



African Mineral Standards

MATRIX REFERENCE MATERIALS

Tel: +27 11 923 0800, Fax: +27 11 392 4715, web: www.amis.co.za, D1 Isando Business Park,
11 Gewel St (off Hulley Rd), Kempton Park, Johannesburg 1609. P.O. Box 856,
Isando, 1600, South Africa, a division of the Set Point Group

AMIS0274

Certified Reference Material

**Gold, silver, epithermal vein ore (high grade),
Palmarejo, Mexico**

Certificate of Analysis

Recommended Concentrations and Limits¹ (at two Standard Deviations)

Certified Concentrations²

Ag M/ICP	323	±	24	g/t
Ag P	315	±	18	g/t
Cu M/ICP	1097	±	52	ppm
Cu P	1102	±	98	ppm
Pb M/ICP	2215	±	212	ppm
Pb P	2228	±	200	ppm
Zn M/ICP	3599	±	204	ppm
Zn P	3444	±	325	ppm
Specific Gravity	2.76	±	0.06	

Provisional Concentrations

Au Pb Collection 3.31 ± 0.44 g/t

1. Manufacturers recommended limits for use of the material as control samples, based on two standard deviations, calculated using "Between Laboratory" statistics for treatment of the data for trivial, non-trivial and technically invalid results. See sections 1, 9 and 12.
2. There is additional certified major element data presented on p2 and uncertified trace element data presented as an appendix.

Major Element Recommended Concentrations and Limits (at two Standard Deviations)

Certified Concentrations

Al ₂ O ₃	8.65	±	0.18	%
CaO	4.42	±	0.10	%
Cr ₂ O ₃	0.030	±	0.004	%
Fe ₂ O ₃	4.59	±	0.06	%
K ₂ O	3.70	±	0.12	%
MgO	1.57	±	0.04	%
MnO	0.56	±	0.02	%
SiO ₂	67.26	±	0.46	%
TiO ₂	0.49	±	0.02	%
S Combustion / LECO	1.97	±	0.06	%

Provisional Concentrations

Na₂O 0.40 ± 0.10 %

Informational mean

LOI 5.59 %

1. Intended Use: AMIS0274 can be used to check analysis of samples of fissure hosted, low-sulphidation, epithermal gold-silver quartz vein ores, with a similar grade and matrix.

It is a matrix matched Certified Reference Material, fit for use as control samples in routine assay laboratory quality control when inserted within runs of samples and measured in parallel to the unknown. Its purpose is to monitor inter-laboratory or instrument bias and within lab precision. It can be used, indirectly, to establish the traceability of results to an SI system of units.

The recommended concentrations and limits for this material are property values based on a measurement campaign (round robin) and reflect consensus results from the laboratories that participated in the round robin.

Slight variations in analytical procedures between laboratories will reflect as slight biases to the recommended concentrations (see Section 19). Good laboratories will report results within the two standard deviation levels with a failure rate of <10 %.

The material can also be used for method development and for the calibration of equipment.

2. Origin of Material: AMIS0274 is a commissioned CRM made from material supplied by SGS Minerals Services from the Palmajero Mine. Palmajero is wholly owned by Coeur d'Alene Mines Corporation. The mine is located about 420 kilometers by road southwest of the city of Chihuahua in the state of Chihuahua in northern Mexico and on the western edge of the Sierra Madre Occidental in the Témoris mining district.

The Palmarejo area ore bodies are hosted in northwest trending structures that cut through a late Cretaceous-Paleocene volcano-sedimentary sequence comprising ash-rich mudstones, sandstones, basalt and andesite. The material supplied was described as "ley alta" – high grade.

3. Mineral and Chemical Composition: The economic silver-gold mineralization is hosted in epithermal, intermediate-sulfidation, quartz-carbonate tectonic-hydrothermal breccia veins and quartz-stockworks, with strong vertical zoning. Precious and base-metal mineral assemblages are dominated by fine-grained pyrite, argentite (acanthite), sphalerite, galena, and electrum. Silver occurs as argentite, electrum and as native silver. Gold is present as native gold and electrum.

4. Appearance: The material is a very fine powder. It is colored Medium light Grey (Corstor 10Y 6/2).

5. Handling instructions: The material is packaged in Laboratory Packs and Explorer Packs that must be shaken or otherwise agitated before use. Normal safety precautions for handling fine particulate matter are suggested, such as the use of safety glasses, breathing protection, gloves and a laboratory coat.

6. Method of Preparation: The ore is crushed, then dry-milled and air classified to 100% <54 μ . This fine powder is mixed in a blender for 14 hours and then split down into numbered 1 kg tubs. These lots are sampled for quality control and for round robin analysis. Quality control will typically comprise sampling 30 tubs selected from the whole stream. Round robin samples are selected the same way, so that one laboratory will receive samples from the beginning, end, and from throughout the batch.

7. Methods of Analysis requested:

1. Au – Pb collection, ICP-OES or ICP-MS.
2. Multi-acid digest multi-element scan - (to include Ag, Cu, Pb, Zn) ICP-OES or ICP-MS.
3. Aqua regia digest multi-element scan - (to include Ag, Cu, Pb, Zn) ICP-OES or ICP-MS.
4. Majors (Al₂O₃, CaO, Cr₂O₃, Fe₂O₃, K₂O, MgO, MnO, Na₂O, SiO₂, TiO₂, LOI) XRF fusion.
5. SG Gas pycnometer.

8. Information requested:

1. State aliquots used for all determinations.
2. Report all results for gold in ppm.
3. All results for major elements to be reported as oxides in percentages.
4. All results for multi-element scans to be reported in ppm.
5. Report all QC data, to include replicates, blanks and certified reference materials used.
6. State and provide brief description of analytical techniques used.

9. Method of Certification: Twenty four laboratories were each given eight randomly selected packages of sample. Eighteen of the laboratories submitted results.

Final limits were calculated after first determining if all data was compatible within a spread normally expected for similar analytical methods done by reputable laboratories. Data from any one laboratory was then removed from further calculations when the mean of all analyses from that laboratory failed a “t test” of the global means of the other laboratories. The means and standard deviations were then re-calculated using all remaining data. Any analysis that fell outside of the new two standard deviations was removed from the ensuing data base. The mean and standard deviations were again calculated using the remaining data.

The “between-laboratory” standard deviation is used in the calculation to eliminate technically and statistically invalid data. Upper and lower limits are based on the standard deviation of the remaining data, which reflect individual analyses and can be used to monitor accuracy in routine laboratory quality control. This is different to limits based on standard deviations derived from grouped set of analyses (see 12), which provide important measures for precision and trueness, but which are less useful for routine QC.

Standards with an RSD of near or less than 5 % are termed “Certified”, RSD’s of between near 5 % and 15 % are termed “Provisional”, and RSD’s over 15 % are termed “Informational”.

10. Participating Laboratories: The 18 out of 24 laboratories that provided results timeously were(not in same order as in the table of assays):

1. Activation Laboratories Pty Ltd (ActLabs) CA
2. ALS Chemex Laboratory Group Johannesburg SA
3. ALS Chemex Laboratory Group Perth WA
4. Bureau Veritas (Namibia)
5. Genalysis Laboratory Services (W Australia P)
6. Intertek Utama Services (Indonesia)
7. OMAC Laboratories Limited (Ireland)
8. Set Point Laboratories (Isando) SA
9. SGS Australia Pty Ltd (Newburn) WA
10. SGS Chelopech (Bulgaria)
11. SGS Durango (Mexico)
12. SGS Geosol Laboratories Ltda (Brazil)
13. SGS Mineral Services Callao (Peru)
14. SGS Mineral Services Lakefield (Canada)
15. SGS South Africa (Pty) Ltd - Booyens JHB
16. SGS Toronto (Canada)
17. SGS Townsville (Australia)
18. Ultra Trace (Pty) Ltd WA

11. Assay Data: Data as received from the laboratories for the important certified elements listed on p1 and 2 are set out below. A proficiency report has been sent to the managers of the participating laboratories. Additional digital data from this round robin is available on request.

Assay data - Economic elements

Lab Code	Au Pb Coll g/t	Ag M/ICP g/t	Ag P g/t	Cu M/ICP ppm	Cu P ppm	Pb M/ICP ppm	Pb P ppm	Zn M/ICP ppm	Zn P ppm
A					1120.00		2260		3720
A					1120.00		2270		3720
A					1110.00		2270		3710
A					1150.00		2270		3700
A					1130.00		2310		3790
A					1120.00		2290		3710
A					1110.00		2250		3700
A					1130.00		2290		3710
B	3.65		310.0	1097	1150.00	2327	2134	3847	3358
B	3.65		308.0	1052	1103.00	2329	2078	3629	3387
B	3.64		297.0	1050	1069.00	2387	2070	3900	3314
B	3.60		303.0	1084	1099.00	2366	2086	3914	3362
B	3.53		308.0	1008	1109.00	2265	2088	3652	3322
B	3.35		293.0	1051	1096.00	2313	1999	3716	3140
B	3.57		326.0	1056	1168.00	2263	2220	3596	3479
B	3.61		303.0	1070	1124.00	2239	2036	3545	3198
C	3.03		320.0	1080	1090.00	2170		3500	3490
C	3.07		320.0	1050	1110.00	2090		3430	3600
C	3.09		320.0	1090	1090.00	2140		3450	3580
C	2.93		310.0	1110	1060.00	2210		3590	3490
C	3.06		320.0	1070	1090.00	2130		3470	3530
C	3.06		320.0	1060	1080.00	2080		3430	3570
C	3.16		310.0	1070	1070.00	2150		3530	3520
C	3.15		310.0	1030	1110.00	2090		3390	3530
D	3.39		325.0	1170		2070		3850	
D	3.02		313.0	1090		2150		3580	
D	3.44		322.0	1110		1920		3660	
D	3.48		304.0	1110		1940		3600	
D	3.54		318.0	1110		1960		3570	
D	3.19		321.0	1140		2010		3720	
D	3.24		310.0	1090		1990		3610	
D	3.66		325.0	1150		2120		3820	
E	3.01	351.0		1120	1100.00	2360	2290	3660	3450
E	3.00	347.0		1110	1110.00	2270	2270	3680	3490
E	3.03	342.0		1120	1140.00	2220	2300	3640	3540
E	3.08	354.0		1120	1110.00	2300	2280	3630	3520
E	3.19	345.0		1120	1080.00	2280	2280	3550	3420
E	2.83	351.0		1120	1110.00	2240	2260	3570	3480
E	3.16	346.0		1120	1110.00	2230	2360	3660	3430
E	2.94	348.0		1130	1100.00	2380	2310	3570	3470

Assay data (cont)- Economic elements

Lab Code	Au Pb Coll g/t	Ag M/ICP g/t	Ag P g/t	Cu M/ICP ppm	Cu P ppm	Pb M/ICP ppm	Pb P ppm	Zn M/ICP ppm	Zn P ppm
F	3.35	311.0		935		2020		3030	
F	3.52	301.0		947		2080		3100	
F	3.46	297.0		937		2060		3050	
F	3.50	300.0		952		2050		3070	
F	3.48	258.0		1030		2100		3270	
F	3.58	310.0		1010		2090		3270	
F	3.42	306.0		959		2030		3100	
F	3.43	316.0		970		2110		3150	
J	3.25	321.0	303.0	1130	1140.00	2290	2140	3820	3550
J	3.47	322.0	305.0	1110	1160.00	2300	2190	3750	3600
J	3.01	324.0	299.0	1140	1190.00	2340	2250	3860	3750
J	3.50	319.0	303.0	1080	1140.00	2210	2160	3620	3610
J	3.43	327.0	281.0	1100	1170.00	2260	2200	3730	3650
J	3.48	324.0	299.0	1110	1170.00	2250	2330	3740	3830
J	3.59	320.0	311.0	1090	1210.00	2230	2280	3660	3870
J	3.62	326.0	301.0	1090	1170.00	2220	2210	3670	3700
L	3.58	307.0		1100	1130.00	2100		3640	
L	3.54	305.0		1100	1110.00	2190		3610	
L	2.87	313.0		1040	1100.00	2120		3430	
L	3.63	322.0		1160	1140.00	2190		3710	
L	3.59	329.0		1120	1120.00	2230		3670	
L	3.54	323.0		1090	1110.00	2210		3570	
L	3.33	321.0		1250	1120.00	2200		3590	
L	3.60	318.0		1130	1120.00	2170		3660	
M	3.41			1096	1095.72	2425	2276	3762	3470
M	3.65			1096	1053.19	2373	2224	3665	3395
M	3.57			1101	1096.10	2427	2299	3738	3505
M	3.50			1091	1096.82	2401	2237	3719	3443
M	3.46			1088	1096.52	2374	2281	3714	3492
M	3.62			1082	1104.45	2361	2303	3691	3481
M	3.62			1104	1082.33	2405	2247	3747	3465
M	3.46			1095	1096.73	2423	2292	3775	3493
N	3.15	311.0	55.0	1114	1140.00	2220	2180	3460	3460
N	3.14	320.0	53.0	1100	1130.00	2250	2110	3490	3420
N	3.18	314.0	56.0	1118	1180.00	2220	2250	3460	3450
N	3.16	327.0	59.0	1120	1160.00	2230	2120	3430	3320
N	3.12	322.0	56.0	1124	1180.00	2250	2150	3490	3380
N	3.18	317.0	56.0	1100	1140.00	2200	2200	3420	3430
N	3.14	319.0	57.0	1110	1180.00	2240	2210	3510	3290
N	3.12	319.0	50.0	1160	1160.00	2200	2160	3470	3340
O	3.36			1074	1025.00	2193	2144	3642	3331
O	3.36			1078	1033.00	2167	2185	3625	3361
O	3.38			1062	1024.00	2162	2090	3594	3326
O	3.33			1063	1020.00	2267	2067	3603	3329
O	3.32			1094	1030.00	2179	2164	3643	3302
O	3.31			1076	1030.00	2173	2116	3592	3367
O	3.40			1059	1011.00	2131	2136	3583	3304
O	3.29			1083	1021.00	2154	2096	3641	3339
Q	3.59	320.0	317.0	1110	1000.00	2270	1980	3580	3160
Q	3.60	321.0	319.0	1110	1000.00	2260	1980	3560	3140
Q	3.59	322.0	316.0	1100	998.00	2290	1980	3610	3140
Q	3.57	323.0	318.0	1120	995.00	2280	1960	3600	3160
Q	3.58	323.0	307.0	1120	1010.00	2290	1940	3630	3180
Q	3.61	319.0	311.0	1110	1010.00	2290	1980	3580	3200
Q	3.57	319.0	319.0	1110	1020.00	2280	2030	3560	3180
Q	3.57	320.0	305.0	1110	1010.00	2290	1990	3600	3140
R	3.12			1071	1057.00	2111		3543	
R	3.11			1072	1060.00	2080		3568	
R	3.01			1080	1044.00	2092		3540	
R	3.01			1074	1038.00	2115		3558	
R	3.07			1077	1056.00	2082		3545	
R	3.12			1074	1045.00	2100		3533	
R	3.12			1084	1046.00	2089		3528	
R	3.21			1070	1057.00	2112		3543	
S	3.08		328.0	1050	1110.00	2170	2250	3600	3710
S	3.07		328.0	1070	1160.00	2200	2320	3600	3840
S	3.07		330.0	1010	1080.00	2100	2240	3610	3800
S	3.08		310.0	1050	1140.00	2320	2270	3860	3920
S	3.12		328.0	1100	1190.00	2270	2410	3860	4040
S	3.16		328.0	1080	1150.00	2230	2360	3790	3910
S	3.06		310.0	1130	1130.00	2300	2380	3890	3870
S	3.13		315.0	1010	1070.00	2250	2290	3760	3710
T	3.10		315.0						
T	2.95		320.0						
T	3.09		253.0						
T	3.20		330.0						
T	3.21		323.0						
T	3.15		319.0						
T	3.12		316.0						
T	3.34		312.0						

Assay data (cont)- Economic elements

Lab Code	Au Pb Coll g/t	Ag M/ICP g/t	Ag P g/t	Cu M/ICP ppm	Cu P ppm	Pb M/ICP ppm	Pb P ppm	Zn M/ICP ppm	Zn P ppm
U		328.0	322.0	1115	1139.60	2336	2396	3560	3465
U		323.0	328.0	1113	1140.20	2340	2422	3572	3437
U		327.0	324.0	1110	1174.10	2330	2445	3559	3615
U		331.0	332.0	1109	1173.80	2343	2445	3559	3580
U		323.0	327.0	1107	1164.30	2352	2395	3594	3416
U		326.0	330.0	1125	1150.30	2339	2426	3596	3549
U		322.0	323.0	1119	1155.60	2324	2409	3598	3668
U		327.0	323.0	1109	1160.30	2344	2424	3586	3518
W	3.13		280.0	1080	1000.00	2100	2080	3350	3060
W	3.31		280.0	1140	1080.00	2140	2150	3500	3280
W	3.11		290.0	1090	1080.00	2090	2080	3420	3270
W	3.17		300.0	1120	1080.00	2110	2130	3460	3250
W	3.16		300.0	1080	1100.00	2050	2150	3390	3360
W	3.31		290.0	1080	1110.00	2060	2160	3330	3430
W	3.23		280.0	1110	1110.00	2170	2110	3470	3430
W	3.21		290.0	1130	1100.00	2170	2140	3540	3420
X			310.0						
X			320.0						
X			310.0						
X			310.0						
X			310.0						
X			310.0						
X			310.0						
X			315.0						

Assay data (cont) – Major Oxides

Lab Code	Al2O3 XRF %	CaO XRF %	Cr2O3 XRF %	Fe2O3 XRF %	K2O XRF %	MgO XRF %	MnO XRF %	Na2O XRF %	SiO2 XRF %	TiO2 XRF %	LOI XRF %	S Comb/LECO %	SG pycnometer
C												1.98	
C												1.98	
C												1.97	
C												2.00	
C												1.99	
C												1.98	
C												1.99	
C												1.99	
D												1.93	2.78
D												1.96	2.78
D												1.95	2.78
D												1.95	2.78
D												1.95	2.80
D												1.95	2.80
D												1.97	2.79
D												1.97	2.78
E	8.70	4.45	0.03	4.58	3.72	1.56	0.56		67.12	0.49	6.44		2.82
E	8.74	4.45	0.03	4.59	3.71	1.58	0.56		67.16	0.49	6.36		2.83
E	8.72	4.45	0.03	4.59	3.71	1.57	0.56		67.15	0.49	6.44		2.80
E	8.69	4.43	0.03	4.58	3.71	1.56	0.56		67.10	0.49	6.36		2.82
E	8.73	4.44	0.03	4.60	3.72	1.57	0.56		67.13	0.49	6.34		2.86
E	8.73	4.44	0.03	4.58	3.71	1.58	0.56		67.10	0.49	6.36		2.85
E	8.73	4.45	0.03	4.60	3.72	1.57	0.56		67.20	0.49	6.42		2.81
E	8.74	4.43	0.03	4.57	3.69	1.58	0.56		67.14	0.49	6.36		2.80
F	8.52	4.33	0.03	4.56	3.62	1.59	0.56	0.04	67.29	0.51	7.59		2.79
F	8.44	4.37	0.02	4.58	3.60	1.55	0.57	0.05	67.43	0.05	7.64		2.76
F	8.63	4.45	0.03	4.61	3.63	1.56	0.58	0.03	67.19	0.50	7.61		2.77
F	8.44	4.42	0.04	4.57	3.60	1.55	0.57	0.05	67.16	0.51	7.63		2.79
F	8.49	4.42	0.03	4.60	3.63	1.51	0.57	0.03	67.60	0.49	7.56		2.80
F	8.65	4.39	0.01	4.58	3.62	1.63	0.57	0.02	67.56	0.49	7.55		2.76
F	8.59	4.41	0.03	4.59	3.61	1.51	0.57	0.02	67.39	0.50	7.52		2.73
F	8.63	4.41	0.04	4.62	3.65	1.57	0.57	0.02	67.48	0.50	7.62		2.77
J	8.49	4.22	0.03	4.47	3.60	1.54	0.55	0.34	65.60	0.47	4.68		2.52
J	8.53	4.24	0.03	4.46	3.61	1.56	0.56	0.35	65.70	0.48	4.50		2.53
J	8.50	4.21	0.03	4.42	3.60	1.54	0.55	0.34	65.40	0.47	4.89		2.53
J	8.47	4.21	0.03	4.44	3.59	1.54	0.55	0.34	65.30	0.47	5.11		2.53
J	8.50	4.22	0.03	4.43	3.61	1.55	0.55	0.35	65.60	0.47	4.70		2.55
J	8.47	4.20	0.03	4.41	3.59	1.54	0.55	0.33	65.40	0.47	5.08		2.55
J	8.52	4.23	0.03	4.43	3.62	1.56	0.55	0.34	65.70	0.47	4.58		2.51
J	8.50	4.21	0.03	4.43	3.62	1.54	0.55	0.34	65.60	0.47	4.78		2.53
L												1.94	2.72
L												1.96	2.72
L												1.94	2.71
L												1.98	2.70
L												1.94	2.70
L												1.93	2.69
L												1.91	2.68
L												1.96	2.67
M	8.53	4.35	0.03	4.43	3.66	1.55	0.56	0.38	66.86	0.48	6.98	2.06	
M	8.81	4.36	0.03	4.45	3.64	1.59	0.55	0.36	68.23	0.52	6.97	2.07	
M	8.50	4.34	0.03	4.48	3.65	1.55	0.55	0.37	67.09	0.47	7.08	2.07	
M	8.54	4.34	0.03	4.43	3.65	1.55	0.55	0.31	66.94	0.48	7.00	2.02	
M	8.55	4.37	0.03	4.40	3.68	1.55	0.56	0.32	67.56	0.48	6.92	2.05	
M	8.52	4.38	0.03	4.47	3.67	1.55	0.56	0.32	67.18	0.48	6.72	2.10	
M	8.63	4.34	0.03	4.40	3.68	1.56	0.55	0.30	67.08	0.49	6.88	2.07	
M	8.58	4.36	0.03	4.38	3.66	1.56	0.55	0.34	67.06	0.48	6.81	2.07	

Assay data (cont) – Major Oxides

Lab Code	Al2O3 XRF %	CaO XRF %	Cr2O3 XRF %	Fe2O3 XRF %	K2O XRF %	MgO XRF %	MnO XRF %	Na2O XRF %	SiO2 XRF %	TiO2 XRF %	LOI XRF %	S Comb/LECO %	SG pycnometer
N	8.71	4.50	0.03	4.53	3.82	1.59	0.56	0.42	67.60	0.50			
N	8.69	4.52	0.03	4.63	3.82	1.62	0.57	0.39	67.80	0.51			
N	8.73	4.49	0.03	4.60	3.82	1.61	0.57	0.42	67.80	0.51			
N	8.79	4.46	0.03	4.52	3.80	1.58	0.56	0.42	67.60	0.51			
N	8.79	4.50	0.03	4.68	3.81	1.56	0.58	0.39	68.90	0.51			
N	8.64	4.46	0.03	4.59	3.81	1.62	0.58	0.40	68.40	0.51			
N	8.71	4.50	0.03	4.60	3.81	1.58	0.59	0.39	68.40	0.53			
N	8.67	4.49	0.03	4.60	3.81	1.62	0.58	0.42	67.60	0.52			
O	8.64	4.40	0.03	4.63	3.73	1.57	0.56	0.39	67.36	0.49	4.60		2.71
O	8.68	4.40	0.03	4.61	3.73	1.56	0.56	0.38	67.37	0.49	4.65		2.76
O	8.71	4.40	0.03	4.61	3.72	1.56	0.56	0.39	67.29	0.50	5.02		2.76
O	8.64	4.38	0.03	4.63	3.72	1.57	0.56	0.38	67.33	0.49	4.98		2.78
O	8.69	4.40	0.03	4.63	3.71	1.57	0.57	0.38	67.44	0.49	4.78		2.77
O	8.66	4.41	0.03	4.62	3.70	1.56	0.57	0.38	67.40	0.49	4.73		2.72
O	8.71	4.39	0.03	4.63	3.71	1.57	0.56	0.39	67.22	0.48	4.93		2.77
O	8.70	4.39	0.03	4.61	3.71	1.56	0.56	0.38	67.32	0.49	4.82		2.74
Q	8.73	4.48	0.04	4.53	3.68	1.86	0.56	0.45	67.19	0.48	6.60		
Q	8.82	4.52	0.04	4.58	3.71	1.88	0.57	0.46	67.53	0.49	6.70		
Q	8.74	4.49	0.02	4.53	3.69	1.86	0.56	0.45	67.39	0.48	6.80		
Q	8.78	4.51	0.05	4.54	3.70	1.86	0.56	0.45	67.56	0.48	6.60		
Q	8.80	4.52	0.03	4.55	3.70	1.90	0.56	0.44	67.52	0.48	6.70		
Q	8.77	4.47	0.03	4.52	3.69	1.83	0.56	0.44	67.25	0.48	6.80		
Q	8.76	4.47	0.02	4.54	3.69	1.84	0.56	0.45	67.28	0.49	6.60		
Q	8.76	4.47	0.03	4.55	3.69	1.85	0.56	0.43	67.25	0.48	6.70		
R	8.59	4.51	0.03	4.57	3.78	1.60	0.62	0.45	67.10	0.50	5.37	2.00	2.76
R	8.59	4.50	0.03	4.57	3.79	1.61	0.62	0.46	67.10	0.49	5.18	2.00	2.75
R	8.43	4.38	0.03	4.54	3.77	1.58	0.60	0.45	67.20	0.48	5.41	2.00	2.76
R	8.59	4.51	0.03	4.55	3.76	1.60	0.62	0.45	67.30	0.49	5.47	2.00	2.74
R	8.52	4.46	0.03	4.56	3.77	1.58	0.61	0.45	67.10	0.49	5.44	2.01	2.76
R	8.62	4.46	0.03	4.55	3.77	1.59	0.61	0.45	67.20	0.49	5.42	2.00	2.75
R	8.61	4.51	0.03	4.57	3.76	1.60	0.61	0.45	67.20	0.49	5.41	1.99	2.76
R	8.60	4.50	0.03	4.59	3.77	1.61	0.62	0.45	67.00	0.49	5.65	1.99	2.77
S	8.60	4.38	0.03	4.60	3.70	1.57	0.57	0.39	67.20	0.49	3.67	1.83	
S	8.67	4.40	0.03	4.61	3.70	1.56	0.57	0.39	67.20	0.49	3.52	1.81	
S	8.58	4.41	0.03	4.63	3.70	1.54	0.57	0.39	67.00	0.49	3.64	1.89	
S	8.59	4.39	0.03	4.62	3.68	1.56	0.57	0.39	67.20	0.49	3.69	1.88	
S	8.62	4.38	0.03	4.62	3.70	1.56	0.57	0.37	67.10	0.49	3.52	1.91	
S	8.61	4.38	0.03	4.62	3.70	1.55	0.57	0.39	67.00	0.49	3.59	1.99	
S	8.64	4.40	0.03	4.59	3.70	1.55	0.57	0.39	67.20	0.49	3.49	1.88	
S	8.63	4.40	0.03	4.63	3.69	1.55	0.57	0.40	67.10	0.48	3.47	1.84	
T	8.72	4.40	0.03	4.63	3.72	1.57	0.56	0.49	67.90	0.49	4.90	1.95	
T	8.57	4.38	0.03	4.74	3.72	1.64	0.56	0.50	66.50	0.49	4.94	1.96	
T	8.60	4.36	0.03	4.60	3.72	1.56	0.55	0.49	66.60	0.48	4.92	1.96	
T	8.71	4.44	0.02	4.65	3.70	1.55	0.54	0.51	67.70	0.49	5.30	1.94	
T	8.65	4.39	0.02	4.63	3.70	1.55	0.55	0.47	67.10	0.48	5.32	1.95	
T	8.59	4.40	0.03	4.63	3.69	1.57	0.56	0.49	67.00	0.49	4.92	1.94	
T	8.60	4.39	0.02	4.62	3.69	1.57	0.56	0.50	67.10	0.48	4.84	1.95	
T	8.65	4.37	0.02	4.61	3.71	1.56	0.57	0.50	67.00	0.48	5.38	1.95	
W	8.79	4.33	0.03	4.48	3.55	1.61	0.55	0.38	67.20	0.48	4.85	2.00	2.73
W	8.59	4.32	0.03	4.46	3.57	1.58	0.56	0.37	67.20	0.48	4.65	1.99	2.73
W	8.68	4.38	0.03	4.53	3.67	1.59	0.56	0.38	67.20	0.49	4.58	2.02	2.73
W	8.60	4.42	0.03	4.59	3.65	1.55	0.56	0.38	67.30	0.50	4.54	2.00	2.76
W	8.71	4.44	0.03	4.55	3.65	1.59	0.56	0.40	67.30	0.49	4.20	2.04	2.75
W	8.71	4.50	0.03	4.61	3.73	1.61	0.58	0.40	67.20	0.50	4.44	2.04	2.81
W	8.80	4.42	0.03	4.56	3.74	1.59	0.56	0.38	67.30	0.49	4.86	2.03	2.73
W	8.70	4.34	0.03	4.49	3.57	1.61	0.55	0.37	67.50	0.49	4.75	2.04	2.76
X												2.00	
X												1.92	
X												1.94	
X												1.95	
X												1.94	
X												1.92	
X												1.94	
X												1.95	

12. Measurement of Uncertainty: The samples used in this certification process have been selected in such a way as to represent the entire batch of material and were taken from the final packaged units; therefore all possible sources of uncertainty (sample uncertainty and measurement uncertainty) are included in the final combined standard uncertainty determination.

The uncertainty measurement takes into consideration the between lab and the within lab variances and is calculated from the square roots of the variances of these components using the formula:

$$\text{Combined standard uncertainty} = \sqrt{(\text{between lab. var}/\text{no of labs}) + (\text{mean square within lab. var}/\text{no of assays})}$$

These uncertainty measurements may be used, by laboratories, as a component for calculating the total uncertainty for method validation according to the relevant ISO guidelines.

Analyte	Method	Unit	S ¹	σ_L ²	Sw ³	CSU ⁴
Au	Pb Coll	g/t	0.220	0.139	0.119	0.037
Ag	M/ICP	g/t	12.114	12.439	4.911	4.749
Ag	P	g/t	9.223	6.435	6.469	2.280
Cu	M/ICP	ppm	26.153	13.486	19.279	4.058
Cu	P	ppm	49.106	34.106	21.238	9.340
Pb	M/ICP	ppm	105.909	72.081	42.551	19.023
Pb	P	ppm	100.365	83.064	43.618	26.733
Zn	M/ICP	ppm	102.164	61.238	61.735	17.450
Zn	P	ppm	162.376	131.506	60.987	40.198
Al ₂ O ₃	XRF	%	0.092	0.066	0.052	0.021
CaO	XRF	%	0.055	0.042	0.031	0.014
Cr ₂ O ₃	XRF	%	0.002	0.000	0.002	0.000
Fe ₂ O ₃	XRF	%	0.033	0.025	0.021	0.009
K ₂ O	XRF	%	0.062	0.051	0.022	0.016
LOI	XRF	%	1.206	1.121	0.149	0.355
MgO	XRF	%	0.022	0.015	0.014	0.005
MnO	XRF	%	0.008	0.006	0.005	0.002
Na ₂ O	XRF	%	0.049	0.046	0.013	0.015
SiO ₂	XRF	%	0.228	0.125	0.181	0.045
TiO ₂	XRF	%	0.012	0.008	0.007	0.003
S	Comb/LECO	%	0.028	0.026	0.016	0.010
SG	pycnometer		0.034	0.031	0.019	0.012

1. S - Std Dev for use on control charts.
2. σ_L - Betw Lab Std Dev, for use to calculate a measure of accuracy.
3. Sw - Within Lab Stc Dev, for use to calculate a measure of precision.
4. CSU - Combined Standard Uncertainty, a component for use to calculate the total uncertainty in method validation.

13. Certified values: The Certified, Provisional and Indicated values listed on p1 of each certificate fulfill the AMIS statistical criteria regarding agreement for certification and have been independently validated by Dr Barry Smees, BSc, PhD, P.Geo, (B.C.)."

14. Metrological Traceability: The values quoted herein are based on the consensus values derived from statistical analysis of the data from an inter laboratory measurement program. Traceability to SI units is via the standards used by the individual laboratories the majority of which are accredited and who have maintained measurement traceability during the analytical process.

15. Certification: AMIS0274 is a new material.

16. Period of validity: The certified values are valid for this product, while still sealed in its original packaging, until notification to the contrary. The stability of the material will be subject to continuous testing for the duration of the inventory. Should product stability become an issue, all customers will be notified and notification to that effect will be placed on the www.amis.co.za website.

17. Minimum sample size: The majority of laboratories reporting used a 0.5g sample size for the ICP and a 30g sample size for the fire assay. These are the recommended minimum sample sizes for the use of this material.

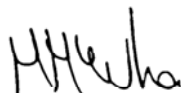
18. Availability: This product is available in Laboratory Packs containing 1kg of material and Explorer Packs containing custom weights (from 50 to 250g) of material. The Laboratory Packs are sealed bottles delivered in sealed foil pouches. The Explorer Packs contain material in standard geochem envelopes, nitrogen flushed and vacuum sealed in foil pouches.

19. Recommended use: The data used to characterize this CRM has been scrutinized using outlier treatment techniques. This, together with the number of participating laboratories, should overcome any "inter-laboratory issues" and should lead to a very accurate measure for the given methods, notwithstanding the underlying assumption that what the good inter-laboratory labs reported was accurate. However an amount of bad data might have had an effect, resulting in limits which in some situations might be too broad for the effective monitoring of a single analytical method, laboratory or production process. Users should set their own limits based on their own data quality objectives and control measurements, after determining the performance characteristics of their own particular method, using a minimum of 20 analyses using this CRM. User set limits should normally be within the limits recommended on p1 and 2 of this certificate.

20. Legal Notice: This certificate and the reference material described in it have been prepared with due care and attention. However AMIS, Set Point Technology (Pty) Ltd, Mike McWha, Dr Barry Smee and Smee and Associates Ltd; accept no liability for any decisions or actions taken following the use of the reference material.

02 July 2012

Certifying Officers:



African Mineral Standards: _____

Mike McWha
BSc (Hons), FGSSA, MAusIMM, Pr.Sci.Nat



Geochemist: _____

Barry W. Smee
BSc, PhD, P.Geo, (B.C.)

Appendix – uncertified trace element statistics

Analyte	Method	Unit	Mean	RSD%	n
Al	M/ICP	%	4.50	5.01	97
As	M/ICP	ppm	137	9.05	96
Ba	M/ICP	ppm	1022	32.8	75
Be	M/ICP	ppm	1.01	13.3	73
Bi	M/ICP	ppm	2.26	42.7	68
Ca	M/ICP	%	3.12	3.21	98
Cd	M/ICP	ppm	27.7	7.02	90
Ce	M/ICP	ppm	27.1	8.98	66
Co	M/ICP	ppm	44.7	7.62	109
Cr	M/ICP	ppm	160	24.4	96
Cs	M/ICP	ppm	1.83	7.85	54
Dy	M/ICP	ppm	2.28	6.36	45
Er	M/ICP	ppm	1.23	12.51	47
Eu	M/ICP	ppm	0.80	9.59	45
Fe	M/ICP	%	3.17	2.84	105
Ga	M/ICP	ppm	10.3	8.19	76
Gd	M/ICP	ppm	2.81	7.67	45
Ge	M/ICP	ppm	1.12	123	24
Hf	M/ICP	ppm	1.54	40.0	64
Ho	M/ICP	ppm	0.45	9.62	48
In	M/ICP	ppm	0.24	8.92	62
K	M/ICP	ppm	2.95	7.46	91
La	M/ICP	ppm	12.8	5.41	79
Li	M/ICP	ppm	38.5	14.1	86
Lu	M/ICP	ppm	0.17	13.3	49
Mg	M/ICP	%	0.94	5.60	96
Mn	M/ICP	ppm	4270	4.09	98
Mo	M/ICP	ppm	29.9	7.10	90
Na	M/ICP	%	0.28	8.16	90
Nb	M/ICP	ppm	4.08	34.9	75
Nd	M/ICP	ppm	14.3	5.24	43
Ni	M/ICP	ppm	40.7	8.31	104
P	M/ICP	ppm	779	6.32	77
Pr	M/ICP	ppm	3.38	5.50	45
Rb	M/ICP	ppm	99.0	8.38	68
Re	M/ICP	ppm	0.00	30.3	23
S	M/ICP	%	2.03	4.79	87
Sb	M/ICP	ppm	16.8	10.8	89
Sc	M/ICP	ppm	9.84	4.48	75
Se	M/ICP	ppm	2.43	22.0	40
Si	M/ICP	%	31.8	0.52	15
Sm	M/ICP	ppm	3.02	9.11	48
Sn	M/ICP	ppm	3.65	15.2	64
Sr	M/ICP	ppm	158	4.37	89
Ta	M/ICP	ppm	0.30	31.7	57
Tb	M/ICP	ppm	0.41	6.67	51
Te	M/ICP	ppm	1.85	26.2	61
Th	M/ICP	ppm	2.10	18.4	64
Ti	M/ICP	%	0.28	6.38	94
Tl	M/ICP	ppm	1.43	5.22	48
Tm	M/ICP	ppm	0.17	16.09	47
U	M/ICP	ppm	1.21	13.05	62
V	M/ICP	ppm	82.7	5.43	91
W	M/ICP	ppm	12.9	30.6	80
Y	M/ICP	ppm	11.4	7.90	91
Yb	M/ICP	ppm	1.07	11.5	55
Zr	M/ICP	ppm	61.4	37.7	94