

Intended use: AMIS0046 is suitable for monitoring the accuracy of a single analysis of gold ores hosted by siliceous rocks. The material can be used for routine quality control by inserting within a batch of samples.

Additional geochemical data for this material, to enable its use for method development and for the calibration of equipment, is available on request.

The recommended mean and "Between Lab" standard deviations for this standard reflect the average 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 and this is acceptable. Good laboratories however will report results within the two standard deviation levels with a failure of <10 %.

Origin of material: This standard was made from Dominion Upper Reef material supplied by Uranium One from their Dominion Project situated 15km north west of Klerksdorp in the Northwest Province, South Africa.

The Dominion reefs are part of the Dominion Group (age 3.1 Ga); a sequence of sediments and volcanics underlying the Witwatersrand Supergroup (age 2.7 Ga). The Dominion succession is taken to mark the initiation of Witwatersrand Basin development on the young Kapvaal Craton and quartz pebble reefs within the Dominion are compositionally similar or identical to younger Witwatersrand reefs.

Mineral and chemical composition: The mineralization within the reef is contained principally within a quartz pebble conglomerate unit, the Upper Reef; which has been mined for its uranium and low gold content. The uranium is present mainly in the form of uraninite (UO₂); gold occurs primarily as discrete grains.

The uncertified major and trace element chemical composition is presented in the appendix to this certificate.

Appearance: The material is a very fine Light Grey coloured powder (Corstor 5Y 7/1)

Radioactivity: Shipments of this material do not require special marking, labeling or placarding. AMIS0046 does contain U (1.2 Bq/g) and Th (0.3 Bq/g) but due to the low activity concentrations it is classified as EXEMPT MATERIAL in terms of "Safety Standards Series No. TS-R-1: Regulations for the Safe Transport of Radioactive Material, International Atomic Energy Agency, 2005, para 403, Table 1".

Method of preparation: The material was crushed, dry-milled and air-classified to 100% <54um. Wet sieve particle size analysis of random samples confirmed the material was 100% <54um. It was then blended in a bi-conical mixer, systematically divided and then sealed into 1kg Laboratory Packs. Samples were randomly selected for homogeneity testing and third party analysis. Statistical analysis for the consensus test results were carried out by an independent statistician. Explorer Packs are subdivided from the Laboratory packs as required.

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 U).
3. U XRF.
4. Majors (Al₂O₃, CaO, Cr₂O₃, Fe₂O₃, K₂O, MgO, MnO, Na₂O, SiO₂, TiO₂. LOI.) XRF fusion.
5. SG (gas pycnometer)

Method of certification: Twenty three laboratories were each given eight randomly selected packages of sample. The results from the twenty one laboratories that issued results timeously were used for the certification. Fifteen laboratories provided the additional uncertified major and trace element data presented in the appendix.

The mean and standard deviation for all data was calculated. Outliers were defined as samples beyond the mean ± 2 Standard Deviations from all data. These outliers were removed from the data and a new mean and standard deviation was determined.

Standards with an RSD of near or less than 5 % are then certified, RSD's of between near 5 % and 15 % are given Provisional Concentrations and limits, those with RSD's over 15 % are given Indicated Concentrations.

This method is different from that used to calculate the Confidence Interval shown on many Government-produced standards in that the actual "between-laboratory" standard deviation is used in the calculations. This produces upper and lower limits that reflect actual individual analyses rather than a grouped set of analyses. The limits can therefore be used to monitor accuracy from individual analyses, unlike the Certified Limits published on other standards which quote a Confidence Interval.

Participating laboratories: (Not in same order as in the table of assays)

1. ACME Analytical Laboratories Ltd., (Canada).
2. AGA - West Wits Laboratory, (South Africa).
3. AGA - Navachab Gold Mine Laboratory, (Namibia).
4. AGA - Vaal River Laboratory (South Africa).
5. ALS Chemex South Africa (Pty) Ltd.
6. ALS Chemex, (Perth, Australia).
7. ALS Chemex, (Vancouver, Canada).
8. Anglo Research (Crown Campus, South Africa).
9. Assayers Canada, (Vancouver).
10. Genalysis Laboratory Services (Pty) Ltd., (Australia).
11. Labtium Inc. (Finland)
12. MAED Laboratories - Knights (South Africa)
13. OMAC Laboratories (Ireland).
14. Performance Laboratories, (South Africa).
15. Pt Intertek Utama Services (Intertek, Indonesia)
16. Set Point Laboratories (Pty) Ltd (South Africa)
17. SGS Lakefield Research (Canada)
18. SGS Lakefield Research Africa (Pty) Ltd. (Joburg, South Africa)
19. SGS Mineral Services - Barberton, (South Africa).
20. SGS Welshpool (Australia).
21. Ultra Trace (Pty) Ltd. (Australia)

Assay Data: Data as received from the laboratories for the certified elements is set out below. A proficiency report has been sent to the managers of the participating laboratories.

Lab Code	Au, g/t	Ag ppm	U M/ICP ppm	U XRF ppm	SG g/cc
A	0.57		100	106	2.79
A	0.59		100	106	2.79
A	0.52		100	108	2.80
A	0.54		120	104	2.74
A	0.63		110	108	2.79
A	0.64		100	106	2.80
A	0.57		100	106	2.74
A	0.57		110	108	2.76
B	0.69		98	91	2.77
B	0.70		99	93	2.74
B	0.68		102	93	2.76
B	0.72		99	95	2.76
B	0.68		95	93	2.75
B	0.68		95	93	2.74
B	0.69		98	93	2.74
B	0.68		96	93	2.75
C	0.67		88	92	
C	0.68		86	86	
C	0.67		87	85	
C	0.69		88	90	
C	0.65		89	88	
C	0.65		88	86	
C	0.64		87	84	
C	0.65		86	84	

Lab Code	Au, g/t	Ag ppm	U M/ICP ppm	U XRF ppm	SG g/cc
D	0.64				
D	0.65				
D	0.68				
D	0.69				
D	0.67				
D	0.64				
D	0.63				
D	0.64				
E	0.67	0.80	89	96	
E	0.65	0.80	91	95	
E	0.65	0.80	91	96	
E	0.67	0.80	92	101	
E	0.69	0.80	94	98	
E	0.68	0.80	93	102	
E	0.68	0.70	93	98	
E	0.66	0.80	94	102	
F	0.68	0.78	71		2.66
F	0.66	0.76	71		2.69
F	0.67	0.70	88		2.67
F	0.73	0.71	91		2.61
F	0.68	0.69	88		2.59
F	0.68	0.73	86		2.58
F	0.69	0.68	89		2.59
F	0.69	0.72	92		2.63

Lab Code	Au, g/t	Ag ppm	U M/ICP ppm	U XRF ppm	SG g/cc
G	0.69		93	88	
G	0.69		89	89	
G	0.67		91	88	
G	0.68		92	92	
G	0.67		92	94	
G	0.69		94	85	
G	0.67		87	78	
G	0.68		87	86	
H					
H					
H					
H					
H					
H					
H					
H					
I					
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I					

Lab Code	Au, g/t	Ag ppm	U M/ICP ppm	U XRF ppm	SG g/cc
J	0.69	0.50			2.54
J	0.69				2.52
J	0.69	0.50			2.54
J	0.68	0.60			2.52
J	0.69	0.60			2.53
J	0.70	0.60			2.53
J	0.70	0.60			2.53
J	0.72	0.50			2.51
K	0.68			99	
K	0.68				
K	0.67			95	
K	0.67			81	
K	0.67			81	
K	0.65			137	
K	0.65			80	
K	0.67			116	
L	0.70	0.67			2.61
L	0.71	0.69			2.64
L	0.70	0.65			2.65
L	0.68	0.63			2.60
L	0.70	0.58			2.67
L	0.70	0.59			2.62
L	0.68	0.63			2.78
L	0.70	0.59			2.62
M	0.66				
M	0.64				
M	0.66				
M	0.66				
M	0.67				
M	0.68				
M	0.66				
M	0.65				
N	0.65				2.78
N	0.64				2.78
N	0.65				2.78
N	0.66				2.78
N	0.65				2.78
N	0.65				2.79
N	0.65				2.78
N	0.65				2.79

Lab Code	Au, g/t	Ag ppm	U M/ICP ppm	U XRF ppm	SG g/cc
O	0.68				
O	0.70				
O	0.72				
O	0.64				
O	0.66				
O	0.66				
O	0.66				
O	0.64				
P	0.68		90		2.47
P	0.67		96		2.57
P	0.68		97		2.48
P	0.69		88		2.50
P	0.67		94		2.49
P	0.67		96		2.58
P	0.70		98		2.67
P	0.70		100		2.46
Q	0.65	1.00	98	100	2.80
Q	0.69	0.50	95	90	2.80
Q	0.67	0.50	97	100	2.79
Q	0.68	0.50	94	100	2.80
Q	0.64	0.50	97	100	2.77
Q	0.66	0.50	97	100	2.79
Q	0.68	0.50	95	90	2.76
Q	0.66	0.50	94	100	2.76
R	0.68		96	95	2.75
R	0.68		98	95	2.75
R	0.67		94	95	2.75
R	0.70		98	97	2.75
R	0.66		93	96	2.75
R	0.70		91	98	2.75
R	0.68		95	97	2.74
R	0.68		93	95	2.75
S	0.67	0.57	87		2.79
S	0.68	0.55	95		2.81
S	0.70	0.58	97		2.71
S	0.68	0.57	94		2.74
S	0.67	0.60	91		2.77
S	0.67	0.53	89		2.74
S	0.65	0.58	89		2.73
S	0.67	0.52	91		2.76

Lab Code	Au, g/t	Ag ppm	U M/ICP ppm	U XRF ppm	SG g/cc
T	0.62		87	110	2.72
T	0.62		90	110	2.71
T	0.64		88	110	2.73
T	0.62		89	110	2.74
T	0.63		88	110	2.71
T	0.61		86	110	2.71
T	0.63		84	120	2.75
T	0.62		89	110	2.72
U	0.62	0.90	96		
U	0.64	0.70	89		
U	0.63	1.00	93		
U	0.64	0.90	94		
U	0.59	0.70	93		
U	0.64	1.90	90		
U	0.62	0.70	93		
U	0.66	0.80	95		
V	0.66				
V	0.69				
V	0.70				
V	0.76				
V	0.77				
V	0.66				
V	0.72				
V	0.76				
W	0.72			102	2.54
W	0.73			101	2.72
W	0.75			101	2.26
W	0.70			102	2.55
W	0.71			102	2.74
W	0.68			101	2.56
W	0.65			103	2.73
W	0.69			101	2.64

Availability: This product is available in Laboratory Packs containing 1kg of material or in Explorer Packs containing client specified weights of material from 50g up to 250g. Laboratory Packs are sealed bottles delivered in sealed foil pouches. Explorer Packs contain material in standard geochem envelopes placed into foil pouches that are nitrogen flushed and vacuum sealed.

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.

28 March 2008

Certifying officers:



African Mineral Standards: _____

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



Geochemist: _____

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

APPENDIX

Major element statistics

The major element chemistry has been calculated, from predominantly XRF data submitted by fifteen of the laboratories, from the eight samples sent to each lab. Uncertified but iterated statistics from this data are:

	mean	2SD	RSD%	n	unit
Al ₂ O ₃	6.14	0.27	2.2	78	%
CaO	1.95	0.06	1.4	76	%
Cr ₂ O ₃	0.08	0.01	6.6	72	%
Fe M/ICP	2.22	0.19	4.2	83	%
Fe ₂ O ₃	3.18	0.15	2.3	85	%
K ₂ O	1.80	0.06	1.5	77	%
LOI	2.36	0.33	6.9	76	%
MgO	0.56	0.04	3.5	71	%
MnO	0.10	0.01	5.6	78	%
Na ₂ O	0.31	0.04	7.0	62	%
P ₂ O ₅	0.06	0.01	8.6	68	%
S	0.23	0.03	6.3	69	%
SiO ₂	82.3	1.2	0.7	75	%
TiO ₂	0.28	0.02	3.4	87	%

APPENDIX (cont)

Trace element statistics

The trace element chemistry has been calculated, from data submitted by fifteen of the laboratories, from the eight samples sent to each lab. Uncertified but iterated statistics from this data are:

	mean	2SD	RSD%	n	unit
Ag M/ICP	0.66	0.26	19.9	54	ppm
Al M/ICP	3.24	0.23	3.5	83	%
As M/ICP	176	14	4.1	92	ppm
Ba M/ICP	139	12	4.3	97	ppm
Be M/ICP	1.20	0.22	9.3	86	ppm
Bi M/ICP	1.09	0.13	5.8	69	ppm
Ca M/ICP	1.40	0.14	5.2	98	%
Cd M/ICP	1.33	0.38	14.2	86	ppm
Ce M/ICP	258	20	3.8	76	ppm
Co (M/ICP)	13.6	2.4	8.8	93	ppm
Cr M/ICP	462	94	10.2	78	ppm
Cs M/ICP	3.04	0.38	6.2	47	ppm
Cu M/ICP	117	12	5.2	101	ppm
Dy M/ICP	10.6	1.0	4.7	37	ppm
Er M/ICP	5.54	1.26	11.3	48	ppm
Eu M/ICP	0.94	0.09	4.7	38	ppm
Ga M/ICP	9.78	2.15	11.0	85	ppm
Gd M/ICP	11.8	1.2	5.0	37	ppm
Ge M/ICP	0.40	0.48	59.4	30	ppm
Hf M/ICP	5.55	0.79	7.1	59	ppm
Ho M/ICP	1.97	0.39	9.8	48	ppm
In M/ICP	0.02	0.01	18.2	44	ppm
K M/ICP	1.46	0.15	5.1	93	%
La M/ICP	136	12	4.6	92	ppm
Li M/ICP	20.5	2.1	5.1	81	ppm
Lu M/ICP	0.82	0.20	12.3	48	ppm
Mg M/ICP	0.33	0.03	4.6	79	ppm
Mn M/ICP	762	79	5.2	93	ppm
Mo M/ICP	23.4	3.9	8.3	100	ppm
Na M/ICP	0.22	0.02	5.4	100	ppm
Nb M/ICP	27.7	7.7	13.9	86	ppm
Nd M/ICP	81.8	8.0	4.9	40	ppm
Ni (M/ICP)	44.0	6.3	7.2	94	ppm
P M/ICP	248	60	12.2	86	ppm
Pb M/ICP	83.8	7.3	4.3	77	ppm
Pr M/ICP	25.7	2.4	4.6	37	ppm
Rb M/ICP	89.7	9.2	5.1	75	ppm
Re M/ICP	0.00	0.00	39.9	24	ppm
Sb M/ICP	27.9	3.9	7.1	100	ppm
Sc M/ICP	4.10	0.70	8.6	61	ppm
Se M/ICP	1.48	1.15	39.0	30	ppm
Sm M/ICP	14.8	1.3	4.3	39	ppm
Sn M/ICP	4.00	0.41	5.2	64	ppm
Sr M/ICP	41.4	4.0	4.8	94	ppm
Ta M/ICP	6.26	2.47	19.7	70	ppm
Tb M/ICP	1.75	0.15	4.2	38	ppm
Te M/ICP	0.07	0.03	24.1	14	ppm
Th M/ICP	73.8	7.9	5.3	78	ppm
Ti M/ICP	0.15	0.04	11.9	107	ppm
Tl M/ICP	0.56	0.07	6.3	62	ppm
Tm M/ICP	0.86	0.19	11.0	45	ppm
V M/ICP	28.6	2.8	4.9	72	ppm
W M/ICP	1.39	0.35	12.4	69	ppm
Y M/ICP	58.3	7.3	6.3	91	ppm
Yb M/ICP	5.97	0.44	3.7	38	ppm
Zn M/ICP	207	25	6.0	100	ppm
Zr M/ICP	151	28	9.3	85	ppm