MATRIX REFERENCE MATERIALS
A Part of Torre Industries

AMIS0492

Certified Reference Material

Gold Ore, Greenstone,
Geita Mine, Tanzania

Certificate of Analysis

Recommended Concentrations and Limits[1. 2.]
(at two Standard Deviations)

Certified Concentration

Au Pb Collection	4.0	±	0.19	g/t
Ag 4A_MICP	2.19	±	1.0	ppm
Cu 4A_MICP	50.4	±	9.1	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, 10 and 13.
2. There is additional uncertified element data presented as an appendix.

AMIS
(A Division of Torre Analytical Services (Pty) Limited)
(Reg. No. 1989/000201/07)
A: 11 Avalon Road, West Lake View Ext 11, Modderfontein, South Africa
P: PO Box 856, Isando, 1600, Gauteng, South Africa
T: +27 (0) 11 923-0800
W: www.amis.co.za

Directors: C E Pettit (British), R Naidoo, N N Robinson, K V Gerber, M Padayachee

Torre Industries

MATRIX REFERENCE MATERIALS
A Part of Torre Industries

Provisional Concentration

Al_2O_3 XRF	7.13	±	0.07	%
CaO XRF	2.8	±	0.05	%
Cr_2O_3 XRF	0.07	±	0.01	%
Fe_2O_3 XRF	23.3	±	0.18	%
K_2O XRF	3.0	±	0.03	%
LOI	3.7	±	0.75	%
MgO XRF	2.0	±	0.13	%
MnO XRF	0.11	±	0.01	%
Na_2O XRF	1.7	±	0.09	%
P_2O_5 XRF	0.14	±	0.003	%
SiO_2 XRF	55.76	±	0.24	%
TiO_2 XRF	0.19	±	0.01	%
U 4A_MICP	5.1	±	0.55	ppm

Informational Concentration

S Comb/LECO	2.1	±	0.08	%
SG	3.0	±	0.04	No unit

1. **Intended Use:** AMIS0492 can be used to check the analysis BIF hosted 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 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:** AMIS0492 is a commissioned CRM made from material supplied by Geita Gold Mine, which is wholly owned and operated by Anglogold Ashanti. The Geita Gold Mine is situated 80km south-west of the town of Mwanza in the north-west of Tanzania. The Geita gold deposit is an Archaean mesothermal orebody, located in the Sukumaland Greenstones of the Geita Greenstone Belt. It is largely hosted in a banded ironstone formation (BIF). Mineralisation is found where auriferous fluids, which are interpreted to have moved along shears often on BIF-diorite contacts, reacted with the BIF. Some lower-grade mineralisation can occur in the diorite as well (usually in association with BIF-hosted mineralisation). Approximately 20% of the gold is hosted in the diorite.

3. Approximate Mineral and Chemical Composition: The major gangue mineral is magnetite with quartz, ankerite, and minor pyrrhotite and chalcopyrite. Gold occurs primarily as discrete grains.

4. Appearance: The material is a very fine powder. It is colored Blueish Grey (Corstor 5PB 2.5/1).

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 material was crushed, dry-milled and air-classified to <54um. Wet sieve partic**l**e size analysis of random samples confirmed the material was 98.5% <54um. 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 scientifically selected for homogeneity testing and third party analysis. Statistical analysis of both homogeneity and the consensus test results were carried out by independent statisticians.

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 U (M/ICP)
3. U XRF
4. Majors (Al_2O_3, CaO, Cr_2O_3, Fe_2O_3, K_2O, MgO, MnO, Na_2O, SiO_2, TiO_2,P_2O_5, U_3O_8, LOI.) XRF fusion
5. SG (gas pycnometer)
6. S Combustion/LECO

8. Information requested

1. State aliquots used for all determinations
2. Report all results for gold and uranium 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 scientifically selected packages of sample. Twenty of the laboratories submitted results in time for certification.

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 13), 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 20 out of 25 laboratories that provided results timeously were (not in same order as in the table of assays):

1. ALS Ireland
2. ALS SA
3. ALS Vancouver
4. Antech Zimbabwe
5. Argetest Ankara Turkey
6. BV Ultratrace_Aus
7. BV Namibia
8. Genalysis Perth
9. Gumustas Mad
10. Chemical and Physical Analytical Lab (CPAL) Jordan (JAEC)
11. Nesch Mintec
12. Quality Lab Tanzania
13. Ready Lead Assay
14. Set point Lab Isando
15. SGS Lakefield
16. SGS Townsville
17. SGS Newburn Aus
18. SGS Vancouver Canada
19. Shiva Analytics
20. Sibanya Gold

11. Assay Data: Data as received from the laboratories for the important certified elements listed on p1 and p2 are set out below.

MATRIX REFERENCE MATERIALS
A Part of Torre Industries

Assay data

Pb Coll Au ppm	Pb Coll Au ppm	Pb Coll Au ppm	Pb Coll Au ppm	4A_MICP Cu ppm	4A_MICP Cu ppm	4A_MICP Ag ppm	4A_MICP Ag ppm	4A_MICP U ppm	SG SG No unit	Comb/LECO S %	LOI LOI %
4.28	3.84	4.08	3.31	55	47	2	2	21	3.05	2.13	3.35
4.01	3.9	4.03	3.14	55	47	2	2	9	3.04	2.17	3.43
4.85	3.94	4.03	3.25	60	47	2	2	35	3.05	2.13	3.48
4.22	3.93	4.02	3.13	55	47	2	3	28	3.02	2.19	3.56
4.53	3.87	4.04	3.32	60	46	2	2	14	3.03	2.19	3.5
4.07	3.84	4.08	4	55	47	2	2	37	3.03	2.16	3.43
4.85	3.93	4.05	4	60	47	1.5	2	21	3.01	2.1	3.54
4.21	3.95	4.03	4	55	47	2	2	27	3.03	2.1	3.41
3.95	3.95	4.07	3.98	48.1		2.04	2.65	5.14	3.01	2.12	4.14
3.93	3.99	4.07	3.98	48.8		2.1	2.5	5.49	3	2.11	4.18
3.91	3.93	4.04	4.03	48.4		2.04	2.49	5.3	3.02	2.1	4.25
3.97	3.95	4.09	3.98	48.9		2.05	2.47	5.41	3.01	2.12	4.21
4.11	4.08	4.1	4	50.4		2.22	2.48	5.58	3	2.11	4.21
3.97	3.9	4.08	4.11	46.9		2.08	2.47	5.46	3.01	2.1	4.17
3.94	3.8	4	4.11	47.9		2.28	2.4	5.12	3.01	2.1	4.22
4.1	3.86	4.03	4.14	49.6		2.06	2.75	5.42	3	2.1	4.29
4.03	4.14	3.89	3.8	52		3		5.41	2.95	2.17	3.68
3.95	3.92	4.09	4.15	53		3		4.88	3.06	2.18	3.61
4.03	3.97	3.96	4.01	53		3		5.39	3.08	2.2	3.71
3.96	3.98	3.99	3.91	53		3		5.13	3.01	2.19	3.82
3.97	3.99	3.94	3.91	53		3		5.19	3.02	2.19	3.73
3.9	3.89	3.9	3.89	53		3		5.17	3.06	2.18	3.65
4.02	4.04	3.91	3.88	52		4		5.23	3.02	2.21	3.74
3.95	4.08	3.99	3.93	53		3		4.91	3	2.21	3.76
3.81	4.08	3.95	4.03	47.7		2.05					3.18
4.1	4.18	3.98	3.9	45.3		1.87					3.15
3.9	4.09	3.81	3.94	47.1		1.91					3.19
3.94	4.14	4.1	3.88	45.9		2.04					3.27
3.88	4.29	3.95	3.98	46.5		1.88					3.29
3.93	4.02	3.05	4.01	47.2		1.85					3.25
4	4.08	2.31	4.32	48.7		1.98					3.23
3.86	4.02	2.9	3.99	45.6		1.85					3.18

XRF Al_2O_3 %	XRF CaO %	XRF Cr_2O_3 %	XRF Fe_2O_3 %	XRF K_2O %	XRF MgO %	XRF MnO %	XRF Na_2O %	XRF P_2O_5 %	XRF SiO_2 %	XRF TiO_2 %	XRF U %
7.18	2.79	0.07	23.39	3.04	2.04	0.11	1.76	0.14	55.81	0.2	21
7.14	2.79	0.07	23.34	3.04	2.04	0.11	1.76	0.14	55.76	0.19	9
7.15	2.79	0.07	23.39	3.03	2.04	0.11	1.75	0.14	55.66	0.2	35
7.15	2.79	0.07	23.35	3.04	2.03	0.11	1.75	0.14	55.65	0.2	28
7.16	2.79	0.07	23.35	3.04	2.04	0.11	1.75	0.14	55.75	0.19	14
7.16	2.79	0.07	23.42	3.04	2.04	0.11	1.75	0.14	55.71	0.19	37
7.13	2.79	0.07	23.43	3.05	2.04	0.11	1.75	0.14	55.63	0.2	21
7.15	2.79	0.07	23.43	3.05	2.04	0.11	1.75	0.14	55.72	0.19	27
7.1	2.72	0.07	23.1	3.04	1.9	0.12	1.66	0.14	55.7	0.19	
7.1	2.72	0.08	23.2	3.03	1.9	0.12	1.66	0.14	55.7	0.19	
7.1	2.73	0.08	23.2	3.04	1.9	0.12	1.65	0.14	55.9	0.19	
7.2	2.72	0.08	23.2	3.03	1.9	0.12	1.65	0.14	55.8	0.19	
7.1	2.73	0.07	23.2	3.03	1.9	0.12	1.65	0.14	55.8	0.19	
7.2	2.73	0.08	23.2	3.05	1.9	0.12	1.63	0.14	55.8	0.19	
7.1	2.73	0.08	23.2	3.04	1.9	0.12	1.63	0.14	55.7	0.2	
7.1	2.73	0.07	23.2	3.04	1.9	0.12	1.66	0.14	55.9	0.19	
7.37	2.9	0.07	23.32	3.02	2.03	0.11	1.72		55.6	0.19	
7.39	2.9	0.07	23.29	3.01	2.03	0.12	1.7		55.8	0.19	
7.39	2.9	0.06	23.35	2.99	2.01	0.11	1.75		55.8	0.19	
7.37	2.9	0.06	23.37	3.02	2.02	0.12	1.71		55.8	0.19	
7.39	2.9	0.07	23.39	2.98	2.04	0.11	1.75		56.5	0.19	
7.24	2.8	0.07	23.32	3.01	2.02	0.12	1.71		55.6	0.18	
7.2	2.8	0.07	23.31	3.01	2.02	0.11	1.75		55.2	0.19	
7.1	2.8	0.07	23.46	3	2.01	0.11	1.72		55	0.18	
7.14	2.76								55.59		
7.09	2.78								55.67		
7.08	2.77								55.89		
7.09	2.77								55.59		
7.08	2.76								56.03		
7.07	2.76								55.63		
7.14	2.75								56.02		
7.13	2.77								56		

AMIS
(A Division of Torre Analytical Services (Pty) Limited)
(Reg. No. 1989/000201/07)
A: 11 Avalon Road, West Lake View Ext 11, Modderfontein, South Africa
P: PO Box 856, Isando, 1600, Gauteng, South Africa
T: +27 (0) 11 923-0800
W: www.amis.co.za

Directors: C E Pettit (British), R Naidoo, N N Robinson, K V Gerber, M Padayachee

Torre Industries

MATRIX REFERENCE MATERIALS
A Part of Torre Industries

12. Measurement of Uncertainty: (*ref Dr Hugh Bartlett, Hugh Bartlett Consulting CC.)*

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	0.095	0.001	0.082	0.013
Ag	4A_MICP	ppm	0.510	0.526	0.227	0.217
Cu	4A_MICP	ppm	4.600	5.492	1.379	2.466

1 *S - Std Dev for use on control charts.*
2 *σL - Betw Lab Std Dev, for use to calculate a measure of accuracy.*
3 *SW - Within Lab Std 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 and 2 of this certificate fulfill the AMIS statistical criteria regarding agreement for certification and have been independently validated by Mr Allan W. Fraser.

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: AMIS0492 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, a division of Torre Analytical Services (Pty) Ltd
, Nozibele Mbangula, and Allan W. Fraser; accept no liability for any decisions or actions taken following the use of the reference material.

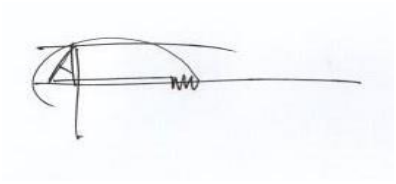
MATRIX REFERENCE MATERIALS
A Part of Torre Industries

12 September 2016
Amended 25 October 2016-Certification of Cu_4A_MICP
Amended 27 October 2016-Certification of Ag_4A_MICP

Certifying Officers:

African Mineral Standards: _____

Nozibele Mbangula



Geochemist:_____

Allan W. Fraser
M.Sc. (Geology), N.D. (Analytical Chem.), Pr.Sci.Nat.

MATRIX REFERENCE MATERIALS
A Part of Torre Industries

Appendix – uncertified element statistics

Element	Gen Method	Std_Mean	N	SD	2SD	RSD_%	Unit
Ag	4A_MICP	2.19	24	0.28	0.57	12.90	ppm
Al	4A_MICP	38183.69	39	1680.91	3361.82	4.40	ppm
Al2O3	XRF	7.13	24	0.04	0.07	0.53	%
Ar	4A_MICP	18.30	24	10.67	21.35	58.34	ppm
Au	4A_MICP	4.04	7	0.05	0.10	1.21	g/t
B	4A_MICP	20.00	4	0.00	0.00	0.00	ppm
Ba	4A_MICP	502.90	31	12.46	24.92	2.48	ppm
Be	4A_MICP	1.28	31	0.08	0.16	6.39	ppm
Bi	4A_MICP	0.88	24	0.07	0.14	8.15	ppm
Ca	4A_MICP	19479.93	40	1092.17	2184.35	5.61	ppm
CaO	4A_MICP	2.86	8	0.05	0.10	1.81	%
CaO	XRF	2.76	24	0.03	0.05	0.99	%
Cd	4A_MICP	0.11	16	0.03	0.06	27.06	ppm
Ce	4A_MICP	29.67	24	2.63	5.26	8.87	ppm
Co	4A_MICP	12.08	32	4.14	8.28	34.27	ppm
Cr	4A_MICP	407.67	24	59.22	118.43	14.53	ppm
Cr2O3	XRF	0.07	24	0.01	0.01	8.56	%
Cs	4A_MICP	5.98	24	0.28	0.56	4.65	ppm
Cu	4A_MICP	50.38	29	3.19	6.38	6.33	ppm
Dy	4A_MICP	1.18	24	0.08	0.16	6.64	ppm
Er	4A_MICP	0.64	23	0.03	0.06	4.92	ppm
Eu	4A_MICP	0.77	24	0.08	0.16	10.29	ppm
Fe	4A_MICP	161457.68	31	2059.80	4119.61	1.28	ppm
Fe2O3	XRF	23.32	23	0.09	0.18	0.38	%
Ga	4A_MICP	9.59	23	0.35	0.69	3.62	ppm
Gd	4A_MICP	1.73	24	0.23	0.46	13.14	ppm
Ge	4A_MICP	2.75	16	2.69	5.38	97.90	ppm
Hf	4A_MICP	1.38	23	0.07	0.13	4.73	ppm
Ho	4A_MICP	0.21	24	0.03	0.06	13.57	ppm
In	4A_MICP	0.02	12	0.00	0.01	17.97	ppm
K	4A_MICP	24470.38	32	1773.80	3547.60	7.25	ppm
K2O	XRF	3.03	23	0.02	0.03	0.55	%
La	4A_MICP	15.42	24	1.98	3.95	12.82	ppm
Li	4A_MICP	19.25	31	0.87	1.73	4.50	ppm
LOI	LOI	3.65	32	0.38	0.75	10.33	%
Lu	4A_MICP	0.09	23	0.03	0.06	32.15	ppm
Mg	4A_MICP	12086.38	29	286.57	573.14	2.37	ppm
MgO	XRF	1.99	24	0.06	0.13	3.20	%
Mn	4A_MICP	851.44	32	15.01	30.01	1.76	ppm
MnO	XRF	0.11	24	0.01	0.01	4.44	%
Mo	4A_MICP	11.55	30	0.61	1.23	5.30	ppm
Na	4A_MICP	12458.94	31	472.20	944.40	3.79	ppm
Na2O	XRF	1.71	24	0.05	0.09	2.75	%
Nb	4A_MICP	2.00	24	0.13	0.26	6.55	ppm
Nd	4A_MICP	12.48	24	0.77	1.53	6.14	ppm
Ni	4A_MICP	49.92	32	7.87	15.73	15.76	ppm
P	4A_MICP	586.83	24	40.69	81.39	6.93	ppm
P2O5	XRF	0.14	15	0.001	0.003	0.91	%
Pb	4A_MICP	12.61	24	1.21	2.42	9.61	ppm
Pr	4A_MICP	3.46	24	0.34	0.69	9.95	ppm
Rb	4A_MICP	85.95	23	1.58	3.17	1.84	ppm
Re	4A_MICP	0.01	8	0.00	0.00	9.12	ppm
S	4A_MICP	2.33	24	0.30	0.59	12.76	%
S	Comb/LECO	2.15	24	0.04	0.08	1.93	%
Sb	4A_MICP	6.67	22	0.10	0.20	1.52	ppm
Sc	4A_MICP	5.11	24	0.50	1.00	9.76	ppm
Se	4A_MICP	2.15	8	0.19	0.39	8.96	ppm
SG	SG	3.02	22	0.02	0.04	0.64	g/cm3
Si	4A_MICP	26.01	15	0.14	0.29	0.55	%
SiO2	4A_MICP	55.66	8	0.45	0.90	0.81	%
SiO2	XRF	55.76	23	0.12	0.24	0.22	%
Sm	4A_MICP	2.20	24	0.17	0.33	7.54	ppm
Sn	4A_MICP	1.21	16	0.22	0.45	18.53	ppm
Sr	4A_MICP	325.90	32	14.42	28.85	4.43	ppm
Ta	4A_MICP	0.14	9	0.02	0.04	13.92	ppm
Tb	4A_MICP	0.22	24	0.04	0.07	16.57	ppm
Te	4A_MICP	2.48	24	0.36	0.73	14.65	ppm
Th	4A_MICP	3.19	23	0.14	0.28	4.41	ppm
Ti	4A_MICP	0.10	32	0.01	0.02	9.57	%
TiO2	XRF	0.19	22	0.00	0.01	2.23	%
Tl	4A_MICP	0.82	24	0.05	0.10	6.01	ppm
Tm	4A_MICP	0.08	24	0.02	0.04	22.00	ppm
U	4A_MICP	5.08	32	0.27	0.55	5.38	ppm
U	XRF	24.00	8	9.70	19.39	40.40	ppm
V	4A_MICP	71.09	32	2.54	5.09	3.58	ppm
W	4A_MICP	10.69	24	0.70	1.40	6.56	ppm
Y	4A_MICP	6.26	24	0.24	0.49	3.91	ppm
Yb	4A_MICP	0.59	24	0.03	0.06	5.44	ppm
Zn	4A_MICP	59.59	32	8.16	16.32	13.69	ppm
Zr	4A_MICP	45.61	30	1.96	3.92	4.30	ppm