African Mineral Standards
MATRIX REFERENCE MATERIALS

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AMIS0261

Certified Reference Material

Gold Ore, greenstone, Syama Gold Mine, Mali

Certificate of Analysis

Recommended Concentrations and Limits[1.]
(at two Standard Deviations)

Certified Concentrations[2.]

Au Pb Collection	1.12	±	0.10	g/t
Cu M/ICP	99	±	9	ppm
Specific Gravity	2.91	±	0.08	

Provisional Concentration

As M/ICP	98	±	6	ppm

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_2O_3	10.66	±	0.18	%
CaO	7.55	±	0.10	%
Fe_2O_3	10.52	±	0.12	%
K_2O	1.46	±	0.03	%
MgO	4.61	±	0.10	%
MnO	0.20	±	0.01	%
Na_2O	2.21	±	0.04	%
SiO_2	46.30	±	0.56	%
TiO_2	1.01	±	0.02	%
LOI	13.78	±	1.26	%
S Comb/LECO	1.49	±	0.12	%

Provisional Concentration

Cr_2O_3	0.05	±	0.01	%

1. Intended Use: AMIS0261 can be used to check analysis of samples of altered (carbonate-silica-pyrite) mafic gold 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: AMIS0261 is a commissioned CRM made from material sourced by SGS Minerals Services from the Syama Gold Mine which is run by Société Des Mines De Syama S.A (SOMISY), a company owned 80% by Resolute Mining Limited and 20% by the Republic of Mali. The mine is situated in south eastern Mali in West Africa, approximately 300km southeast of the capital Bamako and 30kms from the Côte d'Ivoire border.

The Syama mining permit straddles a major regional structure (the Syama shear), which can be traced over hundreds of kilometres southwards into Côte d'Ivoire. A number of gold occurrences, including Syama, lie adjacent to this NNE trending structure, which is believed to play an important role in controlling gold mineralisation in the region.

The mine was initially brought into production in 1990 by BHP, was purchased by Randgold Resources in 1996 and has produced over 1.5Moz of gold. The gold ore was mined using open cut methods and processed using a combination of "whole of ore" roasting and CIL extraction of gold from the roaster calcines. Following a sustained drop in the gold price during the late 1990's,

operations were suspended in early 2001 and the mine placed on care and maintenance. It has recently been brought back into production by the current owners.

The Project is located along a structural and geological feature known locally as the Syama Shear that extends for some 200km south into northern Côte d'Ivoire. Gold mineralisation is hosted within an overturned and thrusted basalt-metasediment package that is in contact (structural footwall) with a largely undeformed conglomeratic unit. Detailed structural studies at the Syama mine and nearby satellite ore bodies confirm that gold mineralisation is controlled by intersecting NNE trending reverse faults and NE trending thrusts, which envelope and bound the ore body in association with intense brecciation, sulphidation and carbonate alteration.

3. Mineral and Chemical Composition: The ore at Syama is located within highly altered (carbonate-silica-pyrite) mafic rocks. The gold mineralisation is very fine grained and often encapsulated in pyrite. The ore is hard, siliceous, abrasive, refractory and in places contains significant quantities of active carbonaceous material. Higher-grade ore is typically found in highly veined and fractured carbonate altered, intensely bleached and silicified basalt containing various quantities of abundant fine-grained and coarse-grained euhedral pyrite. Pyrite is typically observed as two phases, a very fine-grained disseminated phase, with a second much coarser-grained euhedral phase. Rare arsenopyrite has been observed within this unit, with occasional chalcopyrite. Carbonaceous material, probably graphite, is often observed as silicified fine 1mm thick wisps/veinlets, or as free carbon on fracture surfaces within drill core.

4. Appearance: The material is a very fine powder. It is colored a Blueish Grey (Corstor 5B 7/1).

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% <54µ. 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, including HF, ICP- OES or ICP-MS. Multi element scan to include Ag.
3. Majors (Al_2O_3, CaO, Cr_2O_3, Fe_2O_3, K_2O, MgO, MnO, Na_2O, SiO_2, TiO_2. LOI.) XRF fusion.
4. S – Total Combustion.
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 five 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 25 laboratories that provided results timeously were (not in same order as in the table of assays):

1 ALS Chemex Laboratory Group Johannesburg SA
2 ALS Chemex Laboratory Group Perth WA
3 Anglo Gold Ashanti - Navachab Gold Mine Laboratory Namibia
4 Bureau Veritas (Namibia)
5 Genalysis Laboratory Services (W Australia P)
6 Intertek Utama Services (Indonesia)
7 OMAC Laboratories Limited (Ireland)
8 Ready Lead Assay Laboratory
9 Set Point Laboratories (Isando) SA
10 SGS Australia Pty Ltd (Newburn) WA
11 SGS Chelopech (Bulgaria)
12 SGS Geosol Laboratories Ltda (Brazil)
13 SGS Kalgoorlie WA
14 SGS Mineral Services Lakefield (Canada)
15 SGS Mwanza (Tanzania)
16 SGS NSW (Australia)
17 SGS South Africa (Pty) Ltd - Booysens JHB
18 SGS Tarkwa (Ghana)
19 SGS Toronto (Canada)
20 SGS Townsville (Australia)
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.

Lab Code	Au Pb Coll g/t	Cu M/ICP ppm	Ag M/ICP ppm	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
A	1.08	88.73		10.68	7.62	0.05	10.53	1.46	4.64	0.20	2.03	47.16	1.04	14.80	1.56	
A	1.22	89.65		10.61	7.58	0.05	10.17	1.46	4.57	0.20	2.14	46.37	1.03	14.79	1.66	
A	1.21	88.66		10.83	7.60	0.05	10.28	1.48	4.64	0.21	2.12	47.31	1.06	14.76	1.56	
A	1.00	89.93		10.62	7.61	0.05	10.26	1.47	4.64	0.20	2.12	46.72	1.00	14.89	1.60	
A	1.08	89.25		10.79	7.64	0.05	10.24	1.47	4.66	0.20	2.09	47.05	1.05	14.60	1.62	
A	1.14	88.82		10.69	7.57	0.05	10.23	1.45	4.58	0.20	2.08	46.52	1.02	14.72	1.56	
A	1.09	89.97		10.57	7.58	0.05	10.21	1.45	4.54	0.20	2.10	46.53	1.02	14.79	1.56	
A	1.12	88.04		10.81	7.70	0.05	10.25	1.49	4.66	0.21	2.15	47.32	1.04	14.82	1.49	

Assay data (cont)

Lab Code	Au Pb Coll g/t	Cu M/ICP ppm	Ag M/ICP ppm	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
B	1.09	82.00		10.80	7.58		10.40	1.45	4.54	0.20	2.20	46.60	0.78			2.96
B	1.07	84.00		10.80	7.57		10.40	1.47	4.56	0.20	2.18	46.20	0.78			2.98
B	1.10	82.00		10.80	7.57		10.50	1.47	4.56	0.21	2.24	46.60	0.77			2.97
B	1.09	82.00		10.80	7.58		10.50	1.45	4.64	0.20	2.22	46.60	0.75			2.96
B	1.08	82.00		10.80	7.61		10.40	1.46	4.68	0.20	2.24	46.40	0.75			2.96
B	1.08	82.00		10.80	7.61		10.50	1.47	4.74	0.20	2.25	46.00	0.76			2.96
B	1.07	84.00		10.80	7.57		10.40	1.48	4.66	0.20	2.24	46.80	0.77			2.96
B	1.10	82.00		10.80	7.55		10.40	1.48	4.61	0.21	2.24	46.40	0.75			2.97
C	1.22	82.00		10.74	7.57	0.05	10.58	1.47	4.61	0.20	2.22	46.32	1.02	13.30	1.55	2.91
C	1.10	82.00		10.66	7.53	0.05	10.52	1.46	4.62	0.20	2.22	46.36	1.02	13.33	1.48	2.86
C	1.16	81.00		10.71	7.53	0.05	10.52	1.46	4.61	0.20	2.21	46.30	1.02	13.51	1.52	2.89
C	1.22	83.00		10.68	7.51	0.05	10.54	1.46	4.63	0.20	2.20	46.46	1.02	13.40	1.54	2.90
C	1.20	79.00		10.71	7.53	0.05	10.50	1.47	4.62	0.20	2.21	46.31	1.02	13.41	1.54	2.91
C	1.18	81.00		10.65	7.54	0.05	10.50	1.46	4.62	0.20	2.22	46.36	1.02	13.45	1.51	2.91
C	1.14	82.00		10.61	7.56	0.05	10.55	1.47	4.63	0.20	2.20	46.42	1.02	13.51	1.50	2.92
C	1.09	81.00		10.66	7.55	0.05	10.48	1.47	4.61	0.20	2.21	46.36	1.02	13.41	1.51	2.88
D	1.17															
D	1.23															
D	1.26															
D	1.32															
D	1.41															
D	1.26															
D	1.38															
D	1.24															
E	1.05															
E	1.07															
E	1.07															
E	1.06															
E	1.02															
E	1.09															
E	1.16															
E	1.01															
G	1.09	79.00		10.60	7.52	0.05	10.50	1.45	4.60	0.20	2.23	46.20	1.02	13.48	1.61	2.85
G	1.05	83.90		10.50	7.53	0.04	10.50	1.47	4.66	0.20	2.30	46.10	1.03	13.88	1.54	2.88
G	1.12	81.10		10.60	7.61	0.04	10.60	1.49	4.61	0.21	2.21	46.10	1.02	13.48	1.54	2.85
G	1.09	82.00		10.50	7.54	0.04	10.50	1.46	4.56	0.20	2.28	46.00	1.02	13.88	1.57	2.85
G	1.05	80.40		10.50	7.56	0.04	10.60	1.48	4.59	0.21	2.25	46.20	1.03	13.75	1.53	2.87
G	1.02	80.20		10.60	7.51	0.04	10.50	1.45	4.61	0.21	2.20	46.10	1.01	14.50	1.54	2.85
G	1.10	80.40		10.50	7.55	0.04	10.60	1.46	4.59	0.20	2.26	46.20	1.01	13.48	1.52	2.86
G	1.03	87.00		10.60	7.52	0.04	10.50	1.45	4.52	0.21	2.22	46.30	1.02	13.98	1.56	2.85
H															1.54	
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H															1.55	
H															1.53	
H															1.54	
H															1.54	
H															1.54	
J	1.29															
J	1.09															
J	1.17															
J	1.27															
J	1.24															
J	1.11															
J	1.23															
J	1.25															
K	1.14															
K	1.12															
K	1.10															
K	1.14															
K	1.14															
K	1.08															
K	1.13															
K	1.10															
N	1.22	89.00	0.30												1.60	2.93
N	1.17	94.00	0.30												1.58	2.93
N	1.22	91.00	0.20												1.55	2.93
N	1.10	90.00	0.20												1.56	2.93
N	1.28	87.00	0.30												1.57	2.93
N	1.07	89.00	0.20												1.60	2.94
N	1.10	91.00	0.20												1.58	2.94
N	1.12	91.00	0.30												1.56	2.93
O	1.09	80.00		10.62	7.54	0.05	10.52	1.45	4.60	0.20		46.19	1.00	14.07		2.95
O	1.12	75.00		10.60	7.54	0.05	10.49	1.45	4.60	0.20		46.15	1.00	14.07		2.97
O	1.05	80.00		10.62	7.53	0.05	10.51	1.45	4.59	0.20		46.16	1.00	14.10		2.96
O	1.07	75.00		10.63	7.55	0.05	10.47	1.45	4.60	0.20		46.11	1.00	14.07		2.95
O	1.13	80.00		10.65	7.54	0.05	10.52	1.45	4.61	0.20		46.20	1.00	13.98		2.97
O	1.06	75.00		10.61	7.53	0.04	10.49	1.45	4.60	0.20		46.15	1.00	14.03		2.96
O	1.10	80.00		10.59	7.54	0.04	10.47	1.45	4.59	0.20		46.16	1.00	14.00		2.95
O	1.11	85.00		10.59	7.54	0.05	10.51	1.45	4.58	0.20		46.17	1.00	14.01		2.93
P	1.20															
P	1.11															
P	1.09															
P	1.15															
P	1.14															
P	1.17															
P	1.24															
P	1.19															
Q	1.11	94.50	0.29	10.60	7.35	0.05	10.20	1.44	4.55	0.20	2.02	45.70	0.99	12.75		2.67
Q	1.17	91.30	0.24	10.60	7.36	0.05	10.22	1.45	4.54	0.21	2.01	45.70	1.00	12.79		2.71
Q	1.20	89.80	0.25	10.60	7.37	0.05	10.22	1.45	4.54	0.20	2.00	45.80	1.00	12.74		2.62
Q	1.08	96.50	0.21	10.55	7.32	0.05	10.18	1.44	4.53	0.20	2.00	45.50	0.99	13.14		2.63
Q	1.19	93.30	0.25	10.60	7.33	0.05	10.17	1.44	4.53	0.20	2.01	45.70	0.99	12.88		2.61
Q	1.15	93.10	0.22	10.60	7.35	0.05	10.22	1.44	4.54	0.20	2.01	45.60	0.99	12.92		2.62
Q	1.16	90.30	0.25	10.55	7.36	0.05	10.22	1.45	4.53	0.20	2.01	45.50	0.99	13.09		2.63
Q	1.15	90.30	0.28	10.55	7.34	0.05	10.22	1.45	4.52	0.21	2.01	45.50	0.99	13.04		2.65

Assay data (cont)

Lab Code	Au Pb Coll g/t	Cu M/ICP ppm	Ag M/ICP ppm	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
R	1.04	90.00	0.20	10.70	7.56	0.05	10.60	1.47	4.64	0.21	2.27	46.40	1.02	12.00	1.45	
R	1.08	81.00	0.20	10.70	7.54	0.05	10.60	1.46	4.64	0.21	2.22	46.50	1.02	12.00	1.41	
R	1.09	84.00	0.20	10.70	7.55	0.05	10.60	1.47	4.61	0.21	2.25	46.60	1.02	12.10	1.44	
R	1.13	87.00	0.20	10.70	7.58	0.05	10.60	1.46	4.64	0.21	2.23	46.40	1.02	12.00	1.41	
R	1.10	83.00	0.20	10.70	7.56	0.05	10.60	1.47	4.67	0.21	2.22	46.50	1.02	12.00	1.41	
R	1.12	82.00	0.20	10.60	7.56	0.05	10.60	1.46	4.62	0.21	2.25	46.50	1.02	12.00	1.44	
R	1.01	87.00	0.20	10.70	7.57	0.05	10.60	1.46	4.65	0.21	2.25	46.50	1.01	12.00	1.44	
R	1.10	84.00	0.20	10.70	7.57	0.05	10.60	1.46	4.64	0.21	2.22	46.40	1.02	12.10	1.42	
S	1.03			10.70	7.60	0.05	10.60	1.49	4.67	0.20	2.19	46.40	1.02	13.50	1.48	
S	1.06			10.70	7.56	0.04	10.50	1.47	4.63	0.20	2.17	46.30	1.01	13.90	1.46	
S	1.12			10.70	7.59	0.05	10.50	1.48	4.61	0.20	2.20	46.40	1.01	14.00	1.44	
S	1.18			10.70	7.58	0.04	10.50	1.48	4.61	0.20	2.18	46.50	1.01	13.70	1.46	
S	1.10			10.70	7.64	0.04	10.60	1.48	4.68	0.20	2.22	46.80	1.02	13.60	1.45	
S	1.02			10.80	7.64	0.05	10.60	1.47	4.63	0.19	2.21	46.60	1.01	13.40	1.47	
S	1.09			10.70	7.58	0.04	10.60	1.48	4.64	0.19	2.21	46.70	1.01	13.50	1.46	
S	1.03			10.70	7.56	0.05	10.50	1.47	4.61	0.20	2.19	46.30	1.00	14.20	1.45	
T	1.15	90.50		10.50	7.47	0.04	10.50	1.44	4.57	0.20	2.19	45.80	1.01	13.15	1.46	2.90
T	1.25	90.00		10.60	7.50	0.04	10.50	1.45	4.61	0.20	2.18	45.90	1.01	13.09	1.46	2.91
T	1.16	91.80		10.50	7.34	0.04	10.30	1.43	4.52	0.19	2.18	45.30	0.99	12.97	1.46	2.90
T	1.14	91.00		10.60	7.50	0.04	10.50	1.44	4.58	0.20	2.19	46.00	1.02	13.24	1.47	2.90
T	1.12	90.90		10.60	7.54	0.04	10.60	1.45	4.52	0.20	2.19	46.30	1.02	13.11	1.45	2.90
T	1.13	90.00		10.60	7.54	0.04	10.60	1.45	4.49	0.20	2.18	46.10	1.02	13.00	1.45	2.90
T	1.16	91.80		10.60	7.47	0.04	10.50	1.44	4.49	0.20	2.17	46.00	1.01	12.98	1.47	2.89
T	1.10	90.50		10.50	7.37	0.04	10.50	1.40	4.51	0.21	2.18	45.50	0.98	13.18	1.47	2.90
U	1.16	83.10	0.98													
U	1.19	81.90	0.80													
U	1.12	82.80	0.86													
U	1.16	84.00	0.88													
U	1.14	83.60	0.92													
U	1.13	83.80	0.99													
U	1.12	86.80	1.00													
U	1.08	85.80	0.95													
V	1.05	90.00													1.50	2.88
V	1.15	90.00													1.50	2.88
V	1.15	90.00													1.51	2.89
V	1.01	90.00													1.47	2.88
V	1.25	90.00													1.51	2.87
V	1.10	90.00													1.50	2.86
V	1.17	90.00													1.51	2.87
V	1.11	100.00													1.52	2.85
W	1.16	82.20													1.46	
W	1.15	83.10													1.46	
W	1.17	82.40													1.47	
W	1.15	84.40													1.48	
W	1.15	85.60													1.48	
W	1.09	79.80													1.45	
W	1.14	82.10													1.48	
W	1.10	81.30													1.47	
X	1.17	81.00		10.65	7.44	0.06	10.49	1.47	4.69	0.20	2.21	46.27	1.01	14.60	1.38	
X	1.18	80.00		10.65	7.43	0.07	10.43	1.47	4.66	0.20	2.21	46.30	1.01	14.50	1.41	
X	1.16	83.00		10.73	7.48	0.07	10.55	1.48	4.70	0.20	2.22	46.51	1.02	14.60	1.39	
X	1.15	82.00		10.76	7.51	0.06	10.57	1.48	4.72	0.21	2.24	46.67	1.02	14.50	1.41	
X	1.18	79.00		10.67	7.43	0.06	10.46	1.47	4.67	0.20	2.21	46.31	1.01	14.10	1.38	
X	1.15	83.00		10.69	7.48	0.04	10.49	1.47	4.71	0.20	2.23	46.47	1.01	14.50	1.41	
X	1.15	84.00		10.64	7.44	0.03	10.54	1.47	4.69	0.21	2.20	46.24	1.00	14.60	1.38	
X	1.17	83.00		10.68	7.47	0.05	10.44	1.47	4.70	0.20	2.22	46.44	1.01	14.40	1.40	
Y	1.05															
Y	1.08															
Y	1.09															
Y	1.09															
Y	1.11															
Y	1.05															
Y	1.04															
Y	0.99															

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:

Combined standard uncertainty=sqrt((between lab.var/no of labs) + (mean square within lab.var /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]	σL [2]	Sw [3]	CSU [4]
Au	Pb Coll	g/t	0.053	0.021	0.042	0.006
Cu	M/ICP	ppm	4.299	3.112	1.750	0.881
Al2O3	XRF	%	0.087	0.069	0.047	0.022
CaO	XRF	%	0.048	0.040	0.024	0.014
Cr2O3	XRF	%	0.004	0.004	0.002	0.001
Fe2O3	XRF	%	0.066	0.044	0.051	0.017
K2O	XRF	%	0.013	0.009	0.009	0.003
LOI	XRF	%	0.630	0.639	0.186	0.227
MgO	XRF	%	0.051	0.038	0.031	0.012
MnO	XRF	%	0.004	0.003	0.003	0.001
Na2O	XRF	%	0.024	0.020	0.017	0.008
SiO2	XRF	%	0.277	0.207	0.151	0.068
TiO2	XRF	%	0.011	0.009	0.007	0.003
S	Comb/LECO	%	0.062	0.048	0.018	0.015
SG	pycnometer		0.040	0.043	0.012	0.016

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. *S_W - 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: AMIS0261 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.

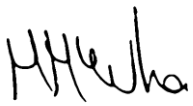
18. Availability: This product is available in Laboratory Packs containing 1kg of material and Explorer Packs containing custom weights (from 50 to 250g) of material. The Laboratory Packs are sealed bottles delivered in sealed foil pouches. The Explorer Packs contain material in standard geochem envelopes,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

04 May 2012 (Arsenic Certified, 23 May 2013, Amended)

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	%	5.77	0.41	3.58	85
Ag	M/ICP	ppm	0.41	0.61	75.8	32
As	M/ICP	ppm	94	34.8	18.6	88
Ba	M/ICP	ppm	187	17.6	4.70	88
Be	M/ICP	ppm	0.91	0.19	10.4	64
Bi	M/ICP	ppm	0.20	0.40	99.7	33
Ca	M/ICP	%	5.38	0.21	1.98	84
Cd	M/ICP	ppm	4309	28991	336	36
Ce	M/ICP	ppm	21.7	4.4	10.2	57
Co	M/ICP	ppm	68.7	6.84	5.0	88
Cr	M/ICP	ppm	261	91	17.4	88
Cs	M/ICP	ppm	2.33	0.30	6.48	45
Cu	M/ICP	ppm	3	0.9	15.9	39
Dy	M/ICP	ppm	2.89	0.92	15.9	39
Er	M/ICP	ppm	1.76	0.77	21.9	40
Eu	M/ICP	ppm	1.02	0.17	8.49	38
Fe	M/ICP	%	7.34	0.42	2.83	96
Ga	M/ICP	ppm	15.7	1.93	6.16	64
Gd	M/ICP	ppm	3.38	0.71	10.6	40
Ge	M/ICP	ppm	2.36	0.21	4.5	8
Hf	M/ICP	ppm	1.67	1.97	58.9	56
Ho	M/ICP	ppm	0.60	0.18	15.3	40
In	M/ICP	ppm	0.07	0.02	13.2	45
K	M/ICP	%	1.24	0.10	4.18	88
La	M/ICP	ppm	9.2	1.61	8.72	80
Li	M/ICP	ppm	29.3	1.65	2.81	10
Lu	M/ICP	ppm	0.28	0.10	17.9	47
Mg	M/ICP	%	2.77	0.19	3.40	88
Mn	M/ICP	ppm	1553	168	5.39	88
Mo	M/ICP	ppm	1.61	0.69	21.3	72
Na	M/ICP	%	1.65	0.11	3.42	81
Nb	M/ICP	ppm	4.04	2.21	27.4	61
Nd	M/ICP	ppm	12.6	1.36	5.42	40
Ni	M/ICP	ppm	80.5	16.6	10.3	88
P	M/ICP	ppm	998	155	7.77	72
Pb	M/ICP	ppm	10.5	8.60	41.1	91
Pd	M/ICP	ppm	0.01	0.01	54.11	8
Pr	M/ICP	ppm	2.83	0.26	4.54	39
Rb	M/ICP	ppm	48.9	6.27	6.42	55
Re	M/ICP	ppm	0.02	0.08	172	14
S	M/ICP	%	1.40	0.95	34.1	80
Sb	M/ICP	ppm	18.9	6.86	18.2	88
Sc	M/ICP	ppm	26.7	3.88	7.3	80
Se	M/ICP	ppm	1.38	1.30	47.1	16
Si	M/ICP	%	14.9	19.5	65.5	24
Sm	M/ICP	ppm	3.22	0.68	10.6	43
Sn	M/ICP	ppm	4.25	15.0	176	49
Sr	M/ICP	ppm	241	37.2	7.71	80
Ta	M/ICP	ppm	0.26	0.20	38.0	51
Tb	M/ICP	ppm	0.50	0.21	21.2	43
Te	M/ICP	ppm	0.10	0.12	61.6	23
Th	M/ICP	ppm	1.41	0.78	27.6	56
Ti	M/ICP	%	0.48	0.20	20.5	88
Tl	M/ICP	ppm	0.28	0.05	9.5	50
Tm	M/ICP	ppm	0.26	0.09	17.2	38
U	M/ICP	ppm	0.58	0.14	12.2	56
V	M/ICP	ppm	227	26.4	5.81	80
W	M/ICP	ppm	31.0	66.1	107	72
Y	M/ICP	ppm	16.3	4.43	13.6	79
Yb	M/ICP	ppm	1.87	0.50	13.5	48
Zn	M/ICP	ppm	82.7	12.2	7.37	96
Zr	M/ICP	ppm	71.9	18.2	12.7	91