

African Mineral Standards

Certificate of Analysis

**Gold, tails grade, siliceous matrix
multi-element reference material
made from the Dominion Reef, South Africa
*Supplementary Certificate for the Major and Minor
Elements***

AMIS0045

**Recommended Concentration and two "Between
Laboratory" Standard Deviations**

Major Element Certified Concentrations

Al ₂ O ₃	4.88	+-	0.37	%
Fe ₂ O ₃	3.25	+-	0.23	%
K ₂ O	1.35	+-	0.12	%
MnO	0.11	+-	0.01	%
SiO ₂	87.7	+-	0.12	%

Major Element Provisional Concentrations

CaO	0.17	+-	0.03	%
LOI	0.93	+-	0.22	%
MgO	0.41	+-	0.06	%
S	0.26	+-	0.03	%
TiO ₂	0.28	+-	0.05	%

Major Element Indicated Means

Na ₂ O	0.026	%
P ₂ O ₅	0.065	%

(Continued p2)

Minor Element Certified Concentrations

As	104	+-	8.6	ppm
Ce	416	+-	42	ppm
La	225	+-	23	ppm
Li	19	+-	1.6	ppm
Rb	73	+-	6.6	ppm
Sn	6	+-	0.7	ppm
Th	120	+-	11.3	ppm
Zn	239.5	+-	21.9	ppm

Minor Element Provisional Concentrations

Ba	88	+-	13	ppm
Co	22	+-	4	ppm
Cu	122	+-	19	ppm
Gd	19	+-	2.7	ppm
Hf	9	+-	1.2	ppm
Ho	2.7	+-	0.6	ppm
Mo	49.6	+-	6.1	ppm
Nb	48.9	+-	9.4	ppm
Ni	52.8	+-	9.1	ppm
Pb	156	+-	26	ppm
Sb	34.2	+-	7.6	ppm
Sc	4.6	+-	0.8	ppm
Sm	24.0	+-	1.6	ppm
Sr	12.8	+-	1.7	ppm
Ta	11.7	+-	2.4	ppm
Tm	1.1	+-	0.2	ppm
V	15.4	+-	2.5	ppm
W	1.1	+-	0.2	ppm
Y	77.1	+-	9.1	ppm
Zr	278	+-	59.8	ppm

Minor Element Indicated Means

Ag	1.06	ppm
Be	0.97	ppm
Bi	2.2	ppm
Cd	1.7	ppm
Cr	567	ppm
Eu	1.2	ppm
Ga	8.3	ppm

Intended use: AMIS0045 was primarily produced to monitor the accuracy of a single analysis of gold ores hosted by siliceous rocks.

The additional geochemical data gathered however also enables its use as a uranium standard and for routine quality control during geochemical exploration programs, by insertion within a batch of stream sediment or soil samples.

It can also be used by laboratories for method development and for the calibration of equipment.

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.

Mineral Composition: The other currently certified values for this material are:

Provisional Concentration

Au (Pb Collection) 0.221 ± 0.032 g/t

Certified Concentrations

U (T/ICP)	83	±	12	ppm**
U (XRF)	87	±	12	ppm**
Specific Gravity	2.76	±	0.13	g/cc

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.

Supplementary analysis methods requested:

1. Multi-acid total digestion, including HF, ICP-OES or MS multi-element scan.
2. XRF fusion whole rock analysis.

Method of certification: Fourteen laboratories were each given eight randomly selected packages of sample and reported major element determinations. Eleven laboratories reported minor elements as well.

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 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 calculated using all remaining data. Any analysis that fell outside of the mean ± 2 standard deviations was removed from the ensuing data base. The mean and standard deviations were again calculated using the remaining data. This method is different from that used by Government agencies 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 Confidence Limits published on other standards. Standards with an RSD of near or less than 5 % are certified, RSD's of between near 5 % and 15 % are Provisional, and RSD's over 15 % are Indicated. The tables below represent raw data received from the laboratories.

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

Major Element Analyses

Lab Code	Al ₂ O ₃ %	CaO %	Fe ₂ O ₃ %	K ₂ O %	LOI %	MgO %	MnO %	Na ₂ O %	P ₂ O ₅ %	S %	SiO ₂ %	TiO ₂ %
A	4.830	0.150	3.190	1.360		0.390	0.110	0.030	0.080	0.200	88.230	0.300
A	4.910	0.160	3.220	1.390		0.390	0.110	0.020	0.090	0.200	88.110	0.310
A	4.920	0.170	3.140	1.350		0.390	0.110	0.030	0.070	0.200	88.210	0.310
A	4.940	0.170	3.200	1.390		0.390	0.110	0.030	0.080	0.200	87.750	0.310
A	4.750	0.140	3.150	1.360		0.360	0.110	0.030	0.110	0.200	87.590	0.300
A	4.950	0.160	3.180	1.370		0.390	0.110	0.020	0.060	0.200	87.740	0.310
A	4.840	0.160	3.110	1.350		0.390	0.110	0.020	0.070	0.200	87.730	0.300
A	4.850	0.160	3.180	1.360		0.390	0.110	0.020	0.080	0.200	87.410	0.300
B	4.422	0.126	3.503			0.348	0.109	0.066				0.167
B	4.347	0.112	3.417			0.348	0.106	0.063				0.183
B	4.422	0.126	3.488			0.348	0.108	0.064				0.167
B	4.366	0.112	3.446			0.348	0.106	0.065				0.183
B	4.441	0.126	3.474			0.348	0.109	0.064				0.183
B	4.385	0.126	3.446			0.348	0.108	0.064				0.167
B	4.366	0.112	3.474			0.348	0.105	0.063				0.167
B	4.403	0.112	3.474	1.012		0.348	0.107	0.066				0.167
C	4.820	0.180	3.310	1.420	1.060	0.410	0.120	0.100	0.090	0.275	86.990	0.300
C	4.780	0.180	3.310	1.400	1.020	0.410	0.110	0.020	0.120	0.275	87.200	0.280
C	4.830	0.180	3.320	1.420	0.950	0.410	0.120	0.020	0.100	0.278	88.130	0.290
C	4.780	0.180	3.280	1.410	1.030	0.410	0.120	0.040	0.090	0.280	87.370	0.280
C	4.810	0.180	3.310	1.410	1.010	0.410	0.120	0.090	0.120	0.280	86.710	0.300
C	4.790	0.180	3.280	1.410	0.980	0.410	0.110	0.050	0.130	0.282	86.820	0.280
C	4.840	0.180	3.320	1.430	1.010	0.410	0.120	0.010	0.100	0.276	87.550	0.280
C	4.810	0.180	3.290	1.420	0.980	0.410	0.120	0.100	0.090	0.279	87.370	0.280
D	4.517	0.154	3.031	1.205		0.364	0.104	0.013	0.055	0.240		0.230
D	4.687	0.154	3.145	1.253		0.364	0.106	0.013	0.060	0.250		0.237
D	4.649	0.154	3.117	1.253		0.364	0.105	0.013	0.060	0.250		0.239
D	4.668	0.154	3.145	1.253		0.364	0.107	0.013	0.060	0.250		0.242
D	4.630	0.154	3.117	1.253		0.364	0.106	0.013	0.057	0.250		0.244
D	4.574	0.154	3.060	1.229		0.364	0.105	0.013	0.057	0.250		0.239
D	4.649	0.154	3.102	1.241		0.364	0.105	0.013	0.060	0.250		0.242
D	4.630	0.154	3.102	1.241		0.364	0.106	0.013	0.060	0.250		0.234
E	5.160	0.150	3.210	1.340	0.950	0.450	0.110	0.040	0.060	0.240	87.550	0.260
E	5.160	0.150	3.230	1.340	0.960	0.450	0.110	0.030	0.060	0.240	87.490	0.260
E	5.110	0.150	3.170	1.330	0.980	0.460	0.100	0.040	0.060	0.240	87.740	0.260
E	5.120	0.160	3.200	1.330	0.990	0.440	0.110	0.040	0.060	0.240	87.630	0.270
E	5.160	0.150	3.220	1.350	0.960	0.450	0.110	0.040	0.060	0.240	87.570	0.270
E	5.120	0.150	3.240	1.330	0.950	0.440	0.110	0.040	0.060	0.200	87.510	0.260
E	5.090	0.150	3.170	1.330	0.940	0.450	0.100	0.050	0.060	0.250	87.440	0.260
E	5.120	0.150	3.180	1.330	0.940	0.440	0.100	0.050	0.060	0.260	87.810	0.270

Major Element Analyses (cont)

Lab Code	Al2O3 %	CaO %	Fe2O3 %	K2O %	LOI %	MgO %	MnO %	Na2O %	P2O5 %	S %	SiO2 %	TiO2 %
F	4.555	0.183	3.446	1.313		0.400	0.104	0.027	0.069			0.291
F	4.649	0.179	3.517	1.337		0.406	0.107	0.026	0.069			0.281
F	4.630	0.182	3.503	1.337		0.408	0.105	0.026	0.069			0.274
F	4.668	0.180	3.531	1.325		0.408	0.107	0.028	0.069			0.294
F	4.498	0.181	3.403	1.313		0.411	0.106	0.028	0.069			0.296
F	4.347	0.171	3.288	1.265		0.395	0.102	0.028	0.069			0.298
F	4.574	0.172	3.460	1.325		0.398	0.104	0.026	0.069			0.311
F	4.574	0.187	3.460	1.325		0.411	0.105	0.031	0.069			0.301
G	4.571	0.161	3.474	1.307	0.750	0.394	0.108	0.024	0.035	0.248	87.210	0.249
G	4.700	0.164	3.560	1.346	0.760	0.403	0.109	0.024	0.035	0.252	87.450	0.255
G	4.789	0.169	3.631	1.370	0.630	0.412	0.111	0.024	0.036	0.256	87.240	0.267
G	4.666	0.163	3.531	1.331	0.750	0.400	0.110	0.024	0.035	0.254	87.610	0.254
G	4.758	0.168	3.603	1.355	0.640	0.408	0.112	0.025	0.036	0.253	86.360	0.245
G	4.716	0.165	3.589	1.337	0.750	0.406	0.109	0.024	0.035	0.254	87.380	0.246
G	4.912	0.172	3.732	1.402	0.700	0.423	0.114	0.025	0.036	0.265	87.060	0.261
G	4.770	0.168	3.617	1.359	0.730	0.409	0.111	0.024	0.036	0.255	86.800	0.259
H	4.950	0.163	3.128	1.358		0.400	0.108		0.063	0.231	88.800	0.310
H	4.920	0.165	3.151	1.363		0.384	0.107		0.063	0.231	88.600	0.312
H	4.960	0.163	3.134	1.356		0.393	0.107		0.063	0.234	88.600	0.315
H	4.940	0.164	3.148	1.358		0.395	0.106		0.063	0.229	88.300	0.311
H	4.950	0.163	3.146	1.367		0.399	0.106		0.064	0.232	88.700	0.312
H	4.930	0.164	3.147	1.358		0.396	0.109		0.061	0.229	88.600	0.311
H	4.940	0.163	3.113	1.362		0.399	0.107		0.065	0.233	88.400	0.312
H	4.950	0.164	3.078	1.361		0.387	0.108		0.062	0.234	88.600	0.307
I	5.235	0.098	3.689	1.277		0.448	0.117					0.183
I	5.292	0.112	3.746	1.277		0.448	0.118					0.183
I	5.159	0.098	3.703	1.253		0.448	0.118					0.183
I	5.273	0.098	3.760	1.277		0.448	0.119					0.183
I	5.008	0.098	3.717	1.241		0.448	0.118					0.167
I	5.103	0.098	3.689	1.241		0.448	0.117					0.183
I	4.876	0.098	3.674	1.241		0.448	0.116					0.167
I	5.065	0.098	3.689	1.217		0.448	0.117					0.167
J	4.938	0.184	3.257	1.323		0.441	0.118	0.025	0.070	0.283		0.242
J	4.986	0.184	3.301	1.341		0.449	0.120	0.025	0.072	0.284		0.241
J	4.939	0.181	3.241	1.330		0.447	0.119	0.025	0.071	0.285		0.238
J	4.955	0.194	3.240	1.330		0.450	0.119	0.025	0.071	0.288		0.244
J	4.971	0.183	3.335	1.336		0.438	0.120	0.024	0.070	0.283		0.243
J	4.956	0.182	3.286	1.333		0.439	0.119	0.024	0.071	0.282		0.242
J	4.993	0.182	3.288	1.344		0.446	0.119	0.024	0.072	0.281		0.246
J	4.962	0.186	3.298	1.335		0.441	0.118	0.025	0.071	0.284		0.248
K	4.300	0.200	3.310	1.380	1.070		0.100		0.050		88.375	0.300
K	4.300	0.210	3.300	1.390	1.047		0.100		0.050		88.072	0.310
K	4.600	0.210	3.370	1.390	1.068		0.100		0.050		88.173	0.310
K	4.300	0.200	3.190	1.380	1.005		0.100		0.050		88.557	0.300
K	4.200	0.220	3.570	1.410	1.018		0.100		0.050		88.264	0.300
K	4.700	0.220	3.290	1.390	1.039		0.100		0.050		88.860	0.300
K	4.800	0.240	3.210	1.420	1.065		0.100		0.050		87.971	0.310
K	4.800	0.360	3.150	1.640	1.048		0.100		0.080		87.971	0.320
L	5.103	0.234	3.102			0.381	0.110	0.043	0.066			0.300
L	5.141	0.204	3.088			0.414	0.114	0.058	0.082			0.300
L	5.103	0.221	3.203			0.398	0.118	0.032	0.073			0.300
L	4.989	0.182	3.102			0.414	0.118	0.046	0.073			0.284
L	5.103	0.214	2.988			0.381	0.110	0.055	0.071			0.284
L	5.273	0.241	3.217			0.398	0.114	0.078	0.073			0.300
L	4.781	0.214	2.917			0.414	0.118	0.036	0.078			0.267
L	4.895	0.185	3.031			0.414	0.118	0.047	0.066			0.284
M	4.860	0.170	3.250	1.390	0.874	0.400	0.110		0.070	0.253	87.700	0.300
M	4.860	0.170	3.260	1.390	0.861	0.400	0.110		0.070	0.257	87.800	0.300
M	4.830	0.170	3.240	1.390	0.844	0.400	0.110	0.020	0.070	0.261	87.700	0.290
M	4.820	0.170	3.240	1.390	0.846	0.400	0.110	0.010	0.070	0.261	87.700	0.300
M	4.840	0.170	3.260	1.390	0.908	0.400	0.110	0.010	0.070	0.261	87.600	0.300
M	4.820	0.170	3.280	1.400	0.859	0.400	0.110	0.010	0.070	0.257	87.800	0.300
M	4.840	0.170	3.240	1.390	0.795	0.400	0.110		0.070	0.261	87.900	0.300
M	4.850	0.170	3.250	1.380	0.854	0.400	0.110		0.070	0.261	87.600	0.290
N	4.989	0.196	3.303	1.446		0.414	0.116	0.027	0.069	0.260	88.135	0.300
N	4.895	0.168	3.317	1.409		0.398	0.117	0.027	0.069	0.255	85.568	0.317
N	4.989	0.196	3.317	1.458		0.398	0.116	0.027	0.069	0.265	85.568	0.284
N	4.970	0.196	3.245	1.421		0.398	0.116	0.027	0.069	0.265	86.210	0.284
N	4.876	0.168	3.303	1.409		0.398	0.112	0.027	0.069	0.260	86.424	0.284
N	4.970	0.196	3.374	1.409		0.414	0.112	0.027	0.069	0.260	88.135	0.317
N	4.989	0.168	3.245	1.421		0.398	0.114	0.027	0.080	0.265	85.568	0.284
N	5.008	0.196	3.317	1.446		0.414	0.115	0.027	0.069	0.260	87.921	0.317

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

1. ACME Analytical Laboratories Ltd., (Canada).
2. ALS Chemex South Africa (Pty) Ltd.
3. ALS Chemex, (Vancouver, Canada).
4. Amdel Limited, (Perth, Australia).
5. Ammtec Ltd., (Western Australia).
6. Assayers Canada, (Vancouver).
7. Genalysis Laboratory Services (Pty) Ltd., (Australia).
8. Geoservice Centre, Geolaboratory, (GTK. Finland).
9. OMAC Laboratories (Ireland).
10. Pt Intertek Utama Services (Intertek, Indonesia)
11. Set Point Laboratories (Pty) Ltd (South Africa)
12. SGS Lakefield Research Africa (Pty) Ltd. (Joburg, South Africa)
13. SGS Welshpool (Australia).
14. Ultra Trace (Pty) Ltd. (Australia)

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.

23 November 2007

Certifying officers:



African Mineral Standards: _____

Mike McWha
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Geochemist: _____

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