



African Mineral Standards

MATRIX REFERENCE MATERIALS

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AMIS0270

Certified Reference Material

**Gold, silver, epithermal vein, final concentrate,
Guanajuato, Mexico**

Certificate of Analysis

**Recommended Concentrations and Limits¹
(at two Standard Deviations)**

Certified Concentrations²

Au Pb Collection	37.02	±	2.16	g/t
Ag M/ICP	6577	±	538	g/t
Cu M/ICP	8880	±	503	ppm
Cu P	8825	±	418	ppm
Pb M/ICP	1.147	±	0.077	%
Pb P	1.160	±	0.106	%
Zn M/ICP	1.170	±	0.041	%
Zn P	1.175	±	0.081	%
Specific Gravity	3.42	±	0.20	

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	3.03	±	0.12	%
CaO	2.17	±	0.06	%
Fe ₂ O ₃	31.74	±	0.72	%
K ₂ O	1.14	±	0.04	%
MgO	1.12	±	0.04	%
MnO	0.08	±	0.01	%
SiO ₂	30.56	±	0.54	%
TiO ₂	0.47	±	0.02	%
LOI	23.18	±	1.40	%
S Comb /LECO	25.74	±	1.12	%

Provisional Concentration

Cr ₂ O ₃	0.04	±	0.01	%
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1. Intended Use: AMIS0270 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: AMIS0270 is a commissioned CRM made from material supplied by SGS Minerals Services from the Guanajuato Mine Complex (GMC) located in Guanajuato State, Mexico. GMC is wholly owned by Great Panther Silver Limited through Minera Mexicana El Rosario, S.A. de C.V. The mine is located on the Central Plateau of Mexico. The City of Guanajuato, where the mines are located, is 380 km by road northwest of Mexico City. Mineralization occurs along regional scale faults, the largest of which is the 25 km long Veta Madre vein structure. The material supplied was described as "final concentrate".

3. Mineral and Chemical Composition: The economic mineralization is hosted in quartz-carbonate-adularia veins and stockwork systems with identifiable ore-shoots that carry the bulk of the economic mineralization. The ore shoots are discontinuous, 10-40m wide and typically equal in vertical dimensions to strike length. The argentiferous mineralization is hosted in quartz veins with gangue mineralogy of quartz, calcite, pyrite, adularia, and sericite. The principal Ag bearing mineralization is acanthite (argentite), aguilarite and naumannite while Au occurs a free Au and as

electrum. The Au to Ag ratios vary from about 1:70 to 1:200. Base metal mineralization is not common; when it occurs it is observed as chalcopyrite, sphalerite and galena.

4. **Appearance:** The material is a very fine powder. It is colored a Dark Grey (Corstor)

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. All results for major elements to be reported as oxides in percentages.
3. All results for multi-element scans to be reported in ppm.
4. Report all QC data, to include replicates, blanks and certified reference materials used.
5. 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. Twenty one 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 21 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. Bureau Veritas (USA)
6. BV (Canada)
7. Genalysis Laboratory Services (South Africa) Pty
8. Genalysis Laboratory Services (W Australia P)
9. Intertek Utama Services (Indonesia)
10. OMAC Laboratories Limited (Ireland)
11. SGS Australia Pty Ltd (Newburn) WA
12. SGS Chelopech (Bulgaria)
13. SGS Durango (Mexico)
14. SGS Geosol Laboratories Ltda (Brazil)
15. SGS Mineral Services Callao (Peru)
16. SGS Mineral Services Lakefield (Canada)
17. SGS Philippines, Inc. (Philippines)
18. SGS South Africa (Pty) Ltd - Booyens JHB
19. SGS Toronto (Canada)
20. SGS Vancouver
21. 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	36.53	6561		9199				12221	
A	35.80	6414		9165				12298	
A	35.74	6320		9025				12330	
A	35.22	6522		9160				12699	
A	35.63	6567		9151				12602	
A	36.56	6531		9045				12512	
A	35.40	6219		9031				12487	
A	35.44	6471		9203				12590	
B	37.00			8690					
B	36.20			8810					
B	38.00			8170					
B	36.90			8420					
B	36.90			8270					
B	37.90			8110					
B	37.00			8420					
B	33.40			8640					
D	37.70		6630	9300	9890	11700	11700	12300	12800
D	37.20		6760	9380	9620	11500	10100	11900	10900
D	38.60		6600	9110	9470	11500	11300	12000	12500
D	36.70		6650	9100	9460	11600	11200	12200	12400
D	38.20		6680	9330	9900	11300	11500	12000	12600
D	39.50		6490	9050	9630	11300	10500	11800	11700
D	38.30		6390	8980	9340	11000	11200	11500	11800
D	38.30		6480	9910	9910	12200	11500	12800	12300

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
E	32.76	6932		9076			11400	11700	11500
E	28.71	6959		8977			11200	11600	11700
E	36.20	6840		8942			11400	11700	11800
E	38.34	6520		9011			11300	12000	11900
E	34.23	6804		9140			11400	11900	12000
E	31.57	6879		9193			11200	11900	11700
E	34.38	6982		8688			11400	11700	11900
E	38.13	6665		8948			11500	11600	11500
F	36.40	6490		8628	8774				
F	37.50	6224		8551	8775				
F	37.20	6130		8697	8805				
F	36.30	6253		8676	8561				
F	37.10	6556		8379	8676				
F	38.90	6176		8687	8650				
F	35.50	6249		8509	8676				
F	36.60	6094		8371	8641				
G	38.70			8770		12000		11700	
G	38.10			8790		11900		11800	
G	35.50			8800		12000		11800	
G	36.60			8750		11900		11700	
G	38.70			8790		11900		11700	
G	37.00			8870		11900		11700	
G	36.50			8800		11900		11800	
G	38.00			8910		11900		11800	
H	38.70	6610		8730	8880	11050	11050	11550	12250
H	35.80	6600		8700	9050	11000	11300	11600	12450
H	36.10	6660		9030	9050	11400	11350	11950	12450
H	38.20	6720		8810	9040	11450	11250	11700	12450
H	37.10	6630		8690	9070	11000	11350	11650	12450
H	31.70	6700		8740	8790	11000	11100	11700	12100
H	38.30	6710		8630	8950	10900	11150	11550	12250
H	37.60	6630		8550	8500	10750	10650	11400	11700
I	37.65	6836		9268	8338	10800	12100	10700	11400
I	38.38	6932		9379	8159	11500	12500	11100	11400
I	33.98	6946		9200	8057	11500	12300	11300	11500
I	35.84	6741		9126	8378	11800	12500	11500	11700
I	38.45	7068		9185	8499	11900	12700	11900	11600
I	38.38	7029		9204	8718	11600	12500	11300	11400
I	37.61	7012		9175	8579	11500	12200	11500	11300
I	38.85	7042		9486	8539	11800	12600	11500	11700
J	36.42								
J	37.52								
J	35.52								
J	36.36								
J	36.80								
J	36.33								
J	37.28								
J	37.04								
L	35.64								
L	36.84								
L	36.80								
L	35.68								
L	35.60								
L	36.00								
L	35.92								
L	36.00								
M	37.70	6703							
M	37.10	6774							
M	36.30	6681							
M	36.00	6651							
M	36.50	6763							
M	36.40	6782							
M	37.80	6772							
M	38.30	6763							

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
N	39.68		731	8567	9149	9319			
N	38.65		831	8594	8850	9424			
N	38.89		791	8625	9652	9270			
N	39.53		804	8696	9010	9072			
N	38.87		797	8649	8995	9177			
N	39.18		803	8720	9025	9166			
N	39.36		783	8500	8983	9214			
N	39.08		669	8616	9093	9035			
P	37.10		6580	9340					
P	36.40		6500	9330					
P	36.70		6400	9330					
P	36.80		6550	9000					
P	36.00		6490	9150					
P	35.90		6510	8990					
P	36.70		6400	9480					
P	36.60		6480	9330					
Q					9400		12000		
Q					9900		12800		
Q					9100		11800		
Q					9600		12200		
Q					9200		11800		
Q					9200		11700		
Q					9400		12200		
Q					9500		12000		
R	36.28	6872	6794	8877	8795	11400		11700	
R	35.47	6789	6711	8787	8799	11300		11800	
R	36.81	6807	6783	8963	8849	11300		11900	
R	35.77	6811	6673	8800	8800	11300		11800	
R	36.28	6776	6786	8827	8879	11300		11800	
R	36.65	6765	6720	8971	8765	11400		11900	
R	34.57	6744	6663	8855	8833	11300		11700	
R	35.46	6728	6761	8740	8753	11200		11700	
S	38.30	6220		8960	8640	12100	11900	11500	11100
S	35.60	6320		9270	8910	12300	12300	12100	11300
S	37.70	6250		9110	8850	12600	12400	11900	11300
S	38.10	6030		9110	8850	12200	12600	11800	11300
S	37.60	6180		8970	8710	12400	11700	11500	10800
S	35.90	6190		9140	8850	12600	12400	11900	11100
S	38.70	6070		9160	8650	12300	11900	11900	10800
S	36.10	6240		9060	8960	12100	12300	11900	11500
T	32.70	6370		8990	8740	11150	11100	11700	11700
T	33.70	6300		8760	8630	11000	11150	11550	11550
T	31.70	6400		8870	8780	11250	11300	11500	11800
T	37.50	6430		8910	8770	11150	11200	11650	11800
T	41.20	6540		8710	8960	11050	11250	11500	11850
T	36.80	6480		8800	8960	11150	11250	11600	12050
T	32.50	6420		9010	8680	11450	11050	11850	11650
T	32.80	6220		8790	8750	11150	11350	11500	11800
U	37.90		8110	8080	8720		11100		11600
U	35.90		8290	8540	8950		11500		11600
U	36.80		7890	7870	8990		11400		11900
U	36.00		7890	8330	8700		11100		11000
U	36.20		7970	7870	8690		11300		11800
U	36.90		7880	8070	8770		11200		11700
U	36.40		8180	7930	8920		11300		11700
U	37.90		7750	8260	8570		10900		11500
V		6751		8620	9710	11500		11800	
V		6778		8580	9920	11200		11600	
V		6662		8610	9730	11200		11800	
V		6737		8610	9780	11000		11400	
V		6725		8640	9950	10600		11400	
V		6693		8570	9800	10900		11400	
V		6724		8270	9990	11100		11700	
V		6767		8670	9920	11400		11800	

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
W				8070	8860	8920	9880	9460	
W				7900	8560	8880	9450	9420	
W				8000	8930	9030	9910	9750	
W				8040	8990	9110	9910	9750	
W				8000	8890	8970	9990	9620	
W				7880	8830	8970	9950	9630	
W				8050	8660	9200	9720		
W				8010	8500	8970	9500	9650	
X	37.90	6440		8730		11500		11400	
X	36.90	6180		8680		11700		11500	
X	36.90	6070		8690		11500		11800	
X	37.30	6000		8720		11400		11900	
X	37.10	5910		8690		11700		11300	
X	37.80	6190		8660		11400		11200	
X	37.40	6470		8640		11700		11100	
X	36.80	6340		8920		11700		11900	

Assay data – Major Oxides

Lab Code	Al2O3 XRF %	CaO XRF %	Cr2O3 XRF %	Fe2O3 XRF %	K2O XRF %	LOI XRF %	MgO XRF %	MnO XRF %	Na2O XRF %	SiO2 XRF %	TiO2 XRF %	S Comb/LECO %	SG pyc
A	3.12	2.18	0.04			1.17	1.11				0.45	26.66	3.34
A	3.12	2.18	0.04			1.18	1.13				0.45	26.93	3.44
A	3.10	2.14	0.04			1.17	1.11				0.45	26.62	3.41
A	3.08	2.20	0.04			1.16	1.11				0.45	26.77	3.47
A	3.10	2.21	0.04			1.17	1.11				0.45	26.84	3.41
A	3.06	2.20	0.04			1.16	1.11				0.44	26.61	3.31
A	3.08	2.20	0.04			1.16	1.13				0.44	26.89	3.33
A	3.08	2.15	0.04			1.17	1.11				0.45	26.81	3.40
B	3.00	2.14		31.60				0.08			0.43	27.80	
B	3.04	2.17		32.03				0.08			0.43	25.70	
B	2.89	2.08		31.02				0.08			0.40	26.00	
B	2.99	2.14		31.74				0.08			0.42	26.40	
B	2.97	2.13		31.74				0.08			0.42	26.10	
B	2.91	2.08		31.02				0.08			0.40	26.10	
B	2.99	2.13		31.45				0.08			0.42	26.00	
B	3.04	2.15		31.88				0.08			0.43	26.00	
D							1.16	0.08			0.47	25.80	
D							1.13	0.08			0.45	25.20	
D							1.11	0.08			0.45	25.30	
D							1.11	0.08			0.43	25.20	
D							1.14	0.08			0.47	25.40	
D							1.09	0.08			0.45	25.40	
D							1.09	0.08			0.45	25.60	
D							1.21	0.09			0.50	25.80	
E	3.08	2.21	0.04	31.89	1.14	22.17	1.14	0.08	0.13	30.86	0.47	25.50	
E	3.06	2.20	0.03	31.78	1.14	22.59	1.14	0.08	0.12	30.77	0.47	25.70	
E	3.06	2.21	0.03	31.72	1.13	21.99	1.12	0.08	0.13	30.73	0.47	25.50	
E	3.09	2.22	0.04	31.88	1.14	21.67	1.13	0.08	0.15	30.89	0.46	25.30	
E	3.07	2.19	0.03	31.71	1.13	21.86	1.14	0.08	0.15	30.86	0.46	25.30	
E	3.09	2.21	0.03	31.80	1.14	21.81	1.14	0.08	0.15	30.88	0.47	25.80	
E	3.01	2.18	0.03	31.39	1.13	21.84	1.13	0.08	0.16	30.70	0.46	24.80	
E	3.09	2.20	0.03	31.78	1.14	21.85	1.13	0.08	0.14	30.90	0.46	25.00	
F	3.10	2.15	0.04	31.60	1.06	24.08	1.12	0.08	0.45	30.70	0.47	26.20	3.36
F	3.14	2.21	0.04	31.60	1.13	24.00	1.10	0.09	0.42	30.60	0.48	26.10	3.38
F	3.15	2.15	0.04	31.60	1.11	24.22	1.11	0.09	0.46	30.40	0.46	26.00	3.38
F	3.17	2.17	0.05	31.70	1.11	24.03	1.11	0.08	0.44	30.70	0.47	27.00	3.37
F	3.24	2.17	0.04	31.80	1.13	24.01	1.13	0.08	0.45	30.60	0.47	27.60	3.38
F	3.14	2.19	0.04	31.80	1.11	24.06	1.10	0.09	0.43	30.60	0.48	26.80	3.38
F	3.20	2.21	0.05	31.80	1.13	24.03	1.11	0.09	0.46	31.10	0.49	26.70	3.38
F	3.15	2.17	0.05	31.70	1.12	24.11	1.13	0.09	0.47	30.40	0.47	25.70	3.36
G	2.99	2.18	0.04	33.70	1.13		1.13	0.08	0.09	30.20	0.48	25.40	3.48
G	2.99	2.18	0.04	33.30	1.13		1.11	0.08	0.11	30.40	0.47	25.50	3.49
G	3.00	2.18	0.04	33.70	1.14		1.13	0.09	0.09	30.60	0.48	25.50	3.47
G	3.00	2.17	0.04	33.30	1.13		1.11	0.08	0.09	30.20	0.47	25.60	3.48
G	3.00	2.17	0.04	33.60	1.14		1.11	0.08	0.09	31.40	0.48	25.50	3.46
G	2.99	2.17	0.04	33.30	1.13		1.11	0.08	0.09	31.40	0.48	25.70	3.47
G	2.99	2.20	0.04	33.70	1.13		1.11	0.08	0.09	31.40	0.47	25.50	3.48
G	3.00	2.18	0.04	33.20	1.13		1.14	0.08	0.11	30.80	0.48	25.70	3.47
H												26.20	3.41
H												26.10	3.45
H												26.30	3.29
H												26.00	3.42
H												26.30	3.42
H												26.00	3.37
H												26.00	3.43
H												26.10	3.38

Assay data (cont) – Major Oxides

Lab Code	Al2O3 XRF %	CaO XRF %	Cr2O3 XRF %	Fe2O3 XRF %	K2O XRF %	LOI XRF %	MgO XRF %	MnO XRF %	Na2O XRF %	SiO2 XRF %	TiO2 XRF %	S Comb/LECO %	SG pyc
J													3.54
J													3.52
J													3.53
J													3.52
J													3.53
J													3.51
J													3.51
J													3.50
L												26.12	
L												25.96	
L												26.27	
L												26.16	
L												26.28	
L												25.87	
L												26.16	
L												25.89	
M	3.04	2.17	0.04	31.70	1.13	22.30	1.13	0.07	0.41	30.50	0.46	25.40	
M	3.04	2.17	0.03	31.40	1.13	22.70	1.13	0.08	0.42	30.20	0.46	25.50	
M	3.06	2.17	0.03	31.80	1.14	22.70	1.12	0.07	0.43	30.60	0.47	25.40	
M	3.05	2.17	0.03	31.60	1.13	22.80	1.13	0.07	0.43	30.50	0.46	25.40	
M	3.05	2.19	0.03	31.70	1.12	22.70	1.14	0.07	0.42	30.50	0.47	25.40	
M	3.02	2.19	0.03	31.60	1.12	22.70	1.12	0.07	0.42	30.30	0.46	25.50	
M	3.05	2.19	0.03	32.10	1.14	22.80	1.13	0.07	0.44	30.70	0.47	25.20	
M	3.04	2.18	0.03	31.50	1.13	22.80	1.13	0.07	0.42	30.30	0.46	25.10	
P	3.03	2.18		32.00	1.13	23.40	1.08	0.08	0.39	30.30	0.48	25.40	
P	3.03	2.19		32.00	1.14	23.40	1.08	0.08	0.42	30.30	0.48	24.60	
P	3.02	2.19		32.20	1.15	23.50	1.09	0.08	0.42	30.30	0.48	25.10	
P	3.03	2.19		32.00	1.14	23.50	1.08	0.08	0.43	30.40	0.48	24.90	
P	3.02	2.20		32.10	1.14	23.30	1.08	0.08	0.39	30.30	0.48	24.60	
P	3.02	2.20		32.00	1.14	23.20	1.08	0.08	0.41	30.30	0.48	24.70	
P	3.02	2.18		32.10	1.13	23.20	1.07	0.08	0.38	30.40	0.48	24.80	
P	3.03	2.19		32.10	1.13	23.20	1.08	0.08	0.39	30.40	0.49	25.10	
R	3.12	2.14			1.16		1.09				0.45	25.90	3.01
R	3.06	2.17			1.12		1.13				0.42	25.85	2.91
R	3.06	2.20			1.13		1.14				0.43	26.00	3.02
R	3.04	2.13			1.11		1.14				0.40	25.95	2.97
R	3.08	2.11			1.12		1.11				0.42	26.05	2.99
R	3.08	2.17			1.11		1.16				0.42	26.10	3.00
R	3.06	2.11			1.11		1.03				0.38	26.00	2.90
R	3.00	2.10			1.10		1.11				0.40	25.95	3.02
S	3.02	2.22	0.04	32.32	1.15	23.10	1.12	0.09		30.91	0.47	24.40	3.42
S	3.02	2.20	0.04	32.26	1.15	22.90	1.12	0.08		30.82	0.47	25.20	3.40
S	3.03	2.21	0.04	32.25	1.15	22.90	1.11	0.08		30.93	0.47	25.00	3.44
S	3.02	2.22	0.04	32.37	1.16	22.90	1.11	0.09		30.90	0.47	25.10	3.42
S	3.02	2.21	0.04	32.28	1.15	22.90	1.11	0.09		30.86	0.47	24.60	3.41
S	3.03	2.21	0.04	32.32	1.15	22.90	1.11	0.08		30.91	0.46	24.90	3.40
S	3.02	2.21	0.04	32.23	1.15	23.00	1.11	0.09		30.85	0.46	25.20	3.43
S	3.03	2.22	0.04	32.30	1.15	23.00	1.11	0.09		30.94	0.47	25.20	3.42
T	2.83	2.07	0.04	32.74				0.09					
T	2.91	2.08	0.04	32.88				0.08					
T	2.95	2.11	0.04	33.17				0.08					
T	2.93	2.10	0.04	33.03				0.09					
T	2.91	2.08	0.04	32.74				0.08					
T	2.93	2.10	0.04	33.03				0.08					
T	3.00	2.15	0.04	33.88				0.09					
T	2.93	2.10	0.04	33.03				0.08					
U	3.03	2.15	0.04	31.36	1.17	23.88	1.06	0.08	0.32	30.28	0.47		3.17
U	3.01	2.14	0.04	31.25	1.15	23.92	1.05	0.08	0.30	30.14	0.46		3.15
U	2.92	2.15	0.04	31.21	1.16	23.94	1.06	0.08	0.32	30.22	0.46		3.15
U	2.92	2.18	0.04	31.24	1.16	23.78	1.06	0.08	0.32	30.47	0.47		3.17
U	2.95	2.16	0.04	31.44	1.14	23.73	1.06	0.08	0.31	30.57	0.47		3.15
U	2.98	2.15	0.04	31.26	1.17	23.76	1.05	0.08	0.31	30.29	0.47		3.15
U	3.03	2.14	0.04	31.22	1.16	23.93	1.06	0.08	0.32	30.16	0.46		3.20
U	2.99	2.16	0.04	31.33	1.15	23.86	1.05	0.08	0.32	30.22	0.47		3.19
V				31.17									
V				30.88									
V				31.74									
V				31.02									
V				30.74									
V				30.88									
V				31.88									
V				31.60									
W												25.46	3.70
W												25.56	3.51
W												25.88	3.47
W												25.59	3.49
W												25.56	3.60
W												25.59	3.66
W												25.49	3.72
W												25.74	3.71
X		2.04	0.04		1.16		1.18	0.08			0.45		
X		2.10	0.04		1.12		1.14	0.08			0.45		
X		2.08	0.04		1.12		1.14	0.08			0.47		
X		2.07	0.04		1.11		1.16	0.08			0.47		
X		2.07	0.04		1.13		1.16	0.08			0.47		
X		2.11	0.04		1.11		1.16	0.08			0.47		
X		2.10	0.04		1.12		1.18	0.08			0.47		
X		2.18	0.04		1.13		1.16	0.08			0.47		

12. Measurement of Uncertainty: (ref Dr Hugh Bartlett, Hugh Bartlett Consulting CC.)

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	1.085	0.515	0.809	0.148
Ag	M/ICP	g/t	269.1	216.4	108.8	66.29
Ag	P	g/t	588.8	916.8	102.3	458.8
Cu	M/ICP	ppm	251.3	164.0	112.9	43.65
Cu	P	ppm	208.8	145.0	133.0	48.38
Pb	M/ICP	ppm	385.5	309.2	214.1	106.3
Pb	P	ppm	531.6	499.3	231.6	179.0
Zn	M/ICP	ppm	203.9	86.87	180.0	34.44
Zn	P	ppm	406.6	317.2	289.9	126.3
Al ₂ O ₃	XRF	%	0.058	0.045	0.027	0.014
CaO	XRF	%	0.032	0.022	0.018	0.007
Cr ₂ O ₃	XRF	%	0.004	0.003	0.002	0.001
Fe ₂ O ₃	XRF	%	0.358	0.306	0.202	0.111
K ₂ O	XRF	%	0.017	0.013	0.010	0.004
MgO	XRF	%	0.023	0.018	0.013	0.006
MnO	XRF	%	0.004	0.002	0.003	0.001
Na ₂ O	XRF	%	0.053	0.081	0.014	0.041
SiO ₂	XRF	%	0.265	0.243	0.151	0.094
TiO ₂	XRF	%	0.011	0.008	0.006	0.003
LOI	XRF	%	0.705	0.853	0.149	0.349
S	Comb/LECO	%	0.560	0.410	0.226	0.116
SG	pycnometer		0.095	0.087	0.038	0.031

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 fulfil the AMIS statistical criteria regarding agreement for certification and have been independently validated by Dr Barry Smee, 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: AMIS0270 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.

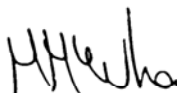
18. Availability: This product is available in Laboratory Packs containing 1kg of material and Explorer Packs containing custom weights (from 50 to 250g) of material. The Laboratory Packs are sealed bottles delivered in sealed foil pouches. The Explorer Packs contain material in standard geochem envelopes,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

10 October 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	2SD	RSD%	n
Al	M/ICP	%	1.6	0.13	4.2	103
Ag	ICP P	g/t	6908	1178	8.5	31
As	M/ICP	ppm	517	79.6	7.7	110
Ba	M/ICP	ppm	116	153	65.9	92
Be	M/ICP	ppm	1.1	0.44	19.6	75
Bi	M/ICP	ppm	6.8	4.3	31.9	50
Ca	M/ICP	%	1.5	0.13	4.3	103
Cd	M/ICP	ppm	87.5	11.3	6.5	105
Ce	M/ICP	ppm	23.5	5.2	11.1	32
Co	M/ICP	ppm	101	17.9	8.8	94
Cr	M/ICP	ppm	230	43.7	9.5	112
Cs	M/ICP	ppm	2.6	0.33	6.2	40
Dy	M/ICP	ppm	2.8	0.84	14.8	32
Er	M/ICP	ppm	1.7	0.57	16.8	32
Eu	M/ICP	ppm	0.62	0.15	11.7	32
Fe	M/ICP	%	22.7	1.7	3.7	74
Ga	M/ICP	ppm	5.4	4.9	45.2	51
Gd	M/ICP	ppm	2.9	0.65	11.2	32
Ge	M/ICP	ppm	2.2	0.28	6.3	8
Hf	M/ICP	ppm	1.4	0.85	31.1	37
Ho	M/ICP	ppm	0.63	0.25	19.5	40
In	M/ICP	ppm	0.76	0.06	4.2	32
K	M/ICP	%	0.91	0.09	5.1	111
La	M/ICP	ppm	11.3	3.5	15.6	80
Li	M/ICP	ppm	40.2	8.2	10.2	95
Lu	M/ICP	ppm	0.22	0.12	26.9	32
Mg	M/ICP	%	0.64	0.08	6.6	112
Mn	M/ICP	ppm	641	62.3	4.9	110
Mo	M/ICP	ppm	28.4	6.9	12.1	110
Na	M/ICP	%	0.06	0.05	41.4	104
Nb	M/ICP	ppm	5.5	0.55	5.0	39
Nd	M/ICP	ppm	13.0	1.6	6.1	32
Ni	M/ICP	ppm	190	34.9	9.2	104
P	M/ICP	ppm	512	156	15.3	92
Pr	M/ICP	ppm	3.3	0.61	9.1	32
Pt	M/ICP	ppm	49.8	0.94	0.95	8
Rb	M/ICP	ppm	48.4	6.5	6.7	32
Re	M/ICP	ppm	0.06	0.04	34.4	21
S	M/ICP	%	24.4	1.3	2.65	38
Sb	M/ICP	ppm	120	31.47	13.1	105
Sc	M/ICP	ppm	6.0	1.8	15.3	96
Se	M/ICP	ppm	457	114	12.5	48
Si	M/ICP	%	14.4	0.40	1.4	16
Sm	M/ICP	ppm	3.0	0.64	10.7	31
Sn	M/ICP	ppm	5.2	5.7	55.2	42
Sr	M/ICP	ppm	59.6	10.8	9.1	104
Ta	M/ICP	ppm	0.34	0.17	24.9	40
Tb	M/ICP	ppm	0.46	0.11	11.7	32
Te	M/ICP	ppm	7.0	2.2	15.7	40
Th	M/ICP	ppm	3.7	2.2	29.3	40
Ti	M/ICP	%	0.26	0.04	7.9	97
Tl	M/ICP	ppm	5.2	9.0	86.6	40
Tm	M/ICP	ppm	0.24	0.10	21.2	32
V	M/ICP	ppm	68.4	23.3	17.1	96
W	M/ICP	ppm	11.8	36.5	154	48
Y	M/ICP	ppm	14.9	3.14	10.5	80
Yb	M/ICP	ppm	1.5	0.55	17.9	30
Zr	M/ICP	ppm	39.6	23.0	29.1	82