

## Witwatersrand Gold Standard High Ore Grade Reference Material

AMIS0028

### *Certificate of Analysis*

#### Certified Concentration and two “Between Laboratory” Standard Deviations

Gold:  $89.4 \pm 5.103$  g/t  
U by multi acid digestion:  $4673^* \pm 427^*$  ppm  
U by XRF:  $4732^* \pm 267^*$  ppm  
Specific Gravity:  $2.81 \pm 0.22$  g/cc.

#### Indicated Concentration

Silver: 9.67 ppm

(\* Or, by applying a chemical conversion factor of  $U \times 1.1793 = U_3O_8$   
 $U_3O_8$  by multi acid digestion:  $5511 \pm 504$  ppm  
 $U_3O_8$  by XRF:  $5580 \pm 315$  ppm)

**Intended use:** AMIS0028 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, 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 grade-sorted pulp rejects sourced from Anglo Gold Ashanti mine assay laboratories in South Africa. It represents sample material from the basal contacts of the Vaal Reef and the Carbon Leader Reef collected during routine underground sampling.

**Approximate mineral and chemical composition:** The major gangue mineral is quartz with minor pyrite, uraninite and thucolite. Gold occurs primarily as discrete grains.

The chemical composition, based on an average of 32 analyses from 6 laboratories, is as follows.

SiO <sub>2</sub>	S <sub>2</sub> O <sub>3</sub>	Fe <sub>2</sub> O <sub>3</sub>	Al <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	MgO
%	%	%	%	%	%
81.70	7.78	6.44	3.67	0.65	0.62
CaO	TiO <sub>2</sub>	Na <sub>2</sub> O	P <sub>2</sub> O <sub>5</sub>	MnO	LOI
%	%	%	%	%	%
0.28	0.18	0.14	0.06	0.06	3.95

**Method of preparation:** The material was crushed, dry-milled and air-classified to 100% <54µm. Wet sieve particle size analysis of random samples confirmed the material was 100% <54µm. 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. ICP-OES, Pb collection.
2. U and Ag. Multi-acid total digestion, including HF, ICP-OES or MS.
3. U, XRF fusion.
4. SG ( gas pycnometer )

**Method of certification:** Nineteen laboratories were each given eight randomly selected packages of sample. The results from the eighteen laboratories that issued results timeously were used. Results are set out below:

AMIS0028

Lab Code	Au g/t-ppm	Ag g/t-ppm	U (Total) ppm	U (XRF) ppm	SG g/cc
A	89.8	10.4			
A	89.1	10.1			
A	90.2	10.5			
A	89.6	10.6			
A	90.5	10.7			
A	90.0				
A	87.6	10.2			
A	90.0	9.4			
B	88.5	10.0		4370	2.904
B	89.2	10.5		4379	3.024
B	87.5	10.2		4501	3.040
B	88.4	9.7			2.831
B	87.4	10.6		4555	2.818
B	89.4	10.2		4473	2.945
B	88.2	12.3		4461	3.095
B	89.0	10.9		4569	3.078
C	93.4	10.5	4760		
C	92.1	10.2	4770		
C	91.9	10.3	4620		
C	94.8	10.7	4690		
C	91.6	10.1	4290		
C	92.5	10.6	4620		
C	97.6	10.0	4780		
C	93.6	10.2	4710		
D	84.2	8.5	4350	4670	2.720
D	89.1	9.0	4650	4690	2.720
D	89.5	8.5	4400	4720	2.690
D	91.9	10.0	4590	4660	2.720
D	90.3	10.0	4650	4700	2.680
D	87.8	9.0	4640	4700	2.720
D	89.3	9.5	4710	4650	2.710
D	90.4	9.0	4410	4680	2.690
E	94.0	7.0	4700	4700	2.750
E	92.0	6.0	4100	4740	2.750
E	94.0	4.0	4100	4730	2.740
E	90.0	7.0	4300	4710	2.740
E	91.0	5.0	4300	4690	2.740
E	92.0	7.0	4800	4800	2.750
E	92.0	5.0	4800	4690	2.750
E	92.0	8.0	4700	4730	2.740
F	86.6	11.6			
F	86.9	12.2			
F	82.4	12.6			
F	85.9	12.7			
F	82.8	11.5			
F	87.2	12.2			
F	86.8	12.7			
F	88.5	12.6			
G	91.5	10.0	4900	4888	
G	92.2	11.0	4900	4928	
G	90.9	10.0	4900	4910	
G	91.8	10.0	4900	4899	
G	92.8	11.0	4900	4915	
G	90.5	10.0	5000	4906	
G	91.2	10.0	4900	4921	
G	91.7	10.0	4900	4909	
H	89.3	9.0	4500		2.640
H	92.7	9.0	4300		2.650
H	92.0	9.0	4400		2.640
H	84.1	9.0	4300		2.650
H	86.0	9.0	4000		2.640
H	90.1	9.0	4400		2.660
H	87.6	9.0	4400		2.650
H	84.6	8.0	4400		2.650
I	84.6	8.3		4500	2.490
I	81.7	8.9		4600	2.460
I	83.0	8.7		4600	2.430
I	82.7	8.6		4600	2.440
I	85.0	9.1		4500	2.600
I	85.5	9.3		4600	2.510
I	82.7	8.7		4600	2.510
I	84.2	8.9		4600	2.570
J	85.3	10.6	4650	4783	2.950
J	83.5	10.1	4760	4774	2.960
J	84.0	10.9	4900	4707	2.970
J	84.9	11.1	4920	4690	2.980
J	84.6	12.1	5080	4859	3.010
J	86.0	11.6	5000	4715	3.000
J	85.2	10.2	4780	4749	2.990
J	83.4	10.4	4860	4766	2.940

Lab Code	Au g/t-ppm	Ag g/t-ppm	U (Total) ppm	U (XRF) ppm	SG g/cc
K	89.6				
K	91.8				
K	90.3				
K	90.1				
K	91.7				
K	89.7				
K	92.1				
K	91.3				
L	89.8	8.1	4860	4790	
L	89.8	8.5	4590	4770	
L	89.7	8.5	4500	4780	
L	90.7	8.7	4780	4790	
L	89.9	8.2	4980	4760	
L	91.4	8.4	4740	4760	
L	91.6	8.4	4760	4750	
L	90.0	8.0	4730	4730	
M	78.6	8.0	5130	4636	
M	77.9	8.3	4670	4664	
M	79.8	8.6	4990	4639	
M	75.4	8.2	4840	4647	
M	78.2	7.5	4730	4651	
M	72.7	7.9	4790	4646	
M	78.5	7.6	4400	4665	
M	78.6	8.2	4480	4635	
N		10.1			
N		11.8			
N		11.1			
N		10.9			
N		10.7			
N		10.9			
N		10.0			
N		10.1			
O					2.870
O					2.880
O					2.870
O					2.870
O					2.880
O					2.890
O					2.880
O					2.880
P	91.2	8.1	4532		2.790
P	90.1	9.2	4522		2.830
P	90.7	9.0	4555		2.810
P	90.9	9.9	4449	4681	2.850
P	91.5	9.6	4562	4657	
P	89.5	9.0	4514	4691	2.900
P	89.4	9.2	4534		2.790
P	90.4	9.4	4579	4695	
Q	91.7				
Q	90.0				
Q	89.6				
Q	91.3				
Q	90.9				
Q	90.1				
Q	89.6				
Q	89.7				
R					
R					
R					
R					
R					
R					
R					
R					
R					
S	88.0				4989
S	88.7				4933
S	86.7				4983
S	91.8				4994
S	86.2				4899
S	87.9				4959
S	89.3				4972
S	87.0				4965

The mean and standard deviation for all data was calculated. Outliers were defined as samples beyond the mean  $\pm$  2 Standard Deviations from all data. These outliers were removed from the data (italicized) and a new mean and standard deviation was determined. 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. Activation Laboratories Ltd., (ActLabs, Ancaster, On Canada)..
3. Anglo Gold Ashanti – Vaal River Laboratory (South Africa).
4. Anglo Gold Ashanti – West Wits Laboratory (South Africa).
5. ALS Chemex Labs Ltd. (Canada).
6. ALS Chemex South Africa ( Pty ) Ltd.
7. Anglo American Research Laboratories ( Pty ) Ltd. (South Africa).
8. Assayers Canada (Vancouver).
9. Genalysis Laboratory Services ( Pty ) Ltd. (Australia).
10. Gold Fields Limited Driefontein Assay Laboratory (South Africa).
11. Geoservice Centre, Geolaboratory, (GTK, Finland).
12. Performance Laboratories (South Africa).
13. Pt Intertek Utama Services (Intertek, Indonesia).
14. Set Point Laboratories ( Pty ) Ltd. (South Africa).
15. SGS Lakefield Research Africa (Johannesburg, South Africa).
16. SGS Welshpool Minerals – (Australia).
17. SRC Labs., (Canada).
18. 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.

3 March 2007

**Certifying officers:**



**African Mineral Standards:** \_\_\_\_\_

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



**Geochemist:** \_\_\_\_\_

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