)).

☐ All results +/- 1 RL (samples below 5 times the RL).

Comments/Qualified Results:

- Duplicate results pending.

7. BATCH QC RESULTS – BLANK SAMPLE

☒ Blank analysis results reported.

☒ All constituents non-detect in the blank sample.

☒ Reporting limits equivalent to project reporting limits.

Constituents detected in blank sample:

Comments/Qualified Results:

8. BATCH QC RESULTS – LABORATORY REPLICATE SAMPLES

☒ Replicate analysis results reported.

☒ All RPDs < 20% (samples above 5 times the reporting limit (RL)).

☒ All results +/- 1 RL (samples below 5 times the RL).

Comments/Qualified Results:

9. BATCH QC RESULTS – REFRENCE SAMPLES

☒ Reference sample analysis results reported.

☐ All % Recovery meet EPA criteria (between 80 and 120 %)

☒ All % Recovery meet lab criteria

Comments/Qualified Results:

- One out of two total boron reference sample had a % recovery > 120% (136%). Sample was close to detection limit and met ALS criteria.
- No results qualified.

10. LABORATORY FOLLOW-UP

- Laboratory contacted regarding poor charge balance errors and detections in method blank (email dated May 4, 2004).

11. ADDITIONAL COMMENTS

- Some results qualified as estimated high (J+) due to detections in method blank.

C. Rus — **Validator**

05/04/04. — **Date**

LABORATORY REPLICATE SAMPLES

Analysis Phase I SPLP Testing

QA/QC Report

Analyte		Result	Target	Units	DL	ALSQC#	Method	QA/QC RPD
Chloride	Cl	1.78	1.81	mg/L	0.5	382475	Colourimetry	+/-MDL
Fluoride	F	0.144	0.143	mg/L	0.02	382475	Electrode	1%
Aluminum	D-Al	0.623	0.64	mg/L	0.001	382475	ICP-MS	3%
Antimony	D-Sb	0.00522	0.0053	mg/L	0.0001	382475	ICP-MS	2%
Arsenic	D-As	0.0103	0.0102	mg/L	0.0001	382475	ICP-MS	1%
Barium	D-Ba	0.00107	0.00113	mg/L	0.00005	382475	ICP-MS	5%
Beryllium	D-Be	<0.00050	<0.00050	mg/L	0.0005	382475	ICP-MS	0%
Bismuth	D-Bi	<0.00050	<0.00050	mg/L	0.0005	382475	ICP-MS	0%
Boron	D-B	0.015	0.015	mg/L	0.01	382475	ICP-MS	0%
Cadmium	D-Cd	<0.000050	<0.000050	mg/L	0.00005	382475	ICP-MS	0%
Calcium	D-Ca	1.29	1.25	mg/L	0.05	382475	ICP-MS	3%
Chromium	D-Cr	0.00071	0.00071	mg/L	0.0005	382475	ICP-MS	0%
Cobalt	D-Co	0.00092	0.00089	mg/L	0.0001	382475	ICP-MS	3%
Copper	D-Cu	0.0384	0.0398	mg/L	0.0001	382475	ICP-MS	4%
Iron	D-Fe	0.802	0.782	mg/L	0.03	382475	ICP-MS	3%
Lead	D-Pb	0.000928	0.00091	mg/L	0.00005	382475	ICP-MS	2%
Lithium	D-Li	<0.0050	<0.0050	mg/L	0.005	382475	ICP-MS	0%
Magnesium	D-Mg	1.37	1.35	mg/L	0.1	382475	ICP-MS	1%
Manganese	D-Mn	0.00515	0.00519	mg/L	0.00005	382475	ICP-MS	1%
Mercury	D-Hg	<0.000050	<0.000050	mg/L	0.00005	382475	ICP-MS	0%
Molybdenum	D-Mo	0.00115	0.00112	mg/L	0.00005	382475	ICP-MS	3%
Nickel	D-Ni	0.0222	0.0222	mg/L	0.0005	382475	ICP-MS	0%
Phosphorus	D-P	<0.30	<0.30	mg/L	0.3	382475	ICP-MS	0%
Potassium	D-K	2.3	<2.0	mg/L	2	382475	ICP-MS	+/- MDL
Selenium	D-Se	<0.0010	<0.0010	mg/L	0.001	382475	ICP-MS	0%
Silicon	D-Si	3.01	2.93	mg/L	0.05	382475	ICP-MS	3%
Silver	D-Ag	0.000023	0.000027	mg/L	0.00001	382475	ICP-MS	+/-MDL
Sodium	D-Na	5.6	5.4	mg/L	2	382475	ICP-MS	+/-MDL
Strontium	D-Sr	0.0265	0.0259	mg/L	0.0001	382475	ICP-MS	2%
Thallium	D-Tl	<0.00010	<0.00010	mg/L	0.0001	382475	ICP-MS	0%
Tin	D-Sn	<0.00010	<0.00010	mg/L	0.0001	382475	ICP-MS	0%
Titanium	D-Ti	<0.010	<0.010	mg/L	0.01	382475	ICP-MS	0%
Uranium	D-U	0.000019	0.000018	mg/L	0.00001	382475	ICP-MS	+/-MDL
Vanadium	D-V	<0.0010	<0.0010	mg/L	0.001	382475	ICP-MS	0%
Zinc	D-Zn	0.0016	0.0016	mg/L	0.001	382475	ICP-MS	0%
Antimony	D-Sb	0.0054	0.00519	mg/L	0.0002	383825	HVAAS	4%
Arsenic	D-As	0.0108	0.0108	mg/L	0.0002	383825	HVAAS	0%
Selenium	D-Se	0.00065	0.00091	mg/L	0.0005	383825	HVAAS	+/-MDL

Number of Parameters Failing Criteria	0
%	0.0%

RPD = relative percent difference

Shaded and bolded QA/QC RPD values identify samples that fail QA/QC criteria.

Metals analysis by ICP-MS assumed for all metals.

LABORATORY REFERENCE SAMPLES
Analysis Phase I SPLP Testing

QA/QC Report

Analyte		Result	Target	Units	DL	ALSQC#	Method	% Recovery
Bismuth	T-Bi	1.02	1	mg/L	0.1	382711	ICP-OES	102%
Lithium	T-Li	0.2	0.2	mg/L	0.01	382711	ICP-OES	100%
Phosphorus	T -P	2.13	2	mg/L	0.3	382711	ICP-OES	107%
Silicon	T-Si	1.01	1	mg/L	0.05	382711	ICP-OES	101%
Tin	T-Sn	1.01	1	mg/L	0.03	382711	ICP-OES	101%
Titanium	T-Ti	0.193	0.2	mg/L	0.01	382711	ICP-OES	97%
Uranium	D-U	0.00005	0.00005	mg/L	0.00001	384704	ICP-MS	100%
Aluminum	T-Al	1.03	1	mg/L	0.2	382712	ICP-OES	103%
Antimony	T-Sb	0.26	0.28	mg/L	0.2	382712	ICP-OES	93%
Arsenic	T-As	0.48	0.49	mg/L	0.2	382712	ICP-OES	98%
Barium	T-Ba	0.524	0.525	mg/L	0.01	382712	ICP-OES	100%
Beryllium	T-Be	0.39	0.397	mg/L	0.005	382712	ICP-OES	98%
Boron	T-B	0.38	0.28	mg/L	0.1	382712	ICP-OES	**136%**
Cadmium	T-Cd	0.349	0.353	mg/L	0.01	382712	ICP-OES	99%
Chromium	T-Cr	0.166	0.167	mg/L	0.01	382712	ICP-OES	99%
Cobalt	T-Co	0.241	0.24	mg/L	0.01	382712	ICP-OES	100%
Copper	T-Cu	0.394	0.391	mg/L	0.01	382712	ICP-OES	101%
Iron	T-Fe	0.997	1.01	mg/L	0.03	382712	ICP-OES	99%
Lead	T-Pb	0.853	0.857	mg/L	0.05	382712	ICP-OES	100%
Manganese	T-Mn	2.24	2.26	mg/L	0.005	382712	ICP-OES	99%
Molybdenum	T-Mo	0.099	0.097	mg/L	0.03	382712	ICP-OES	102%
Nickel	T-Ni	0.656	0.611	mg/L	0.05	382712	ICP-OES	107%
Selenium	T-Se	0.2	*0.2*	mg/L	0.2	382712	ICP-OES	100%
Silver	T-Ag	0.206	0.21	mg/L	0.01	382712	ICP-OES	98%
Strontium	T-Sr	0.103	0.104	mg/L	0.005	382712	ICP-OES	99%
Thallium	T-Tl	0.4	0.38	mg/L	0.2	382712	ICP-OES	105%
Titanium	T-Ti	0.19	0.192	mg/L	0.01	382712	ICP-OES	99%
Vanadium	T-V	1.49	1.5	mg/L	0.03	382712	ICP-OES	99%
Zinc	T-Zn	0.12	0.121	mg/L	0.005	382712	ICP-OES	99%
Mercury	T-Hg	0.00984	0.01	mg/L	0.00001	383215	CVAFS	98%
Calcium	T-Ca	14.8	15.6	mg/L	0.05	382710	ICP-OES	95%
Magnesium	T-Mg	5.58	5.85	mg/L	0.1	382710	ICP-OES	95%
Potassium	T -K	32.4	33.1	mg/L	2	382710	ICP-OES	98%
Sodium	T-Na	39.5	39.1	mg/L	2	382710	ICP-OES	101%
Aluminum	T-Al	*0.2*	*0.2*	mg/L	0.2	382709	ICP-OES	100%
Antimony	T-Sb	*0.2*	*0.2*	mg/L	0.2	382709	ICP-OES	100%
Antimony	T-Sb	0.0288	0.0272	mg/L	0.0002	384409	HVAAS	106%
Arsenic	T-As	*0.2*	*0.2*	mg/L	0.2	382709	ICP-OES	100%
Arsenic	T-As	0.127	0.128	mg/L	0.0002	384437	HVAAS	99%
Barium	T-Ba	0.331	0.338	mg/L	0.01	382709	ICP-OES	98%
Beryllium	T-Be	0.074	0.0751	mg/L	0.005	382709	ICP-OES	99%
Boron	T-B	0.24	0.23	mg/L	0.1	382709	ICP-OES	104%
Cadmium	T-Cd	0.085	0.088	mg/L	0.01	382709	ICP-OES	97%
Chromium	T-Cr	0.218	0.218	mg/L	0.01	382709	ICP-OES	100%
Cobalt	T-Co	0.281	0.28	mg/L	0.01	382709	ICP-OES	100%
Copper	T-Cu	0.291	0.287	mg/L	0.01	382709	ICP-OES	101%
Iron	T-Fe	0.368	0.368	mg/L	0.03	382709	ICP-OES	100%
Lead	T-Pb	0.278	0.264	mg/L	0.05	382709	ICP-OES	105%
Manganese	T -Mn	0.477	0.479	mg/L	0.005	382709	ICP-OES	100%
Molybdenum	T -Mo	0.15	0.149	mg/L	0.03	382709	ICP-OES	101%
Nickel	T-Ni	0.087	0.078	mg/L	0.05	382709	ICP-OES	112%
Selenium	T-Se	*0.2*	*0.2*	mg/L	0.2	382709	ICP-OES	100%
Selenium	T-Se	0.0298	0.0307	mg/L	0.0005	384075	HVAAS	97%
Silver	T-Ag	0.069	0.063	mg/L	0.01	382709	ICP-OES	110%
Strontium	T-Sr	0.362	0.367	mg/L	0.005	382709	ICP-OES	99%
Thallium	T-Tl	*0.2*	*0.2*	mg/L	0.2	382709	ICP-OES	100%
Tin	T-Sn	0.891	0.89	mg/L	0.03	382709	ICP-OES	100%
Titanium	T-Ti	0.098	0.093	mg/L	0.01	382709	ICP-OES	105%
Vanadium	T-V	0.113	0.097	mg/L	0.03	382709	ICP-OES	116%
Zinc	T-Zn	0.144	0.148	mg/L	0.005	382709	ICP-OES	97%
Chloride	Cl	79.6	77.9	mg/L	0.5	384196	Colourimetry	102%
Chloride	Cl	7.85	7.79	mg/L	0.5	384194	Colourimetry	101%
Chloride	Cl	161	156	mg/L	0.5	384197	Colourimetry	103%
Fluoride	F	3.04	3.01	mg/L	0.02	383961	Electrode	101%

Non-detect values shown at the detection limit in italics.
Shaded and bolded % Recovery values identify samples that fail QA/QC criteria.

Number of Parameters Failing EPA Criteria	1
%	1.6%
Number of Parameters Failing ALS Criteria	0
%	0.0%

APPENDIX C

CANADIAN ENVIRONMENTAL METALLURGICAL INC.
STATIC TESTING REPORT

1636 West 75 Avenue, Vancouver, BC Canada V6P 6G2 TEL: (604) 265 5536 FAX: (604) 264 5535

CEM Inc.

Canadian Environmental and Metallurgical Inc.

DATA REPORT

Date: April 23, 2004

CEM Inc. File No. 0356

Report On: Static Testing
Eagle Acid Rock Drainage Study
Marquette County, Michigan

Report To: Golder Associates Inc.
18300 NE Union Hill Road, Suite 200
Redmond, Washington
98052-0777

Attention: Ms. Cheryl Ross
Mr. Rens Verburg

EAGLE ACID ROCK DRAINAGE STUDY

1.0 SAMPLES

Thirty drill core rock samples for static testing were received from Kennecott Exploration by Canadian Environmental & Metallurgical Incorporated (CEMI) on March 12, 2004.

1.1 Sample Preparation

All samples were passed through a jaw crusher, resulting in material of size fraction (approximately) minus 3/8 inch. Prior to use, the jaw crusher was thoroughly washed and scrubbed with distilled water then dried under a stream of air from a compressed air gun. To prevent cross-contamination, samples described as "sulphide" were processed last. If there was visible evidence of contamination in the crusher after processing a sulphide sample, the equipment was re-cleaned and dried as described above. Thirty representative samples were then obtained using a riffle splitter followed by pulverization with a Bico puck and ring pulverizer. These samples were subsequently split to obtain representative sub-samples for the required analyses.

2.0 STATIC TESTING

The following assays were carried out on 30 Eagle ARD samples: whole rock analysis, head sample ICP analysis, Modified Sobek acid-base accounting tests, total inorganic carbon analysis, and the determination of sulphur species.

2.1 Solids Analysis

Splits of all samples were submitted to ALS Chemex (North Vancouver, BC) for whole rock analysis by X-Ray Fluorescence Spectroscopy (ME-XRF06), a 50-element ICP metals scan following an aqua regia digestion (ME-MS41), total sulphur analysis using a LECO sulphur analyzer (S-IR08), the determination of HCl-Leachable sulphate sulphur (S-GRA06a), and the determination of total inorganic carbon (C-GAS05). Overlimit copper assays (>10,000 ppm) were analyzed by aqua regia digestion with an Atomic Absorption Spectrophotometry finish (Cu-AA46).

Ten samples (VR90425A, VR91625A, VR91620A, VR71109A, VR91306A, VR71275A,

VR91267A, VR71373A, VR90181A, VR90125A) were subsequently selected for X-Ray Diffraction/Rietveld Analysis (Leslie Research and Consulting, Tsawwassen, BC) and for Short Term Leach Testing (SPLP - EPA Method 1312). This latter procedure is designed to assess the leachability of analytes from solid phases under moderately acidic conditions (pH 4.2).

2.2 Determination of Neutralization Potential (Acid-Base Accounting)

The paste pH is determined prior to conducting the acid-base accounting (ABA) tests. A small amount of pulverized sample is wetted with distilled water and, upon saturation, the pH of the paste is measured. A fizz test (addition of 25% HCl to a dry, pulverized sample) is employed to provide an additional guide to the strength and amount of acid to be added to each sample.

The acid-base accounting test is carried out using the Modified Sobek method as described in the *Mine Environment Neutral Drainage (MEND) Program Acid Rock Drainage Prediction Manual*. To summarize, two grams of pulverized sample were weighed into a 250 mL Erlenmeyer flask to which was added sufficient standardized hydrochloric acid to obtain a pH of 1.5 to 2.0. The flask was then placed on an oscillating table and agitated for 24 hours at 150 rpm. The pH was periodically checked and adjusted to maintain sufficient acidity for reaction (target pH 1.5-2.0). After 24 hours, the contents of the flask were titrated to pH 8.3 with standardized sodium hydroxide.

All pH measurements were made with an Orion® Model 420A pH meter equipped with a Corning® G/P 476086 pH probe. The pH meter was calibrated with pH 4.00 and 7.00 buffers and checked with pH 2.00 and 10.00 buffers. All buffers are accurate to within ±0.01 pH units.

The neutralization potential (NP) of the sample is calculated from the titration data. The acid producing potential (AP) is derived from the calculated sulphide-sulphur value (S_T - S_{SO4}), assuming the total conversion of sulphide to sulphate and the production of 4 moles of H+ per mole of pyrite oxidized. If present, other sulphur species could also contribute to the amount of AP produced; these species, however, have not been taken into consideration in the calculation of AP. The net neutralization potential (Net NP) is thus the difference between the NP and the AP. CANMET's NBM-1 reference material was not used due to questions about its suitability as a standard material.

ALS Chemex

Whole Rock Geochemistry – ME-XRF06

Sample Decomposition: Lithium Tetraborate Fusion*
Analytical Method: X-Ray Fluorescence Spectroscopy (XRF)

A prepared sample (1.000 gram) is added to lithium tetraborate flux (9.000 grams), mixed well and fused in a furnace at 1100°C. A flat glass disc is prepared from the resulting melt. This disc is then analyzed by X-ray fluorescence spectrometry. Oxide concentration is calculated from the determined elemental concentration and the result is reported in that format.

To determine loss on ignition (L.O.I.), a porcelain crucible is dried in an oven at 105°C, cooled and the weight recorded. A prepared sample (3.00 grams) is added to the crucible and then ashed at 1000°C for one hour. The sample is then cooled in a desiccator, weighed and the percent loss on ignition is calculated.

Oxide Determined	Symbol	Lower Reporting Limit	Upper Reporting Limit	Units
Aluminum Oxide	Al_2O_3	0.01	100	%
Barium Oxide	BaO	0.01	100	%
Calcium Oxide	CaO	0.01	100	%
Chromium Oxide	Cr_2O_3	0.01	100	%
Ferric Oxide	Fe_2O_3	0.01	100	%
Magnesium Oxide	MgO	0.01	100	%
Manganese Oxide	MnO	0.01	100	%
Phosophorus Oxide	P_2O_5	0.01	100	%
Potassium Oxide	K_2O	0.01	100	%
Silicon Oxide	SiO_2	0.01	100	%
Sodium Oxide	Na_2O	0.01	100	%
Strontium Oxide	SrO	0.01	100	%
Titanium Oxide	TiO_2	0.01	100	%
Loss On Ignition	L.O.I.	0.01	100	%

*Note: For samples that are high in sulphides, we may substitute a peroxide fusion in order to obtain better results.

ALS Chemex

Geochemical Procedure – ME-MS41
Ultra-Trace Level Methods Using ICP-MS and ICP-AES

Sample Decomposition: Aqua Regia Digestion
Analytical Method: Inductively Coupled Plasma - Atomic Emission Spectroscopy (ICP - AES)
Inductively Coupled Plasma - Mass Spectrometry (ICP-MS)

A prepared sample (0.50 grams) is digested with aqua regia for at least one hour in a graphite heating block. After cooling, the resulting solution is diluted to 12.5 ml with demineralized water, mixed and analyzed by inductively coupled plasma-atomic emission spectrometry for the major elements as specified in the table below (Analytical Technique is AES). Following this analysis, the results are reviewed for high concentrations of bismuth, mercury, molybdenum, silver and tungsten and diluted accordingly. Samples are then analysed by ICP-MS for the remaining suite of elements. The analytical results are corrected for inter-element spectral interferences.

Element	Symbol	Detection Limit	Upper Limit	Units	Analytical Technique
Silver	Ag	0.01	100	ppm	AES+MS
Aluminum*	Al	0.01	15	%	AES
Arsenic	As	0.1	10,000	ppm	AES+MS
Boron*	B	10	10,000	ppm	AES
Barium*	Ba	10	10,000	ppm	AES
Beryllium*	Be	0.05	100	ppm	AES
Bismuth	Bi	0.01	10,000	ppm	AES+MS
Calcium*	Ca	0.01	15	%	AES
Cadmium	Cd	0.01	500	ppm	AES+MS
Cerium*	Ce	0.02	500	ppm	MS
Cobalt	Co	0.1	10,000	ppm	AES
Chromium*	Cr	1	10,000	ppm	AES
Cesium*	Cs	0.05	500	ppm	MS
Copper	Cu	0.2	10,000	ppm	AES+MS
Iron	Fe	0.01	15	%	AES
Gallium*	Ga	0.05	10,000	ppm	AES+MS
Germanium*	Ge	0.05	500	ppm	MS
Hafnium*	Hf	0.02	500	ppm	MS
Mercury	Hg	0.01	10,000	ppm	AES+MS

Element	Symbol	Detection Limit	Upper Limit	Units	Analytical Technique
Indium*	In	0.005	500	ppm	MS
Potassium*	K	0.01	10	%	AES
Lanthanum*	La	0.2	10,000	ppm	AES
Lithium*	Li	0.1	500	ppm	MS
Magnesium*	Mg	0.01	15	%	AES
Manganese	Mn	5	10,000	ppm	AES
Molybdenum	Mo	0.05	10,000	ppm	AES+MS
Sodium*	Na	0.01	10	%	AES
Niobium*	Nb	0.05	500	ppm	MS
Nickel	Ni	0.2	10,000	ppm	AES
Phosphorus	P	10	10,000	ppm	AES
Lead	Pb	0.2	10,000	ppm	AES
Rubidium*	Rb	0.1	500	ppm	MS
Rhenium*	Re	0.001	50	ppm	MS
Sulfur*	S	0.01	10	%	AES
Antimony*	Sb	0.05	10,000	ppm	AES+MS
Scandium*	Sc	0.1	10,000	ppm	AES
Selenium	Se	0.2	1,000	ppm	MS
Tin*	Sn	0.2	500	ppm	MS
Strontium*	Sr	0.2	10,000	ppm	AES
Tantalum*	Ta	0.01	500	ppm	MS
Tellurium*	Te	0.01	500	ppm	MS
Thorium*	Th	0.2	500	ppm	MS
Titanium*	Ti	0.01	10	%	AES
Thallium*	Tl	0.02	10,000	ppm	AES+MS
Uranium	U	0.05	10,000	ppm	AES+MS
Vanadium	V	1	10,000	ppm	AES
Tungsten*	W	0.05	10,000	ppm	AES+MS
Yttrium*	Y	0.05	500	ppm	MS
Zinc	Zn	2	10,000	ppm	AES
Zirconium*	Zr	0.5	500	ppm	MS

*Elements for which the digestion is possibly incomplete.

MS - Results are from the ICP-MS Scan
AES - Results are from the ICP-AES Scan
AES+MS - Results are a combination of ICP-AES and ICP-MS scans

ALS Chemex

Static Test - Acid-Base Accounting Packages

The acid rock drainage static test has been designed to measure the balance between potentially acid-generating minerals (maximum potential acidity) and acid-neutralizing minerals (neutralization potential) in a sample. This procedure, known as Acid-Base Accounting (ABA), yields a figure known as Net Neutralization Potential (NNP), which determines whether a particular sample will theoretically generate acidity over time. Depending on the parameters included, there are different options of the static test.

Parameters	Method Code				
	ABA-PKG01	ABA-PKG02	ABA-PKG03	ABA-PKG04	ABA-PKG05
Net Neutralization Potential (NNP)	✓	✓	✓	✓	✓
Maximum Potential Acidity (MPA)	✓	✓	✓	✓	✓
Neutralization Potential & Fizz Rating	✓	✓	✓	✓	✓
Ratio (Neutralization Potential: MPA)	✓	✓	✓	✓	✓
Paste pH	✓	✓	✓	✓	✓
Total Sulfur	✓	✓	✓	✓	✓
HCl-leachable Sulfate		✓	✓	✓	✓
Sulfide*		✓	✓	✓	✓
Total Sulfate (Carbonate Leach)			✓		✓
Inorganic Carbon (CO2)				✓	✓

***ABA-PKG02A, ABA-PKG03A, ABA-PKG04A and ABA-PKG05A are also available. In the 'A' packages sulfide is determined gravimetrically by method S-IR07 (described following) rather than by a subtraction calculation, S-CAL06 and S-CAL06a (also described following).**

Method Code: OA-VOL08
Method Precision: +/- 10%

Parameter	Symbol	Lower Reporting Limit	Upper Reporting Limit	Units
Net Neutralization Potential	NNP	1	1000	t CaCO3/1000 t ore

Neutralization Potential	NP	1	1000	t CaCO3/1000 t ore
Maximum Potential Acidity	MPA	0.5	2000	t CaCO3/1000 t ore
Fizz Rating	-	1	4	Unity
Ratio (NP:MPA)	NP:MPA	0.01	1000	Unity

Neutralization Potential

Approximately 0.5 grams of sample is treated with 1 or 2 drops of 25% HCl to determine its "fizz rating", which determines the volume and normality of HCl to be used in the titration. A 2.0 gram sample is then treated with the appropriate volume and normality of HCl by gentle heating until reaction is complete, followed by the addition of carbon-dioxide free de-ionized water and a one minute boiling period. The solution is covered tightly to cool, then titrated with the appropriate normality of sodium hydroxide solution until the pH reading remains at 7.0 for at least 30 seconds.

The Neutralization Potential is expressed as "tonnes $CaCO_3$ equivalent per 1000 tonnes of material".

Calculation: Neutralization Potential (NP) = 50a[x-(b/a)y]/c

where a = normality of HCl
b = normality of NaOH
c = sample weight in grams
x = volume of HCl added (ml)
y = volume of NaOH added (ml) to pH 7.0

Maximum Potential Acidity

The sample is analyzed for Total Sulfur using a Leco sulfur analyzer. The Maximum Potential Acidity (MPA) is calculated by multiplying the Total Sulfur result by 31.25.

MPA (tonnes $CaCO_3$ equivalent per 1000 tonnes of material) = % Total Sulfur x 31.25

Fizz Test

Before performing the analysis for Neutralization Potential, the sample must be rated as to its carbonate content in order to determine the volume and normality of hydrochloric acid to be used in the analysis. This is done by conducting a "fizz test". Approximately 0.5 grams of sample is treated with one or two drops of 1:3 HCl and the degree of fizzing is assessed. The following table outlines the volume and normality of hydrochloric acid to be used with each "fizz rating".

Fizz Rating	Volume (ml) of HCl to be used	Normality of HCl to be used
None (1)	20	0.1 N
Slight (2)	40	0.1N
Moderate (3)	40	0.5 N
Strong (4)	80	0.5 N

Paste pH

Method Code: OA-ELE07

Method Precision: +/- 10%

Parameter	Lower Reporting Limit	Upper Reporting Limit	Units
pH	0.1	14	Unity

Approximately 10 grams of sample is allowed to become saturated with water by adding approximately 5 ml of de-ionized water to the sample without stirring. More water can be added as required to saturate the sample. The sample is then stirred and adjusted to the required consistency with additional de-ionized water. The pH of the paste is then measured by a pH electrode in combination with a pH meter.

Total Sulfur

Method Code: S-IR08

Method Precision: +/- 5%

Parameter	Symbol	Lower Reporting Limit	Upper Reporting Limit	Units
Total Sulfur	S	0.01	50	%

The sample is analyzed for Total Sulfur using a Leco sulfur analyzer. The sample (0.5 to 5.0 grams) is heated to approximately 1350 degrees Celsius in an induction furnace while passing a stream of oxygen through the sample. Sulfur dioxide released from the sample is measured by an IR detection system and the Total Sulfur result is provided.

Sulfide Sulfur
Method Code: S-IR07 (method used to determine sulfide sulfur in 'A' packages)
Method Precision: +/- 5%

Parameter	Symbol	Lower Reporting Limit	Upper Reporting Limit	Units
Sulfide Sulfur	S	0.01	10	%

A prepared sample is selectively leached by converting metal sulfide to insoluble carbonates and soluble sulfate by heating with sodium carbonate solution. The resulting insoluble carbonates are removed by filtration and the sulfide residue is washed free of carbonate solution and analyzed by a Leco sulfur analyzer.

HCl-Leachable Sulfate
Method Code: S-GRA06a
Method Precision: +/- 5%

Parameter	Symbol	Lower Reporting Limit	Upper Reporting Limit	Units
Sulfate Sulfur	S	0.01	50	%

A prepared sample (0.2 to 1.0 gram) is heated with dilute hydrochloric acid for 30 minutes. Silica and any acid-insoluble materials are removed by filtration and ferric iron is reduced to ferrous iron by the addition of hydroxylamine hydrochloride. The sulfate in the resulting filtrate is then precipitated with barium chloride in a dilute hydrochloric acid medium. The barium sulfate precipitate is filtered, ignited, weighed and calculated as %S (of the HCl-leachable sulfate) in the original sample.

Sulfide Sulfur
Method Code: S-CAL06a

Parameter	Symbol	Lower Reporting Limit	Upper Reporting Limit	Units
Sulfide Sulfur	S	0.01	50	%

Sulfide Sulfur (%S) is calculated by subtracting the Sulfate (%S) obtained from the HCl Leach from the Total Sulfur (%S) obtained from the Leco analyzer.

Total Sulfate (Carbonate Leach)
Method Code: S-GRA06
Method Precision: +/- 5%

Parameter	Symbol	Lower Reporting Limit	Upper Reporting Limit	Units
Total Sulfate	S	0.01	50	%

A prepared sample is boiled with a sodium carbonate solution for 30 minutes. Any insoluble materials are removed by filtration and ferric iron is reduced to ferrous iron by the addition of hydroxylamine hydrochloride. The sulfate in the resulting filtrate is then precipitated with barium chloride in a dilute hydrochloric acid medium. The barium sulfate precipitate is filtered, ignited, weighed and calculated as %S (of total sulfate) in the original sample.

Sulfide Sulfur
Method Code: S-CAL06

Parameter	Symbol	Lower Reporting Limit	Upper Reporting Limit	Units
Sulfide Sulfur	S	0.01	50	%

Sulfide Sulfur (%S) is calculated by subtracting the Sulfate (%S) obtained from the Carbonate Leach from the Total Sulfur (%S) obtained from the Leco analyzer.

Inorganic Carbon (CO2)
Method Code: C-GAS05
Method Precision: +/- 5%

Parameter	Symbol	Lower Reporting Limit	Upper Reporting Limit	Units
Inorganic Carbon	CO2	0.2	50.0	%

A prepared sample (0.2 gram) is leached with dilute hydrochloric acid. Carbon dioxide is released and carried into a measuring buret by a stream of oxygen. The

volume of the two gases is measured. The gases are then passed through a potassium hydroxide solution that dissolves carbon dioxide. The oxygen is returned into the buret and the volume is again measured. The difference in volume, corrected for temperature and atmospheric pressure, is proportional to the percentage of inorganic carbon in the sample.

APPENDIX

STATIC TESTING DATA

Client : **Golder Associates Inc.**
Project : **Eagle ARD Testing Program**
CEMI Project : **0356**
Test : **Modified Sobek Method Acid-Base Accounting**
Date : **March 15, 2004**

Sample	Paste pH	S(T) %	S(SO4) %	AP	NP	Net NP	NP/AP	TIC %	Carbonate NP
VR91618A	7.6	1.09	0.01	33.8	4.9	-28.9	0.1	<0.05	4.2
VR71043A	9.2	0.16	<0.01	5.0	90.0	85.0	18.0	1.08	90.0
VR71087A	9.0	1.42	0.01	44.1	6.6	-37.5	0.1	<0.05	4.2
VR91619A	8.7	1.09	0.01	33.8	4.6	-29.1	0.1	<0.05	4.2
VR91620A	9.0	0.31	0.01	9.4	5.6	-3.8	0.6	<0.05	4.2
VR91621A	9.1	0.49	0.02	14.7	103.6	88.9	7.1	1.25	104.2
VR91622A	9.0	1.44	0.02	44.4	11.8	-32.6	0.3	0.09	7.5
VR71109A	9.2	0.67	0.02	20.3	25.3	4.9	1.2	0.25	20.8
VR71161A	9.1	0.83	0.01	25.6	7.4	-18.3	0.3	<0.05	4.2
VR91623A	9.4	0.35	0.01	10.6	71.9	61.3	6.8	0.83	69.2
VR71275A	9.4	0.99	0.01	30.6	24.6	-6.0	0.8	<0.05	4.2
VR71314A	9.6	0.30	0.03	8.4	41.4	32.9	4.9	0.05	4.2
VR71373A	9.6	2.44	0.02	75.6	34.4	-41.3	0.5	0.06	5.0
VR71450A	6.1	35.0	0.08	1091.3	2.8	-1088.4	<0.1	<0.05	4.2
VR91624A	9.1	0.16	0.03	4.1	64.9	60.8	16.0	0.09	7.5
VR71821A	9.5	3.37	0.01	105.0	39.0	-66.0	0.4	0.11	9.2
VR71938A	9.7	1.60	0.01	49.7	43.4	-6.3	0.9	0.31	25.8
VR91625A	9.2	1.39	0.01	43.1	12.3	-30.9	0.3	0.11	9.2
VR90125A	9.3	8.13	0.02	253.4	23.9	-229.6	0.1	0.05	4.2
VR90181A	4.6	32.4	<0.01	1012.5	0.9	-1011.6	<0.1	<0.05	4.2
VR90257A	9.1	0.19	0.01	5.6	5.6	0.0	1.0	<0.05	4.2
VR91626A	8.2	1.08	0.02	33.1	8.8	-24.3	0.3	<0.05	4.2
VR90425A	9.2	0.77	0.01	23.8	8.8	-15.0	0.4	<0.05	4.2
VR90457A	8.9	15.45	0.01	482.5	44.0	-438.5	0.1	0.06	5.0
VR91267A	9.7	0.89	0.02	27.2	22.2	-5.0	0.8	0.05	4.2
VR91306A	8.8	2.72	0.02	84.4	20.6	-63.8	0.2	0.11	9.2
VR91482A	9.0	1.09	0.01	33.8	8.6	-25.2	0.3	<0.05	4.2
VR91542A	9.1	13.65	0.04	425.3	67.2	-358.1	0.2	0.23	19.2
VR91579A	8.7	1.38	0.02	42.5	8.1	-34.4	0.2	<0.05	4.2
VR91627A	9.1	1.40	0.03	42.8	8.6	-34.2	0.2	<0.05	4.2
RE VR91623A	9.5	0.36	0.03	10.3	72.3	61.9	7.0	0.79	65.8
RE VR90181A	4.5	31.7	0.01	990.3	0.8	-989.6	<0.1	<0.05	4.2
RE VR91627A	9.0	1.37	0.01	42.5	8.8	-33.8	0.2	<0.05	4.2

AP = Acid potential in tonnes CaCO3 equivalent per 1000 tonnes of material.
AP is determined from the calculated suphide sulphur content: S(T) - S(SO4), assuming total conversion of sulphide to sulphate.
NP = Neutralization potential in tonnes CaCO3 equivalent per 1000 tonnes of material.
NET NP = Net neutralization potential = Tonnes CaCO3 equivalent per 1000 tonnes of material.
NOTE: Where S(T) is reported as <0.01%, a S(T) value of 0.01% is used for the AP calculation.
Where S(SO4) is reported as <0.01%, it is assumed to be zero for the AP calculation (ie. if S(SO4) is less than 0.01% or is not analyzed, AP is calculated from S(T) only).
TIC = Total Inorganic Carbon as %C.
Carbonate NP calculated from total inorganic carbon (TIC) assay. TIC value of 0.05 is used in calculation if TIC <0.05%.

RE = Replicate sample

Client : **Golder Associates Inc.**
Project : **Eagle ARD Testing Program**
CEMI Project : **0356**
Test : **Whole Rock Analysis**
Date : **March 22, 2004**

		VR91618A	VR71043A	VR71087A	VR91619A	VR91620A	VR91621A	VR91622A	VR71109A	VR71161A	VR91623A	VR71275A	VR71314A	VR71373A	VR71450A	VR91624A	VR71821A	VR71938A
SiO2	%	57.85	69.34	57.86	58.65	71.19	62.81	57.76	57.72	58.63	64.52	46.42	42.75	39.95	1.24	40.75	40.36	43.72
Al2O3	%	18.05	10.44	17.23	17.48	12.81	12.05	17.33	17.41	17.64	13.24	5.05	6.26	5.74	0.51	5.09	4.63	7.45
Fe2O3	%	8.83	4.11	9.21	8.88	5.50	6.02	9.29	8.26	9.18	5.95	14.50	16.73	19.17	73.62	16.09	21.42	18.85
CaO	%	0.19	4.85	0.24	0.21	0.25	3.14	0.52	0.92	0.28	3.84	6.17	4.78	4.60	0.08	4.56	3.38	7.46
MgO	%	3.38	1.22	3.19	3.28	1.73	3.89	3.11	3.71	2.77	1.93	19.50	22.05	21.11	0.28	25.80	20.85	12.89
Na2O	%	0.85	2.45	1.02	1.13	2.77	1.89	1.43	0.79	1.59	2.47	0.49	0.91	0.63	<0.01	0.76	0.45	0.73
K2O	%	4.06	1.24	3.97	3.72	1.50	2.00	3.56	4.43	3.45	1.73	0.19	0.34	0.26	0.11	0.24	0.18	0.39
Cr2O3	%	0.02	0.03	0.03	0.03	0.02	0.03	0.02	0.02	0.03	0.09	0.37	0.15	0.16	0.02	0.32	0.33	0.15
TiO2	%	0.90	0.48	0.89	0.91	0.55	0.61	0.92	0.88	0.89	0.62	1.11	1.30	1.16	0.11	0.94	0.96	2.33
MnO	%	0.03	0.06	0.04	0.04	0.01	0.10	0.03	0.06	0.02	0.06	0.20	0.20	0.18	0.07	0.20	0.21	0.19
P2O5	%	0.11	0.09	0.13	0.13	0.10	0.09	0.13	0.13	0.11	0.09	0.07	0.10	0.09	<0.01	0.07	0.06	0.21
SrO	%	0.01	0.04	0.01	<0.01	0.01	0.01	0.01	0.01	0.01	0.04	<0.01	0.01	<0.01	0.02	0.02	0.01	0.02
BaO	%	0.07	0.04	0.07	0.06	0.03	0.03	0.07	0.07	0.07	0.03	0.02	0.03	0.02	<0.01	0.02	0.01	0.03
LOI	%	4.77	4.04	4.21	4.58	2.44	5.71	4.31	4.33	4.84	3.80	5.76	4.26	5.33	10.80	4.90	6.33	3.70
Total	%	99.12	98.44	98.10	99.11	98.92	98.39	98.48	98.76	99.51	98.41	99.86	99.86	98.40	86.87	99.76	99.17	98.13

		VR91625A	VR90125A	VR90181A	VR90257A	VR91626A	VR90425A	VR90457A	VR91267A	VR91306A	VR91482A	VR91542A	VR91579A	VR91627A	VR91623A DUP	VR90181A DUP	VR91627A DUP
SiO2	%	57.70	34.36	0.61	75.05	57.35	57.54	19.52	46.37	56.91	58.69	21.38	57.73	57.50	64.25	0.57	57.79
Al2O3	%	17.39	3.40	0.13	11.1	17.60	17.81	1.37	8.39	12.28	17.29	1.12	17.45	17.49	12.99	0.12	17.63
Fe2O3	%	9.42	28.57	73.77	4.59	8.94	8.95	44.96	15.87	12.68	8.83	38.67	9.43	9.50	5.86	73.67	8.97
CaO	%	0.58	4.07	0.02	0.28	0.26	0.23	0.84	6.39	0.43	0.28	0.75	0.2	0.25	3.81	0.02	0.24
MgO	%	3.12	18.24	0.20	1.78	3.97	4.02	16.23	15.41	4.30	3.56	18.40	3.63	3.43	1.90	0.18	3.25
Na2O	%	1.53	0.25	<0.01	2.81	0.29	0.63	<0.01	1.07	1.48	1.20	<0.01	0.78	1.19	2.49	<0.01	1.23
K2O	%	3.38	0.2	0.04	1.55	4.36	4.59	0.14	0.50	2.16	3.39	0.10	3.94	3.73	1.73	0.04	3.78
Cr2O3	%	0.02	0.37	<0.01	0.04	0.02	0.03	0.18	0.20	0.03	0.03	0.09	0.02	0.03	0.03	<0.01	0.02
TiO2	%	0.90	0.69	0.05	0.50	0.88	0.92	0.36	1.48	0.71	0.92	0.35	0.92	0.91	0.63	0.07	0.92
MnO	%	0.03	0.18	0.04	0.02	0.04	0.04	0.14	0.18	0.06	0.03	0.16	0.04	0.03	0.06	0.04	0.03
P2O5	%	0.12	0.05	0.01	0.09	0.12	0.11	0.04	0.12	0.08	0.12	0.03	0.13	0.13	0.11	0.02	0.14
SrO	%	0.01	0.02	<0.01	0.04	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.04	0.02	0.02
BaO	%	0.06	<0.01	0.01	0.03	0.06	0.07	0.01	0.03	0.03	0.06	0.01	0.07	0.07	0.04	0.01	0.05
LOI	%	5.15	6.08	11.80	1.74	4.90	4.27	10.95	3.34	4.62	4.52	12.70	4.73	4.85	4.29	11.80	4.72
Total	%	99.42	96.48	86.68	99.62	98.81	99.21	94.76	99.36	95.77	98.92	93.77	99.08	99.12	98.21	86.57	98.78

Client : **Golder Associates Inc.**
Project : **Eagle ARD Testing Program**
CEMI Project : **0356**
Test : **Metal Scan by ICP-MS/AES**
Date : **March 23, 2004**

Sample:		VR91618A	VR71043A	VR71087A	VR91619A	VR91620A	VR91621A	VR91622A	VR71109A	VR71161A	VR91623A	VR71275A	VR71314A	VR71373A	VR71450A	VR91624A	VR71821A	VR71938A	VR91625A
Element																			
Ag	ppm	0.13	0.06	5.32	0.13	0.17	0.11	0.13	0.10	0.11	0.09	0.51	0.21	1.30	12.35	0.09	2.51	4.36	0.31
Al	%	2.27	1.24	2.35	2.53	1.68	1.86	2.48	2.76	2.39	1.83	1.91	1.53	1.61	0.24	1.46	1.50	2.09	2.26
As	ppm	19.4	13.0	19.4	14.9	13.6	13.8	15.3	12.5	13.8	16.4	0.7	0.8	1.4	6.4	0.2	1.5	1.5	30.8
B	ppm	10	<10	10	10	<10	10	<10	10	10	<10	30	70	50	<10	10	50	10	<10
Ba	ppm	30	20	50	40	30	30	50	40	50	30	20	40	30	10	30	30	30	40
Be	ppm	0.33	0.19	0.70	0.38	0.25	0.38	0.38	0.88	0.51	0.27	0.16	0.23	0.16	0.06	0.16	0.13	0.33	0.37
Bi	ppm	0.34	0.12	0.82	0.29	0.12	0.14	0.26	0.26	0.41	0.17	0.23	0.09	0.79	4.24	0.03	1.02	1.58	0.47
Ca	%	0.11	3.43	0.12	0.14	0.14	2.21	0.36	0.63	0.17	2.69	0.56	0.63	0.59	0.03	0.74	0.60	1.52	0.40
Cd	ppm	0.40	0.10	1.43	0.60	0.11	0.13	0.26	0.25	0.90	0.13	0.26	0.15	0.54	4.19	0.09	1.29	1.70	0.92
Ce	ppm	57.2	36.4	59.8	61.6	35.6	41.2	60.8	68.5	61.4	44.9	8.87	12.70	10.20	1.74	10.40	8.41	20.3	60.4
Co	ppm	22.9	10.6	23.4	24.2	13.8	14.4	23.9	20.2	24.8	14.8	88.3	86.6	187.5	1340	101.5	217	113.0	25.9
Cr	ppm	72	150	104	96	166	142	96	124	108	166	976	242	305	61	677	971	298	80
Cs	ppm	0.74	0.38	2.46	0.51	0.44	0.42	0.55	1.81	0.65	0.46	1.50	1.17	2.02	0.46	0.49	1.40	3.75	0.57
Cu	ppm	59.2	23.4	4340	78.4	78.5	36.7	69.2	70.1	80.1	37.1	1135	479	3720	>10000	214	5250	5760	112.0
Cu	%														4.76				
Fe	%	4.97	2.54	5.66	5.42	3.52	3.74	5.88	5.22	5.51	3.64	5.42	7.04	9.24	>15	7.51	10.55	7.91	5.79
Ga	ppm	7.10	3.80	6.88	7.23	5.32	5.46	7.29	8.58	7.45	5.71	6.93	5.89	5.87	1.24	5.16	5.52	10.60	6.41
Ge	ppm	0.12	0.08	0.13	0.12	0.07	0.09	0.13	0.12	0.11	0.09	0.20	0.18	0.33	2.02	0.21	0.36	0.27	0.12
Hf	ppm	0.68	0.39	1.24	0.77	0.61	0.57	0.67	1.07	1.02	0.39	0.14	0.16	0.14	0.06	0.11	0.15	0.48	0.53
Hg	ppm	0.13	0.04	0.15	0.15	0.08	0.07	0.16	0.20	0.12	0.10	0.03	0.01	0.02	0.12	0.02	0.04	0.12	0.22
In	ppm	0.020	0.009	0.043	0.023	0.009	0.010	0.015	0.019	0.031	0.013	0.03	0.020	0.051	0.406	0.015	0.087	0.100	0.036
K	%	0.18	0.11	0.39	0.23	0.15	0.20	0.30	0.36	0.29	0.18	0.10	0.20	0.16	0.08	0.15	0.12	0.21	0.21
La	ppm	29.7	18.4	32.5	31.4	16.8	20.4	31.7	34.8	31.7	22.5	4.1	5.9	4.7	0.8	4.8	3.9	8.8	31.4
Li	ppm	46.5	18.2	51.6	50.3	33.6	34.2	45.5	82.4	38.5	28.1	30.7	13.9	12.2	5.7	5.00	18.8	16.8	42.0
Mg	%	1.37	0.63	1.36	1.46	0.91	2.15	1.45	1.84	1.22	0.96	5.24	7.68	7.91	0.09	10.10	6.32	3.35	1.48
Mn	ppm	233	541	285	269	190	782	279	451	219	510	423	618	507	465	860	689	486	277
Mo	ppm	2.40	2.23	5.48	3.77	2.60	2.80	5.95	4.12	8.03	2.78	0.68	1.02	1.14	3.59	0.77	1.10	1.33	11.45
Na	%	<0.01	0.01	0.01	<0.01	0.01	0.02	0.01	0.02	<0.01	0.02	0.09	0.14	0.12	<0.01	0.18	0.13	0.12	0.01
Nb	ppm	<0.05	<0.05	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.06	0.06	0.36	0.07	0.06	0.05	<0.05
Ni	ppm	89.4	39.4	168.0	100.0	57.4	57.3	106.5	94.2	109.0	62.0	1590	1080	5870	>10000	1325	6230	3390	147.5
P	ppm	470	370	490	570	450	430	560	480	500	450	300	450	380	10	350	300	930	530
Pb	ppm	18.6	10.6	43.8	17.8	8.1	10.6	17.9	5.5	25.4	15.1	4.1	3.1	5.4	69.6	2.3	12.5	18.2	23.5
Rb	ppm	9.2	6.1	31.5	11.5	8.3	9.5	15.4	20.3	15.6	9.1	7.5	10.2	10.5	4.9	6.5	6.9	16.2	10.2
Re	ppm	0.002	<0.001	0.004	0.003	<0.001	<0.001	0.002	0.003	0.007	<0.001	0.005	0.001	0.012	0.064	0.001	0.015	0.004	0.007
S	%	1.00	0.16	1.39	1.09	0.30	0.51	1.47	0.67	0.83	0.36	1.02	0.30	2.26	6.79	0.17	3.58	1.58	1.36
Sb	ppm	1.52	0.57	0.87	1.68	0.38	0.60	2.52	0.75	0.56	0.68	0.06	<0.05	0.14	0.38	<0.05	0.10	0.08	1.54
Sc	ppm	3.1	2.5	5.1	3.4	3.1	3.8	3.9	6.2	4.2	3.8	12.3	4.7	5.5	1.1	6.7	9.0	7.5	3.4
Se	ppm	0.6	0.3	0.9	0.5	0.3	0.5	0.7	0.6	0.9	0.4	2.3	0.9	5.9	84.2	0.5	9.7	6.2	0.8
Sn	ppm	0.6	0.2	0.9	0.2	0.3	0.2	0.3	0.7	0.3	0.2	0.3	0.4	0.8	4.5	0.3	1.0	1.4	0.2
Sr	ppm	14.6	217	12.0	17.5	11.4	18.7	21.1	19.8	14.9	182.0	47.1	30.9	32.8	2.4	50.3	48.6	66.9	25.2
Ta	ppm	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Te	ppm	0.03	0.02	0.05	0.03	0.01	0.01	0.02	0.02	0.05	0.01	0.17	0.07	0.54	6.78	0.03	1.02	1.66	0.07
Th	ppm	6.7	4.4	7.5	6.8	4.7	4.6	6.5	7.3	6.8	4.9	0.8	1.2	1.0	0.3	0.8	0.7	1.2	5.5
Ti	%	0.005	<0.005	0.023	0.005	<0.005	<0.005	0.006	0.017	0.006	0.005	0.102	0.120	0.108	0.025	0.105	0.111	0.222	0.006
Tl	ppm	0.14	0.07	0.45	0.16	0.08	0.10	0.19	0.23	0.13	0.10	0.15	0.10	0.31	0.74	0.05	0.16	0.34	0.11
U	ppm	1.94	0.91	3.61	1.98	1.22	1.14	1.84	3.03	3.30	0.90	0.19	0.29	0.21	0.11	0.22	0.18	0.23	2.05
V	ppm	27	18	60	32	24	25	32	74	36	28	88	69	62	33	57	82	133	34
W	ppm	0.05	0.15	0.09	0.13	0.08	0.19	0.05	0.12	0.07	0.15	<0.05	0.11	0.05	0.10	0.06	0.07	0.06	0.10
Y	ppm	8.18	7.70	14.30	9.10	6.45	10.75	9.14	15.10	13.10	6.84	5.74	6.89	6.87	0.54	5.20	5.25	12.60	7.87
Zn	ppm	166	69	155	188	77	92	138	83	231	87	58	87	70	123	85	67	66	222
Zr	ppm	25.2	14.1	49.2	29.8	23.0	22.0	26.7	41.4	38.4	14.8	5.1	7.0	5.6	2.9	4.7	5.4	15.7	18.9

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Element		Sample:	VR90125A	VR90181A	VR90257A	VR91626A	VR90425A	VR90457A	VR91267A	VR91306A	VR91482A	VR91542A	VR91579A	VR91627A	VR91623A DUP	VR90181A DUP	VR91627A DUP
Ag	ppm		4.56	27.7	0.13	0.23	0.09	5.13	0.47	4.06	0.13	6.54	0.13	0.25	0.10	28.4	0.20
Al	%		0.60	0.02	1.45	2.86	3.09	0.40	2.20	2.90	2.60	0.45	3.17	2.54	1.80	0.02	2.48
As	ppm		1.2	5.9	9.2	16.4	15.8	2.9	0.7	38.6	15.5	2.6	11.9	14.4	15.1	5.3	14.6
B	ppm		70	<10	10	20	10	<10	20	10	10	140	10	<10	<10	<10	<10
Ba	ppm		20	<10	20	50	40	10	40	10	40	10	50	40	30	<10	30
Be	ppm		0.10	<0.05	0.19	0.75	0.94	0.07	0.18	0.59	0.80	0.09	0.77	0.42	0.28	<0.05	0.35
Bi	ppm		1.33	5.73	0.07	0.33	0.20	1.41	0.19	1.13	0.33	1.63	0.33	0.57	0.17	6.12	0.54
Ca	%		0.24	<0.01	0.09	0.17	0.13	0.14	0.81	0.27	0.17	0.39	0.12	0.17	2.62	<0.01	0.17
Cd	ppm		1.46	9.93	0.05	0.80	0.06	2.01	0.23	1.21	0.47	2.16	0.06	0.88	0.10	10.3	0.89
Ce	ppm		5.86	0.48	35.8	57.6	63.8	2.92	12.90	42.0	55.9	4.38	60.9	59.8	45.5	0.42	59.0
Co	ppm		392	1110	13.6	22.4	23.8	651	76.8	93.7	23.5	585	23.7	25.3	13.7	1120	22.8
Cr	ppm		494	<1	295	92	132	379	557	189	104	202	110	85	152	<1	75
Cs	ppm		1.37	0.05	0.57	1.20	2.25	0.18	5.52	0.53	1.14	0.42	1.60	0.49	0.46	0.05	0.41
Cu	ppm		9810	>10000	230	315	48	>10000	1090	>10000	98	>10000	79.5	192.0	38.2	>10000	86.5
Cu	%			5.62				1.78		1.50		2.26				5.87	
Fe	%		14.85	>15	2.99	5.39	5.59	>15	5.98	8.00	5.39	>15	6.23	5.72	3.58	>15	5.76
Ga	ppm		2.43	1.03	6.50	7.62	9.85	1.62	8.22	10.80	7.46	1.71	8.73	6.73	5.36	0.96	6.58
Ge	ppm		0.58	1.99	0.09	0.13	0.13	1.09	0.18	0.23	0.13	1.00	0.12	0.12	0.09	2.06	0.14
Hf	ppm		0.13	0.02	0.62	0.80	1.15	0.11	0.17	0.77	1.00	0.11	0.96	0.86	0.40	0.05	0.81
Hg	ppm		0.04	0.25	0.02	0.23	0.04	0.06	0.01	0.17	0.14	0.08	0.08	0.19	0.10	0.27	0.17
In	ppm		0.100	0.653	0.014	0.020	0.024	0.171	0.030	0.116	0.029	0.198	0.027	0.049	0.012	0.659	0.042
K	%		0.11	0.01	0.12	0.41	0.48	0.07	0.29	0.13	0.30	0.05	0.37	0.27	0.17	<0.01	0.20
La	ppm		2.6	0.2	16.0	28.3	30.9	1.4	5.7	19.6	27.6	2.0	29.8	29.4	21.7	0.2	29.6
Li	ppm		7.9	1.1	33.5	70.2	105.0	2.4	20.9	59.0	58.1	7.3	69.1	45.8	27.5	2.0	45.1
Mg	%		6.29	0.04	1.06	1.94	2.05	8.84	3.61	2.66	1.68	10.00	2.03	1.62	0.96	0.03	1.58
Mn	ppm		532	286	236	310	303	811	378	491	266	795	320	269	497	255	270
Mo	ppm		1.30	3.19	3.96	3.65	2.06	1.94	1.09	2.58	8.36	1.63	4.46	7.23	2.64	3.29	7.17
Na	%		0.04	<0.01	0.05	<0.01	0.02	0.04	0.22	0.04	0.01	0.03	0.02	0.01	0.02	<0.01	0.01
Nb	ppm		0.09	0.39	<0.05	<0.05	0.07	0.18	<0.05	0.05	<0.05	0.15	<0.05	<0.05	<0.05	0.33	<0.05
Ni	ppm		>10000	>10000	197.5	269	104.0	>10000	1395	2970	113.0	>10000	115.5	219	62.5	>10000	122.0
P	ppm		190	<10	320	510	470	100	480	370	540	110	490	580	430	10	590
Pb	ppm		20.8	64.4	2.8	22.1	6.8	21.2	3.7	10.5	34.1	20.7	16.0	32.6	15.8	62.3	33.7
Rb	ppm		6.9	0.3	4.9	19.6	30.9	3.7	21.7	4.2	15.7	2.4	17.8	12.8	8.6	0.3	10.0
Re	ppm		0.054	0.058	0.001	0.005	0.002	0.040	0.005	0.003	0.004	0.031	0.003	0.003	<0.001	0.061	0.003
S	%		4.70	6.89	0.20	1.04	0.76	6.51	0.89	2.89	1.06	6.94	1.51	1.41	0.37	7.26	1.39
Sb	ppm		0.09	0.46	0.40	1.27	0.54	0.12	<0.05	3.16	1.52	3.90	0.98	1.71	0.63	0.38	1.75
Sc	ppm		4.3	1.0	5.6	4.9	7.8	4.7	6.6	9.1	5.7	4.8	7.6	3.8	3.8	1.1	3.3
Se	ppm		17.1	83.9	0.4	0.8	0.4	34.1	2.1	6.9	0.6	35.2	0.8	0.8	0.4	86.8	0.7
Sn	ppm		0.9	12.2	0.8	0.5	0.6	1.3	0.5	2.9	0.6	2.0	1.3	0.3	0.3	11.7	0.2
Sr	ppm		13.0	1.4	13.0	26.0	17.7	9.3	59.6	19.6	16.4	18.2	18.8	15.4	178.0	1.4	15.2
Ta	ppm		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
Te	ppm		1.46	11.60	0.02	0.06	0.03	2.03	0.13	0.39	0.04	2.00	0.04	0.06	0.02	11.85	0.05
Th	ppm		0.6	<0.2	5.4	5.1	7.3	0.3	1.2	5.3	5.6	0.4	6.3	6.5	4.3	<0.2	6.0
Ti	%		0.074	0.009	0.007	0.017	0.038	0.078	0.174	0.009	0.009	0.050	0.007	0.005	0.005	0.007	0.005
Tl	ppm		0.24	0.70	0.05	0.28	0.31	0.18	0.34	0.36	0.20	0.19	0.19	0.16	0.09	0.57	0.13
U	ppm		0.13	<0.05	1.36	1.99	2.74	0.12	0.26	1.49	2.75	0.10	2.87	2.34	0.85	<0.05	2.06
V	ppm		44	62	46	50	80.00	46.00	124	77	54	38	69	32	26	55	30
W	ppm		0.05	0.21	0.12	0.08	0.10	0.07	0.05	0.13	0.07	0.05	0.07	0.07	0.06	0.13	<0.05
Y	ppm		2.85	0.11	7.98	9.72	12.50	1.53	7.06	7.48	11.35	2.69	12.45	9.97	6.44	0.12	9.30
Zn	ppm		59.0	186	30	128	61	108	39	158	140	108	49	210	78	184	209
Zr	ppm		4.0	0.9	21.5	29.6	46.2	4.9	6.3	26.8	40.3	4.7	41.6	34.6	14.7	1.8	33.1

CEMI

ALS Chemex
EXCELLENCE IN ANALYTICAL CHEMISTRY
ALS Canada Ltd.
212 Brooksbank Avenue
North Vancouver BC V7J 2C1 Canada
Phone: 604 984 0221 Fax: 604 984 0218

To: **CANADIAN ENVIRONMENTAL AND METALLURGICAL INC.**
1636 WEST 75TH AVE.
VANCOUVER BC V6P 6G2

Date: 24-MAR-2004
Account: CEMI

QC CERTIFICATE VA04013652

Project: 0361

P.O. No.: 1701 74V 9726

This report is for 33 Pulp samples submitted to our lab in Vancouver, BC, Canada on 15-MAR-2004.

The following have access to data associated with this certificate:

VIC KHERA		

SAMPLE PREPARATION

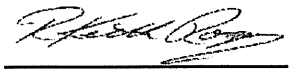
ALS CODE	DESCRIPTION
WEI-21	Received Sample Weight
LOG-22	Sample login - Rcd w/o BarCode
PUL-31	Pulverize split to 85% <75 um

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	
S-GRA06a	Sulfate Sulfur (HCl leachable)	
S-IR08	Total Sulphur (Leco)	LECO
C-GAS05	Inorganic Carbon (CO2)	
Cu-AA46	Ore grade Cu - aqua regia/AA	AAS
ME-MS41	50 element aqua regia ICP-MS	
ME-XRF06	Whole Rock Package - XRF	XRF
OA-GRA06	LOI for ME-XRF06	WST-SIM

To: **CANADIAN ENVIRONMENTAL AND METALLURGICAL INC.**
ATTN: VIC KHERA
1636 WEST 75TH AVE.
VANCOUVER BC V6P 6G2

This is the Final Report and supersedes any preliminary report with this certificate number. Results apply to samples as submitted. All pages of this report have been checked and approved for release.

Signature: 

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Date: 24-MAR-2004
Account: CEMI

Project: 0361

QC CERTIFICATE OF ANALYSIS VA04013652

Sample Description	Method	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41
	Analyte	Ag	Al	As	B	Ba	Be	Bi	Ca	Cd	Ce	Co	Cr	Cs	Cu	Fe
	Units	ppm	%	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%
	LOR	0.01	0.01	0.1	10	10	0.05	0.01	0.01	0.01	0.02	0.1	1	0.05	0.2	0.01
		STANDARDS														
CO-ASSAY																
Target Range																
CO-ASSAY																
CO-ASSAY																
Target Range																
CU-106																
CU-106																
Target Range																
G2000																
G2000																
Target Range																
G2000		3.33	1.82	471	<10	850	1.04	1.07	0.50	7.74	43.0	24.8	68	9.58	295	3.73
G2000		3.12	1.80	481	<10	840	1.07	1.04	0.51	7.21	44.1	23.7	70	8.81	297	3.70
Target Range		3.05 - 3.75	1.66 - 2.06	436 - 533	<10 - 20	740 - 920	0.81 - 1.10	0.98 - 1.22	0.46 - 0.58	6.83 - 8.37	38.2 - 46.8	22.6 - 27.8	64 - 80	7.96 - 9.84	273 - 334	3.41 - 4.19
GEOMS-03		0.38	1.74	632	<10	1020	0.99	0.29	0.34	0.30	35.7	9.9	71	6.36	125.0	4.06
GEOMS-03		0.48	1.68	619	<10	970	1.19	0.33	0.34	0.32	41.3	10.8	68	6.51	124.5	4.03
Target Range		0.42 - 0.54	1.63 - 2.01	553 - 677	<10 - 20	940 - 1180	0.94 - 1.26	0.31 - 0.40	0.30 - 0.38	0.31 - 0.41	37.6 - 45.9	10.4 - 13.0	59 - 74	6.32 - 7.84	120.5 - 147.5	3.48 - 4.28
SY-4																
Target Range																
UTS-1																
Target Range																
UTS-1																
Target Range																
UTS-3																

Comments: MEXRF06: Samples with low totals contain high base metals; samples were rechecked

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1636 WEST 75TH AVE.
VANCOUVER BC V6P 6G2

Date: 24-MAR-2004
Account: CEMI

Project: 0361

QC CERTIFICATE OF ANALYSIS VA04013652

Sample Description	Method / Analyte / Units / LOR	ME-MS41 Ag ppm 0.01	ME-MS41 Al % 0.01	ME-MS41 As ppm 0.1	ME-MS41 B ppm 10	ME-MS41 Ba ppm 10	ME-MS41 Be ppm 0.05	ME-MS41 Bi ppm 0.01	ME-MS41 Ca % 0.01	ME-MS41 Cd ppm 0.01	ME-MS41 Ce ppm 0.02	ME-MS41 Co ppm 0.1	ME-MS41 Cr ppm 1	ME-MS41 Cs ppm 0.05	ME-MS41 Cu ppm 0.2	ME-MS41 Fe % 0.01
		STANDARDS														
Target Range																
		BLANKS														
BLANK																
Target Range																
BLANK		<0.01	<0.01	<0.1	<10	<10	<0.05	<0.01	<0.01	<0.01	<0.02	<0.1	<1	<0.05	<0.2	<0.01
BLANK		<0.01	<0.01	<0.1	<10	<10	<0.05	<0.01	<0.01	0.01	<0.02	<0.1	<1	<0.05	0.3	<0.01
Target Range		<0.01 - 0.02	<0.01 - 0.02	<0.1 - 0.2	<10 - 20	<10 - 20	<0.05 - 0.10	<0.01 - 0.02	<0.01 - 0.02	<0.01 - 0.02	<0.02 - 0.04	<0.1 - 0.2	<1 - 2	<0.05 - 0.10	<0.2 - 0.4	<0.01 - 0.02
BLANK																
Target Range																
BLANK																
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Target Range																

Comments: MEXRF06: Samples with low totals contain high base metals; samples were rechecked

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Date: 24-MAR-2004
Account: CEMI

Project: 0361

QC CERTIFICATE OF ANALYSIS VA04013652

Sample Description	Method / Analyte / Units / LOR	ME-MS41 Ag ppm 0.01	ME-MS41 Al % 0.01	ME-MS41 As ppm 0.1	ME-MS41 B ppm 10	ME-MS41 Ba ppm 10	ME-MS41 Be ppm 0.05	ME-MS41 Bi ppm 0.01	ME-MS41 Ca % 0.01	ME-MS41 Cd ppm 0.01	ME-MS41 Ce ppm 0.02	ME-MS41 Co ppm 0.1	ME-MS41 Cr ppm 1	ME-MS41 Cs ppm 0.05	ME-MS41 Cu ppm 0.2	ME-MS41 Fe % 0.01
PREP BLANKS AND DUPLICATES																
18781																
DUP																
Target Range																
18798		0.13	2.60	15.5	10	40	0.80	0.33	0.17	0.47	55.9	23.5	104	1.14	98.0	5.39
DUP		0.12	2.50	15.5	<10	40	0.71	0.33	0.16	0.48	54.8	23.7	108	1.12	90.9	5.14
Target Range		0.10 - 0.15	2.40 - 2.70	14.5 - 16.5	<10 - 20	20 - 60	0.62 - 0.89	0.29 - 0.37	0.14 - 0.19	0.43 - 0.52	52.5 - 58.2	22.2 - 25.0	99 - 113	0.97 - 1.29	89.3 - 99.6	4.98 - 5.55
18819																
DUP																
Target Range																
ORIGINAL																
DUP																
Target Range																
ORIGINAL		14.00	0.49	94.0	20	30	0.07	4.27	0.01	0.25	24.5	0.7	193	2.34	29.9	1.28
DUP		13.95	0.47	93.3	20	30	0.10	4.32	0.01	0.24	24.4	0.8	192	2.32	35.0	1.21
Target Range		13.25 - 14.70	0.44 - 0.52	88.8 - 98.5	<10 - 40	<10 - 50	<0.05 - 0.10	4.06 - 4.53	<0.01 - 0.02	0.21 - 0.28	23.2 - 25.7	0.5 - 1.0	181 - 204	2.11 - 2.55	30.4 - 34.5	1.16 - 1.33

Comments: MEXRF06: Samples with low totals contain high base metals; samples were rechecked

ALS Chemex
EXCELLENCE IN ANALYTICAL CHEMISTRY
ALS Canada Ltd.
212 Brooksbank Avenue
North Vancouver BC V7J 2C1 Canada
Phone: 604 984 0221 Fax: 604 984 0218

To: **CANADIAN ENVIRONMENTAL AND METALLURGICAL INC.**
1636 WEST 75TH AVE.
VANCOUVER BC V6P 6G2

Date: 24-MAR-2004
Account: CEMI

Project: 0361

QC CERTIFICATE OF ANALYSIS VA04013652

Sample Description	Method / Analyte / Units / LOR	ME-MS41 Ga ppm 0.05	ME-MS41 Ge ppm 0.05	ME-MS41 Hf ppm 0.02	ME-MS41 Hg ppm 0.01	ME-MS41 In ppm 0.005	ME-MS41 K % 0.01	ME-MS41 La ppm 0.2	ME-MS41 Li ppm 0.1	ME-MS41 Mg % 0.01	ME-MS41 Mn ppm 5	ME-MS41 Mo ppm 0.05	ME-MS41 Na % 0.01	ME-MS41 Nb ppm 0.05	ME-MS41 Ni ppm 0.2	ME-MS41 P ppm 10
		STANDARDS														
CO-ASSAY																
Target Range																
CO-ASSAY																
CO-ASSAY																
Target Range																
CU-106																
CU-106																
Target Range																
G2000																
G2000																
Target Range																
G2000		6.96	0.27	0.10	0.72	0.388	0.40	23.6	18.8	0.66	554	5.65	0.01	0.11	276	930
G2000		6.33	0.25	0.12	0.71	0.382	0.41	22.9	18.2	0.67	555	5.88	0.02	0.13	276	940
Target Range		5.62 - 6.98	0.18 - 0.34	0.10 - 0.16	0.62 - 0.78	0.355 - 0.445	0.38 - 0.48	20.5 - 25.5	14.8 - 18.4	0.60 - 0.76	506 - 630	5.44 - 6.76	<0.01 - 0.02	<0.05 - 0.16	257 - 315	840 - 1050
GEOMS-03		5.47	0.26	0.10	0.59	0.033	0.33	20.4	14.2	0.43	527	2.59	<0.01	0.07	47.2	1000
GEOMS-03		5.80	0.30	0.11	0.67	0.035	0.33	22.2	16.0	0.44	529	3.05	0.02	0.09	52.1	1020
Target Range		5.35 - 6.65	0.16 - 0.30	0.09 - 0.15	0.61 - 0.77	0.033 - 0.051	0.29 - 0.37	21.0 - 26.1	14.1 - 17.5	0.39 - 0.49	483 - 601	3.05 - 3.83	<0.01 - 0.03	<0.05 - 0.16	48.1 - 59.3	880 - 1100
SY-4																
Target Range																
UTS-1																
Target Range																
UTS-1																
Target Range																
UTS-3																

Comments: MEXRF06: Samples with low totals contain high base metals; samples were rechecked

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VANCOUVER BC V6P 6G2

Date: 24-MAR-2004
Account: CEMI

Project: 0361

QC CERTIFICATE OF ANALYSIS VA04013652

Sample Description	Method / Analyte / Units / LOR	ME-MS41 Ga ppm 0.05	ME-MS41 Ge ppm 0.05	ME-MS41 Hf ppm 0.02	ME-MS41 Hg ppm 0.01	ME-MS41 In ppm 0.005	ME-MS41 K % 0.01	ME-MS41 La ppm 0.2	ME-MS41 Li ppm 0.1	ME-MS41 Mg % 0.01	ME-MS41 Mn ppm 5	ME-MS41 Mo ppm 0.05	ME-MS41 Na % 0.01	ME-MS41 Nb ppm 0.05	ME-MS41 Ni ppm 0.2	ME-MS41 P ppm 10
		STANDARDS														
Target Range																
		BLANKS														
BLANK																
Target Range																
BLANK		<0.05	<0.05	<0.02	<0.01	<0.005	<0.01	<0.2	<0.1	<0.01	<5	<0.05	<0.01	<0.05	<0.2	<10
BLANK		<0.05	<0.05	<0.02	0.01	<0.005	<0.01	<0.2	0.1	<0.01	<5	<0.05	<0.01	<0.05	<0.2	<10
Target Range		<0.05 - 0.10	<0.05 - 0.10	<0.02 - 0.04	<0.01 - 0.02	<0.005 - 0.010	<0.01 - 0.02	<0.2 - 0.4	<0.1 - 0.2	<0.01 - 0.02	<5 - 10	<0.05 - 0.10	<0.01 - 0.02	<0.05 - 0.10	<0.2 - 0.4	<10 - 20
BLANK																
Target Range																
BLANK																
Target Range																
BLANK																
Target Range																
BLANK																
BLANK																
Target Range																

Comments: MEXRF06: Samples with low totals contain high base metals; samples were rechecked

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Project: 0361

QC CERTIFICATE OF ANALYSIS VA04013652

Sample Description	Method / Analyte / Units / LOR	ME-MS41 Ga ppm 0.05	ME-MS41 Ge ppm 0.05	ME-MS41 Hf ppm 0.02	ME-MS41 Hg ppm 0.01	ME-MS41 In ppm 0.005	ME-MS41 K % 0.01	ME-MS41 La ppm 0.2	ME-MS41 Li ppm 0.1	ME-MS41 Mg % 0.01	ME-MS41 Mn ppm 5	ME-MS41 Mo ppm 0.05	ME-MS41 Na % 0.01	ME-MS41 Nb ppm 0.05	ME-MS41 Ni ppm 0.2	ME-MS41 P ppm 10
PREP BLANKS AND DUPLICATES																
18781																
DUP																
Target Range																
18798		7.46	0.13	1.00	0.14	0.029	0.30	27.6	58.1	1.68	266	8.36	0.01	<0.05	113.0	540
DUP		7.57	0.12	1.05	0.15	0.029	0.32	27.2	60.1	1.60	255	8.50	0.01	<0.05	112.5	510
Target Range		7.04 - 7.99	<0.05 - 0.23	0.93 - 1.12	0.12 - 0.17	0.018 - 0.040	0.27 - 0.35	25.6 - 29.2	55.9 - 62.3	1.54 - 1.74	237 - 284	7.91 - 8.95	<0.01 - 0.02	<0.05 - 0.10	106.5 - 119.0	480 - 570
18819																
DUP																
Target Range																
ORIGINAL																
DUP																
Target Range																
ORIGINAL		1.18	<0.05	<0.02	1.07	0.057	0.32	13.0	0.3	0.01	26	47.4	<0.01	0.06	4.8	150
DUP		1.16	0.05	<0.02	1.06	0.057	0.31	13.0	0.4	0.02	25	47.2	<0.01	0.06	5.9	140
Target Range		1.01 - 1.33	<0.05 - 0.10	<0.02 - 0.04	0.99 - 1.14	0.044 - 0.070	0.28 - 0.35	12.0 - 14.1	<0.1 - 0.6	<0.01 - 0.02	14 - 37	44.8 - 49.8	<0.01 - 0.02	<0.05 - 0.10	4.7 - 6.0	120 - 170

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Date: 24-MAR-2004
Account: CEMI

Project: 0361

QC CERTIFICATE OF ANALYSIS VA04013652

Sample Description	Method / Analyte / Units / LOR	ME-MS41 Pb ppm 0.2	ME-MS41 Rb ppm 0.1	ME-MS41 Re ppm 0.001	ME-MS41 S % 0.01	ME-MS41 Sb ppm 0.05	ME-MS41 Sc ppm 0.1	ME-MS41 Se ppm 0.2	ME-MS41 Sn ppm 0.2	ME-MS41 Sr ppm 0.2	ME-MS41 Ta ppm 0.01	ME-MS41 Te ppm 0.01	ME-MS41 Th ppm 0.2	ME-MS41 Ti % 0.005	ME-MS41 Tl ppm 0.02	ME-MS41 U ppm 0.05
		STANDARDS														
CO-ASSAY																
Target Range																
CO-ASSAY																
CO-ASSAY																
Target Range																
CU-106																
CU-106																
Target Range																
G2000																
G2000																
Target Range																
G2000		664	35.5	0.004	0.26	22.6	8.3	4.3	1.5	68.0	<0.01	0.14	5.5	0.051	0.72	2.06
G2000		653	31.7	0.005	0.27	23.0	7.8	3.7	1.5	66.7	<0.01	0.15	5.1	0.051	0.64	1.95
Target Range		603 - 737	29.8 - 36.6	0.003 - 0.005	0.26 - 0.34	20.3 - 24.9	6.7 - 8.5	3.6 - 4.8	1.2 - 1.9	59.7 - 73.4	<0.01 - 0.02	0.11 - 0.15	4.5 - 5.9	<0.005 - 0.016	0.64 - 0.82	1.75 - 2.25
GEOMS-03		5.1	23.8	0.001	0.03	10.05	8.4	2.0	1.3	93.6	<0.01	0.09	4.4	0.035	0.85	1.98
GEOMS-03		6.1	24.5	0.001	0.04	12.05	9.2	2.2	1.5	95.9	<0.01	0.09	4.7	0.031	0.83	2.16
Target Range		5.7 - 7.4	24.2 - 29.8	<0.001 - 0.002	0.02 - 0.04	9.72 - 12.00	7.9 - 9.9	2.0 - 2.8	1.3 - 2.0	95.2 - 117.0	<0.01 - 0.02	0.08 - 0.12	4.2 - 5.6	0.022 - 0.038	0.84 - 1.08	1.99 - 2.55
SY-4																
Target Range																
UTS-1																
Target Range																
UTS-1																
Target Range																
UTS-3																

Comments: MEXRF06: Samples with low totals contain high base metals; samples were rechecked

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ALS Canada Ltd.
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North Vancouver BC V7J 2C1 Canada
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1636 WEST 75TH AVE.
VANCOUVER BC V6P 6G2

Date: 24-MAR-2004
Account: CEMI

Project: 0361

QC CERTIFICATE OF ANALYSIS VA04013652

Sample Description	Method / Analyte / Units / LOR	ME-MS41 Pb ppm 0.2	ME-MS41 Rb ppm 0.1	ME-MS41 Re ppm 0.001	ME-MS41 S % 0.01	ME-MS41 Sb ppm 0.05	ME-MS41 Sc ppm 0.1	ME-MS41 Se ppm 0.2	ME-MS41 Sn ppm 0.2	ME-MS41 Sr ppm 0.2	ME-MS41 Ta ppm 0.01	ME-MS41 Te ppm 0.01	ME-MS41 Th ppm 0.2	ME-MS41 Ti % 0.005	ME-MS41 Tl ppm 0.02	ME-MS41 U ppm 0.05
		STANDARDS														
Target Range																
		BLANKS														
BLANK																
Target Range																
BLANK		<0.2	<0.1	<0.001	<0.01	<0.05	<0.1	<0.2	<0.2	<0.2	<0.01	<0.01	<0.2	<0.005	<0.02	<0.05
BLANK		<0.2	<0.1	<0.001	0.01	<0.05	<0.1	<0.2	<0.2	<0.2	<0.01	<0.01	<0.2	<0.005	<0.02	<0.05
Target Range		<0.2 - 0.4	<0.1 - 0.2	<0.001 - 0.002	<0.01 - 0.02	<0.05 - 0.10	<0.1 - 0.2	<0.2 - 0.4	<0.2 - 0.4	<0.2 - 0.4	<0.01 - 0.02	<0.01 - 0.02	<0.2 - 0.4	<0.005 - 0.010	<0.02 - 0.04	<0.05 - 0.10
BLANK																
Target Range																
BLANK																
Target Range																
BLANK																
Target Range																
BLANK																
BLANK																
Target Range																

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Project: 0361

QC CERTIFICATE OF ANALYSIS VA04013652

Sample Description	Method / Analyte / Units / LOR	ME-MS41 Pb ppm 0.2	ME-MS41 Rb ppm 0.1	ME-MS41 Re ppm 0.001	ME-MS41 S % 0.01	ME-MS41 Sb ppm 0.05	ME-MS41 Sc ppm 0.1	ME-MS41 Se ppm 0.2	ME-MS41 Sn ppm 0.2	ME-MS41 Sr ppm 0.2	ME-MS41 Ta ppm 0.01	ME-MS41 Te ppm 0.01	ME-MS41 Th ppm 0.2	ME-MS41 Ti % 0.005	ME-MS41 Tl ppm 0.02	ME-MS41 U ppm 0.05
		PREP BLANKS AND DUPLICATES														
18781																
DUP																
Target Range																
18798		34.1	15.7	0.004	1.06	1.52	5.7	0.6	0.6	16.4	<0.01	0.04	5.6	0.009	0.20	2.75
DUP		35.5	16.3	0.004	1.02	1.61	5.9	0.7	0.6	16.3	<0.01	0.04	5.8	0.009	0.21	2.83
Target Range		32.7 - 36.9	15.0 - 17.0	0.002 - 0.006	0.97 - 1.11	1.39 - 1.74	5.3 - 6.3	<0.2 - 1.1	<0.2 - 1.0	15.1 - 17.6	<0.01 - 0.02	0.02 - 0.06	5.0 - 6.4	<0.005 - 0.010	0.15 - 0.26	2.55 - 3.03
18819																
DUP																
Target Range																
ORIGINAL																
DUP																
Target Range																
ORIGINAL		161.5	23.2	0.015	0.07	108.5	1.0	1.4	2.2	4.4	<0.01	0.45	5.4	<	0.51	0.59
DUP		149.0	23.4	0.012	0.07	108.0	1.0	1.3	2.2	4.4	<0.01	0.40	5.5	<0.005	0.48	0.58
Target Range		147.0 - 163.5	21.9 - 24.7	0.011 - 0.016	0.05 - 0.09	102.5 - 114.0	0.8 - 1.3	0.9 - 1.8	1.7 - 2.7	3.8 - 5.0	<0.01 - 0.02	0.38 - 0.47	4.8 - 6.1	<0.005 - 0.010	0.43 - 0.56	0.46 - 0.71

Comments: MEXRF06: Samples with low totals contain high base metals; samples were rechecked

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VANCOUVER BC V6P 6G2

Date: 24-MAR-2004
Account: CEMI

Project: 0361

QC CERTIFICATE OF ANALYSIS VA04013652

Sample Description	Method Analyte Units LOR	ME-MS41 V ppm 1	ME-MS41 W ppm 0.05	ME-MS41 Y ppm 0.05	ME-MS41 Zn ppm 2	ME-MS41 Zr ppm 0.5	Cu-AA46 Cu % 0.01	ME-XRF06 SiO2 % 0.01	ME-XRF06 Al2O3 % 0.01	ME-XRF06 Fe2O3 % 0.01	ME-XRF06 CaO % 0.01	ME-XRF06 MgO % 0.01	ME-XRF06 Na2O % 0.01	ME-XRF06 K2O % 0.01	ME-XRF06 Cr2O3 % 0.01	ME-XRF06 TiO2 % 0.01
		STANDARDS														
CO-ASSAY																
Target Range																
CO-ASSAY							5.65									
CO-ASSAY							5.64									
Target Range							5.49 - 5.91									
CU-106							1.43									
CU-106							1.45									
Target Range							1.37 - 1.49									
G2000								74.26	9.86	5.73	0.88	1.32	0.45	1.61	0.02	0.71
G2000								74.68	9.84	5.82	0.87	1.32	0.45	1.59	0.02	0.71
Target Range								70.94 - 78.42	9.44 - 10.46	5.44 - 6.04	0.82 - 0.92	1.24 - 1.40	0.42 - 0.48	1.51 - 1.69	<0.01 - 0.03	0.66 - 0.76
G2000		65	6.30	17.25	1240	2.3										
G2000		65	6.15	16.40	1215	2.4										
Target Range		59 - 74	5.17 - 6.43	14.35 - 17.65	1130 - 1385	1.7 - 3.2										
GEOMS-03		70	5.83	14.50	44	2.5										
GEOMS-03		67	6.85	15.30	43	2.4										
Target Range		59 - 75	5.24 - 6.52	14.45 - 17.80	40 - 54	1.9 - 3.4										
SY-4																
Target Range																
UTS-1																
Target Range																
UTS-1																
Target Range																
UTS-3																

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QC CERTIFICATE OF ANALYSIS VA04013652

Sample Description	Method	ME-MS41	ME-MS41	ME-MS41	ME-MS41	ME-MS41	Cu-AA46	ME-XRF06	ME-XRF06	ME-XRF06	ME-XRF06	ME-XRF06	ME-XRF06	ME-XRF06	ME-XRF06	ME-XRF06
	Analyte	V	W	Y	Zn	Zr	Cu	SiO2	Al2O3	Fe2O3	CaO	MgO	Na2O	K2O	Cr2O3	TiO2
	Units	ppm	ppm	ppm	ppm	ppm	%	%	%	%	%	%	%	%	%	%
	LOR	1	0.05	0.05	2	0.5	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
STANDARDS																
Target Range																
BLANKS																
BLANK								<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Target Range								<0.01 - 0.02	<0.01 - 0.04	<0.01 - 0.02	<0.01 - 0.03	<0.01 - 0.02	<0.01 - 0.02	<0.01 - 0.04	<0.01 - 0.02	<0.01 - 0.02
BLANK		<1	<0.05	<0.05	<2	<0.5										
BLANK		<1	<0.05	<0.05	<2	<0.5										
Target Range		<1 - 2	<0.05 - 0.10	<0.05 - 0.10	<2 - 4	<0.5 - 1.0										
BLANK																
Target Range																
BLANK																
Target Range																
BLANK																
Target Range																
BLANK							<0.01									
BLANK							<0.01									
Target Range							<0.01 - 0.02									

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QC CERTIFICATE OF ANALYSIS VA04013652

Sample Description	Method / Analyte / Units / LOR	ME-MS41 V ppm 1	ME-MS41 W ppm 0.05	ME-MS41 Y ppm 0.05	ME-MS41 Zn ppm 2	ME-MS41 Zr ppm 0.5	Cu-AA46 Cu % 0.01	ME-XRF06 SiO2 % 0.01	ME-XRF06 Al2O3 % 0.01	ME-XRF06 Fe2O3 % 0.01	ME-XRF06 CaO % 0.01	ME-XRF06 MgO % 0.01	ME-XRF06 Na2O % 0.01	ME-XRF06 K2O % 0.01	ME-XRF06 Cr2O3 % 0.01	ME-XRF06 TiO2 % 0.01
PREP BLANKS AND DUPLICATES																
18781								64.52	13.24	5.95	3.84	1.93	2.47	1.73	0.09	0.62
DUP								64.59	13.25	5.95	3.83	1.95	2.45	1.75	0.10	0.63
Target Range								62.92 - 66.19	12.89 - 13.60	5.78 - 6.12	3.72 - 3.95	1.87 - 2.01	2.38 - 2.54	1.68 - 1.80	0.07 - 0.12	0.59 - 0.66
18798		54	0.07	11.35	140	40.3										
DUP		56	0.07	11.50	166	40.7										
Target Range		50 - 60	<0.05 - 0.10	10.75 - 12.10	141 - 165	37.5 - 43.5										
18819							5.87									
DUP							5.95									
Target Range							5.74 - 6.08									
ORIGINAL							1.35									
DUP							1.32									
Target Range							1.28 - 1.39									
ORIGINAL		6	1.44	1.16	19	<0.5										
DUP		6	1.44	1.18	19	<0.5										
Target Range		4 - 8	1.27 - 1.61	1.01 - 1.33	14 - 24	<0.5 - 1.0										

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QC CERTIFICATE OF ANALYSIS VA04013652

Sample Description	Method / Analyte / Units / LOR	ME-XRF06 MnO % 0.01	ME-XRF06 P2O5 % 0.01	ME-XRF06 SrO % 0.01	ME-XRF06 BaO % 0.01	ME-XRF06 LOI % 0.01	ME-XRF06 Total % 0.01	S-GRA06a S % 0.01	S-IR08 S % 0.01	C-GAS05 C % 0.05	C-GAS05 CO2 % 0.2
		STANDARDS									
CO-ASSAY										0.56	2.1
Target Range										0.41 - 0.59	1.5 - 2.2
CO-ASSAY											
CO-ASSAY											
Target Range											
CU-106											
CU-106											
Target Range											
G2000		0.08	0.21	0.01	0.28	4.40	99.82				
G2000		0.08	0.22	0.01	0.28	4.40	100.30				
Target Range		0.07 - 0.09	0.20 - 0.24	<0.01 - 0.02	0.26 - 0.30	4.26 - 4.72	94.99 - 101.00				
G2000											
G2000											
Target Range											
GEOMS-03											
GEOMS-03											
Target Range											
SY-4										0.94	3.5
Target Range										0.84 - 1.08	3.1 - 3.9
UTS-1								0.91			
Target Range								0.83 - 0.93			
UTS-1									1.01		
Target Range									0.95 - 1.05		
UTS-3									0.23		

Comments: MEXRF06: Samples with low totals contain high base metals; samples were rechecked

ALS Chemex
EXCELLENCE IN ANALYTICAL CHEMISTRY
ALS Canada Ltd.
212 Brooksbank Avenue
North Vancouver BC V7J 2C1 Canada
Phone: 604 984 0221 Fax: 604 984 0218

To: **CANADIAN ENVIRONMENTAL AND METALLURGICAL INC.**
1636 WEST 75TH AVE.
VANCOUVER BC V6P 6G2

Date: 24-MAR-2004
Account: CEMI

Project: 0361

QC CERTIFICATE OF ANALYSIS VA04013652

Sample Description	Method / Analyte / Units / LOR	ME-XRF06 MnO % 0.01	ME-XRF06 P2O5 % 0.01	ME-XRF06 SrO % 0.01	ME-XRF06 BaO % 0.01	ME-XRF06 LOI % 0.01	ME-XRF06 Total % 0.01	S-GRA06a S % 0.01	S-IR08 S % 0.01	C-GAS05 C % 0.05	C-GAS05 CO2 % 0.2
STANDARDS											
Target Range									0.21 - 0.25		
BLANKS											
BLANK		<0.01	<0.01	<0.01	<0.01		<0.01				
Target Range		<0.01 - 0.02	<0.01 - 0.03	<0.01 - 0.02	<0.01 - 0.02	-	-				
BLANK											
BLANK											
Target Range											
BLANK										<0.05	<0.2
Target Range										<0.05 - 0.10	<0.2 - 0.4
BLANK								<0.01			
Target Range								-			
BLANK									<0.01		
Target Range									<0.01 - 0.02		
BLANK											
BLANK											
Target Range											

Comments: MEXRF06: Samples with low totals contain high base metals; samples were rechecked

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QC CERTIFICATE OF ANALYSIS VA04013652

Sample Description	Method / Analyte / Units / LOR	ME-XRF06 MnO % 0.01	ME-XRF06 P2O5 % 0.01	ME-XRF06 SrO % 0.01	ME-XRF06 BaO % 0.01	ME-XRF06 LOI % 0.01	ME-XRF06 Total % 0.01	S-GRA06a S % 0.01	S-IR08 S % 0.01	C-GAS05 C % 0.05	C-GAS05 CO2 % 0.2
		PREP BLANKS AND DUPLICATES									
18781		0.06	0.09	0.04	0.03	3.80	98.41	0.01	0.35	0.83	3.1
DUP		0.06	0.10	0.05	0.04	3.70	98.44	0.03	0.36	0.82	3.0
Target Range		0.04 - 0.08	0.07 - 0.12	0.02 - 0.07	<0.01 - 0.06	3.64 - 3.86	95.94 - 100.90	<0.01 - 0.04	0.33 - 0.38	0.68 - 0.97	2.5 - 3.6
18798											
DUP											
Target Range											
18819											
DUP											
Target Range											
ORIGINAL											
DUP											
Target Range											
ORIGINAL											
DUP											
Target Range											

Comments: MEXRF06: Samples with low totals contain high base metals; samples were rechecked

Client : **Golder Associates Inc.**
Project : **Eagle ARD Testing Program**
CEMI Project : **0356**
Test : **Short Term Leach Testing (EPA 1312)**
Test Date : **April 22, 2004**

SAMPLE	DISTILLED WATER VOLUME (mL)	SAMPLE WEIGHT (g)	pH	REDOX. (mV)	CONDUCTIVITY (uS/cm)	ALKALINITY (mg $CaCO_3$/L)	ACIDITY (pH 4.5) (mg $CaCO_3$/L)	ACIDITY (pH 8.3) (mg $CaCO_3$/L)	SULPHATE (mg/L)
VR90425A	2000	100	7.69	185	32	19.5	0.0	8.0	8
VR91625A	2000	100	9.09	222	38	26.0	0.0	0.0	<3
VR91620A	2000	100	7.85	231	36	24.0	0.0	1.5	<3
VR71109A	2000	100	8.72	179	59	31.0	0.0	0.0	<3
VR91306A	2000	100	7.80	214	33	20.0	0.0	1.5	<3
VR71275A	2000	100	9.29	201	72	35.0	0.0	0.0	10
VR91267A	2000	100	9.27	197	44	27.5	0.0	0.0	7
VR71373A	2000	100	9.35	180	66	26.0	0.0	0.0	<3
VR90181A	2000	100	5.17	133	117	2.0	0.0	33.5	48
VR90125A	2000	100	7.61	104	97	17.0	0.0	2.0	<3
BLANK	2000	100	4.48	278	10	0.0	0.0	5.5	<3
VR71373A DUP	2000	100	9.20	129	58	22.0	0.0	0.0	<3

Client : Golder Associates Inc.
Project : Eagle ARD Testing Program
CEMI Project : 0356
Test : Short Term Leach Testing (EPA 1312)
Test Date : April 22, 2004

Sample Weight (g)	100
Extraction Fluid	60/40 H2SO4/HNO3
Extractant pH	4.2
Extractant Volume (mL)	2000

Leachate Analysis

Dissolved Metals	(mg/L)	VR90425A	Detection Limits	VR90425A HVAAS	Detection Limits	VR91625A	Detection Limits	VR91625A HVAAS	Detection Limits	VR91620A	Detection Limits	VR91620A HVAAS	Detection Limits	VR71109A	Detection Limits	VR71109A HVAAS	Detection Limits	VR91306A	Detection Limits	VR91306A HVAAS	Detection Limits	VR71275A	Detection Limits	VR71275A HVAAS	Detection Limits	VR91267A
Aluminum	Al	2.24	0.001			0.553	0.001			0.495	0.001			1.3	0.001			0.623	0.001			1.9	0.001			0.917
Antimony	Sb	0.00084	0.0001	0.0008	0.0002	0.00324	0.0001	0.0032	0.0002	0.00067	0.0001	0.00078	0.0002	0.00067	0.0001	0.00072	0.0002	0.00522	0.0001	0.0054	0.0002	<0.00010	0.0001	<0.00020	0.0002	<0.00010
Arsenic	As	0.00858	0.0001	0.00823	0.0002	0.00843	0.0001	0.00838	0.0002	0.0065	0.0001	0.00671	0.0002	0.00741	0.0001	0.00707	0.0002	0.0103	0.0001	0.0108	0.0002	0.00057	0.0001	0.00061	0.0002	0.00033
Barium	Ba	0.0114	0.00005			0.000981	0.00005			0.00107	0.00005			0.00687	0.00005			0.00107	0.00005			0.0015	0.00005			0.00223
Beryllium	Be	<0.00050	0.0005			<0.00050	0.0005			<0.00050	0.0005			<0.00050	0.0005			<0.00050	0.0005			<0.00050	0.0005			<0.00050
Bismuth	Bi	<0.00050	0.0005			<0.00050	0.0005			<0.00050	0.0005			<0.00050	0.0005			<0.00050	0.0005			<0.00050	0.0005			<0.00050
Boron	B	0.023	0.01			0.026	0.01			0.012	0.01			0.02	0.01			0.015	0.01			0.164	0.01			0.052
Cadmium	Cd	<0.000050	0.00005			<0.000050	0.00005			<0.000050	0.00005			<0.000050	0.00005			<0.000050	0.00005			<0.000050	0.00005			<0.000050
Calcium	Ca	0.811	0.05			4.9	0.05			3.05	0.05			3.92	0.05			1.29	0.05			1.46	0.05			1.5
Chromium	Cr	0.00431	0.0005			<0.00050	0.0005			<0.00050	0.0005			0.002	0.0005			0.00071	0.0005			0.0923	0.0005			0.0307
Cobalt	Co	0.00101	0.0001			<0.00010	0.0001			<0.00010	0.0001			0.00026	0.0001			0.00092	0.0001			0.00497	0.0001			0.00412
Copper	Cu	0.00376	0.0001			0.00059	0.0001			0.00088	0.0001			0.00251	0.0001			0.0384	0.0001			0.0158	0.0001			0.0144
Iron	Fe	2.04	0.03			0.053	0.03			0.081	0.03			0.527	0.03			0.802	0.03			6.26	0.03			2.93
Lead	Pb	0.00121	0.00005			0.000179	0.00005			0.000134	0.00005			0.000283	0.00005			0.000928	0.00005			0.000527	0.00005			0.00076
Lithium	Li	<0.0050	0.005			<0.0050	0.005			<0.0050	0.005			<0.0050	0.005			<0.0050	0.005			<0.0050	0.005			<0.0050
Magnesium	Mg	1.19	0.1			0.32	0.1			0.46	0.1			0.81	0.1			1.37	0.1			8.96	0.1			3.78
Manganese	Mn	0.0108	0.00005			0.000476	0.00005			0.000918	0.00005			0.00901	0.00005			0.00515	0.00005			0.0541	0.00005			0.0234
Mercury	Hg	<0.000050	0.00005			<0.000050	0.00005			<0.000050	0.00005			<0.000050	0.00005			<0.000050	0.00005			<0.000050	0.00005			<0.000050
Molybdenum	Mo	0.00131	0.00005			0.00615	0.00005			0.0015	0.00005			0.00216	0.00005			0.00115	0.00005			0.000078	0.00005			0.000065
Nickel	Ni	0.0048	0.0005			<0.00050	0.0005			<0.00050	0.0005			0.00113	0.0005			0.0222	0.0005			0.0703	0.0005			0.0785
Phosphorous	P	<0.30	0.3			<0.30	0.3			<0.30	0.3			<0.30	0.3			<0.30	0.3			<0.30	0.3			<0.30
Potassium	K	4.8	2			2.1	2			2.5	2			2.2	2			2.3	2			<2.0	2			4.3
Selenium	Se	<0.0010	0.001	<0.00050	0.0005	<0.0010	0.001	<0.00050	0.0005	<0.0010	0.001	<0.00050	0.0005	<0.0010	0.001	<0.00050	0.0005	<0.0010	0.001	0.00065	0.0005	<0.0010	0.001	0.00086	0.0005	<0.0010
Silicon	Si	10.8	0.05			3.76	0.05			3.88	0.05			6.15	0.05			3.01	0.05			13.4	0.05			8.68
Silver	Ag	<0.000010	0.00001			<0.000010	0.00001			0.00001	0.00001			<0.000010	0.00001			0.000023	0.00001			0.000037	0.00001			0.000028
Sodium	Na	7.3	2			3.7	2			4.8	2			7.4	2			5.6	2			14.2	2			8.1
Strontium	Sr	0.0125	0.0001			0.0141	0.0001			0.0108	0.0001			0.0342	0.0001			0.0265	0.0001			0.0261	0.0001			0.0234
Thallium	Tl	<0.00010	0.0001			<0.00010	0.0001			<0.00010	0.0001			<0.00010	0.0001			<0.00010	0.0001			<0.00010	0.0001			<0.00010
Tin	Sn	<0.00010	0.0001			<0.00010	0.0001			<0.00010	0.0001			0.00012	0.0001			<0.00010	0.0001			0.00012	0.0001			0.00025
Titanium	Ti	0.067	0.01			<0.010	0.01			<0.010	0.01			0.02	0.01			<0.010	0.01			0.046	0.01			0.037
Uranium	U	0.00014	0.00001			0.000088	0.00001			0.000051	0.00001			0.000119	0.00001			0.000019	0.00001			0.000011	0.00001			<0.000010
Vanadium	V	0.0077	0.001			0.0046	0.001			0.0026	0.001			0.0045	0.001			<0.0010	0.001			0.0242	0.001			0.0136
Zinc	Zn	0.0029	0.001			<0.0010	0.001			<0.0010	0.001			0.0013	0.001			0.0016	0.001			0.0053	0.001			0.0021
Dissolved Anions	**(mg/L)**																									
Chloride	Cl	1.86	0.5			1.07	0.5			1	0.5			0.66	0.5			1.78	0.5			2.46	0.5			2.58
Fluoride	F	0.048	0.02			0.046	0.02			0.043	0.02			0.032	0.02			0.144	0.02			<0.020	0.02			0.027
Nutrients	**(mg/L)**																									
Ammonia	N	IP				IP				IP				IP				IP				IP				IP
Nitrite/Nitrate	N	IP				IP				IP				IP				IP				IP				IP
Total Dissolved Solids	(mg/L)	IP				IP				IP				IP				IP				IP				IP

Note: Detection limits are mg/L unless specified otherwise...

Client : Golder
Project : Eagle A
CEMI Project : 0356
Test : Short T
Test Date : April 22

Sample Weight (g)
Extraction Fluid 60/40 H
Extractant pH
Extractant Volume (mL)

Leachate Analysis

Dissolved Metals	(mg/L)	Detection Limits	VR91267A HVAAS	Detection Limits	VR71373A	Detection Limits	VR71373A HVAAS	Detection Limits	VR90181A	Detection Limits	VR90181A HVAAS	Detection Limits	VR90125A	Detection Limits	VR90125A HVAAS	Detection Limits	BLANK	Detection Limits	BLANK HVAAS	Detection Limits	VR71373A DUP	Detection Limits	VR71373A DUP - HVAAS	Detection Limits
Aluminum	Al	0.001			0.0261	0.001			0.0061	0.005			0.0358	0.001			0.0026	0.001			IP			
Antimony	Sb	0.0001	<0.00020	0.0002	0.00015	0.0001	<0.00020	0.0002	<0.00050	0.0005	<0.00020	0.0002	0.0004	0.0001	0.00048	0.0002	0.00106	0.0001	0.00102	0.0002	IP		IP	
Arsenic	As	0.0001	0.00033	0.0002	0.00029	0.0001	0.00035	0.0002	<0.00050	0.0005	<0.00020	0.0002	0.00044	0.0001	0.00063	0.0002	0.00065	0.0001	0.00068	0.0002	IP		IP	
Barium	Ba	0.00005			0.00247	0.00005			0.00359	0.00025			0.00132	0.00005			0.000137	0.00005			IP			
Beryllium	Be	0.0005			<0.00050	0.0005			<0.0025	0.0025			<0.00050	0.0005			<0.00050	0.0005			IP			
Bismuth	Bi	0.0005			<0.00050	0.0005			<0.0025	0.0025			<0.00050	0.0005			<0.00050	0.0005			IP			
Boron	B	0.01			0.044	0.01			<0.050	0.05			0.103	0.01			<0.010	0.01			IP			
Cadmium	Cd	0.00005			<0.000050	0.00005			0.00403	0.00025			<0.000050	0.00005			<0.000050	0.00005			IP			
Calcium	Ca	0.05			4.28	0.05			0.662	0.05			1.88	0.05			<0.050	0.05			IP			
Chromium	Cr	0.0005			<0.00050	0.0005			<0.0025	0.0025			0.00103	0.0005			<0.00050	0.0005			IP			
Cobalt	Co	0.0001			<0.00010	0.0001			0.222	0.0005			0.00024	0.0001			<0.00010	0.0001			IP			
Copper	Cu	0.0001			0.00104	0.0001			0.0426	0.0005			0.00331	0.0001			0.0121	0.0001			IP			
Iron	Fe	0.03			<0.030	0.03			12.8	0.03			0.069	0.03			<0.030	0.03			IP			
Lead	Pb	0.00005			<0.000050	0.00005			0.00136	0.00025			0.000082	0.00005			0.000246	0.00005			IP			
Lithium	Li	0.005			<0.0050	0.005			<0.025	0.025			<0.0050	0.005			<0.0050	0.005			IP			
Magnesium	Mg	0.1			2.43	0.1			0.73	0.1			4.14	0.1			<0.10	0.1			IP			
Manganese	Mn	0.00005			0.000202	0.00005			0.131	0.00025			0.00103	0.00005			0.000051	0.00005			IP			
Mercury	Hg	0.00005			<0.000050	0.00005			<0.000050	0.00005			<0.000050	0.00005			<0.000050	0.00005			IP			
Molybdenum	Mo	0.00005			<0.000050	0.00005			<0.00025	0.00025			0.000086	0.00005			<0.000050	0.00005			IP			
Nickel	Ni	0.0005			0.00543	0.0005			15.6	0.0025			0.0147	0.0005			<0.00050	0.0005			IP			
Phosphorous	P	0.3			<0.30	0.3			<0.30	0.3			<0.30	0.3			<0.30	0.3			IP			
Potassium	K	2			<2.0	2			<2.0	2			<2.0	2			<2.0	2			IP			
Selenium	Se	0.001	0.00059	0.0005	<0.0010	0.001	<0.00050	0.0005	<0.0050	0.005	0.00187	0.0005	<0.0010	0.001	<0.00050	0.0005	<0.0010	0.001	<0.00050	0.0005	IP		IP	
Silicon	Si	0.05			4.08	0.05			0.67	0.05			3.97	0.05			<0.050	0.05			IP			
Silver	Ag	0.00001			<0.000010	0.00001			<0.000050	0.00005			<0.000010	0.00001			<0.000010	0.00001			IP			
Sodium	Na	2			2.2	2			<2.0	2			2	2			<2.0	2			IP			
Strontium	Sr	0.0001			0.0261	0.0001			0.0127	0.0005			0.00892	0.0001			<0.00010	0.0001			IP			
Thallium	Tl	0.0001			<0.00010	0.0001			<0.00050	0.0005			<0.00010	0.0001			<0.00010	0.0001			IP			
Tin	Sn	0.0001			<0.00010	0.0001			<0.00050	0.0005			<0.00010	0.0001			<0.00010	0.0001			IP			
Titanium	Ti	0.01			<0.010	0.01			<0.010	0.01			<0.010	0.01			<0.010	0.01			IP			
Uranium	U	0.00001			<0.000010	0.00001			<0.000050	0.00005			<0.000010	0.00001			<0.000010	0.00001			IP			
Vanadium	V	0.001			0.0017	0.001			<0.0050	0.005			<0.0010	0.001			<0.0010	0.001			IP			
Zinc	Zn	0.001			<0.0010	0.001			0.0417	0.005			<0.0010	0.001			0.0018	0.001			IP			
Dissolved Anions	(mg/L)																							
Chloride	Cl	0.5			3.98	0.5			2.87	0.5			12.2	0.5			<0.50	0.5			IP			
Fluoride	F	0.02			0.062	0.02			0.037	0.02			0.074	0.02			<0.020	0.02			IP			
Nutrients	(mg/L)																							
Ammonia	N				IP				IP				IP				IP				IP			
Nitrite/Nitrate	N				IP				IP				IP				IP				IP			
Total Dissolved Solids	(mg/L)				IP				IP				IP				IP				IP			

Note: Detection limits are mg/L u

ALS Environmental

CHEMICAL ANALYSIS REPORT

Date:	May 3, 2004
ALS File No.	U2390
Report On:	Release 1517 PartI & II Water Analysis - SPLP
Report To:	**Canadian Environmental and** Metallurgical Inc. 1636 West 75th Avenue Vancouver, BC V6P 6G2
Attention:	**Mr. Sohan Basra**
Received:	April 12, 2004

ALS ENVIRONMENTAL
per:

Leanne Harris, B.Sc. - Project Chemist
Brent C. Mack, B.Sc. - Project Chemist

ALS CANADA LTD.
1988 Triumph Street, Vancouver, BC Canada V5L 1K5
Phone: 604-253-4188 Fax: 604-253-6700 Website: www.alsenviro.com

File No. U2390

REMARKS

Please note that the detection limits for certain Dissolved Metals have been increased for some of the samples reported in the following data tables due to sample matrix interferences.

In particular, the detection limits for the sample identified as "19004" were increased due to elevated D-Nickel.

A Campbell Brothers Limited Company

File No. U2390

RESULTS OF ANALYSIS - Water

Sample ID		18996	18997	18998
Sample Date		04-04-12	04-04-12	04-04-12
Sample Time		13:00	13:00	13:00
ALS ID		*1*	*2*	*3*
Dissolved Anions				
Chloride	Cl	1.86	1.07	1.00
Fluoride	F	0.048	0.046	0.043

Remarks regarding the analyses appear at the beginning of this report.
Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.

A Campbell Brothers Limited Company

File No. U2390

RESULTS OF ANALYSIS - Water

Sample ID		18996	18996 HVAAS	18997	18997 HVAAS	18998
Sample Date		04-04-12	04-04-12	04-04-12	04-04-12	04-04-12
Sample Time		13:00	13:00	13:00	13:00	13:00
ALS ID		*1*	*1 a*	*2*	*2 a*	*3*
Dissolved Metals						
Aluminum	D-Al	2.24	-	0.553	-	0.495
Antimony	D-Sb	0.00084	0.00080	0.00324	0.00320	0.00067
Arsenic	D-As	0.00858	0.00823	0.00843	0.00838	0.00650
Barium	D-Ba	0.0114	-	0.000981	-	0.00107
Beryllium	D-Be	<0.00050	-	<0.00050	-	<0.00050
Bismuth	D-Bi	<0.00050	-	<0.00050	-	<0.00050
Boron	D-B	0.023	-	0.026	-	0.012
Cadmium	D-Cd	<0.000050	-	<0.000050	-	<0.000050
Calcium	D-Ca	0.811	-	4.90	-	3.05
Chromium	D-Cr	0.00431	-	<0.00050	-	<0.00050
Cobalt	D-Co	0.00101	-	<0.00010	-	<0.00010
Copper	D-Cu	0.00376	-	0.00059	-	0.00088
Iron	D-Fe	2.04	-	0.053	-	0.081
Lead	D-Pb	0.00121	-	0.000179	-	0.000134
Lithium	D-Li	<0.0050	-	<0.0050	-	<0.0050
Magnesium	D-Mg	1.19	-	0.32	-	0.46
Manganese	D-Mn	0.0108	-	0.000476	-	0.000918
Mercury	D-Hg	<0.000050	-	<0.000050	-	<0.000050
Molybdenum	D-Mo	0.00131	-	0.00615	-	0.00150
Nickel	D-Ni	0.00480	-	<0.00050	-	<0.00050
Phosphorus	D-P	<0.30	-	<0.30	-	<0.30
Potassium	D-K	4.8	-	2.1	-	2.5
Selenium	D-Se	<0.0010	<0.00050	<0.0010	<0.00050	<0.0010
Silicon	D-Si	10.8	-	3.76	-	3.88
Silver	D-Ag	<0.000010	-	<0.000010	-	0.000010
Sodium	D-Na	7.3	-	3.7	-	4.8
Strontium	D-Sr	0.0125	-	0.0141	-	0.0108
Thallium	D-Tl	<0.00010	-	<0.00010	-	<0.00010
Tin	D-Sn	<0.00010	-	<0.00010	-	<0.00010
Titanium	D-Ti	0.067	-	<0.010	-	<0.010
Uranium	D-U	0.000140	-	0.000088	-	0.000051
Vanadium	D-V	0.0077	-	0.0046	-	0.0026
Zinc	D-Zn	0.0029	-	<0.0010	-	<0.0010

Remarks regarding the analyses appear at the beginning of this report.
Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.

A Campbell Brothers Limited Company

File No. U2390

RESULTS OF ANALYSIS - Water

Sample ID		18999	19000
Sample Date		04-04-12	04-04-12
Sample Time		13:00	13:00
ALS ID		*4*	*5*
Dissolved Anions			
Chloride	Cl	0.66	1.78
Fluoride	F	0.032	0.144

Remarks regarding the analyses appear at the beginning of this report.
Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.

A Campbell Brothers Limited Company

File No. U2390

RESULTS OF ANALYSIS - Water

Sample ID		18998 HVAAS	18999	18999 HVAAS	19000	19000 HVAAS
Sample Date		04-04-12	04-04-12	04-04-12	04-04-12	04-04-12
Sample Time		13:00	13:00	13:00	13:00	13:00
ALS ID		*3 a*	*4*	*4 a*	*5*	*5 a*
Dissolved Metals						
Aluminum	D-Al	-	1.30	-	0.623	-
Antimony	D-Sb	0.00078	0.00067	0.00072	0.00522	0.00540
Arsenic	D-As	0.00671	0.00741	0.00707	0.0103	0.0108
Barium	D-Ba	-	0.00687	-	0.00107	-
Beryllium	D-Be	-	<0.00050	-	<0.00050	-
Bismuth	D-Bi	-	<0.00050	-	<0.00050	-
Boron	D-B	-	0.020	-	0.015	-
Cadmium	D-Cd	-	<0.000050	-	<0.000050	-
Calcium	D-Ca	-	3.92	-	1.29	-
Chromium	D-Cr	-	0.00200	-	0.00071	-
Cobalt	D-Co	-	0.00026	-	0.00092	-
Copper	D-Cu	-	0.00251	-	0.0384	-
Iron	D-Fe	-	0.527	-	0.802	-
Lead	D-Pb	-	0.000283	-	0.000928	-
Lithium	D-Li	-	<0.0050	-	<0.0050	-
Magnesium	D-Mg	-	0.81	-	1.37	-
Manganese	D-Mn	-	0.00901	-	0.00515	-
Mercury	D-Hg	-	<0.000050	-	<0.000050	-
Molybdenum	D-Mo	-	0.00216	-	0.00115	-
Nickel	D-Ni	-	0.00113	-	0.0222	-
Phosphorus	D-P	-	<0.30	-	<0.30	-
Potassium	D-K	-	2.2	-	2.3	-
Selenium	D-Se	<0.00050	<0.0010	<0.00050	<0.0010	0.00065
Silicon	D-Si	-	6.15	-	3.01	-
Silver	D-Ag	-	<0.000010	-	0.000023	-
Sodium	D-Na	-	7.4	-	5.6	-
Strontium	D-Sr	-	0.0342	-	0.0265	-
Thallium	D-Tl	-	<0.00010	-	<0.00010	-
Tin	D-Sn	-	0.00012	-	<0.00010	-
Titanium	D-Ti	-	0.020	-	<0.010	-
Uranium	D-U	-	0.000119	-	0.000019	-
Vanadium	D-V	-	0.0045	-	<0.0010	-
Zinc	D-Zn	-	0.0013	-	0.0016	-

Remarks regarding the analyses appear at the beginning of this report.
Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.

A Campbell Brothers Limited Company

File No. U2390

RESULTS OF ANALYSIS - Water

Sample ID		19001	19002	19003
Sample Date		04-04-12	04-04-12	04-04-12
Sample Time		13:00	13:00	13:00
ALS ID		*6*	*7*	*8*
Dissolved Anions				
Chloride	Cl	2.46	2.58	3.98
Fluoride	F	<0.020	0.027	0.062

Remarks regarding the analyses appear at the beginning of this report.
Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.

A Campbell Brothers Limited Company

File No. U2390

RESULTS OF ANALYSIS - Water

Sample ID		19001	19001 HVAAS	19002	19002 HVAAS	19003
Sample Date		04-04-12	04-04-12	04-04-12	04-04-12	04-04-12
Sample Time		13:00	13:00	13:00	13:00	13:00
ALS ID		*6*	*6 a*	*7*	*7 a*	*8*
Dissolved Metals						
Aluminum	D-Al	1.90	-	0.917	-	0.0261
Antimony	D-Sb	<0.00010	<0.00020	<0.00010	<0.00020	0.00015
Arsenic	D-As	0.00057	0.00061	0.00033	0.00033	0.00029
Barium	D-Ba	0.00150	-	0.00223	-	0.00247
Beryllium	D-Be	<0.00050	-	<0.00050	-	<0.00050
Bismuth	D-Bi	<0.00050	-	<0.00050	-	<0.00050
Boron	D-B	0.164	-	0.052	-	0.044
Cadmium	D-Cd	<0.000050	-	<0.000050	-	<0.000050
Calcium	D-Ca	1.46	-	1.50	-	4.28
Chromium	D-Cr	0.0923	-	0.0307	-	<0.00050
Cobalt	D-Co	0.00497	-	0.00412	-	<0.00010
Copper	D-Cu	0.0158	-	0.0144	-	0.00104
Iron	D-Fe	6.26	-	2.93	-	<0.030
Lead	D-Pb	0.000527	-	0.000760	-	<0.000050
Lithium	D-Li	<0.0050	-	<0.0050	-	<0.0050
Magnesium	D-Mg	8.96	-	3.78	-	2.43
Manganese	D-Mn	0.0541	-	0.0234	-	0.000202
Mercury	D-Hg	<0.000050	-	<0.000050	-	<0.000050
Molybdenum	D-Mo	0.000078	-	0.000065	-	<0.000050
Nickel	D-Ni	0.0703	-	0.0785	-	0.00543
Phosphorus	D-P	<0.30	-	<0.30	-	<0.30
Potassium	D-K	<2.0	-	4.3	-	<2.0
Selenium	D-Se	<0.0010	0.00086	<0.0010	0.00059	<0.0010
Silicon	D-Si	13.4	-	8.68	-	4.08
Silver	D-Ag	0.000037	-	0.000028	-	<0.000010
Sodium	D-Na	14.2	-	8.1	-	2.2
Strontium	D-Sr	0.0261	-	0.0234	-	0.0261
Thallium	D-Tl	<0.00010	-	<0.00010	-	<0.00010
Tin	D-Sn	0.00012	-	0.00025	-	<0.00010
Titanium	D-Ti	0.046	-	0.037	-	<0.010
Uranium	D-U	0.000011	-	<0.000010	-	<0.000010
Vanadium	D-V	0.0242	-	0.0136	-	0.0017
Zinc	D-Zn	0.0053	-	0.0021	-	<0.0010

Remarks regarding the analyses appear at the beginning of this report.
Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.

A Campbell Brothers Limited Company

File No. U2390

RESULTS OF ANALYSIS - Water

Sample ID		19004	19005
Sample Date		04-04-12	04-04-12
Sample Time		13:00	13:00
ALS ID		*9*	*10*
Dissolved Anions			
Chloride	Cl	2.87	12.2
Fluoride	F	0.037	0.074

Remarks regarding the analyses appear at the beginning of this report.
Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.

A Campbell Brothers Limited Company

File No. U2390

RESULTS OF ANALYSIS - Water

Sample ID		19003 HVAAS	19004	19004 HVAAS	19005	19005 HVAAS
Sample Date		04-04-12	04-04-12	04-04-12	04-04-12	04-04-12
Sample Time		13:00	13:00	13:00	13:00	13:00
ALS ID		*8 a*	*9*	*9 a*	*10*	*10 a*
Dissolved Metals						
Aluminum	D-Al	-	0.0061	-	0.0358	-
Antimony	D-Sb	<0.00020	<0.00050	<0.00020	0.00040	0.00048
Arsenic	D-As	0.00035	<0.00050	<0.00020	0.00044	0.00063
Barium	D-Ba	-	0.00359	-	0.00132	-
Beryllium	D-Be	-	<0.0025	-	<0.00050	-
Bismuth	D-Bi	-	<0.0025	-	<0.00050	-
Boron	D-B	-	<0.050	-	0.103	-
Cadmium	D-Cd	-	0.00403	-	<0.000050	-
Calcium	D-Ca	-	0.662	-	1.88	-
Chromium	D-Cr	-	<0.0025	-	0.00103	-
Cobalt	D-Co	-	0.222	-	0.00024	-
Copper	D-Cu	-	0.0426	-	0.00331	-
Iron	D-Fe	-	12.8	-	0.069	-
Lead	D-Pb	-	0.00136	-	0.000082	-
Lithium	D-Li	-	<0.025	-	<0.0050	-
Magnesium	D-Mg	-	0.73	-	4.14	-
Manganese	D-Mn	-	0.131	-	0.00103	-
Mercury	D-Hg	-	<0.000050	-	<0.000050	-
Molybdenum	D-Mo	-	<0.00025	-	0.000086	-
Nickel	D-Ni	-	15.6	-	0.0147	-
Phosphorus	D-P	-	<0.30	-	<0.30	-
Potassium	D-K	-	<2.0	-	<2.0	-
Selenium	D-Se	<0.00050	<0.0050	0.00187	<0.0010	<0.00050
Silicon	D-Si	-	0.670	-	3.97	-
Silver	D-Ag	-	<0.000050	-	<0.000010	-
Sodium	D-Na	-	<2.0	-	2.0	-
Strontium	D-Sr	-	0.0127	-	0.00892	-
Thallium	D-Tl	-	<0.00050	-	<0.00010	-
Tin	D-Sn	-	<0.00050	-	<0.00010	-
Titanium	D-Ti	-	<0.010	-	<0.010	-
Uranium	D-U	-	<0.000050	-	<0.000010	-
Vanadium	D-V	-	<0.0050	-	<0.0010	-
Zinc	D-Zn	-	0.0417	-	<0.0010	-

Remarks regarding the analyses appear at the beginning of this report.
Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.

A Campbell Brothers Limited Company

File No. U2390

RESULTS OF ANALYSIS - Water

Sample ID		19006
Sample Date		04-04-12
Sample Time		13:00
ALS ID		*11*
Dissolved Anions		
Chloride	Cl	<0.50
Fluoride	F	<0.020

Remarks regarding the analyses appear at the beginning of this report.
Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.

A Campbell Brothers Limited Company

File No. U2390

RESULTS OF ANALYSIS - Water

Sample ID		19006	19006 HVAAS
Sample Date		04-04-12	04-04-12
Sample Time		13:00	13:00
ALS ID		*11*	*11 a*
Dissolved Metals			
Aluminum	D-Al	0.0026	-
Antimony	D-Sb	0.00106	0.00102
Arsenic	D-As	0.00065	0.00068
Barium	D-Ba	0.000137	-
Beryllium	D-Be	<0.00050	-
Bismuth	D-Bi	<0.00050	-
Boron	D-B	<0.010	-
Cadmium	D-Cd	<0.000050	-
Calcium	D-Ca	<0.050	-
Chromium	D-Cr	<0.00050	-
Cobalt	D-Co	<0.00010	-
Copper	D-Cu	0.0121	-
Iron	D-Fe	<0.030	-
Lead	D-Pb	0.000246	-
Lithium	D-Li	<0.0050	-
Magnesium	D-Mg	<0.10	-
Manganese	D-Mn	0.000051	-
Mercury	D-Hg	<0.000050	-
Molybdenum	D-Mo	<0.000050	-
Nickel	D-Ni	<0.00050	-
Phosphorus	D-P	<0.30	-
Potassium	D-K	<2.0	-
Selenium	D-Se	<0.0010	<0.00050
Silicon	D-Si	<0.050	-
Silver	D-Ag	<0.000010	-
Sodium	D-Na	<2.0	-
Strontium	D-Sr	<0.00010	-
Thallium	D-Tl	<0.00010	-
Tin	D-Sn	<0.00010	-
Titanium	D-Ti	<0.010	-
Uranium	D-U	<0.000010	-
Vanadium	D-V	<0.0010	-
Zinc	D-Zn	0.0018	-

Remarks regarding the analyses appear at the beginning of this report.
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< = Less than the detection limit indicated.

A Campbell Brothers Limited Company

File No. U2390

Appendix 1 - QUALITY CONTROL - Replicates

Water		19000	19000	19000 HVAAS	19000 HVAAS
		04-04-12 13:00	QC # 382475	04-04-12 13:00	QC # 383825
Dissolved Anions					
Chloride	Cl	1.78	1.81	-	-
Fluoride	F	0.144	0.143	-	-

Remarks regarding the analyses appear at the beginning of this report.
Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.

A Campbell Brothers Limited Company

File No. U2390

Appendix 1 - QUALITY CONTROL - Replicates

Water		19000	19000	19000 HVAAS	19000 HVAAS
		04-04-12 13:00	QC # 382475	04-04-12 13:00	QC # 383825
Dissolved Metals					
Aluminum	D-Al	0.623	0.640	-	-
Antimony	D-Sb	0.00522	0.00530	0.00540	0.00519
Arsenic	D-As	0.0103	0.0102	0.0108	0.0108
Barium	D-Ba	0.00107	0.00113	-	-
Beryllium	D-Be	<0.00050	<0.00050	-	-
Bismuth	D-Bi	<0.00050	<0.00050	-	-
Boron	D-B	0.015	0.015	-	-
Cadmium	D-Cd	<0.000050	<0.000050	-	-
Calcium	D-Ca	1.29	1.25	-	-
Chromium	D-Cr	0.00071	0.00071	-	-
Cobalt	D-Co	0.00092	0.00089	-	-
Copper	D-Cu	0.0384	0.0398	-	-
Iron	D-Fe	0.802	0.782	-	-
Lead	D-Pb	0.000928	0.000910	-	-
Lithium	D-Li	<0.0050	<0.0050	-	-
Magnesium	D-Mg	1.37	1.35	-	-
Manganese	D-Mn	0.00515	0.00519	-	-
Mercury	D-Hg	<0.000050	<0.000050	-	-
Molybdenum	D-Mo	0.00115	0.00112	-	-
Nickel	D-Ni	0.0222	0.0222	-	-
Phosphorus	D-P	<0.30	<0.30	-	-
Potassium	D-K	2.3	<2.0	-	-
Selenium	D-Se	<0.0010	<0.0010	0.00065	0.00091
Silicon	D-Si	3.01	2.93	-	-
Silver	D-Ag	0.000023	0.000027	-	-
Sodium	D-Na	5.6	5.4	-	-
Strontium	D-Sr	0.0265	0.0259	-	-
Thallium	D-Tl	<0.00010	<0.00010	-	-
Tin	D-Sn	<0.00010	<0.00010	-	-
Titanium	D-Ti	<0.010	<0.010	-	-
Uranium	D-U	0.000019	0.000018	-	-
Vanadium	D-V	<0.0010	<0.0010	-	-
Zinc	D-Zn	0.0016	0.0016	-	-

Remarks regarding the analyses appear at the beginning of this report.
Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.

A Campbell Brothers Limited Company

File No. U2390

Appendix 1 - QUALITY CONTROL - Reference Materials

Water

		Result	Target	Units	DL	ALSQC#	Method
ULTRA SCIENTIFIC, ULTMIX							
Total Metals							
Bismuth	T-Bi	1.02	1.00	mg/L	0.1	382711	a
Lithium	T-Li	0.200	0.200	mg/L	0.01	382711	a
Phosphorus	T-P	2.13	2.00	mg/L	0.3	382711	a
Silicon	T-Si	1.01	1.00	mg/L	0.05	382711	a
Tin	T-Sn	1.01	1.00	mg/L	0.03	382711	a
Titanium	T-Ti	0.193	0.200	mg/L	0.01	382711	a
NRC Ottawa River Water, SLRS-4							
Dissolved Metals							
Uranium	D-U	0.000050	0.000050	mg/L	0.00001	384704	b
APG Trace Metals, 31652-31653							
Total Metals							
Aluminum	T-Al	1.03	1.00	mg/L	0.2	382712	a
Antimony	T-Sb	0.26	0.28	mg/L	0.2	382712	a
Arsenic	T-As	0.48	0.49	mg/L	0.2	382712	a
Barium	T-Ba	0.524	0.525	mg/L	0.01	382712	a
Beryllium	T-Be	0.390	0.397	mg/L	0.005	382712	a
Boron	T-B	0.38	0.28	mg/L	0.1	382712	a
Cadmium	T-Cd	0.349	0.353	mg/L	0.01	382712	a
Chromium	T-Cr	0.166	0.167	mg/L	0.01	382712	a
Cobalt	T-Co	0.241	0.240	mg/L	0.01	382712	a
Copper	T-Cu	0.394	0.391	mg/L	0.01	382712	a
Iron	T-Fe	0.997	1.01	mg/L	0.03	382712	a
Lead	T-Pb	0.853	0.857	mg/L	0.05	382712	a
Manganese	T-Mn	2.24	2.26	mg/L	0.005	382712	a
Molybdenum	T-Mo	0.099	0.097	mg/L	0.03	382712	a
Nickel	T-Ni	0.656	0.611	mg/L	0.05	382712	a
Selenium	T-Se	0.20	<0.20	mg/L	0.2	382712	a
Silver	T-Ag	0.206	0.210	mg/L	0.01	382712	a
Strontium	T-Sr	0.103	0.104	mg/L	0.005	382712	a

Methods:
a = ICPOES
b = ICPMS

A Campbell Brothers Limited Company

File No. U2390

Appendix 1 - QUALITY CONTROL - Reference Materials

Water

		Result	Target	Units	DL	ALSQC#	Method
APG Trace Metals, 31652-31653							
Total Metals							
Thallium	T-Tl	0.40	0.38	mg/L	0.2	382712	a
Titanium	T-Ti	0.190	0.192	mg/L	0.01	382712	a
Vanadium	T-V	1.49	1.50	mg/L	0.03	382712	a
Zinc	T-Zn	0.120	0.121	mg/L	0.005	382712	a
ALS Environmental Hg Water RM, Hg RM 002							
Total Metals							
Mercury	T-Hg	0.00984	0.0100	mg/L	0.00001	383215	b
APG Minerals, 32993-32994							
Total Metals							
Calcium	T-Ca	14.8	15.6	mg/L	0.05	382710	a
Magnesium	T-Mg	5.58	5.85	mg/L	0.1	382710	a
Potassium	T-K	32.4	33.1	mg/L	2	382710	a
Sodium	T-Na	39.5	39.1	mg/L	2	382710	a
APG Trace Metals, 35299-35300							
Total Metals							
Aluminum	T-Al	<0.20	<0.20	mg/L	0.2	382709	a
Antimony	T-Sb	<0.20	<0.20	mg/L	0.2	382709	a
Antimony	T-Sb	0.0288	0.0272	mg/L	0.0002	384409	c
Arsenic	T-As	<0.20	<0.20	mg/L	0.2	382709	a
Arsenic	T-As	0.127	0.128	mg/L	0.0002	384437	c
Barium	T-Ba	0.331	0.338	mg/L	0.01	382709	a
Beryllium	T-Be	0.0740	0.0751	mg/L	0.005	382709	a
Boron	T-B	0.24	0.23	mg/L	0.1	382709	a
Cadmium	T-Cd	0.085	0.088	mg/L	0.01	382709	a
Chromium	T-Cr	0.218	0.218	mg/L	0.01	382709	a
Cobalt	T-Co	0.281	0.280	mg/L	0.01	382709	a
Copper	T-Cu	0.291	0.287	mg/L	0.01	382709	a
Iron	T-Fe	0.368	0.368	mg/L	0.03	382709	a

Methods:
a = ICPOES
b = CVAFS
c = HVAAS

A Campbell Brothers Limited Company

File No. U2390

Appendix 1 - QUALITY CONTROL - Reference Materials

Water

		Result	Target	Units	DL	ALSQC#	Method
APG Trace Metals, 35299-35300							
Total Metals							
Lead	T-Pb	0.278	0.264	mg/L	0.05	382709	a
Manganese	T-Mn	0.477	0.479	mg/L	0.005	382709	a
Molybdenum	T-Mo	0.150	0.149	mg/L	0.03	382709	a
Nickel	T-Ni	0.087	0.078	mg/L	0.05	382709	a
Selenium	T-Se	<0.20	<0.20	mg/L	0.2	382709	a
Selenium	T-Se	0.0298	0.0307	mg/L	0.0005	384075	b
Silver	T-Ag	0.069	0.063	mg/L	0.01	382709	a
Strontium	T-Sr	0.362	0.367	mg/L	0.005	382709	a
Thallium	T-Tl	<0.20	<0.20	mg/L	0.2	382709	a
Tin	T-Sn	0.891	0.890	mg/L	0.03	382709	a
Titanium	T-Ti	0.098	0.093	mg/L	0.01	382709	a
Vanadium	T-V	0.113	0.097	mg/L	0.03	382709	a
Zinc	T-Zn	0.144	0.148	mg/L	0.005	382709	a
SPEX Minerals, 19-45M, 19.-46M							
Dissolved Anions							
Chloride	Cl	79.6	77.9	mg/L	0.5	384196	c
SPEX Minerals (10xD), 19-45M, 19-46M							
Dissolved Anions							
Chloride	Cl	7.85	7.79	mg/L	0.5	384194	c
SPEX Minerals (2xC), 19-45M, 19-46M							
Dissolved Anions							
Chloride	Cl	161	156	mg/L	0.5	384197	c
ERA Minerals, P102506							
Dissolved Anions							
Fluoride	F	3.04	3.01	mg/L	0.02	383961	d

Methods:
a = ICPOES
b = HVAAS
c = Colourimetry
d = Electrode

A Campbell Brothers Limited Company

File No. U2390

Appendix 1 - QUALITY CONTROL - Blanks

Water

		Result	Target	Units	DL	ALSQC#	Method
Dissolved Anions							
Chloride	Cl	<0.5	<0.5	mg/L	0.5	384190	a
Fluoride	F	<0.02	<0.02	mg/L	0.02	383959	b
Dissolved Metals							
Aluminum	D-Al	<0.0010	<0.0010	mg/L	0.001	384692	c
Antimony	D-Sb	<0.00010	<0.00010	mg/L	0.0001	384692	c
Antimony	D-Sb	<0.00020	<0.00020	mg/L	0.0002	384693	d
Arsenic	D-As	<0.00010	<0.00010	mg/L	0.0001	384692	c
Arsenic	D-As	<0.00020	<0.00020	mg/L	0.0002	384693	d
Barium	D-Ba	<0.000050	<0.000050	mg/L	0.00005	384692	c
Beryllium	D-Be	<0.00050	<0.00050	mg/L	0.0005	384692	c
Bismuth	D-Bi	<0.00050	<0.00050	mg/L	0.0005	384692	c
Boron	D-B	<0.010	<0.010	mg/L	0.01	384692	c
Cadmium	D-Cd	<0.000050	<0.000050	mg/L	0.00005	384692	c
Calcium	D-Ca	<0.050	<0.050	mg/L	0.05	384692	e
Chromium	D-Cr	<0.00050	<0.00050	mg/L	0.0005	384692	c
Cobalt	D-Co	<0.00010	<0.00010	mg/L	0.0001	384692	c
Copper	D-Cu	<0.00010	<0.00010	mg/L	0.0001	384692	c
Iron	D-Fe	<0.030	<0.030	mg/L	0.03	384692	e
Lead	D-Pb	<0.000050	<0.000050	mg/L	0.00005	384692	c
Lithium	D-Li	<0.0050	<0.0050	mg/L	0.005	384692	c
Magnesium	D-Mg	<0.10	<0.10	mg/L	0.1	384692	e
Manganese	D-Mn	<0.000050	<0.000050	mg/L	0.00005	384692	c
Mercury	D-Hg	<0.000050	<0.000050	mg/L	0.00005	384692	f
Molybdenum	D-Mo	<0.000050	<0.000050	mg/L	0.00005	384692	c
Nickel	D-Ni	<0.00050	<0.00050	mg/L	0.0005	384692	c
Phosphorus	D-P	<0.30	<0.30	mg/L	0.3	384692	e
Potassium	D-K	<2.0	<2.0	mg/L	2	384692	e
Selenium	D-Se	<0.0010	<0.0010	mg/L	0.001	384692	c
Selenium	D-Se	<0.00050	<0.00050	mg/L	0.0005	384693	d
Silicon	D-Si	<0.050	<0.050	mg/L	0.05	384692	e
Silver	D-Ag	<0.000010	<0.000010	mg/L	0.00001	384692	c
Sodium	D-Na	<2.0	<2.0	mg/L	2	384692	e
Strontium	D-Sr	<0.00010	<0.00010	mg/L	0.0001	384692	c
Thallium	D-Tl	<0.00010	<0.00010	mg/L	0.0001	384692	c

Methods:
a = Colourimetry
b = Electrode
c = ICPMS
d = HVAAS
e = ICPOES
f = CVAFS

A Campbell Brothers Limited Company

File No. U2390

Appendix 1 - QUALITY CONTROL - Blanks

Water

		Result	Target	Units	DL	ALSQC#	Method
Dissolved Metals							
Tin	D-Sn	<0.00010	<0.00010	mg/L	0.0001	384692	a
Titanium	D-Ti	<0.010	<0.010	mg/L	0.01	384692	b
Uranium	D-U	<0.000010	<0.000010	mg/L	0.00001	384692	a
Vanadium	D-V	<0.0010	<0.0010	mg/L	0.001	384692	a
Zinc	D-Zn	<0.0010	<0.0010	mg/L	0.001	384692	a

Methods:
a = ICPMS
b = ICPOES

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Appendix 2 - METHODOLOGY

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

Chloride in Water

This analysis is carried out using procedures adapted from APHA Method 4500 "Chloride". Chloride is determined using the ferricyanide colourimetric method.

Recommended Holding Time:
Sample: 28 days
Reference: APHA
For more detail see ALS Environmental "Collection & Sampling Guide"

Fluoride in Water

This analysis is carried out using procedures adapted from APHA Method 4500-F "Fluoride". Fluoride is determined using a selective ion electrode.

Recommended Holding Time:
Sample: 28 days
Reference: APHA
For more detail see ALS Environmental "Collection & Sampling Guide"

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
For more detail see:	ALS "Collection & Sampling Guide"

Mercury 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 procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride.

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Appendix 2 - METHODOLOGY - Continued

Instrumental analysis is by cold vapour atomic absorption and/or fluorescence spectrophotometry (EPA Method 7470A/7471A/245.7).

Recommended Holding Time:

Sample:	28 days
Reference:	EPA

For more detail see ALS Environmental "Collection & Sampling Guide"

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

This Chemical Analysis Report shall only be reproduced in full, except with the written approval of ALS Environmental.

End of Report

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APPENDIX D

CANADIAN ENVIRONMENTAL METALLURGICAL INC.
KINETIC TESTING REPORT

1636 West 75 Avenue, Vancouver, BC Canada V6P 6G2 TEL: (604) 265 5536 FAX: (604) 264 5535

CEM Inc.
Canadian Environmental and Metallurgical Inc.

INTERIM DATA REPORT

Date: April 28, 2004

CEM Inc. File No. 0356

Report On: Kinetic Testing
Eagle Acid Rock Drainage Study
Marquette County, Michigan

Report To: Golder Associates Inc.
18300 NE Union Hill Road, Suite 200
Redmond, Washington
98052-0777

Attention: Ms. Cheryl Ross
Mr. Rens Verburg

EAGLE ACID ROCK DRAINAGE STUDY

1.0 SAMPLES

Five drill core rock samples were received from Golder Associates by Canadian Environmental & Metallurgical Incorporated (CEMI) on February 10, 2004. The samples were identified as VR71100A, VR71120A, VR71213A, VR71325A, and VR71499A, respectively.

1.1 Sample Preparation

The samples were air-dried on kraft paper at ambient temperatures (15-20°C). When dry, the samples were passed through a jaw crusher, resulting in material of size fraction (approximately) minus 3/8 inch. Prior to use, the jaw crusher was thoroughly washed and scrubbed with distilled water then dried under a stream of compressed air from an air gun. To prevent cross-contamination, the sample that appeared to be of sulphidic composition (VR71120A) was processed last. Two representative splits (~ 200 g each) of the crushed sample were obtained using a riffle splitter. One sample was submitted for mineralogical analysis (Leslie Research and Consulting, Tsawwassen, BC). The second split was pulverized with a Bico puck and ring pulverizer. This latter sample was further split to obtain a representative sub-sample for future static testing. The remaining crushed sample underwent a sieve analysis after which the various size fractions were recombined to charge the humidity cell.

2.0 KINETIC TESTING

On February 16, 2004, five humidity cells were assembled for kinetic testing of the samples described in the above paragraphs. These samples were labelled Cell 1 to Cell 5, inclusively.

2.1 Structure and Charge of Humidity Cell

Each humidity cell was constructed of acrylic tubing with an inside diameter of six centimeters and an overall height of seventy-nine centimeters. An acrylic base plate was glued to the bottom of the tube and threaded with a nylon hose adapter to which a length of tubing was attached to allow for leachate drainage into a collection container. A perforated PVC support

plate was positioned inside the cell, 2.5 cm above the base plate and covered with six layers of nylon mesh. Another nylon adapter was threaded into the side of the cell between the support plate and the base plate, and a length of tubing was connected from this side adapter to the humidifier to allow the inflow of humid air to the cell. A dry air line was also connected to the cell at the same location. A removable acrylic lid was placed on top of the cell.

Prior to charging the cells, the columns were washed with 4% HNO_3 then rinsed 5x with ultrapure distilled water (supplied by ALS Environmental, Vancouver, BC). The columns were then filled to the 65 cm mark with ALS ultrapure water (pH ~4) and allowed to stand for 2 hours. The columns were subsequently drained and the drainage water analyzed for pH, Eh, conductivity, acidity, alkalinity, and sulphate. These samples were called "Column Blanks". One of the five column blanks was submitted to ALS Environmental for low-level metals analysis by ICP-MS/OES as well as analyses for mercury, chloride, fluoride, ammonia, nitrate+nitrite, and total dissolved solids.

The charge and resulting sample height in each cell are as follows: **Cell 1:** 1.551 kg, 34.0 cm; **Cell 2:** 2.667 kg, 28.5 cm; **Cell 3**: 2.159 kg, 40.0 cm; **Cell 4**: 3.856 kg, 65.5 cm; and **Cell 5:** 2.118 kg, 42.5 cm. The pore water volume was determined by filling the columns with ALS ultrapure water to the surface of the sample, allowing the water to sit for one hour and then draining the leachate into acid-washed collection bottles. This initial flush of the sample was called Cycle 0.The sample was then covered with a perforated PVC support plate to which was attached a length of coiled tubing punctured with holes. The tubing was passed through the acrylic lid of the cell into a feed bottle containing ALS ultrapure distilled water. The feed line was connected to a cartridge pump which was programmed to deliver 500 mL of distilled water to the cell over a twenty-four hour period. This type of water addition to the sample is referred to as a trickle leach.

2.2 Leach Cycle – Trickle Leach

The humidity cell leach cycle was seven days in length. Dry air was passed through the sample for three days, followed by three days on a humid air cycle. On the final day, with the air and humid lines closed and the drain from the cell opened, 500 mL of distilled water was pumped into the cell. The feed water slowly percolated through the sample and drained into a collection

vessel.

2.3 Leachate Analysis

At the end of each weekly cycle, the volume of leachate collected was recorded. The leachate was filtered through a Gelman magnetic filter funnel fitted with membrane filter paper of pore size 0.45 micrometres and analyzed for the following parameters: pH, Eh, conductivity, acidity, alkalinity, and sulphate.

Conductivity and pH were determined in the laboratory using standard procedures. The conductivity was measured directly in the leachate sample with a calibrated Fisher Scientific Traceable™ Digital Conductivity Meter. All pH measurements were made with an Orion® Model 420A pH meter equipped with an Orion® 91-62 Ag/AgCl combination electrode. The pH meter was calibrated with pH 4.00 and 7.00 buffers and checked with pH 2.00 and 10.00 buffers. All buffers are accurate to within $\pm$ 0.01 pH units.

An aliquot of filtered leachate was titrated with standardized sulphuric acid to pH 4.5 to calculate total alkalinity. Standardized sodium hydroxide was used to titrate an aliquot of leachate to pH 4.5 and to pH 8.3 to calculate total acidity. Sulphate was determined by a turbidimetric analysis of a filtered leachate sample (*Standard Methods for the Examination of Water and Wastewater*, American Public Health Association, 18th Edition, 1992).

Filtered leachate samples were submitted weekly to ALS Environmental for analysis as outlined in Sections 6.1 and 7.1 of the Eagle ARD Sampling and Analysis Plan.

APPENDIX
KINETIC TESTING RESULTS

HUMIDITY CELL TEST

Client: Golder Associates
Project: Eagle ARD Testing Program
CEMI Project No. 0356
Sample: (Sample # VR71100A) Cell 1
Dry Weight: 1.551 kg

WEEK	DATE	WATER ADDED (L)	pH WATER ADDED	LEACHATE COLLECTED (L)	LEACHATE pH	CONDUCTIVITY (µS/cm)	ACIDITY (pH 4.5) (mg CaCO3/L)	ACIDITY (pH 8.3) (mg CaCO3/L)	ALKALINITY (mg CaCO3/L)	SULPHATE (mg/L)
0	20-Feb-04	0.570	5.41	0.470	9.02	102	0.0	0.0	55.0	29
1	24-Feb-04	0.500	5.62	0.430	7.88	155	0.0	9.0	63.0	14
2	2-Mar-04	0.500	5.54	0.445	7.58	103	0.0	6.5	30.5	13
3	9-Mar-04	0.500	5.31	0.450	7.56	89	0.0	6.0	26.0	15
4	16-Mar-04	0.500	5.44	0.450	7.24	82	0.0	10.5	21.5	22
5	23-Mar-04	0.500	5.20	0.445	7.20	96	0.0	9.5	21.0	25
6	30-Mar-04	0.500	5.38	0.445	7.41	101	0.0	10.5	22.0	26
7	6-Apr-04	0.500	5.41	0.445	7.43	91	0.0	11.0	21.0	21
8	13-Apr-04	0.500	5.55	0.450	7.24	88	0.0	7.0	19.5	23

HUMIDITY CELL TEST

Client: Golder Associates
Project: Eagle ARD Testing Program
CEMI Project No. 0356
Sample: (Sample # VR71100A) Cell 1

Leachate Analysis

Dissolved Metals	(mg/L)	Week 0	Detection Limits	Week 0 HVAAS	Detection Limits	Week 1	Detection Limits	Week 1 HVAAS	Detection Limits	Week 2	Detection Limits	Week 2 DUP	Detection Limits	Week 3	Detection Limits	Week 3 HVAAS	Detection Limits	Week 4	Detection Limits	Week 5	Detection Limits	Week 5 HVAAS	Detection Limits	Week 6	Detection Limits	Week 7	Detection Limits
Aluminum	Al	0.978	0.001			0.303	0.002			0.22	0.2	0.21	0.2	0.162	0.001			<0.20	0.2	0.0873	0.001			<0.20	0.2	<0.20	0.2
Antimony	Sb	0.0117	0.0001	0.0112	0.0002	0.00783	0.0002	0.0085	0.002	<0.20	0.2	<0.20	0.2	0.00596	0.0001	0.00594	0.0002	<0.20	0.2	0.00487	0.0001	0.0044	0.002	<0.20	0.2	<0.20	0.2
Arsenic	As	0.0486	0.0001	0.0528	0.002	0.0237	0.0002	0.0266	0.0002	<0.20	0.2	<0.20	0.2	0.0257	0.0001	0.0243	0.0002	<0.20	0.2	0.0233	0.0001	0.0329	0.0002	<0.20	0.2	<0.20	0.2
Barium	Ba	0.00160	0.00005			0.00143	0.0001			<0.010	0.01	<0.010	0.01	0.000638	0.00005			<0.010	0.01	0.000681	0.00005			<0.010	0.01	<0.010	0.01
Beryllium	Be	<0.00050	0.0005			<0.0010	0.001			<0.0050	0.005	<0.0050	0.005	<0.00050	0.0005			<0.0050	0.005	<0.00050	0.0005			<0.0050	0.005	<0.0050	0.005
Bismuth	Bi	<0.00050	0.0005			<0.0010	0.001			<0.20	0.2	<0.20	0.2	<0.00050	0.0005			<0.20	0.2	<0.00050	0.0005			<0.20	0.2	<0.20	0.2
Boron	B	0.419	0.01			0.222	0.02			0.18	0.1	0.16	0.1	0.120	0.01			0.11	0.1	0.099	0.01			<0.10	0.1	<0.10	0.1
Cadmium	Cd	0.000066	0.00005			<0.00010	0.0001			<0.010	0.01	<0.010	0.01	<0.000050	0.00005			<0.010	0.01	<0.000050	0.00005			<0.010	0.01	<0.010	0.01
Calcium	Ca	0.528	0.05			1.19	0.05			1.50	0.05	1.45	0.05	2.75	0.05			3.90	0.05	4.62	0.05			5.19	0.05	5.47	0.05
Chromium	Cr	0.00080	0.0005			<0.0010	0.001			<0.010	0.01	<0.010	0.01	<0.00050	0.0005			<0.010	0.01	<0.00050	0.0005			<0.010	0.01	<0.010	0.01
Cobalt	Co	0.00023	0.0001			<0.00020	0.0002			<0.010	0.01	<0.010	0.01	0.00013	0.0001			<0.010	0.01	0.00021	0.0001			<0.010	0.01	<0.010	0.01
Copper	Cu	0.00808	0.0001			0.00225	0.0002			<0.010	0.01	<0.010	0.01	0.00149	0.0001			<0.010	0.01	0.00079	0.0001			<0.010	0.01	<0.010	0.01
Iron	Fe	0.21	0.03			0.062	0.03			<0.030	0.03	<0.030	0.03	<0.030	0.03			<0.030	0.03	<0.030	0.03			0.055	0.03	<0.030	0.03
Lead	Pb	0.000748	0.00005			0.00030	0.0001			<0.050	0.05	<0.050	0.05	0.000323	0.00005			<0.050	0.05	0.000070	0.00005			<0.050	0.05	<0.050	0.05
Lithium	Li	<0.0050	0.005			<0.010	0.01			<0.010	0.01	<0.010	0.01	0.0095	0.005			0.013	0.01	0.0086	0.005			0.012	0.01	0.01	0.01
Magnesium	Mg	0.52	0.1			0.72	0.1			0.89	0.1	0.86	0.1	1.62	0.1			2.41	0.1	2.89	0.1			3.31	0.1	3.47	0.1
Manganese	Mn	0.00245	0.00005			0.00258	0.0001			<0.0050	0.005	<0.0050	0.005	0.00379	0.00005			0.0062	0.005	0.00745	0.00005			0.0081	0.005	0.0098	0.005
Mercury	Hg	0.000065	0.00005			<0.000050	0.00005							<0.000050	0.00005					<0.000050	0.00005						
Molybdenum	Mo	0.0846	0.00005			0.0295	0.0001			<0.030	0.03	<0.030	0.03	0.0159	0.00005			<0.030	0.03	0.0121	0.00005			<0.030	0.03	<0.030	0.03
Nickel	Ni	0.00098	0.0005			<0.0010	0.001			<0.050	0.05	<0.050	0.05	<0.00050	0.0005			<0.050	0.05	0.00063	0.0005			<0.050	0.05	<0.050	0.05
Phosphorous	P	<0.30	0.3			<0.30	0.3			<0.30	0.3	<0.30	0.3	<0.30	0.3			<0.30	0.3	<0.30	0.3			<0.30	0.3	<0.30	0.3
Potassium	K	5.5	2			8.3	2			7.7	2	8.1	2	6.9	2			5.4	2	4.4	2			3.7	2	3.9	2
Selenium	Se	0.0021	0.001	0.00199	0.0005	<0.0020	0.002	0.00100	0.0005	<0.20	0.2	<0.20	0.2	<0.0010	0.001	<0.00050	0.0005	<0.20	0.2	<0.0010	0.001	0.00066	0.0005	<0.20	0.2	<0.20	0.2
Silicon	Si	3.12	0.05			2.39	0.05			2.31	0.05	2.28	0.05	2.31	0.05			2.23	0.05	2.16	0.05			2.24	0.05	2.28	0.05
Silver	Ag	0.000595	0.00001			0.000126	0.00002			<0.010	0.01	<0.010	0.01	0.000139	0.00001			<0.010	0.01	0.000022	0.00001			<0.010	0.01	<0.010	0.01
Sodium	Na	40.6	2			29.5	2			15.7	2	15.3	2	10.7	2			9.2	2	8.2	2			9.0	2	6.4	2
Strontium	Sr	0.00915	0.0001			0.0227	0.0002			0.0371	0.005	0.0365	0.005	0.0530	0.0001			0.0769	0.005	0.0878	0.0001			0.0973	0.005	0.1	0.005
Thallium	Tl	0.00013	0.0001			<0.00020	0.0002			<0.20	0.2	<0.20	0.2	<0.00010	0.0001			<0.20	0.2	<0.00010	0.0001			<0.20	0.2	<0.20	0.2
Tin	Sn	0.00053	0.0001			0.00032	0.0002			<0.030	0.03	<0.030	0.03	0.00019	0.0001			<0.030	0.03	0.00010	0.0001			<0.030	0.03	<0.030	0.03
Titanium	Ti	<0.010	0.01			<0.010	0.01			<0.010	0.01	<0.010	0.01	<0.010	0.01			<0.010	0.01	<0.010	0.01			<0.010	0.01	<0.010	0.01
Uranium	U	0.000201	0.00001			0.000195	0.00002							0.000091	0.00001					0.000115	0.00001						
Vanadium	V	0.0123	0.001			0.0033	0.002			<0.030	0.03	<0.030	0.03	0.0022	0.001			<0.030	0.03	0.0016	0.001			<0.030	0.03	<0.030	0.03
Zinc	Zn	0.0040	0.001			<0.0020	0.002			<0.0050	0.005	<0.0050	0.005	<0.0010	0.001			0.0063	0.005	0.0015	0.001			0.0145	0.005	0.0067	0.005
Dissolved Anions	**(mg/L)**																										
Chloride	Cl	12.2	0.5			0.84	0.5							<0.50	0.5					<0.50	0.5						
Fluoride	F	0.520	0.02			0.254	0.02							0.094	0.02					0.053	0.02						
Sulphate	SO4																							29.7	1		
Nutrients	**(mg/L)**																										
Ammonia	N	0.260	0.02			0.096	0.02							0.081	0.02					0.033	0.02						
Nitrite/Nitrate	N	0.147	0.005			0.0389	0.005							0.0231	0.005					0.0130	0.005						
Total Dissolved Solids	(mg/L)	318	10			336	14							50	10					66	17						

Note: Detection limits are mg/L unless specified otherwise...

HUMIDITY CELL TEST

Client: **Golder Associates**
Project: **Eagle ARD Testing Program**
CEMI Project No. **0356**
Sample: **(Sample # VR71120A) Cell 2**
Dry Weight: **2.667 kg**

WEEK	DATE	WATER ADDED (L)	pH WATER ADDED	LEACHATE COLLECTED (L)	LEACHATE pH	CONDUCTIVITY (µS/cm)	ACIDITY (pH 4.5) (mg CaCO3/L)	ACIDITY (pH 8.3) (mg CaCO3/L)	ALKALINITY (mg CaCO3/L)	SULPHATE (mg/L)
0	20-Feb-04	0.340	5.41	0.275	5.81	730	0.0	361.0	3.5	542
1	24-Feb-04	0.500	5.62	0.400	4.14	1074	4.0	765.0	0.0	837
2	2-Mar-04	0.500	5.54	0.410	3.81	1325	9.0	949.0	0.0	1120
3	9-Mar-04	0.500	5.31	0.410	3.61	1484	6.0	1067.0	0.0	1220
4	16-Mar-04	0.500	5.44	0.425	3.62	1358	13.0	1072.0	0.0	1100
5	23-Mar-04	0.500	5.20	0.420	3.75	1360	13.0	953.0	0.0	991
6	30-Mar-04	0.500	5.38	0.415	3.75	1270	12.0	889.0	0.0	942
7	6-Apr-04	0.500	5.41	0.420	3.70	1167	12.0	781.0	0.0	885
8	13-Apr-04	0.500	5.55	0.475	3.98	1322	6.0	991.0	0.0	1110

HUMIDITY CELL TEST
Client: Golder Associates
Project: Eagle ARD Testing Program
CEMI Project No. 0356
Sample: (Sample # VR71120A) Cell 2

Leachate Analysis

Dissolved Metals	(mg/L)	Week 0	Detection Limits	Week 0 HVAAS	Detection Limits	Week 1	Detection Limits	Week 1 HVAAS	Detection Limits	Week 2	Detection Limits	Week 3	Detection Limits	Week 3 HVAAS	Detection Limits	Week 3 DUP	Detection Limits	Week 3 HVAAS-DUP	Detection Limits	Week 4	Detection Limits	Week 5	Detection Limits	Week 5 HVAAS	Detection Limits	Week 6	Detection Limits	Week 7	Detection Limits
Aluminum	Al	<0.050	0.05			0.121	0.05			<0.40	0.4	0.12	0.1			<0.10	0.1			<0.40	0.4	0.30	0.1			<0.20	0.2	<0.20	0.2
Antimony	Sb	<0.0050	0.005	<0.00020	0.0002	<0.0050	0.005	<0.0020	0.002	<0.40	0.4	<0.010	0.01	0.00252	0.0002	<0.010	0.01	0.00254	0.0002	<0.40	0.4	<0.010	0.01	<0.0020	0.002	<0.30	0.3	<0.30	0.3
Arsenic	As	<0.0050	0.005	0.00527	0.0002	<0.0050	0.005	0.0184	0.0002	<0.40	0.4	<0.010	0.01	0.0120	0.0002	<0.010	0.01	0.0123	0.0002	<0.40	0.4	<0.010	0.01	0.00835	0.0002	<0.20	0.2	<0.20	0.2
Barium	Ba	0.0582	0.0025			0.0431	0.0025			0.025	0.02	0.0214	0.005			0.0196	0.005			0.024	0.02	0.0147	0.005			<0.010	0.01	0.013	0.01
Beryllium	Be	<0.025	0.025			<0.025	0.025			<0.010	0.01	<0.050	0.05			<0.050	0.05			<0.010	0.01	<0.050	0.05			<0.0050	0.005	<0.0050	0.005
Bismuth	Bi	<0.025	0.025			<0.025	0.025			<0.40	0.4	<0.050	0.05			<0.050	0.05			<0.40	0.4	<0.050	0.05			<0.20	0.2	<0.20	0.2
Boron	B	0.52	0.5			<0.50	0.5			<0.20	0.2	<1.0	1			<1.0	1			<0.20	0.2	<1.0	1			<0.10	0.1	<0.10	0.1
Cadmium	Cd	<0.0025	0.0025			0.0773	0.0025			<0.20	0.2	0.0612	0.005			0.0533	0.005			<0.10	0.1	0.0254	0.005			<0.10	0.1	<0.20	0.2
Calcium	Ca	19.0	0.05			21.3	0.1			5.69	0.1	4.08	0.1			4.11	0.1			3.85	0.1	2.08	0.1			1.92	0.05	1.39	0.05
Chromium	Cr	<0.025	0.025			<0.025	0.025			<0.10	0.1	<0.050	0.05			<0.050	0.05			<0.10	0.1	<0.050	0.05			<0.10	0.1	<0.10	0.1
Cobalt	Co	0.464	0.005			4.81	0.005			6.99	0.02	8.21	0.01			7.57	0.01			8.95	0.02	6.78	0.01			6.31	0.01	5.46	0.01
Copper	Cu	0.0539	0.005			0.0752	0.005			0.108	0.04	0.818	0.01			0.754	0.01			0.794	0.02	0.634	0.01			0.405	0.05	0.585	0.01
Iron	Fe	97.6	0.03			176	0.06			219	0.06	290	0.06			293	0.06			246	0.06	232	0.06			209	0.03	197	0.03
Lead	Pb	0.0032	0.0025			0.0140	0.0025			0.17	0.1	0.0525	0.005			0.0462	0.005			<0.10	0.1	0.0490	0.005			<0.050	0.05	<0.050	0.05
Lithium	Li	<0.25	0.25			<0.25	0.25			<0.020	0.02	<0.50	0.5			<0.50	0.5			<0.020	0.02	<0.50	0.5			<0.010	0.01	<0.010	0.01
Magnesium	Mg	16.9	0.1			22.3	0.2			9.75	0.2	9.42	0.2			9.57	0.2			9.35	0.2	6.53	0.2			6.15	0.1	5.22	0.1
Manganese	Mn	10.2	0.0025			9.81	0.0025			7.77	0.01	9.20	0.005			8.47	0.005			10.9	0.01	7.82	0.005			7.43	0.005	6.81	0.005
Mercury	Hg	0.000125	0.00005			<0.000050	0.00005					<0.000050	0.00005			<0.000050	0.00005					0.000190	0.00005						
Molybdenum	Mo	0.0114	0.0025			<0.0025	0.0025			<0.060	0.06	0.0060	0.005			<0.0050	0.005			<0.060	0.06	<0.0050	0.005			<0.030	0.03	<0.030	0.03
Nickel	Ni	148	0.025			276	0.025			380	0.1	405	0.05			377	0.05			427	0.1	338	0.05			320	0.05	287	0.05
Phosphorous	P	<0.30	0.3			<0.60	0.6			<0.60	0.6	<0.60	0.6			<0.60	0.6			<0.60	0.6	<0.60	0.6			<0.30	0.3	<0.30	0.3
Potassium	K	5.2	2			<4.0	4			<4.0	4	<4.0	4			<4.0	4			<4.0	4	<4.0	4			<2.0	2	<2.0	2
Selenium	Se	<0.050	0.05	0.00553	0.0005	<0.025	0.025	0.0170	0.0005	<0.40	0.4	<0.10	0.1	0.0497	0.0005	<0.10	0.1	0.0503	0.0005	<0.40	0.4	<0.10	0.1	0.0365	0.0005	<0.20	0.2	<0.20	0.2
Silicon	Si	1.77	0.05			2.56	0.1			1.97	0.1	1.95	0.1			1.99	0.1			2.01	0.1	2.00	0.1			2.10	0.05	2.27	0.05
Silver	Ag	<0.00050	0.0005			<0.00050	0.0005			<0.020	0.02	<0.0010	0.001			<0.0010	0.001			<0.020	0.02	<0.0010	0.001			<0.010	0.01	<0.010	0.01
Sodium	Na	33.2	2			18.1	4			<4.0	4	<4.0	4			<4.0	4			<4.0	4	<4.0	4			<2.0	2	<2.0	2
Strontium	Sr	0.378	0.005			0.301	0.005			0.046	0.01	0.029	0.01			0.026	0.01			0.031	0.01	0.015	0.01			0.0160	0.005	0.0118	0.005
Thallium	Tl	<0.0050	0.005			<0.0050	0.005			<0.40	0.4	<0.010	0.01			<0.010	0.01			<0.40	0.4	<0.010	0.01			<0.20	0.2	<0.20	0.2
Tin	Sn	<0.0050	0.005			<0.0050	0.005			<0.060	0.06	<0.010	0.01			<0.010	0.01			<0.060	0.06	<0.010	0.01			<0.030	0.03	<0.040	0.04
Titanium	Ti	<0.010	0.01			<0.020	0.02			<0.020	0.02	<0.020	0.02			<0.020	0.02			<0.020	0.02	<0.020	0.02			<0.010	0.01	<0.010	0.01
Uranium	U	<0.00050	0.0005			<0.00050	0.0005					<0.0010	0.001			<0.0010	0.001					<0.0010	0.001						
Vanadium	V	<0.050	0.05			<0.050	0.05			<0.060	0.06	<0.10	0.1			<0.10	0.1			<0.060	0.06	<0.10	0.1			<0.030	0.03	<0.030	0.03
Zinc	Zn	0.537	0.05			2.48	0.05			1.09	0.04	0.89	0.1			0.84	0.1			1.01	0.3	0.32	0.1			<0.31	0.31	<0.30	0.3
Dissolved Anions	**(mg/L)**																												
Chloride	Cl	124	0.5			29.6	2.5					3.82	0.5									12.3	0.5						
Fluoride	F	0.024	0.02			<0.020	0.02					2.6	2									0.025	0.02						
Sulphate	SO4																									1060	10		
Ammonia	N	0.486	0.02			0.392	0.02					0.090	0.02									0.042	0.02						
Nitrite/Nitrate	N	0.388	0.005			0.0814	0.005					0.059	0.01									0.0801	0.005						
Total Dissolved Solids	(mg/L)	1240	10			1600	14					2180	10									1900	13						

Note: Detection limits are mg/L unless specified otherwise...

HUMIDITY CELL TEST

Client: Golder Associates
Project: Eagle ARD Testing Program
CEMI Project No. 0356
Sample: (Sample # VR71325A) Cell 4
Dry Weight: 3.856 kg

WEEK	DATE	WATER ADDED (L)	pH WATER ADDED	LEACHATE COLLECTED (L)	LEACHATE pH	CONDUCTIVITY (µS/cm)	ACIDITY (pH 4.5) (mg CaCO3/L)	ACIDITY (pH 8.3) (mg CaCO3/L)	ALKALINITY (mg CaCO3/L)	SULPHATE (mg/L)
0	20-Feb-04	0.860	5.41	0.685	9.05	368	0.0	0.0	61.0	40
1	24-Feb-04	0.500	5.62	0.395	8.28	789	0.0	1.5	159.0	112
2	2-Mar-04	0.500	5.54	0.445	7.64	687	0.0	6.5	65.5	155
3	9-Mar-04	0.500	5.31	0.435	7.67	573	0.0	5.0	58.0	106
4	16-Mar-04	0.500	5.44	0.395	7.56	433	0.0	7.0	51.0	105
5	23-Mar-04	0.500	5.20	0.450	7.64	605	0.0	5.0	46.0	119
6	30-Mar-04	0.500	5.38	0.430	7.88	543	0.0	9.0	44.0	116
7	6-Apr-04	0.500	5.41	0.425	7.59	558	0.0	5.0	36.5	120
8	13-Apr-04	0.500	5.55	0.390	7.64	472	0.0	8.5	44.0	110

HUMIDITY CELL TEST

Client: Golder Associates
Project: Eagle ARD Testing Program
CEMI Project No. 0356
Sample: (Sample # VR71325A) Cell 4

Leachate Analysis

Dissolved Metals	(mg/L)	Week 0	Detection Limits	Week 0 HVAAS	Detection Limits	Week 1	Detection Limits	Week 1 HVAAS	Detection Limits	Week 2	Detection Limits	Week 3	Detection Limits	Week 3 HVAAS	Detection Limits	Week 4	Detection Limits	Week 5	Detection Limits	Week 5 HVAAS	Detection Limits	Week 6	Detection Limits	Week 7	Detection Limits
Aluminum	Al	<0.0050	0.005			<0.0050	0.005			<0.20	0.2	<0.0050	0.005			<0.20	0.2	0.0022	0.001			<0.20	0.2	<0.20	0.2
Antimony	Sb	0.00086	0.0005	0.00100	0.0002	0.00129	0.0005	<0.0020	0.002	<0.20	0.2	<0.0010	0.001	0.00130	0.0002	<0.20	0.2	0.00059	0.0001	<0.0020	0.002	<0.20	0.2	<0.20	0.2
Arsenic	As	0.00071	0.0005	0.00156	0.0002	0.00111	0.0005	0.00150	0.0002	<0.20	0.2	<0.0020	0.002	0.00242	0.0002	<0.20	0.2	0.00053	0.0001	0.0012	0.0002	<0.20	0.2	<0.20	0.2
Barium	Ba	0.00736	0.00025			0.0182	0.00025			0.021	0.01	0.0196	0.00025			0.023	0.01	0.0186	0.00005			0.022	0.01	0.025	0.01
Beryllium	Be	<0.0025	0.0025			<0.0025	0.0025			<0.0050	0.005	<0.0025	0.0025			<0.0050	0.005	<0.00050	0.0005			<0.0050	0.005	<0.0050	0.005
Bismuth	Bi	<0.0025	0.0025			<0.0025	0.0025			<0.20	0.2	<0.0025	0.0025			<0.20	0.2	<0.00050	0.0005			<0.20	0.2	<0.20	0.2
Boron	B	1.16	0.05			2.50	0.05			2.22	0.1	1.77	0.05			1.76	0.1	1.42	0.01			1.64	0.1	1.35	0.1
Cadmium	Cd	<0.00025	0.00025			<0.00025	0.00025			<0.010	0.01	<0.00025	0.00025			<0.010	0.01	<0.000050	0.00005			<0.010	0.01	<0.010	0.01
Calcium	Ca	5.58	0.05			11.8	0.05			21.1	0.05	20.3	0.05			20.7	0.05	22.9	0.05			22.9	0.05	24.7	0.05
Chromium	Cr	<0.0025	0.0025			<0.0025	0.0025			<0.010	0.01	<0.0025	0.0025			<0.010	0.01	<0.00050	0.0005			<0.010	0.01	<0.010	0.01
Cobalt	Co	<0.00050	0.0005			0.00184	0.0005			<0.010	0.01	0.00226	0.0005			<0.010	0.01	0.00178	0.0001			<0.010	0.01	<0.010	0.01
Copper	Cu	0.00514	0.0005			0.0594	0.0005			0.020	0.01	0.0128	0.0005			0.022	0.01	0.0118	0.0001			0.016	0.01	0.018	0.01
Iron	Fe	<0.030	0.03			<0.030	0.03			<0.030	0.03	<0.030	0.03			<0.030	0.03	<0.030	0.03			<0.030	0.03	<0.030	0.03
Lead	Pb	<0.00025	0.00025			<0.00025	0.00025			<0.050	0.05	0.00051	0.00025			<0.050	0.05	<0.000050	0.00005			<0.050	0.05	<0.050	0.05
Lithium	Li	<0.025	0.025			<0.025	0.025			<0.010	0.01	<0.025	0.025			<0.010	0.01	<0.0050	0.005			<0.010	0.01	<0.010	0.01
Magnesium	Mg	15.5	0.1			68.8	0.1			64.6	0.1	47.1	0.1			38.4	0.1	40.2	0.1			37.7	0.1	37.2	0.1
Manganese	Mn	0.00122	0.00025			0.0105	0.00025			0.0142	0.005	0.0121	0.00025			0.0135	0.005	0.0149	0.00005			0.0183	0.005	0.0228	0.005
Mercury	Hg	<0.000050	0.00005			0.000079	0.00005					0.000052	0.00005					0.000166	0.00005						
Molybdenum	Mo	0.0021	0.00025			0.00194	0.00025			<0.030	0.03	0.00054	0.00025			<0.030	0.03	0.000516	0.00005			<0.030	0.03	<0.030	0.03
Nickel	Ni	0.0224	0.0025			0.121	0.0025			0.109	0.05	0.101	0.0025			0.070	0.05	0.0703	0.0005			0.072	0.05	0.093	0.05
Phosphorous	P	<0.30	0.3			<0.30	0.3			<0.30	0.3	<0.30	0.3			<0.30	0.3	<0.30	0.3			<0.30	0.3	<0.30	0.3
Potassium	K	12.5	2			43.2	2			39.3	2	32.3	2			27.1	2	27.4	2			24.9	2	23.4	2
Selenium	Se	<0.0050	0.005	0.00129	0.0005	<0.0050	0.005	0.00230	0.0005	<0.20	0.2	<0.0050	0.005	0.00216	0.0005	<0.20	0.2	0.0025	0.001	0.00236	0.0005	<0.20	0.2	<0.20	0.2
Silicon	Si	3.44	0.05			3.84	0.05			2.72	0.05	2.57	0.05			2.59	0.05	2.33	0.05			2.34	0.05	2.34	0.05
Silver	Ag	<0.000050	0.00005			0.000899	0.00005			<0.010	0.01	0.000388	0.00005			<0.010	0.01	0.000406	0.00001			<0.010	0.01	<0.010	0.01
Sodium	Na	42.2	2			79.4	2			48.7	2	29.8	2			19.8	2	20.0	2			16.3	2	13	2
Strontium	Sr	0.0721	0.0005			0.162	0.0005			0.234	0.005	0.160	0.0005			0.138	0.005	0.113	0.0001			0.100	0.005	0.0975	0.005
Thallium	Tl	<0.00050	0.0005			<0.00050	0.0005			<0.20	0.2	<0.00050	0.0005			<0.20	0.2	<0.00010	0.0001			<0.20	0.2	<0.20	0.2
Tin	Sn	<0.00050	0.0005			<0.00050	0.0005			<0.030	0.03	0.00056	0.0005			<0.030	0.03	0.00019	0.0001			<0.030	0.03	<0.030	0.03
Titanium	Ti	<0.010	0.01			<0.010	0.01			<0.010	0.01	<0.010	0.01			<0.010	0.01	<0.010	0.01			<0.010	0.01	<0.010	0.01
Uranium	U	<0.000050	0.00005			<0.000050	0.00005					<0.000050	0.00005					<0.000010	0.00001						
Vanadium	V	<0.0050	0.005			<0.0050	0.005			<0.030	0.03	<0.0050	0.005			<0.030	0.03	<0.0010	0.001			<0.030	0.03	<0.030	0.03
Zinc	Zn	<0.0050	0.005			<0.0050	0.005			<0.0050	0.005	<0.0050	0.005			0.0124	0.005	0.0035	0.001			0.0175	0.005	0.0096	0.005
Dissolved Anions	**(mg/L)**																								
Chloride	Cl	96.8	0.5			34.0	1					7.07	0.5					130	0.5						
Fluoride	F	0.026	0.02			0.022	0.02					<0.020	0.02					0.025	0.02						
Sulphate	SO4																					121	1		
Ammonia	N	0.104	0.02			0.051	0.02					<0.020	0.02					<0.020	0.02						
Nitrite/Nitrate	N	0.0839	0.005			<0.0050	0.005					<0.0050	0.005					0.0076	0.005						
Total Dissolved Solids	(mg/L)	262	10			2870	200					512	10					448	17						

Note: Detection limits are mg/L unless specified otherwise...

HUMIDITY CELL TEST

Client: Golder Associates
Project: Eagle ARD Testing Program
CEMI Project No. 0356
Sample: (Sample # VR71499A) Cell 5
Dry Weight: 2.118 kg

WEEK	DATE	WATER ADDED (L)	pH WATER ADDED	LEACHATE COLLECTED (L)	LEACHATE pH	CONDUCTIVITY (µS/cm)	ACIDITY (pH 4.5) (mg CaCO3/L)	ACIDITY (pH 8.3) (mg CaCO3/L)	ALKALINITY (mg CaCO3/L)	SULPHATE (mg/L)
0	20-Feb-04	0.630	5.41	0.505	9.37	215	0.0	0.0	74.0	11
1	24-Feb-04	0.500	5.62	0.405	8.14	200	0.0	2.0	98.0	6
2	2-Mar-04	0.500	5.54	0.425	7.98	127	0.0	4.0	49.5	<3
3	9-Mar-04	0.500	5.31	0.430	7.78	114	0.0	9.5	40.5	10
4	16-Mar-04	0.500	5.44	0.430	7.50	96	0.0	11.0	35.5	9
5	23-Mar-04	0.500	5.20	0.425	7.54	102	0.0	10.5	34.5	15
6	30-Mar-04	0.500	5.38	0.430	7.67	106	0.0	4.0	33.0	17
7	6-Apr-04	0.500	5.41	0.425	7.50	108	0.0	17.5	32.0	21
8	13-Apr-04	0.500	5.55	0.475	7.72	157	0.0	5.5	32.5	39

HUMIDITY CELL TEST
Client: Golder Associates
Project: Eagle ARD Testing Program
CEMI Project No. 0356
Sample: (Sample # VR71499A) Cell 5

Leachate Analysis

Dissolved Metals	(mg/L)	Week 0	Detection Limits	Week 0 HVAAS	Detection Limits	Week 1	Detection Limits	Week 1 HVAAS	Detection Limits	Week 2	Detection Limits	Week 3	Detection Limits	Week 3 HVAAS	Detection Limits	Week 4	Detection Limits	Week 5	Detection Limits	Week 5 HVAAS	Detection Limits	Week 6	Detection Limits	Week 7	Detection Limits
Aluminum	Al	1.20	0.001			0.196	0.001			0.33	0.2	0.296	0.001			0.21	0.2	0.155	0.001			<0.20	0.2	<0.20	0.2
Antimony	Sb	0.0179	0.0001	0.0165	0.0002	0.00940	0.0001	0.0095	0.002	<0.20	0.2	0.00530	0.0001	0.00530	0.0002	<0.20	0.2	0.00332	0.0001	0.0024	0.002	<0.20	0.2	<0.20	0.2
Arsenic	As	0.0240	0.0001	0.0269	0.002	0.0132	0.0001	0.0132	0.0002	<0.20	0.2	0.0253	0.0001	0.0233	0.0002	<0.20	0.2	0.0200	0.0001	0.0264	0.0002	<0.20	0.2	<0.20	0.2
Barium	Ba	0.00161	0.00005			0.00232	0.00005			<0.010	0.01	0.00115	0.00005			<0.010	0.01	0.00176	0.00005			<0.010	0.01	<0.010	0.01
Beryllium	Be	<0.00050	0.0005			<0.00050	0.0005			<0.0050	0.005	<0.00050	0.0005			<0.0050	0.005	<0.00050	0.0005			<0.0050	0.005	<0.0050	0.005
Bismuth	Bi	<0.00050	0.0005			<0.00050	0.0005			<0.20	0.2	<0.00050	0.0005			<0.20	0.2	<0.00050	0.0005			<0.20	0.2	<0.20	0.2
Boron	B	0.417	0.01			0.258	0.01			0.21	0.1	0.170	0.01			0.15	0.1	0.133	0.01			<0.10	0.1	<0.10	0.1
Cadmium	Cd	<0.000050	0.00005			<0.000050	0.00005			<0.010	0.01	<0.000050	0.00005			<0.010	0.01	<0.000050	0.00005			<0.010	0.01	<0.010	0.01
Calcium	Ca	0.993	0.05			4.38	0.05			2.98	0.05	4.33	0.05			5.22	0.05	6.58	0.05			7.79	0.05	9.42	0.05
Chromium	Cr	0.00076	0.0005			<0.00050	0.0005			<0.010	0.01	<0.00050	0.0005			<0.010	0.01	<0.00050	0.0005			<0.010	0.01	<0.010	0.01
Cobalt	Co	0.00013	0.0001			<0.00010	0.0001			<0.010	0.01	<0.00010	0.0001			<0.010	0.01	<0.00010	0.0001			<0.010	0.01	<0.010	0.01
Copper	Cu	0.00511	0.0001			0.00149	0.0001			<0.010	0.01	0.00163	0.0001			<0.010	0.01	0.00122	0.0001			<0.010	0.01	<0.010	0.01
Iron	Fe	0.095	0.03			<0.030	0.03			<0.030	0.03	<0.030	0.03			<0.030	0.03	<0.030	0.03			<0.030	0.03	<0.030	0.03
Lead	Pb	0.000643	0.00005			0.000195	0.00005			<0.050	0.05	0.000177	0.00005			<0.050	0.05	0.000055	0.00005			<0.050	0.05	<0.050	0.05
Lithium	Li	<0.0050	0.005			0.0129	0.005			<0.010	0.01	0.0090	0.005			<0.010	0.01	0.0092	0.005			0.016	0.01	<0.010	0.01
Magnesium	Mg	0.34	0.1			1.92	0.1			1.22	0.1	1.61	0.1			1.82	0.1	2.10	0.1			2.31	0.1	2.48	0.1
Manganese	Mn	0.000797	0.00005			0.00335	0.00005			<0.0050	0.005	0.00151	0.00005			<0.0050	0.005	0.00239	0.00005			<0.0050	0.005	0.0057	0.005
Mercury	Hg	<0.000050	0.00005			<0.000050	0.00005					<0.000050	0.00005					<0.000050	0.00005						
Molybdenum	Mo	0.0253	0.00005			0.0105	0.00005			<0.030	0.03	0.00871	0.00005			<0.030	0.03	0.00567	0.00005			<0.030	0.03	<0.030	0.03
Nickel	Ni	0.00060	0.0005			0.00056	0.0005			<0.050	0.05	<0.00050	0.0005			<0.050	0.05	<0.00050	0.0005			<0.050	0.05	<0.050	0.05
Phosphorous	P	<0.30	0.3			<0.30	0.3			<0.30	0.3	<0.30	0.3			<0.30	0.3	<0.30	0.3			<0.30	0.3	<0.30	0.3
Potassium	K	7.5	2			14.7	2			9.1	2	8.5	2			6.6	2	6.7	2			6.4	2	5.3	2
Selenium	Se	0.0022	0.001	0.00200	0.0005	0.00097	0.0005	0.00100	0.0005	<0.20	0.2	0.0014	0.001	0.00137	0.0005	<0.20	0.2	<0.0010	0.001	0.00126	0.0005	<0.20	0.2	<0.20	0.2
Silicon	Si	3.04	0.05			2.54	0.05			2.56	0.05	2.54	0.05			2.43	0.05	2.36	0.05			2.38	0.05	2.51	0.05
Silver	Ag	0.000017	0.00001			0.000038	0.00001			<0.010	0.01	0.000070	0.00001			<0.010	0.01	<0.000010	0.00001			<0.010	0.01	<0.010	0.01
Sodium	Na	39.1	2			33.0	2			17.4	2	13.1	2			10.3	2	8.7	2			7.8	2	6.9	2
Strontium	Sr	0.0121	0.0001			0.0647	0.0001			0.0491	0.005	0.0540	0.0001			0.0607	0.005	0.0665	0.0001			0.0760	0.005	0.0828	0.005
Thallium	Tl	<0.00010	0.0001			<0.00010	0.0001			<0.20	0.2	<0.00010	0.0001			<0.20	0.2	<0.00010	0.0001			<0.20	0.2	<0.20	0.2
Tin	Sn	0.00098	0.0001			0.00049	0.0001			<0.030	0.03	0.00053	0.0001			<0.030	0.03	0.00017	0.0001			<0.030	0.03	<0.030	0.03
Titanium	Ti	<0.010	0.01			<0.010	0.01			<0.010	0.01	<0.010	0.01			<0.010	0.01	<0.010	0.01			<0.010	0.01	<0.010	0.01
Uranium	U	0.000157	0.00001			0.000239	0.00001					0.000142	0.00001					0.000194	0.00001						
Vanadium	V	0.0190	0.001			0.0035	0.001			<0.030	0.03	0.0062	0.001			<0.030	0.03	0.0033	0.001			<0.030	0.03	<0.030	0.03
Zinc	Zn	0.0016	0.001			<0.0010	0.001			<0.0050	0.005	<0.0010	0.001			0.0083	0.005	0.0012	0.001			0.0074	0.005	0.0067	0.005
Dissolved Anions	**(mg/L)**																								
Chloride	Cl	12.4	0.5			1.82	0.5					0.89	0.5					1.55	0.5						
Fluoride	F	0.745	0.02			0.248	0.02					0.191	0.02					0.067	0.02						
Sulphate	SO4																					22	1		
Ammonia	N	0.415	0.02			0.154	0.02					0.060	0.02					<0.020	0.02						
Nitrite/Nitrate	N	0.118	0.005			0.0404	0.005					0.0359	0.005					0.0174	0.005						
Total Dissolved Solids	(mg/L)	497	10			120	200					78	10					66	17						

Note: Detection limits are mg/L unless specified otherwise...

ALS Environmental

CHEMICAL ANALYSIS REPORT

Date:	March 3, 2004
ALS File No.	T9844 - Column Blank QAQC
Report On:	Release 1423 Water Analysis
Report To:	**Canadian Environmental and** Metallurgical Inc. 1636 West 75th Avenue Vancouver, BC V6P 6G2
Attention:	**Mr. Sohan Basra**
Received:	February 23, 2004

ALS ENVIRONMENTAL
per:

Leanne Harris, B.Sc. - Project Chemist
Joanne Patrick, B.Sc. - Project Chemist

ALS CANADA LTD.
1988 Triumph Street, Vancouver, BC Canada V5L 1K5
Phone: 604-253-4188 Fax: 604-253-6700 Website: www.alsenviro.com

File No. T9844

RESULTS OF ANALYSIS - Water

Sample ID			18584
ALS ID			*1*
Physical Tests			
Total Dissolved Solids			<10
Dissolved Anions			
Chloride	Cl		0.55
Fluoride	F		<0.020
Nutrients			
Ammonia Nitrogen		N	<0.020
Nitrite/Nitrate Nitrogen		N	0.0075

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

A Campbell Brothers Limited Company

File No. T9844

RESULTS OF ANALYSIS - Water

Sample ID	18584
ALS ID	*1*

Dissolved Metals

Aluminum	D-Al	<0.0010
Antimony	D-Sb	<0.00010
Arsenic	D-As	0.00108
Barium	D-Ba	0.000070
Beryllium	D-Be	<0.00050
Bismuth	D-Bi	<0.00050
Boron	D-B	<0.010
Cadmium	D-Cd	<0.000050
Calcium	D-Ca	<0.050
Chromium	D-Cr	<0.00050
Cobalt	D-Co	<0.00010
Copper	D-Cu	0.00013
Iron	D-Fe	<0.030
Lead	D-Pb	<0.000050
Lithium	D-Li	<0.0050
Magnesium	D-Mg	<0.10
Manganese	D-Mn	<0.000050
Mercury	D-Hg	<0.000050
Molybdenum	D-Mo	<0.000050
Nickel	D-Ni	<0.00050
Phosphorus	D-P	<0.30
Potassium	D-K	<2.0
Selenium	D-Se	<0.0010
Silicon	D-Si	<0.050
Silver	D-Ag	<0.000010
Sodium	D-Na	<2.0
Strontium	D-Sr	<0.00010
Thallium	D-Tl	<0.00010
Tin	D-Sn	<0.00010
Titanium	D-Ti	<0.010
Uranium	D-U	<0.000010
Vanadium	D-V	<0.0010
Zinc	D-Zn	0.0059

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

A Campbell Brothers Limited Company

File No. T9844

Appendix 1 - QUALITY CONTROL - Reference Materials

Water

		Result	Target	Units	DL	ALSQC#	Method
ULTRA SCIENTIFIC, ULTMIX							
Total Metals							
Bismuth	T-Bi	1.02	1.00	mg/L	0.1	376877	a
Bismuth	T-Bi	1.01	1.00	mg/L	0.1	377155	a
Bismuth	T-Bi	1.02	1.00	mg/L	0.05	377260	b
Lithium	T-Li	0.203	0.200	mg/L	0.01	376877	a
Lithium	T-Li	0.206	0.200	mg/L	0.01	377155	a
Lithium	T-Li	<0.50	<0.50	mg/L	0.5	377260	b
Phosphorus	T-P	1.97	2.00	mg/L	0.3	376877	a
Phosphorus	T-P	2.02	2.00	mg/L	0.3	377155	a
Silicon	T-Si	1.00	1.00	mg/L	0.05	376877	a
Silicon	T-Si	1.02	1.00	mg/L	0.05	377155	a
Tin	T-Sn	1.03	1.00	mg/L	0.03	376877	a
Tin	T-Sn	1.04	1.00	mg/L	0.03	377155	a
Tin	T-Sn	1.01	1.00	mg/L	0.01	377260	b
Titanium	T-Ti	0.200	0.200	mg/L	0.01	376877	a
Titanium	T-Ti	0.201	0.200	mg/L	0.01	377155	a
NRC Ottawa River Water, SLRS-4							
Dissolved Metals							
Aluminum	D-Al	0.0574	0.0540	mg/L	0.001	377259	b
Antimony	D-Sb	0.000260	0.000230	mg/L	0.00005	377259	b
Arsenic	D-As	0.00075	0.00068	mg/L	0.0001	377259	b
Barium	D-Ba	0.0135	0.0122	mg/L	0.00005	377259	b
Beryllium	D-Be	<0.00050	<0.00050	mg/L	0.0005	377259	b
Cadmium	D-Cd	<0.000050	<0.000050	mg/L	0.00005	377259	b
Calcium	D-Ca	5.86	6.20	mg/L	0.02	377259	b
Chromium	D-Cr	<0.00050	<0.00050	mg/L	0.0005	377259	b
Cobalt	D-Co	<0.00010	<0.00010	mg/L	0.0001	377259	b
Copper	D-Cu	0.00188	0.00181	mg/L	0.0001	377259	b
Lead	D-Pb	0.000082	0.000086	mg/L	0.00005	377259	b
Magnesium	D-Mg	1.89	1.60	mg/L	0.005	377259	b
Manganese	D-Mn	0.00332	0.00337	mg/L	0.00005	377259	b
Molybdenum	D-Mo	0.000223	0.000210	mg/L	0.00005	377259	b
Nickel	D-Ni	0.00075	0.00067	mg/L	0.0001	377259	b
Potassium	D-K	0.678	0.680	mg/L	0.01	377259	b

Methods:
a = ICPOES
b = ICPMS

A Campbell Brothers Limited Company

File No. T9844

Appendix 1 - QUALITY CONTROL - Reference Materials

Water

		Result	Target	Units	DL	ALSQC#	Method
NRC Ottawa River Water, SLRS-4							
Dissolved Metals							
Strontium	D-Sr	0.0283	0.0263	mg/L	0.0001	377259	a
Uranium	D-U	0.000049	0.000050	mg/L	0.00001	377259	a
Vanadium	D-V	<0.0010	<0.0010	mg/L	0.001	377259	a
Zinc	D-Zn	0.0011	<0.0010	mg/L	0.001	377259	a
APG Trace Metals, 31381-31382							
Total Metals							
Aluminum	T-Al	0.197	0.152	mg/L	0.01	377261	a
Antimony	T-Sb	0.271	0.262	mg/L	0.001	377261	a
Arsenic	T-As	0.146	0.152	mg/L	0.001	377261	a
Barium	T-Ba	0.438	0.438	mg/L	0.0005	377261	a
Beryllium	T-Be	0.0374	0.0367	mg/L	0.005	377261	a
Boron	T-B	0.12	0.10	mg/L	0.1	377261	a
Cadmium	T-Cd	0.0740	0.0767	mg/L	0.0005	377261	a
Chromium	T-Cr	0.122	0.125	mg/L	0.005	377261	a
Cobalt	T-Co	0.215	0.225	mg/L	0.001	377261	a
Copper	T-Cu	0.297	0.309	mg/L	0.001	377261	a
Lead	T-Pb	0.386	0.402	mg/L	0.0005	377261	a
Manganese	T-Mn	0.324	0.339	mg/L	0.0005	377261	a
Molybdenum	T-Mo	0.0972	0.0950	mg/L	0.0005	377261	a
Nickel	T-Ni	0.204	0.203	mg/L	0.005	377261	a
Selenium	T-Se	0.0368	0.0365	mg/L	0.005	377261	a
Silver	T-Ag	0.0705	0.0733	mg/L	0.0001	377261	a
Strontium	T-Sr	0.344	0.354	mg/L	0.001	377261	a
Thallium	T-Tl	0.107	0.111	mg/L	0.001	377261	a
Vanadium	T-V	0.193	0.194	mg/L	0.01	377261	a
Zinc	T-Zn	0.145	0.151	mg/L	0.01	377261	a
APG Trace Metals, 31652-31653							
Total Metals							
Aluminum	T-Al	0.99	1.00	mg/L	0.2	376878	b
Aluminum	T-Al	1.00	1.00	mg/L	0.2	377156	b
Antimony	T-Sb	0.28	0.28	mg/L	0.2	376878	b
Antimony	T-Sb	0.28	0.28	mg/L	0.2	377156	b

Methods:
a = ICPMS
b = ICPOES

A Campbell Brothers Limited Company

File No. T9844

Appendix 1 - QUALITY CONTROL - Reference Materials

Water

		Result	Target	Units	DL	ALSQC#	Method
APG Trace Metals, 31652-31653							
Total Metals							
Arsenic	T-As	0.49	0.49	mg/L	0.2	376878	a
Arsenic	T-As	0.49	0.49	mg/L	0.2	377156	a
Barium	T-Ba	0.526	0.525	mg/L	0.01	376878	a
Barium	T-Ba	0.525	0.525	mg/L	0.01	377156	a
Beryllium	T-Be	0.400	0.397	mg/L	0.005	376878	a
Beryllium	T-Be	0.389	0.397	mg/L	0.005	377156	a
Boron	T-B	0.35	0.28	mg/L	0.1	376878	a
Boron	T-B	0.35	0.28	mg/L	0.1	377156	a
Cadmium	T-Cd	0.354	0.353	mg/L	0.01	376878	a
Cadmium	T-Cd	0.352	0.353	mg/L	0.01	377156	a
Chromium	T-Cr	0.168	0.167	mg/L	0.01	376878	a
Chromium	T-Cr	0.169	0.167	mg/L	0.01	377156	a
Cobalt	T-Co	0.241	0.240	mg/L	0.01	376878	a
Cobalt	T-Co	0.245	0.240	mg/L	0.01	377156	a
Copper	T-Cu	0.396	0.391	mg/L	0.01	376878	a
Copper	T-Cu	0.402	0.391	mg/L	0.01	377156	a
Iron	T-Fe	1.00	1.01	mg/L	0.03	376878	a
Iron	T-Fe	0.994	1.01	mg/L	0.03	377156	a
Lead	T-Pb	0.844	0.857	mg/L	0.05	376878	a
Lead	T-Pb	0.837	0.857	mg/L	0.05	377156	a
Manganese	T-Mn	2.25	2.26	mg/L	0.005	376878	a
Manganese	T-Mn	2.27	2.26	mg/L	0.005	377156	a
Molybdenum	T-Mo	0.097	0.097	mg/L	0.03	376878	a
Molybdenum	T-Mo	0.098	0.097	mg/L	0.03	377156	a
Nickel	T-Ni	0.627	0.611	mg/L	0.05	376878	a
Nickel	T-Ni	0.625	0.611	mg/L	0.05	377156	a
Selenium	T-Se	<0.20	<0.20	mg/L	0.2	376878	a
Selenium	T-Se	0.21	<0.20	mg/L	0.2	377156	a
Silver	T-Ag	0.210	0.210	mg/L	0.01	376878	a
Silver	T-Ag	0.210	0.210	mg/L	0.01	377156	a
Strontium	T-Sr	0.104	0.104	mg/L	0.005	376878	a
Strontium	T-Sr	0.104	0.104	mg/L	0.005	377156	a
Thallium	T-Tl	0.35	0.38	mg/L	0.2	376878	a
Thallium	T-Tl	0.33	0.38	mg/L	0.2	377156	a
Titanium	T-Ti	0.192	0.192	mg/L	0.01	376878	a

Methods:
a = ICPOES

A Campbell Brothers Limited Company

File No. T9844

Appendix 1 - QUALITY CONTROL - Reference Materials

Water

		Result	Target	Units	DL	ALSQC#	Method
APG Trace Metals, 31652-31653							
Total Metals							
Titanium	T-Ti	0.187	0.192	mg/L	0.01	377156	a
Vanadium	T-V	1.51	1.50	mg/L	0.03	376878	a
Vanadium	T-V	1.50	1.50	mg/L	0.03	377156	a
Zinc	T-Zn	0.120	0.121	mg/L	0.005	376878	a
Zinc	T-Zn	0.121	0.121	mg/L	0.005	377156	a
ALS Environmental Hg Water RM, Hg RM 002							
Total Metals							
Mercury	T-Hg	0.00988	0.0100	mg/L	0.00001	376622	b
ERA WasteWatR, P094506							
Dissolved Anions							
Fluoride	F	1.03	1.02	mg/L	0.02	377041	c
APG Minerals, 32993-32994							
Total Metals							
Calcium	T-Ca	15.6	15.6	mg/L	0.05	376876	a
Calcium	T-Ca	15.4	15.6	mg/L	0.05	377154	a
Calcium	T-Ca	15.0	15.6	mg/L	0.04	377258	d
Magnesium	T-Mg	5.59	5.85	mg/L	0.1	376876	a
Magnesium	T-Mg	5.62	5.85	mg/L	0.1	377154	a
Magnesium	T-Mg	6.42	5.85	mg/L	0.01	377258	d
Potassium	T-K	34.0	33.1	mg/L	2	376876	a
Potassium	T-K	33.9	33.1	mg/L	2	377154	a
Potassium	T-K	33.3	33.1	mg/L	0.1	377258	d
Sodium	T-Na	40.2	39.1	mg/L	2	376876	a
Sodium	T-Na	41.8	39.1	mg/L	2	377154	a
Sodium	T-Na	38.7	39.1	mg/L	0.02	377258	d
SPEX Nutrients, 16-1 Nut1							
Nutrients							
Ammonia Nitrogen	N	11.2	11.4	mg/L	0.02	376955	c

Methods:
a = ICPOES
b = CVAFS
c = Electrode
d = ICPMS

A Campbell Brothers Limited Company

File No. T9844

Appendix 1 - QUALITY CONTROL - Reference Materials

Water

		Result	Target	Units	DL	ALSQC#	Method
SPEX Nutrients, 16-1 Nut1							
Nutrients							
Nitrite/Nitrate Nitrogen	N	18.8	17.1	mg/L	0.005	377632	a
APG Trace Metals, 35299-35300							
Total Metals							
Aluminum	T-Al	<0.20	<0.20	mg/L	0.2	376875	b
Aluminum	T-Al	<0.20	<0.20	mg/L	0.2	377153	b
Antimony	T-Sb	<0.20	<0.20	mg/L	0.2	376875	b
Antimony	T-Sb	<0.20	<0.20	mg/L	0.2	377153	b
Arsenic	T-As	<0.20	<0.20	mg/L	0.2	376875	b
Arsenic	T-As	<0.20	<0.20	mg/L	0.2	377153	b
Barium	T-Ba	0.338	0.338	mg/L	0.01	376875	b
Barium	T-Ba	0.344	0.338	mg/L	0.01	377153	b
Beryllium	T-Be	0.0776	0.0751	mg/L	0.005	376875	b
Beryllium	T-Be	0.0773	0.0751	mg/L	0.005	377153	b
Boron	T-B	0.20	0.23	mg/L	0.1	376875	b
Boron	T-B	0.18	0.23	mg/L	0.1	377153	b
Cadmium	T-Cd	0.094	0.088	mg/L	0.01	376875	b
Cadmium	T-Cd	0.092	0.088	mg/L	0.01	377153	b
Chromium	T-Cr	0.222	0.218	mg/L	0.01	376875	b
Chromium	T-Cr	0.224	0.218	mg/L	0.01	377153	b
Cobalt	T-Co	0.291	0.280	mg/L	0.01	376875	b
Cobalt	T-Co	0.296	0.280	mg/L	0.01	377153	b
Copper	T-Cu	0.295	0.287	mg/L	0.01	376875	b
Copper	T-Cu	0.300	0.287	mg/L	0.01	377153	b
Iron	T-Fe	0.387	0.368	mg/L	0.03	376875	b
Iron	T-Fe	0.385	0.368	mg/L	0.03	377153	b
Lead	T-Pb	0.251	0.264	mg/L	0.05	376875	b
Lead	T-Pb	0.253	0.264	mg/L	0.05	377153	b
Manganese	T-Mn	0.485	0.479	mg/L	0.005	376875	b
Manganese	T-Mn	0.495	0.479	mg/L	0.005	377153	b
Molybdenum	T-Mo	0.148	0.149	mg/L	0.03	376875	b
Molybdenum	T-Mo	0.153	0.149	mg/L	0.03	377153	b
Nickel	T-Ni	0.076	0.078	mg/L	0.05	376875	b
Nickel	T-Ni	0.081	0.078	mg/L	0.05	377153	b

Methods:
a = Colourimetry
b = ICPOES

A Campbell Brothers Limited Company

File No. T9844

Appendix 1 - QUALITY CONTROL - Reference Materials

Water

		Result	Target	Units	DL	ALSQC#	Method
APG Trace Metals, 35299-35300							
Total Metals							
Selenium	T-Se	<0.20	<0.20	mg/L	0.2	376875	a
Selenium	T-Se	<0.20	<0.20	mg/L	0.2	377153	a
Silver	T-Ag	0.059	0.063	mg/L	0.01	376875	a
Silver	T-Ag	0.061	0.063	mg/L	0.01	377153	a
Strontium	T-Sr	0.373	0.367	mg/L	0.005	376875	a
Strontium	T-Sr	0.377	0.367	mg/L	0.005	377153	a
Thallium	T-Tl	<0.20	<0.20	mg/L	0.2	376875	a
Thallium	T-Tl	<0.20	<0.20	mg/L	0.2	377153	a
Tin	T-Sn	0.902	0.890	mg/L	0.03	376875	a
Tin	T-Sn	0.905	0.890	mg/L	0.03	377153	a
Titanium	T-Ti	0.099	0.093	mg/L	0.01	376875	a
Titanium	T-Ti	0.096	0.093	mg/L	0.01	377153	a
Vanadium	T-V	0.101	0.097	mg/L	0.03	376875	a
Vanadium	T-V	0.100	0.097	mg/L	0.03	377153	a
Zinc	T-Zn	0.151	0.148	mg/L	0.005	376875	a
Zinc	T-Zn	0.153	0.148	mg/L	0.005	377153	a
ERA Minerals, POO96506							
Physical Tests							
Total Dissolved Solids		225	236	mg/L	10	376813	b
SPEX Minerals, 19-45M, 19.-46M							
Dissolved Anions							
Chloride	Cl	79.3	77.9	mg/L	0.5	376681	c
SPEX Minerals (10xD), 19-45M, 19-46M							
Dissolved Anions							
Chloride	Cl	7.74	7.79	mg/L	0.5	376682	c
SPEX Minerals (2xC), 19-45M, 19-46M							
Dissolved Anions							
Chloride	Cl	160	156	mg/L	0.5	376683	c

Methods:
a = ICPOES
b = Gravimetry
c = Colourimetry

A Campbell Brothers Limited Company

File No. T9844

Appendix 1 - QUALITY CONTROL - Blanks

Water

			Result	Target	Units	DL	ALSQC#	Method
Physical Tests								
Total Dissolved Solids			<10	<10	mg/L	10	376808	a
Dissolved Anions								
Chloride	Cl		<0.5	<0.5	mg/L	0.5	376680	b
Fluoride	F		<0.02	<0.02	mg/L	0.02	377036	c
Nutrients								
Ammonia Nitrogen		N	<0.02	<0.02	mg/L	0.02	376954	c
Nitrite/Nitrate Nitrogen		N	<0.005	<0.005	mg/L	0.005	376847	b
Dissolved Metals								
Aluminum	D-Al		<0.0010	<0.0010	mg/L	0.001	377450	d
Antimony	D-Sb		<0.00010	<0.00010	mg/L	0.0001	377450	d
Arsenic	D-As		<0.00010	<0.00010	mg/L	0.0001	377450	d
Barium	D-Ba		<0.000050	<0.000050	mg/L	0.00005	377450	d
Beryllium	D-Be		<0.00050	<0.00050	mg/L	0.0005	377450	d
Bismuth	D-Bi		<0.00050	<0.00050	mg/L	0.0005	377450	d
Boron	D-B		<0.010	<0.010	mg/L	0.01	377450	d
Cadmium	D-Cd		<0.000050	<0.000050	mg/L	0.00005	377450	d
Calcium	D-Ca		<0.050	<0.050	mg/L	0.05	377450	e
Chromium	D-Cr		<0.00050	<0.00050	mg/L	0.0005	377450	d
Cobalt	D-Co		<0.00010	<0.00010	mg/L	0.0001	377450	d
Copper	D-Cu		<0.00010	<0.00010	mg/L	0.0001	377450	d
Iron	D-Fe		<0.030	<0.030	mg/L	0.03	377450	e
Lead	D-Pb		<0.000050	<0.000050	mg/L	0.00005	377450	d
Lithium	D-Li		<0.0050	<0.0050	mg/L	0.005	377450	d
Magnesium	D-Mg		<0.10	<0.10	mg/L	0.1	377450	e
Manganese	D-Mn		<0.000050	<0.000050	mg/L	0.00005	377450	d
Mercury	D-Hg		<0.000050	<0.000050	mg/L	0.00005	377450	f
Molybdenum	D-Mo		<0.000050	<0.000050	mg/L	0.00005	377450	d
Nickel	D-Ni		<0.00050	<0.00050	mg/L	0.0005	377450	d
Phosphorus	D-P		<0.30	<0.30	mg/L	0.3	377450	e
Potassium	D-K		<2.0	<2.0	mg/L	2	377450	e
Selenium	D-Se		<0.0010	<0.0010	mg/L	0.001	377450	d
Silicon	D-Si		<0.050	<0.050	mg/L	0.05	377450	e
Silver	D-Ag		<0.000010	<0.000010	mg/L	0.00001	377450	d
Sodium	D-Na		<2.0	<2.0	mg/L	2	377450	e
Strontium	D-Sr		<0.00010	<0.00010	mg/L	0.0001	377450	d

Methods:
a = Gravimetry
b = Colourimetry
c = Electrode
d = ICPMS
e = ICPOES
f = WM_D_BrCl_CVAFS

A Campbell Brothers Limited Company

File No. T9844

Appendix 1 - QUALITY CONTROL - Blanks

Water

		Result	Target	Units	DL	ALSQC#	Method
Dissolved Metals							
Thallium	D-Tl	<0.00010	<0.00010	mg/L	0.0001	377450	a
Tin	D-Sn	<0.00010	<0.00010	mg/L	0.0001	377450	a
Titanium	D-Ti	<0.010	<0.010	mg/L	0.01	377450	b
Uranium	D-U	<0.000010	<0.000010	mg/L	0.00001	377450	a
Vanadium	D-V	<0.0010	<0.0010	mg/L	0.001	377450	a
Zinc	D-Zn	<0.0010	<0.0010	mg/L	0.001	377450	a

Methods:
a = ICPMS
b = ICPOES

A Campbell Brothers Limited Company

Appendix 2 - METHODOLOGY

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

Solids in Water

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total dissolved solids (TDS) and total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius, TSS is determined by drying the filter at 104 degrees celsius. Total solids are determined by evaporating a sample to dryness at 104 degrees celsius. Fixed and volatile solids are determined by igniting a dried sample residue at 550 degrees celsius.

Recommended Holding Time:
Sample: 7 days
Reference: APHA
For more detail see ALS Environmental "Collection & Sampling Guide"

Chloride in Water

This analysis is carried out using procedures adapted from APHA Method 4500 "Chloride". Chloride is determined using the ferricyanide colourimetric method.

Recommended Holding Time:
Sample: 28 days
Reference: APHA
For more detail see ALS Environmental "Collection & Sampling Guide"

Fluoride in Water

This analysis is carried out using procedures adapted from APHA Method 4500-F "Fluoride". Fluoride is determined using a selective ion electrode.

Recommended Holding Time:
Sample: 28 days
Reference: APHA
For more detail see ALS Environmental "Collection & Sampling Guide"

Ammonia in Water by Selective Ion Electrode

This analysis is carried out, on sulphuric acid preserved samples, using procedures adapted from APHA Method 4500-NH3 "Nitrogen (Ammonia)". Ammonia is determined using an ammonia selective electrode.

Recommended Holding Time:
Sample: 28 days
Reference: APHA

A Campbell Brothers Limited Company

Appendix 2 - METHODOLOGY - Continued

For more detail see ALS Environmental "Collection & Sampling Guide"

Nitrate and Nitrite in Water by Colourimetry

This analysis is carried out using procedures adapted from APHA Method 4500-NO2 "Nitrogen (Nitrite)" and Method 4500-NO3 "Nitrogen (Nitrate)". Nitrite is determined using the azo dye colourimetric method. Nitrate is determined using the cadmium reduction colourimetric method. Nitrate/nitrite is the sum of the concentrations of nitrate and nitrite present in the sample.

Recommended Holding Time:
Sample: 2 days
Reference: APHA and EPA
For more detail see ALS Environmental "Collection & Sampling Guide"

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
For more detail see:	ALS "Collection & Sampling Guide"

Mercury 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 procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic absorption and/or fluorescence spectrophotometry (EPA Method 7470A/7471A/245.7).

Recommended Holding Time:

Sample:	28 days
Reference:	EPA

For more detail see ALS Environmental "Collection & Sampling Guide"

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Appendix 2 - METHODOLOGY - Continued

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

This Chemical Analysis Report shall only be reproduced in full, except with the written approval of ALS Environmental.

End of Report

A Campbell Brothers Limited Company

ALS Environmental

CHEMICAL ANALYSIS REPORT

Date:	March 8, 2004
ALS File No.	T9845 - Week 0
Report On:	Release 1424 Water Analysis
Report To:	**Canadian Environmental and** Metallurgical Inc. 1636 West 75th Avenue Vancouver, BC V6P 6G2
Attention:	**Mr. Sohan Basra**
Received:	February 23, 2004

ALS ENVIRONMENTAL
per:

Leanne Harris, B.Sc. - Project Chemist
Joanne Patrick, B.Sc. - Project Chemist

ALS CANADA LTD.
1988 Triumph Street, Vancouver, BC Canada V5L 1K5
Phone: 604-253-4188 Fax: 604-253-5700 Website: www.alsenviro.com

File No. T9845

REMARKS

Please note that the detection limits for certain Dissolved Metals have been increased for some of the samples reported in the following data tables due to sample matrix interferences.

In particular, the detection limit for D-Selenium was increased for the sample identified as "18580" due to elevated D-Nickel. The detection limit for D-Selenium was increased for the sample identified as "15851" due to elevated Chloride. The detection limit for D-Selenium was increased for the sample identified as "18582" due to elevated D-Boron.

A Campbell Brothers Limited Company

File No. T9845

RESULTS OF ANALYSIS - Water

Sample ID			18579	18580	18581
ALS ID			*1*	*2*	*3*
Physical Tests					
Total Dissolved Solids			318	1240	754
Dissolved Anions					
Chloride	Cl		12.2	124	203
Fluoride	F		0.520	0.024	0.025
Nutrients					
Ammonia Nitrogen		N	0.260	0.486	0.154
Nitrite/Nitrate Nitrogen		N	0.147	0.388	0.0688

Remarks regarding the analyses appear at the beginning of this report.
Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.

A Campbell Brothers Limited Company

File No. T9845

RESULTS OF ANALYSIS - Water

Sample ID		18579	18579 HVAAS	18580	18580 HVAAS	18581
ALS ID		*1*	*1 a*	*2*	*2 a*	*3*
Dissolved Metals						
Aluminum	D-Al	0.978	-	<0.050	-	0.0035
Antimony	D-Sb	0.0117	0.0112	<0.0050	<0.00020	0.00101
Arsenic	D-As	0.0486	0.0528	<0.0050	0.00527	<0.0020
Barium	D-Ba	0.00160	-	0.0582	-	0.0674
Beryllium	D-Be	<0.00050	-	<0.025	-	<0.00050
Bismuth	D-Bi	<0.00050	-	<0.025	-	<0.00050
Boron	D-B	0.419	-	0.52	-	0.013
Cadmium	D-Cd	0.000066	-	<0.0025	-	<0.000050
Calcium	D-Ca	0.528	-	19.0	-	20.2
Chromium	D-Cr	0.00080	-	<0.025	-	<0.00050
Cobalt	D-Co	0.00023	-	0.464	-	0.00027
Copper	D-Cu	0.00808	-	0.0539	-	0.00209
Iron	D-Fe	0.210	-	97.6	-	<0.030
Lead	D-Pb	0.000748	-	0.0032	-	0.000121
Lithium	D-Li	<0.0050	-	<0.25	-	<0.0050
Magnesium	D-Mg	0.52	-	16.9	-	38.9
Manganese	D-Mn	0.00245	-	10.2	-	0.00458
Mercury	D-Hg	0.000065	-	0.000125	-	<0.000050
Molybdenum	D-Mo	0.0846	-	0.0114	-	0.000541
Nickel	D-Ni	0.00098	-	148	-	0.00926
Phosphorus	D-P	<0.30	-	<0.30	-	<0.30
Potassium	D-K	5.5	-	5.2	-	25.5
Selenium	D-Se	0.0021	0.00199	<0.050	0.00553	<0.0020
Silicon	D-Si	3.12	-	1.77	-	3.66
Silver	D-Ag	0.000595	-	<0.00050	-	<0.000010
Sodium	D-Na	40.6	-	33.2	-	26.4
Strontium	D-Sr	0.00915	-	0.378	-	0.160
Thallium	D-Tl	0.00013	-	<0.0050	-	<0.00010
Tin	D-Sn	0.00053	-	<0.0050	-	0.00016
Titanium	D-Ti	<0.010	-	<0.010	-	<0.010
Uranium	D-U	0.000201	-	<0.00050	-	<0.000010
Vanadium	D-V	0.0123	-	<0.050	-	<0.0010
Zinc	D-Zn	0.0040	-	0.537	-	0.0017

Remarks regarding the analyses appear at the beginning of this report.
Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.

A Campbell Brothers Limited Company

File No. T9845

RESULTS OF ANALYSIS - Water

Sample ID			18582	18583
ALS ID			*4*	*5*
Physical Tests				
Total Dissolved Solids			262	497
Dissolved Anions				
Chloride	Cl		96.8	12.4
Fluoride	F		0.026	0.745
Nutrients				
Ammonia Nitrogen		N	0.104	0.415
Nitrite/Nitrate Nitrogen		N	0.0839	0.118

Remarks regarding the analyses appear at the beginning of this report.
Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.

A Campbell Brothers Limited Company

File No. T9845

RESULTS OF ANALYSIS - Water

Sample ID		18581 HVAAS	18582	18582 HVAAS	18583	18583 HVAAS
ALS ID		*3 a*	*4*	*4 a*	*5*	*5 a*
Dissolved Metals						
Aluminum	D-Al	-	<0.0050	-	1.20	-
Antimony	D-Sb	0.00100	0.00086	0.00100	0.0179	0.0165
Arsenic	D-As	<0.00020	0.00071	0.00156	0.0240	0.0269
Barium	D-Ba	-	0.00736	-	0.00161	-
Beryllium	D-Be	-	<0.0025	-	<0.00050	-
Bismuth	D-Bi	-	<0.0025	-	<0.00050	-
Boron	D-B	-	1.16	-	0.417	-
Cadmium	D-Cd	-	<0.00025	-	<0.000050	-
Calcium	D-Ca	-	5.58	-	0.993	-
Chromium	D-Cr	-	<0.0025	-	0.00076	-
Cobalt	D-Co	-	<0.00050	-	0.00013	-
Copper	D-Cu	-	0.00514	-	0.00511	-
Iron	D-Fe	-	<0.030	-	0.095	-
Lead	D-Pb	-	<0.00025	-	0.000643	-
Lithium	D-Li	-	<0.025	-	<0.0050	-
Magnesium	D-Mg	-	15.5	-	0.34	-
Manganese	D-Mn	-	0.00122	-	0.000797	-
Mercury	D-Hg	-	<0.000050	-	<0.000050	-
Molybdenum	D-Mo	-	0.00210	-	0.0253	-
Nickel	D-Ni	-	0.0224	-	0.00060	-
Phosphorus	D-P	-	<0.30	-	<0.30	-
Potassium	D-K	-	12.5	-	7.5	-
Selenium	D-Se	<0.00050	<0.0050	0.00129	0.0022	0.00200
Silicon	D-Si	-	3.44	-	3.04	-
Silver	D-Ag	-	<0.000050	-	0.000017	-
Sodium	D-Na	-	42.2	-	39.1	-
Strontium	D-Sr	-	0.0721	-	0.0121	-
Thallium	D-Tl	-	<0.00050	-	<0.00010	-
Tin	D-Sn	-	<0.00050	-	0.00098	-
Titanium	D-Ti	-	<0.010	-	<0.010	-
Uranium	D-U	-	<0.000050	-	0.000157	-
Vanadium	D-V	-	<0.0050	-	0.0190	-
Zinc	D-Zn	-	<0.0050	-	0.0016	-

Remarks regarding the analyses appear at the beginning of this report.
Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.

A Campbell Brothers Limited Company

File No. T9845

Appendix 1 - QUALITY CONTROL - Reference Materials

Water

		Result	Target	Units	DL	ALSQC#	Method
ULTRA SCIENTIFIC, ULTMIX							
Total Metals							
Bismuth	T-Bi	1.02	1.00	mg/L	0.1	376877	a
Bismuth	T-Bi	1.02	1.00	mg/L	0.05	377260	b
Lithium	T-Li	0.203	0.200	mg/L	0.01	376877	a
Lithium	T-Li	<0.50	<0.50	mg/L	0.5	377260	b
Phosphorus	T-P	1.97	2.00	mg/L	0.3	376877	a
Silicon	T-Si	1.00	1.00	mg/L	0.05	376877	a
Tin	T-Sn	1.03	1.00	mg/L	0.03	376877	a
Tin	T-Sn	1.01	1.00	mg/L	0.01	377260	b
Titanium	T-Ti	0.200	0.200	mg/L	0.01	376877	a
NRC Ottawa River Water, SLRS-4							
Dissolved Metals							
Aluminum	D-Al	0.0574	0.0540	mg/L	0.001	377259	b
Antimony	D-Sb	0.000260	0.000230	mg/L	0.00005	377259	b
Arsenic	D-As	0.00075	0.00068	mg/L	0.0001	377259	b
Barium	D-Ba	0.0135	0.0122	mg/L	0.00005	377259	b
Beryllium	D-Be	<0.00050	<0.00050	mg/L	0.0005	377259	b
Cadmium	D-Cd	<0.000050	<0.000050	mg/L	0.00005	377259	b
Calcium	D-Ca	5.86	6.20	mg/L	0.02	377259	b
Chromium	D-Cr	<0.00050	<0.00050	mg/L	0.0005	377259	b
Cobalt	D-Co	<0.00010	<0.00010	mg/L	0.0001	377259	b
Copper	D-Cu	0.00188	0.00181	mg/L	0.0001	377259	b
Lead	D-Pb	0.000082	0.000086	mg/L	0.00005	377259	b
Magnesium	D-Mg	1.89	1.60	mg/L	0.005	377259	b
Manganese	D-Mn	0.00332	0.00337	mg/L	0.00005	377259	b
Molybdenum	D-Mo	0.000223	0.000210	mg/L	0.00005	377259	b
Nickel	D-Ni	0.00075	0.00067	mg/L	0.0001	377259	b
Potassium	D-K	0.678	0.680	mg/L	0.01	377259	b
Strontium	D-Sr	0.0283	0.0263	mg/L	0.0001	377259	b
Uranium	D-U	0.000049	0.000050	mg/L	0.00001	377259	b
Vanadium	D-V	<0.0010	<0.0010	mg/L	0.001	377259	b
Zinc	D-Zn	0.0011	<0.0010	mg/L	0.001	377259	b

Methods:
a = ICPOES
b = ICPMS

A Campbell Brothers Limited Company

File No. T9845

Appendix 1 - QUALITY CONTROL - Reference Materials

Water

		Result	Target	Units	DL	ALSQC#	Method
APG Trace Metals, 31381-31382							
Total Metals							
Aluminum	T-Al	0.197	0.152	mg/L	0.01	377261	a
Antimony	T-Sb	0.299	0.262	mg/L	0.0002	377013	b
Antimony	T-Sb	0.271	0.262	mg/L	0.001	377261	a
Arsenic	T-As	0.160	0.152	mg/L	0.0002	376986	b
Arsenic	T-As	0.146	0.152	mg/L	0.001	377261	a
Barium	T-Ba	0.438	0.438	mg/L	0.0005	377261	a
Beryllium	T-Be	0.0374	0.0367	mg/L	0.005	377261	a
Boron	T-B	0.12	0.10	mg/L	0.1	377261	a
Cadmium	T-Cd	0.0740	0.0767	mg/L	0.0005	377261	a
Chromium	T-Cr	0.122	0.125	mg/L	0.005	377261	a
Cobalt	T-Co	0.215	0.225	mg/L	0.001	377261	a
Copper	T-Cu	0.297	0.309	mg/L	0.001	377261	a
Lead	T-Pb	0.386	0.402	mg/L	0.0005	377261	a
Manganese	T-Mn	0.324	0.339	mg/L	0.0005	377261	a
Molybdenum	T-Mo	0.0972	0.0950	mg/L	0.0005	377261	a
Nickel	T-Ni	0.204	0.203	mg/L	0.005	377261	a
Selenium	T-Se	0.0368	0.0365	mg/L	0.005	377261	a
Selenium	T-Se	0.0367	0.0365	mg/L	0.0005	377473	b
Silver	T-Ag	0.0705	0.0733	mg/L	0.0001	377261	a
Strontium	T-Sr	0.344	0.354	mg/L	0.001	377261	a
Thallium	T-Tl	0.107	0.111	mg/L	0.001	377261	a
Vanadium	T-V	0.193	0.194	mg/L	0.01	377261	a
Zinc	T-Zn	0.145	0.151	mg/L	0.01	377261	a
APG Trace Metals, 31652-31653							
Total Metals							
Aluminum	T-Al	0.99	1.00	mg/L	0.2	376878	c
Antimony	T-Sb	0.28	0.28	mg/L	0.2	376878	c
Arsenic	T-As	0.49	0.49	mg/L	0.2	376878	c
Barium	T-Ba	0.526	0.525	mg/L	0.01	376878	c
Beryllium	T-Be	0.400	0.397	mg/L	0.005	376878	c
Boron	T-B	0.35	0.28	mg/L	0.1	376878	c
Cadmium	T-Cd	0.354	0.353	mg/L	0.01	376878	c
Chromium	T-Cr	0.168	0.167	mg/L	0.01	376878	c

Methods:
a = ICPMS
b = HVAAS
c = ICPOES

A Campbell Brothers Limited Company

File No. T9845

Appendix 1 - QUALITY CONTROL - Reference Materials

Water

		Result	Target	Units	DL	ALSQC#	Method
APG Trace Metals, 31652-31653							
Total Metals							
Cobalt	T-Co	0.241	0.240	mg/L	0.01	376878	a
Copper	T-Cu	0.396	0.391	mg/L	0.01	376878	a
Iron	T-Fe	1.00	1.01	mg/L	0.03	376878	a
Lead	T-Pb	0.844	0.857	mg/L	0.05	376878	a
Manganese	T-Mn	2.25	2.26	mg/L	0.005	376878	a
Molybdenum	T-Mo	0.097	0.097	mg/L	0.03	376878	a
Nickel	T-Ni	0.627	0.611	mg/L	0.05	376878	a
Selenium	T-Se	<0.20	<0.20	mg/L	0.2	376878	a
Silver	T-Ag	0.210	0.210	mg/L	0.01	376878	a
Strontium	T-Sr	0.104	0.104	mg/L	0.005	376878	a
Thallium	T-Tl	0.35	0.38	mg/L	0.2	376878	a
Titanium	T-Ti	0.192	0.192	mg/L	0.01	376878	a
Vanadium	T-V	1.51	1.50	mg/L	0.03	376878	a
Zinc	T-Zn	0.120	0.121	mg/L	0.005	376878	a
ALS Environmental Hg Water RM, Hg RM 002							
Total Metals							
Mercury	T-Hg	0.0102	0.0100	mg/L	0.00001	376999	b
ERA WasteWatR, P094506							
Dissolved Anions							
Fluoride	F	1.03	1.02	mg/L	0.02	377041	c
APG Minerals, 32993-32994							
Total Metals							
Calcium	T-Ca	15.6	15.6	mg/L	0.05	376876	a
Calcium	T-Ca	15.0	15.6	mg/L	0.04	377258	d
Magnesium	T-Mg	5.59	5.85	mg/L	0.1	376876	a
Magnesium	T-Mg	6.42	5.85	mg/L	0.01	377258	d
Potassium	T-K	34.0	33.1	mg/L	2	376876	a
Potassium	T-K	33.3	33.1	mg/L	0.1	377258	d
Sodium	T-Na	40.2	39.1	mg/L	2	376876	a

Methods:
a = ICPOES
b = CVAFS
c = Electrode
d = ICPMS

A Campbell Brothers Limited Company

File No. T9845

Appendix 1 - QUALITY CONTROL - Reference Materials

Water

			Result	Target	Units	DL	ALSQC#	Method
APG Minerals, 32993-32994								
Total Metals								
Sodium	T-Na		38.7	39.1	mg/L	0.02	377258	a
SPEX Nutrients, 16-1 Nut1								
Nutrients								
Ammonia Nitrogen		N	11.2	11.4	mg/L	0.02	376955	b
Nitrite/Nitrate Nitrogen		N	18.8	17.1	mg/L	0.005	377632	c
APG Trace Metals, 35299-35300								
Total Metals								
Aluminum	T-Al		<0.20	<0.20	mg/L	0.2	376875	d
Antimony	T-Sb		<0.20	<0.20	mg/L	0.2	376875	d
Arsenic	T-As		<0.20	<0.20	mg/L	0.2	376875	d
Barium	T-Ba		0.338	0.338	mg/L	0.01	376875	d
Beryllium	T-Be		0.0776	0.0751	mg/L	0.005	376875	d
Boron	T-B		0.20	0.23	mg/L	0.1	376875	d
Cadmium	T-Cd		0.094	0.088	mg/L	0.01	376875	d
Chromium	T-Cr		0.222	0.218	mg/L	0.01	376875	d
Cobalt	T-Co		0.291	0.280	mg/L	0.01	376875	d
Copper	T-Cu		0.295	0.287	mg/L	0.01	376875	d
Iron	T-Fe		0.387	0.368	mg/L	0.03	376875	d
Lead	T-Pb		0.251	0.264	mg/L	0.05	376875	d
Manganese	T-Mn		0.485	0.479	mg/L	0.005	376875	d
Molybdenum	T-Mo		0.148	0.149	mg/L	0.03	376875	d
Nickel	T-Ni		0.076	0.078	mg/L	0.05	376875	d
Selenium	T-Se		<0.20	<0.20	mg/L	0.2	376875	d
Silver	T-Ag		0.059	0.063	mg/L	0.01	376875	d
Strontium	T-Sr		0.373	0.367	mg/L	0.005	376875	d
Thallium	T-Tl		<0.20	<0.20	mg/L	0.2	376875	d
Tin	T-Sn		0.902	0.890	mg/L	0.03	376875	d
Titanium	T-Ti		0.099	0.093	mg/L	0.01	376875	d
Vanadium	T-V		0.101	0.097	mg/L	0.03	376875	d
Zinc	T-Zn		0.151	0.148	mg/L	0.005	376875	d

Methods:
a = ICPMS
b = Electrode
c = Colourimetry
d = ICPOES

A Campbell Brothers Limited Company

File No. T9845

Appendix 1 - QUALITY CONTROL - Reference Materials

Water

	Result	Target	Units	DL	ALSQC#	Method
ERA Minerals, POO96506						
Physical Tests						
Total Dissolved Solids	239	236	mg/L	10	378131	a
SPEX Minerals, 19-45M, 19.-46M						
Dissolved Anions						
Chloride Cl	79.3	77.9	mg/L	0.5	376681	b
SPEX Minerals (10xD), 19-45M, 19-46M						
Dissolved Anions						
Chloride Cl	7.74	7.79	mg/L	0.5	376682	b
SPEX Minerals (2xC), 19-45M, 19-46M						
Dissolved Anions						
Chloride Cl	160	156	mg/L	0.5	376683	b

Methods:
a = Gravimetry
b = Colourimetry

A Campbell Brothers Limited Company

File No. T9845

Appendix 1 - QUALITY CONTROL - Blanks

Water

			Result	Target	Units	DL	ALSQC#	Method
Physical Tests								
Total Dissolved Solids			<10	<10	mg/L	10	378130	a
Dissolved Anions								
Chloride	Cl		<0.5	<0.5	mg/L	0.5	376680	b
Fluoride	F		<0.02	<0.02	mg/L	0.02	377036	c
Nutrients								
Ammonia Nitrogen		N	<0.02	<0.02	mg/L	0.02	376954	c
Nitrite/Nitrate Nitrogen		N	<0.005	<0.005	mg/L	0.005	376847	b
Dissolved Metals								
Aluminum	D-Al		<0.0010	<0.0010	mg/L	0.001	377630	d
Antimony	D-Sb		<0.00010	<0.00010	mg/L	0.0001	377630	d
Antimony	D-Sb		<0.00020	<0.00020	mg/L	0.0002	377631	e
Arsenic	D-As		<0.00010	<0.00010	mg/L	0.0001	377630	d
Arsenic	D-As		<0.00020	<0.00020	mg/L	0.0002	377631	e
Barium	D-Ba		<0.000050	<0.000050	mg/L	0.00005	377630	d
Beryllium	D-Be		<0.00050	<0.00050	mg/L	0.0005	377630	d
Bismuth	D-Bi		<0.00050	<0.00050	mg/L	0.0005	377630	d
Boron	D-B		<0.010	<0.010	mg/L	0.01	377630	d
Cadmium	D-Cd		<0.000050	<0.000050	mg/L	0.00005	377630	d
Calcium	D-Ca		<0.050	<0.050	mg/L	0.05	377630	f
Chromium	D-Cr		<0.00050	<0.00050	mg/L	0.0005	377630	d
Cobalt	D-Co		<0.00010	<0.00010	mg/L	0.0001	377630	d
Copper	D-Cu		<0.00010	<0.00010	mg/L	0.0001	377630	d
Iron	D-Fe		<0.030	<0.030	mg/L	0.03	377630	f
Lead	D-Pb		<0.000050	<0.000050	mg/L	0.00005	377630	d
Lithium	D-Li		<0.0050	<0.0050	mg/L	0.005	377630	d
Magnesium	D-Mg		<0.10	<0.10	mg/L	0.1	377630	f
Manganese	D-Mn		<0.000050	<0.000050	mg/L	0.00005	377630	d
Mercury	D-Hg		<0.000050	<0.000050	mg/L	0.00005	377630	g
Molybdenum	D-Mo		<0.000050	<0.000050	mg/L	0.00005	377630	d
Nickel	D-Ni		<0.00050	<0.00050	mg/L	0.0005	377630	d
Phosphorus	D-P		<0.30	<0.30	mg/L	0.3	377630	f
Potassium	D-K		<2.0	<2.0	mg/L	2	377630	f
Selenium	D-Se		<0.0010	<0.0010	mg/L	0.001	377630	d
Selenium	D-Se		<0.00050	<0.00050	mg/L	0.0005	377631	e
Silicon	D-Si		<0.050	<0.050	mg/L	0.05	377630	f

Methods:
a = Gravimetry
b = Colourimetry
c = Electrode
d = ICPMS
e = HVAAS
f = ICPOES
g = WM_D_BrCl_CVAFS

A Campbell Brothers Limited Company

File No. T9845

Appendix 1 - QUALITY CONTROL - Blanks

Water

		Result	Target	Units	DL	ALSQC#	Method
Dissolved Metals							
Silver	D-Ag	<0.000010	<0.000010	mg/L	0.00001	377630	a
Sodium	D-Na	<2.0	<2.0	mg/L	2	377630	b
Strontium	D-Sr	<0.00010	<0.00010	mg/L	0.0001	377630	a
Thallium	D-Tl	<0.00010	<0.00010	mg/L	0.0001	377630	a
Tin	D-Sn	<0.00010	<0.00010	mg/L	0.0001	377630	a
Titanium	D-Ti	<0.010	<0.010	mg/L	0.01	377630	b
Uranium	D-U	<0.000010	<0.000010	mg/L	0.00001	377630	a
Vanadium	D-V	<0.0010	<0.0010	mg/L	0.001	377630	a
Zinc	D-Zn	<0.0010	<0.0010	mg/L	0.001	377630	a

Methods:
a = ICPMS
b = ICPOES

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Appendix 2 - METHODOLOGY

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

Solids in Water

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total dissolved solids (TDS) and total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius, TSS is determined by drying the filter at 104 degrees celsius. Total solids are determined by evaporating a sample to dryness at 104 degrees celsius. Fixed and volatile solids are determined by igniting a dried sample residue at 550 degrees celsius.

Recommended Holding Time:
Sample: 7 days
Reference: APHA
For more detail see ALS Environmental "Collection & Sampling Guide"

Chloride in Water

This analysis is carried out using procedures adapted from APHA Method 4500 "Chloride". Chloride is determined using the ferricyanide colourimetric method.

Recommended Holding Time:
Sample: 28 days
Reference: APHA
For more detail see ALS Environmental "Collection & Sampling Guide"

Fluoride in Water

This analysis is carried out using procedures adapted from APHA Method 4500-F "Fluoride". Fluoride is determined using a selective ion electrode.

Recommended Holding Time:
Sample: 28 days
Reference: APHA
For more detail see ALS Environmental "Collection & Sampling Guide"

Ammonia in Water by Selective Ion Electrode

This analysis is carried out, on sulphuric acid preserved samples, using procedures adapted from APHA Method 4500-NH3 "Nitrogen (Ammonia)". Ammonia is determined using an ammonia selective electrode.

Recommended Holding Time:
Sample: 28 days
Reference: APHA

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Appendix 2 - METHODOLOGY - Continued

For more detail see ALS Environmental "Collection & Sampling Guide"

Nitrate and Nitrite in Water by Colourimetry

This analysis is carried out using procedures adapted from APHA Method 4500-NO2 "Nitrogen (Nitrite)" and Method 4500-NO3 "Nitrogen (Nitrate)". Nitrite is determined using the azo dye colourimetric method. Nitrate is determined using the cadmium reduction colourimetric method. Nitrate/nitrite is the sum of the concentrations of nitrate and nitrite present in the sample.

Recommended Holding Time:
Sample: 2 days
Reference: APHA and EPA
For more detail see ALS Environmental "Collection & Sampling Guide"

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
For more detail see:	ALS "Collection & Sampling Guide"

Mercury 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 procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic absorption and/or fluorescence spectrophotometry (EPA Method 7470A/7471A/245.7).

Recommended Holding Time:

Sample:	28 days
Reference:	EPA

For more detail see ALS Environmental "Collection & Sampling Guide"

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Appendix 2 - METHODOLOGY - Continued

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

This Chemical Analysis Report shall only be reproduced in full, except with the written approval of ALS Environmental.

End of Report

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ALS Environmental

CHEMICAL ANALYSIS REPORT

Date:	March 8, 2004
ALS File No.	T9845 - Week 0
Report On:	Release 1424 Water Analysis
Report To:	**Canadian Environmental and** Metallurgical Inc. 1636 West 75th Avenue Vancouver, BC V6P 6G2
Attention:	**Mr. Sohan Basra**
Received:	February 23, 2004

ALS ENVIRONMENTAL
per:

Leanne Harris, B.Sc. - Project Chemist
Joanne Patrick, B.Sc. - Project Chemist

ALS CANADA LTD.
1988 Triumph Street, Vancouver, BC Canada V5L 1K5
Phone: 604-253-4188 Fax: 604-253-6700 Website: www.alsenviro.com

File No. T9845

REMARKS

Please note that the detection limits for certain Dissolved Metals have been increased for some of the samples reported in the following data tables due to sample matrix interferences.

In particular, the detection limit for D-Selenium was increased for the sample identified as "18580" due to elevated D-Nickel. The detection limit for D-Selenium was increased for the sample identified as "15851" due to elevated Chloride. The detection limit for D-Selenium was increased for the sample identified as "18582" due to elevated D-Boron.

A Campbell Brothers Limited Company

File No. T9845

RESULTS OF ANALYSIS - Water

Sample ID			18579	18580	18581
ALS ID			*1*	*2*	*3*
Physical Tests					
Total Dissolved Solids			318	1240	754
Dissolved Anions					
Chloride	Cl		12.2	124	203
Fluoride	F		0.520	0.024	0.025
Nutrients					
Ammonia Nitrogen		N	0.260	0.486	0.154
Nitrite/Nitrate Nitrogen		N	0.147	0.388	0.0688

Remarks regarding the analyses appear at the beginning of this report.
Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.

A Campbell Brothers Limited Company

File No. T9845

RESULTS OF ANALYSIS - Water

Sample ID		18579	18579 HVAAS	18580	18580 HVAAS	18581
ALS ID		*1*	*1 a*	*2*	*2 a*	*3*
Dissolved Metals						
Aluminum	D-Al	0.978	-	<0.050	-	0.0035
Antimony	D-Sb	0.0117	0.0112	<0.0050	<0.00020	0.00101
Arsenic	D-As	0.0486	0.0528	<0.0050	0.00527	<0.0020
Barium	D-Ba	0.00160	-	0.0582	-	0.0674
Beryllium	D-Be	<0.00050	-	<0.025	-	<0.00050
Bismuth	D-Bi	<0.00050	-	<0.025	-	<0.00050
Boron	D-B	0.419	-	0.52	-	0.013
Cadmium	D-Cd	0.000066	-	<0.0025	-	<0.000050
Calcium	D-Ca	0.528	-	19.0	-	20.2
Chromium	D-Cr	0.00080	-	<0.025	-	<0.00050
Cobalt	D-Co	0.00023	-	0.464	-	0.00027
Copper	D-Cu	0.00808	-	0.0539	-	0.00209
Iron	D-Fe	0.210	-	97.6	-	<0.030
Lead	D-Pb	0.000748	-	0.0032	-	0.000121
Lithium	D-Li	<0.0050	-	<0.25	-	<0.0050
Magnesium	D-Mg	0.52	-	16.9	-	38.9
Manganese	D-Mn	0.00245	-	10.2	-	0.00458
Mercury	D-Hg	0.000065	-	0.000125	-	<0.000050
Molybdenum	D-Mo	0.0846	-	0.0114	-	0.000541
Nickel	D-Ni	0.00098	-	148	-	0.00926
Phosphorus	D-P	<0.30	-	<0.30	-	<0.30
Potassium	D-K	5.5	-	5.2	-	25.5
Selenium	D-Se	0.0021	0.00199	<0.050	0.00553	<0.0020
Silicon	D-Si	3.12	-	1.77	-	3.66
Silver	D-Ag	0.000595	-	<0.00050	-	<0.000010
Sodium	D-Na	40.6	-	33.2	-	26.4
Strontium	D-Sr	0.00915	-	0.378	-	0.160
Thallium	D-Tl	0.00013	-	<0.0050	-	<0.00010
Tin	D-Sn	0.00053	-	<0.0050	-	0.00016
Titanium	D-Ti	<0.010	-	<0.010	-	<0.010
Uranium	D-U	0.000201	-	<0.00050	-	<0.000010
Vanadium	D-V	0.0123	-	<0.050	-	<0.0010
Zinc	D-Zn	0.0040	-	0.537	-	0.0017

Remarks regarding the analyses appear at the beginning of this report.
Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.

A Campbell Brothers Limited Company

File No. T9845

RESULTS OF ANALYSIS - Water

Sample ID			18582	18583
ALS ID			*4*	*5*
Physical Tests				
Total Dissolved Solids			262	497
Dissolved Anions				
Chloride	Cl		96.8	12.4
Fluoride	F		0.026	0.745
Nutrients				
Ammonia Nitrogen		N	0.104	0.415
Nitrite/Nitrate Nitrogen		N	0.0839	0.118

Remarks regarding the analyses appear at the beginning of this report.
Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.

A Campbell Brothers Limited Company

File No. T9845

RESULTS OF ANALYSIS - Water

Sample ID		18581 HVAAS	18582	18582 HVAAS	18583	18583 HVAAS
ALS ID		*3 a*	*4*	*4 a*	*5*	*5 a*
Dissolved Metals						
Aluminum	D-Al	-	<0.0050	-	1.20	-
Antimony	D-Sb	0.00100	0.00086	0.00100	0.0179	0.0165
Arsenic	D-As	<0.00020	0.00071	0.00156	0.0240	0.0269
Barium	D-Ba	-	0.00736	-	0.00161	-
Beryllium	D-Be	-	<0.0025	-	<0.00050	-
Bismuth	D-Bi	-	<0.0025	-	<0.00050	-
Boron	D-B	-	1.16	-	0.417	-
Cadmium	D-Cd	-	<0.00025	-	<0.000050	-
Calcium	D-Ca	-	5.58	-	0.993	-
Chromium	D-Cr	-	<0.0025	-	0.00076	-
Cobalt	D-Co	-	<0.00050	-	0.00013	-
Copper	D-Cu	-	0.00514	-	0.00511	-
Iron	D-Fe	-	<0.030	-	0.095	-
Lead	D-Pb	-	<0.00025	-	0.000643	-
Lithium	D-Li	-	<0.025	-	<0.0050	-
Magnesium	D-Mg	-	15.5	-	0.34	-
Manganese	D-Mn	-	0.00122	-	0.000797	-
Mercury	D-Hg	-	<0.000050	-	<0.000050	-
Molybdenum	D-Mo	-	0.00210	-	0.0253	-
Nickel	D-Ni	-	0.0224	-	0.00060	-
Phosphorus	D-P	-	<0.30	-	<0.30	-
Potassium	D-K	-	12.5	-	7.5	-
Selenium	D-Se	<0.00050	<0.0050	0.00129	0.0022	0.00200
Silicon	D-Si	-	3.44	-	3.04	-
Silver	D-Ag	-	<0.000050	-	0.000017	-
Sodium	D-Na	-	42.2	-	39.1	-
Strontium	D-Sr	-	0.0721	-	0.0121	-
Thallium	D-Tl	-	<0.00050	-	<0.00010	-
Tin	D-Sn	-	<0.00050	-	0.00098	-
Titanium	D-Ti	-	<0.010	-	<0.010	-
Uranium	D-U	-	<0.000050	-	0.000157	-
Vanadium	D-V	-	<0.0050	-	0.0190	-
Zinc	D-Zn	-	<0.0050	-	0.0016	-

Remarks regarding the analyses appear at the beginning of this report.
Results are expressed as milligrams per litre except where noted.
< = Less than the detection limit indicated.

A Campbell Brothers Limited Company

File No. T9845

Appendix 1 - QUALITY CONTROL - Reference Materials

Water

		Result	Target	Units	DL	ALSQC#	Method
ULTRA SCIENTIFIC, ULTMIX							
Total Metals							
Bismuth	T-Bi	1.02	1.00	mg/L	0.1	376877	a
Bismuth	T-Bi	1.02	1.00	mg/L	0.05	377260	b
Lithium	T-Li	0.203	0.200	mg/L	0.01	376877	a
Lithium	T-Li	<0.50	<0.50	mg/L	0.5	377260	b
Phosphorus	T-P	1.97	2.00	mg/L	0.3	376877	a
Silicon	T-Si	1.00	1.00	mg/L	0.05	376877	a
Tin	T-Sn	1.03	1.00	mg/L	0.03	376877	a
Tin	T-Sn	1.01	1.00	mg/L	0.01	377260	b
Titanium	T-Ti	0.200	0.200	mg/L	0.01	376877	a
NRC Ottawa River Water, SLRS-4							
Dissolved Metals							
Aluminum	D-Al	0.0574	0.0540	mg/L	0.001	377259	b
Antimony	D-Sb	0.000260	0.000230	mg/L	0.00005	377259	b
Arsenic	D-As	0.00075	0.00068	mg/L	0.0001	377259	b
Barium	D-Ba	0.0135	0.0122	mg/L	0.00005	377259	b
Beryllium	D-Be	<0.00050	<0.00050	mg/L	0.0005	377259	b
Cadmium	D-Cd	<0.000050	<0.000050	mg/L	0.00005	377259	b
Calcium	D-Ca	5.86	6.20	mg/L	0.02	377259	b
Chromium	D-Cr	<0.00050	<0.00050	mg/L	0.0005	377259	b
Cobalt	D-Co	<0.00010	<0.00010	mg/L	0.0001	377259	b
Copper	D-Cu	0.00188	0.00181	mg/L	0.0001	377259	b
Lead	D-Pb	0.000082	0.000086	mg/L	0.00005	377259	b
Magnesium	D-Mg	1.89	1.60	mg/L	0.005	377259	b
Manganese	D-Mn	0.00332	0.00337	mg/L	0.00005	377259	b
Molybdenum	D-Mo	0.000223	0.000210	mg/L	0.00005	377259	b
Nickel	D-Ni	0.00075	0.00067	mg/L	0.0001	377259	b
Potassium	D-K	0.678	0.680	mg/L	0.01	377259	b
Strontium	D-Sr	0.0283	0.0263	mg/L	0.0001	377259	b
Uranium	D-U	0.000049	0.000050	mg/L	0.00001	377259	b
Vanadium	D-V	<0.0010	<0.0010	mg/L	0.001	377259	b
Zinc	D-Zn	0.0011	<0.0010	mg/L	0.001	377259	b

Methods:
a = ICPOES
b = ICPMS

A Campbell Brothers Limited Company

File No. T9845

Appendix 1 - QUALITY CONTROL - Reference Materials

Water

		Result	Target	Units	DL	ALSQC#	Method
APG Trace Metals, 31381-31382							
Total Metals							
Aluminum	T-Al	0.197	0.152	mg/L	0.01	377261	a
Antimony	T-Sb	0.299	0.262	mg/L	0.0002	377013	b
Antimony	T-Sb	0.271	0.262	mg/L	0.001	377261	a
Arsenic	T-As	0.160	0.152	mg/L	0.0002	376986	b
Arsenic	T-As	0.146	0.152	mg/L	0.001	377261	a
Barium	T-Ba	0.438	0.438	mg/L	0.0005	377261	a
Beryllium	T-Be	0.0374	0.0367	mg/L	0.005	377261	a
Boron	T-B	0.12	0.10	mg/L	0.1	377261	a
Cadmium	T-Cd	0.0740	0.0767	mg/L	0.0005	377261	a
Chromium	T-Cr	0.122	0.125	mg/L	0.005	377261	a
Cobalt	T-Co	0.215	0.225	mg/L	0.001	377261	a
Copper	T-Cu	0.297	0.309	mg/L	0.001	377261	a
Lead	T-Pb	0.386	0.402	mg/L	0.0005	377261	a
Manganese	T-Mn	0.324	0.339	mg/L	0.0005	377261	a
Molybdenum	T-Mo	0.0972	0.0950	mg/L	0.0005	377261	a
Nickel	T-Ni	0.204	0.203	mg/L	0.005	377261	a
Selenium	T-Se	0.0368	0.0365	mg/L	0.005	377261	a
Selenium	T-Se	0.0367	0.0365	mg/L	0.0005	377473	b
Silver	T-Ag	0.0705	0.0733	mg/L	0.0001	377261	a
Strontium	T-Sr	0.344	0.354	mg/L	0.001	377261	a
Thallium	T-Tl	0.107	0.111	mg/L	0.001	377261	a
Vanadium	T-V	0.193	0.194	mg/L	0.01	377261	a
Zinc	T-Zn	0.145	0.151	mg/L	0.01	377261	a
APG Trace Metals, 31652-31653							
Total Metals							
Aluminum	T-Al	0.99	1.00	mg/L	0.2	376878	c
Antimony	T-Sb	0.28	0.28	mg/L	0.2	376878	c
Arsenic	T-As	0.49	0.49	mg/L	0.2	376878	c
Barium	T-Ba	0.526	0.525	mg/L	0.01	376878	c
Beryllium	T-Be	0.400	0.397	mg/L	0.005	376878	c
Boron	T-B	0.35	0.28	mg/L	0.1	376878	c
Cadmium	T-Cd	0.354	0.353	mg/L	0.01	376878	c
Chromium	T-Cr	0.168	0.167	mg/L	0.01	376878	c

Methods:
a = ICPMS
b = HVAAS
c = ICPOES

A Campbell Brothers Limited Company

File No. T9845

Appendix 1 - QUALITY CONTROL - Reference Materials

Water

		Result	Target	Units	DL	ALSQC#	Method
APG Trace Metals, 31652-31653							
Total Metals							
Cobalt	T-Co	0.241	0.240	mg/L	0.01	376878	a
Copper	T-Cu	0.396	0.391	mg/L	0.01	376878	a
Iron	T-Fe	1.00	1.01	mg/L	0.03	376878	a
Lead	T-Pb	0.844	0.857	mg/L	0.05	376878	a
Manganese	T-Mn	2.25	2.26	mg/L	0.005	376878	a
Molybdenum	T-Mo	0.097	0.097	mg/L	0.03	376878	a
Nickel	T-Ni	0.627	0.611	mg/L	0.05	376878	a
Selenium	T-Se	<0.20	<0.20	mg/L	0.2	376878	a
Silver	T-Ag	0.210	0.210	mg/L	0.01	376878	a
Strontium	T-Sr	0.104	0.104	mg/L	0.005	376878	a
Thallium	T-Tl	0.35	0.38	mg/L	0.2	376878	a
Titanium	T-Ti	0.192	0.192	mg/L	0.01	376878	a
Vanadium	T-V	1.51	1.50	mg/L	0.03	376878	a
Zinc	T-Zn	0.120	0.121	mg/L	0.005	376878	a
ALS Environmental Hg Water RM, Hg RM 002							
Total Metals							
Mercury	T-Hg	0.0102	0.0100	mg/L	0.00001	376999	b
ERA WasteWatR, P094506							
Dissolved Anions							
Fluoride	F	1.03	1.02	mg/L	0.02	377041	c
APG Minerals, 32993-32994							
Total Metals							
Calcium	T-Ca	15.6	15.6	mg/L	0.05	376876	a
Calcium	T-Ca	15.0	15.6	mg/L	0.04	377258	d
Magnesium	T-Mg	5.59	5.85	mg/L	0.1	376876	a
Magnesium	T-Mg	6.42	5.85	mg/L	0.01	377258	d
Potassium	T-K	34.0	33.1	mg/L	2	376876	a
Potassium	T-K	33.3	33.1	mg/L	0.1	377258	d
Sodium	T-Na	40.2	39.1	mg/L	2	376876	a

Methods:
a = ICPOES
b = CVAFS
c = Electrode
d = ICPMS

A Campbell Brothers Limited Company

File No. T9845

Appendix 1 - QUALITY CONTROL - Reference Materials

Water

			Result	Target	Units	DL	ALSQC#	Method
APG Minerals, 32993-32994								
Total Metals								
Sodium	T-Na		38.7	39.1	mg/L	0.02	377258	a
SPEX Nutrients, 16-1 Nut1								
Nutrients								
Ammonia Nitrogen		N	11.2	11.4	mg/L	0.02	376955	b
Nitrite/Nitrate Nitrogen		N	18.8	17.1	mg/L	0.005	377632	c
APG Trace Metals, 35299-35300								
Total Metals								
Aluminum	T-Al		<0.20	<0.20	mg/L	0.2	376875	d
Antimony	T-Sb		<0.20	<0.20	mg/L	0.2	376875	d
Arsenic	T-As		<0.20	<0.20	mg/L	0.2	376875	d
Barium	T-Ba		0.338	0.338	mg/L	0.01	376875	d
Beryllium	T-Be		0.0776	0.0751	mg/L	0.005	376875	d
Boron	T-B		0.20	0.23	mg/L	0.1	376875	d
Cadmium	T-Cd		0.094	0.088	mg/L	0.01	376875	d
Chromium	T-Cr		0.222	0.218	mg/L	0.01	376875	d
Cobalt	T-Co		0.291	0.280	mg/L	0.01	376875	d
Copper	T-Cu		0.295	0.287	mg/L	0.01	376875	d
Iron	T-Fe		0.387	0.368	mg/L	0.03	376875	d
Lead	T-Pb		0.251	0.264	mg/L	0.05	376875	d
Manganese	T-Mn		0.485	0.479	mg/L	0.005	376875	d
Molybdenum	T-Mo		0.148	0.149	mg/L	0.03	376875	d
Nickel	T-Ni		0.076	0.078	mg/L	0.05	376875	d
Selenium	T-Se		<0.20	<0.20	mg/L	0.2	376875	d
Silver	T-Ag		0.059	0.063	mg/L	0.01	376875	d
Strontium	T-Sr		0.373	0.367	mg/L	0.005	376875	d
Thallium	T-Tl		<0.20	<0.20	mg/L	0.2	376875	d
Tin	T-Sn		0.902	0.890	mg/L	0.03	376875	d
Titanium	T-Ti		0.099	0.093	mg/L	0.01	376875	d
Vanadium	T-V		0.101	0.097	mg/L	0.03	376875	d
Zinc	T-Zn		0.151	0.148	mg/L	0.005	376875	d

Methods:
a = ICPMS
b = Electrode
c = Colourimetry
d = ICPOES

A Campbell Brothers Limited Company

File No. T9845

Appendix 1 - QUALITY CONTROL - Reference Materials

Water

	Result	Target	Units	DL	ALSQC#	Method
ERA Minerals, POO96506						
Physical Tests						
Total Dissolved Solids	239	236	mg/L	10	378131	a
SPEX Minerals, 19-45M, 19.-46M						
Dissolved Anions						
Chloride Cl	79.3	77.9	mg/L	0.5	376681	b
SPEX Minerals (10xD), 19-45M, 19-46M						
Dissolved Anions						
Chloride Cl	7.74	7.79	mg/L	0.5	376682	b
SPEX Minerals (2xC), 19-45M, 19-46M						
Dissolved Anions						
Chloride Cl	160	156	mg/L	0.5	376683	b

Methods:
a = Gravimetry
b = Colourimetry

A Campbell Brothers Limited Company

File No. T9845

Appendix 1 - QUALITY CONTROL - Blanks

Water

			Result	Target	Units	DL	ALSQC#	Method
Physical Tests								
Total Dissolved Solids			<10	<10	mg/L	10	378130	a
Dissolved Anions								
Chloride	Cl		<0.5	<0.5	mg/L	0.5	376680	b
Fluoride	F		<0.02	<0.02	mg/L	0.02	377036	c
Nutrients								
Ammonia Nitrogen		N	<0.02	<0.02	mg/L	0.02	376954	c
Nitrite/Nitrate Nitrogen		N	<0.005	<0.005	mg/L	0.005	376847	b
Dissolved Metals								
Aluminum	D-Al		<0.0010	<0.0010	mg/L	0.001	377630	d
Antimony	D-Sb		<0.00010	<0.00010	mg/L	0.0001	377630	d
Antimony	D-Sb		<0.00020	<0.00020	mg/L	0.0002	377631	e
Arsenic	D-As		<0.00010	<0.00010	mg/L	0.0001	377630	d
Arsenic	D-As		<0.00020	<0.00020	mg/L	0.0002	377631	e
Barium	D-Ba		<0.000050	<0.000050	mg/L	0.00005	377630	d
Beryllium	D-Be		<0.00050	<0.00050	mg/L	0.0005	377630	d
Bismuth	D-Bi		<0.00050	<0.00050	mg/L	0.0005	377630	d
Boron	D-B		<0.010	<0.010	mg/L	0.01	377630	d
Cadmium	D-Cd		<0.000050	<0.000050	mg/L	0.00005	377630	d
Calcium	D-Ca		<0.050	<0.050	mg/L	0.05	377630	f
Chromium	D-Cr		<0.00050	<0.00050	mg/L	0.0005	377630	d
Cobalt	D-Co		<0.00010	<0.00010	mg/L	0.0001	377630	d
Copper	D-Cu		<0.00010	<0.00010	mg/L	0.0001	377630	d
Iron	D-Fe		<0.030	<0.030	mg/L	0.03	377630	f
Lead	D-Pb		<0.000050	<0.000050	mg/L	0.00005	377630	d
Lithium	D-Li		<0.0050	<0.0050	mg/L	0.005	377630	d
Magnesium	D-Mg		<0.10	<0.10	mg/L	0.1	377630	f
Manganese	D-Mn		<0.000050	<0.000050	mg/L	0.00005	377630	d
Mercury	D-Hg		<0.000050	<0.000050	mg/L	0.00005	377630	g
Molybdenum	D-Mo		<0.000050	<0.000050	mg/L	0.00005	377630	d
Nickel	D-Ni		<0.00050	<0.00050	mg/L	0.0005	377630	d
Phosphorus	D-P		<0.30	<0.30	mg/L	0.3	377630	f
Potassium	D-K		<2.0	<2.0	mg/L	2	377630	f
Selenium	D-Se		<0.0010	<0.0010	mg/L	0.001	377630	d
Selenium	D-Se		<0.00050	<0.00050	mg/L	0.0005	377631	e
Silicon	D-Si		<0.050	<0.050	mg/L	0.05	377630	f

Methods:
a = Gravimetry
b = Colourimetry
c = Electrode
d = ICPMS
e = HVAAS
f = ICPOES
g = WM_D_BrCl_CVAFS

A Campbell Brothers Limited Company

File No. T9845

Appendix 1 - QUALITY CONTROL - Blanks

Water

		Result	Target	Units	DL	ALSQC#	Method
Dissolved Metals							
Silver	D-Ag	<0.000010	<0.000010	mg/L	0.00001	377630	a
Sodium	D-Na	<2.0	<2.0	mg/L	2	377630	b
Strontium	D-Sr	<0.00010	<0.00010	mg/L	0.0001	377630	a
Thallium	D-Tl	<0.00010	<0.00010	mg/L	0.0001	377630	a
Tin	D-Sn	<0.00010	<0.00010	mg/L	0.0001	377630	a
Titanium	D-Ti	<0.010	<0.010	mg/L	0.01	377630	b
Uranium	D-U	<0.000010	<0.000010	mg/L	0.00001	377630	a
Vanadium	D-V	<0.0010	<0.0010	mg/L	0.001	377630	a
Zinc	D-Zn	<0.0010	<0.0010	mg/L	0.001	377630	a

Methods:
a = ICPMS
b = ICPOES

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Appendix 2 - METHODOLOGY

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

Solids in Water

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total dissolved solids (TDS) and total suspended solids (TSS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius, TSS is determined by drying the filter at 104 degrees celsius. Total solids are determined by evaporating a sample to dryness at 104 degrees celsius. Fixed and volatile solids are determined by igniting a dried sample residue at 550 degrees celsius.

Recommended Holding Time:
Sample: 7 days
Reference: APHA
For more detail see ALS Environmental "Collection & Sampling Guide"

Chloride in Water

This analysis is carried out using procedures adapted from APHA Method 4500 "Chloride". Chloride is determined using the ferricyanide colourimetric method.

Recommended Holding Time:
Sample: 28 days
Reference: APHA
For more detail see ALS Environmental "Collection & Sampling Guide"

Fluoride in Water

This analysis is carried out using procedures adapted from APHA Method 4500-F "Fluoride". Fluoride is determined using a selective ion electrode.

Recommended Holding Time:
Sample: 28 days
Reference: APHA
For more detail see ALS Environmental "Collection & Sampling Guide"

Ammonia in Water by Selective Ion Electrode

This analysis is carried out, on sulphuric acid preserved samples, using procedures adapted from APHA Method 4500-NH3 "Nitrogen (Ammonia)". Ammonia is determined using an ammonia selective electrode.

Recommended Holding Time:
Sample: 28 days
Reference: APHA

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Appendix 2 - METHODOLOGY - Continued

For more detail see ALS Environmental "Collection & Sampling Guide"

Nitrate and Nitrite in Water by Colourimetry

This analysis is carried out using procedures adapted from APHA Method 4500-NO2 "Nitrogen (Nitrite)" and Method 4500-NO3 "Nitrogen (Nitrate)". Nitrite is determined using the azo dye colourimetric method. Nitrate is determined using the cadmium reduction colourimetric method. Nitrate/nitrite is the sum of the concentrations of nitrate and nitrite present in the sample.

Recommended Holding Time:
Sample: 2 days
Reference: APHA and EPA
For more detail see ALS Environmental "Collection & Sampling Guide"

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
For more detail see:	ALS "Collection & Sampling Guide"

Mercury 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 procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic absorption and/or fluorescence spectrophotometry (EPA Method 7470A/7471A/245.7).

Recommended Holding Time:

Sample:	28 days
Reference:	EPA

For more detail see ALS Environmental "Collection & Sampling Guide"

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Appendix 2 - METHODOLOGY - Continued

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

This Chemical Analysis Report shall only be reproduced in full, except with the written approval of ALS Environmental.

End of Report

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ALS Environmental

CHEMICAL ANALYSIS REPORT

Date:	March 9, 2004
ALS File No.	U1045 - Week 1
Report On:	Release 1432 Water Analysis
Report To:	**Canadian Environmental and** Metallurgical Inc. 1636 West 75th Avenue Vancouver, BC V6P 6G2
Attention:	**Mr. Sohan Basra**
Received:	February 27, 2004

ALS ENVIRONMENTAL
per:

Leanne Harris, B.Sc. - Project Chemist
Joanne Patrick, B.Sc. - Project Chemist

ALS CANADA LTD.
1988 Triumph Street, Vancouver, BC Canada V5L 1K5
Phone: 604-253-4188 Fax: 604-253-5700 Website: www.alsenviro.com