

# African Mineral Standards

## *Certificate of Analysis*

Gold Ore Reference Material,  
low grade, carbonate matrix,  
from Navachab Gold Mine,  
Namibia.

AMIS0049

**Recommended Concentration and two “Between  
Laboratory” Standard Deviations**

### *Certified Concentrations*

Gold:  $0.677 \pm 0.062$  g/t

Specific Gravity:  $2.83 \pm 0.22$  g/cc

**Intended Use:** AMIS0049 is suitable for monitoring the accuracy of a single analysis of gold ores hosted by carbonate matrix 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 using ore sourced from the AngloGold Ashanti (Namibia) Ltd - Navachab Gold Mine. This mine is located in Namibia, 10km southwest of Karibib and 170km west northwest of Windhoek. The orebody is located in the Central Zone of the Pan-African Damara Orogen. Gold mineralization is hosted by a steeply dipping metamorphosed sequence of interbedded siliciclastic and carbonate rocks. All lithological units contain mineralization to some extent within sheeted quartz veins. The calc-silicate/marble unit (MC) hosts higher-grade replacement skarnoid mineralization. Carbonate rich ore for this material was blended from selected RC borehole chips.

**Approximate Mineral and Chemical Composition:** The major gangue minerals are quartz, calcite, feldspar and dolomite with minor garnet, hornblende, diopside, ilmenite, biotite and tremolite. Sulphides comprise pyrrhotite; subordinate pyrite, chalcopyrite and traces of bismuth, bismuthinite, sphalerite and galena. Gold occurs as free gold with minor maldonite (gold-bismuth alloy). Approximately ±75% of the gold is <54µ.

The chemical composition as determined by XRF by three analyses from one laboratory is as follows.

CaO	%	28.93	Na <sub>2</sub> O	%	0.0667
MgO	%	16.40	BaO	%	0.0180
SiO <sub>2</sub>	%	11.73	SrO	%	0.0167
Al <sub>2</sub> O <sub>3</sub>	%	2.31	Cr <sub>2</sub> O <sub>3</sub>	%	0.0067
Fe <sub>2</sub> O <sub>3</sub>	%	1.37	CuO	%	0.0057
K <sub>2</sub> O	%	0.67	SnO <sub>2</sub>	%	0.0057
SO <sub>3</sub>	%	0.25	ZnO	%	0.0023
MnO	%	0.12	NiO	%	0.0013
P <sub>2</sub> O <sub>5</sub>	%	0.11	Rb <sub>2</sub> O	%	0.0003
TiO <sub>2</sub>	%	0.10			

**Appearance:** The material is a very fine powder coloured Very Light Grey (Corstor Colour Gauge - 5Y 8/1).

**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. Explorer Packs are subdivided from the Laboratory packs as required. Samples were randomly selected for homogeneity testing and third party analysis. Statistical analysis of both homogeneity and the consensus test results were carried out by independent statisticians.

**Method of Analysis:** ICP-OES or ICP-MS, Pb collection for Au. Specific gravity either by gas pycnometer or by water displacement using a pycnometer bottle.

**Method of Certification:** Twenty laboratories were each given eight randomly selected packages of sample. Results were received from eighteen of those laboratories. The results were used for the Au and SG determinations are set out below:

Lab Code	Au, g/t	SG, g/cc	Lab Code	Au, g/t	SG, g/cc
A	0.650	2.680	K	0.695	
A	0.650	2.700	K	0.711	
A	0.710	2.590	K	0.683	
A	0.720	2.670	K	0.735	
A	0.660	2.540	K	0.685	
A	0.680	2.550	K	0.704	
A	0.660	2.620	K	0.684	
A	0.700	2.540	K	0.701	
B	0.795		L	0.690	
B	0.778		L	0.670	
B	0.774		L	0.700	
B	0.697		L	0.680	
B	0.737		L	0.680	
B	0.812		L	0.680	
B	0.660		L	0.680	
B	0.719		L	0.690	
C	0.647	2.780	M	0.760	
C	0.652	2.840	M	0.700	
C	0.712	2.790	M	0.770	
C	0.651	2.770	M	0.710	
C	0.629	2.730	M	0.750	
C	0.646	2.800	M	0.740	
C	0.665	2.690	M	0.690	
C	0.630	2.720	M	0.750	
D	0.698		N	0.610	
D	0.689		N	0.630	
D	0.672		N	0.650	
D	0.685		N	0.660	
D	0.661		N	0.680	
D	0.690		N	0.670	
D	0.654		N	0.650	
D	0.646		N	0.670	
E	0.650	2.860	O	0.697	2.840
E	0.680	2.870	O	0.706	2.840
E	0.670	2.860	O	0.683	2.830
E	0.660	2.870	O	0.699	2.840
E	0.650	2.870	O	0.657	2.840
E	0.660	2.860	O	0.662	2.830
E	0.670	2.870	O	0.696	2.830
E	0.650	2.870	O	0.681	2.840
F	0.698		P	1.080	3.040
F	0.683		P	0.675	3.040
F	0.707		P	0.647	3.020
F	0.686		P	0.634	3.050
F	0.686		P	0.651	3.030
F	0.693		P	0.660	3.090
F	0.716		P	0.630	3.060
F	0.735		P	0.683	3.010
G			Q	0.800	
G			Q	0.720	
G			Q	0.600	
G			Q	0.640	
G			Q	0.800	
G			Q	0.680	
G			Q	0.720	
G			Q	0.720	
H	0.630		R	0.640	2.740
H	0.630		R	0.660	2.740
H	0.640		R	0.630	2.770
H	0.660		R	0.640	2.760
H	0.660		R	0.640	2.720
H	0.660		R	0.650	2.740
H	0.650		R	0.650	2.760
H	0.680		R	0.660	2.760
I	0.700	2.950	S	0.690	
I	0.660	2.950	S	0.680	
I	0.670	2.920	S	0.690	
I	0.700	2.970	S	0.700	
I	0.720	3.030	S	0.710	
I	0.700	2.810	S	0.670	
I	0.690	2.960	S	0.700	
I	0.700	2.950	S	0.680	
J			T	0.628	2.780
J			T	0.679	2.740
J			T	0.669	2.780
J			T	0.647	2.760
J			T	0.678	2.780
J			T	0.726	2.770
J			T	0.691	2.760
J			T	0.675	2.760

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 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 the same order as in the table of assays)

1. ACME Analytical Laboratories Ltd., (Canada).
2. AGA - Navachab Gold Mine Laboratory, (Namibia).
3. AGA - Vaal River Laboratory (South Africa).
4. ALS Chemex South Africa ( Pty ) Ltd.
5. ALS Chemex, (Vancouver, Canada).
6. Anglo Research (Crown Campus, South Africa).
7. Assay Analytical Services ( South Africa )
8. Assayers Canada, (Vancouver).
9. Genalysis Laboratory Services ( Pty ) Ltd., (Australia).
10. Geoservice Centre, Geolaboratory, (GTK. Finland).
11. Performance Laboratories, (South Africa).
12. Pt Intertek Utama Services (Intertek, Indonesia)
13. Set Point Laboratories ( Pty ) Ltd (South Africa)
14. SGS Lakefield Research (Canada)
15. SGS Lakefield Research Africa ( Pty ) Ltd. (Joburg, South Africa)
16. SGS Mineral Services - Barberton, (South Africa).
17. SGS Welshpool (Australia).
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.

14 July 2007

**Certifying Officers:**



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