



Tel: +2711 923 7000 Fax: +2711 923 7027 e-mail: info@amis.co.za web: www.amis.co.za
30 Electron Avenue, Isando, 1600. P.O. Box 856, Isando, 1600, South Africa.
A Division of Set Point Industrial Technology (Pty) Ltd. Reg.No. 1989/000201/07.

Certificate of Analysis

Copper Oxide Ore
Reference Material from Lonshi
Democratic Republic of the Congo

AMIS0118

Recommended Concentration and two “Between Laboratory” Standard Deviations

Certified Concentrations

Cu (F)	4525	±	306	ppm
Cu (M/ICP)	4615	±	270	ppm
Cu (P)	4032	±	333	ppm
Cu (XRF)	4837	±	280	ppm
SG	2.75	±	0.26	g/cc

Provisional Concentration

U (M/ICP)	31.2	±	4.8	ppm
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Intended Use: AMIS0118 is suitable to monitor the accuracy of a single analysis of oxide copper ore. 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 oxide ore sourced from the Lonshi Copper Mine which is owned and operated by Compagnie Miniere du Sakania sprl (Comisa), a wholly owned Congolese subsidiary of First Quantum Minerals Ltd (FQM). The mine is situated in the Congo Pedicle region of the Province of Katanga, Democratic Republic of the Congo.

Lonshi belongs to the class of deposits which occur in the lower Kundelungu stratigraphy. Lonshi sulphides are hosted in basal Kundelungu Group conglomerate/diamictite (Grand Conglomerat) while the oxides are contained within the overlying dolomite which has been deeply weathered leaving a dolomite residual. The residual material hosts the oxides which consist of black copper minerals and malachite.

Primary sulphide, where present in the Grand Conglomerat, is mostly bornite with minor chalcopyrite interstitial to clasts, while supergene sulphide is present as chalcocite.

Chemical composition: The uncertified major element chemistry for this particular oxide orebody, from data submitted by 15 of the laboratories, is set out below. The trace element chemistry for this particular product has also been determined (but not certified) and is presented in the appendix.

	unit	mean	2SD	RSD%	n
Al ₂ O ₃	%	17.76	0.37	1.05	100
CaO	%	0.52	0.05	4.56	119
Cr ₂ O ₃	%	0.038	0.01	9.16	84
Fe ₂ O ₃	%	12.92	0.31	1.21	92
K ₂ O	%	0.67	0.02	1.71	94
LOI	%	10.52	1.13	5.37	82
MgO	%	0.65	0.04	3.50	92
MnO	%	0.09	0.01	4.30	103
Na ₂ O	%	0.15	0.03	9.33	94
P ₂ O ₅	%	0.22	0.01	3.00	91
S	%	0.30	0.03	4.34	69
SiO ₂	%	54.73	1.59	1.45	119
TiO ₂	%	1.17	0.03	1.38	94

Appearance: The material is a very fine pale yellowish brown powder (Corstor Colour Gauge - 10YR 6/4).

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. 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 an independent statistician.

Methods of Analysis:

1. Cu, Fusion AAS or ICP-OES.
2. Multi-acid digest multi-element scan - ICP-OES or ICP-MS.
3. Aqua regia digest - Cu. ICP-OES or ICP-MS.
4. Pressed pellet multi-element scan - XRF.
5. Fusion (Majors). XRF.
6. Au. Pb collection ICP-OES or ICP-MS.
7. SG. Gas pycnometer.
8. Cu QBM/AAS Acid Soluble Copper – as per Bwana Mkubwa method supplied.

Method of Certification: Twenty one laboratories were each given eight randomly selected packages of sample. Results from the twenty laboratories that reported back were used for the determinations in the tables below

The 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.

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

1. ACME Analytical Laboratories Ltd CA
2. Activation Laboratories Pty Ltd (ActLabs) CA
3. ALS Chemex Laboratory Group Johannesburg SA
4. ALS Chemex Laboratory Group Perth WA
5. ALS Chemex Laboratory Group Vancouver CA
6. Anglo Research (Crown Campus)
7. Assayers Canada
8. Bwana Mkubwa Mine Laboratory
9. Genalysis Laboratory Services WA
10. Geoscience Laboratories (GEO LABS) CA
11. Intertek Testing Services Ltd Shanghai (ITS Beijing)
12. Intertek Utama Services (Indonesia)
13. Labtium Inc Finland
14. Nkomati JV Laboratory SA
15. OMAC Laboratories Limited (Ireland)

16. Set Point Laboratories (Isando) SA
17. SGS Australia Pty Ltd (Newburn) WA
18. SGS Lakefield Research Africa Pty Ltd (Booyens) SA
19. SGS Mineral Services Lakefield (Canada)
20. Ultra Trace (Pty) Ltd WA

Assay Data: Data as received from the laboratories for the important certified elements listed on p1 is set out below. A proficiency report has been sent to the managers of the participating laboratories. Additional data from this round robin is available on request.

Lab Code	Cu (F) ppm	Cu (M/ICP) ppm	Cu (P) ppm	Cu (XRF) ppm	SG g/cc	U (M/ICP) ppm
A	4640	4680	3950	4060	2.51	28.00
A	4650	4610	3900	4100	2.53	28.70
A	4650	4710	3930	4020	2.64	29.90
A	4620	4690	3810	3930	2.53	29.90
A	4650	4680	3820	4000	2.57	29.80
A	4650	4770	3850	4200	2.52	29.80
A	4640	4710	3890	4010	2.51	30.00
A	4610	4660	3850	4900	2.56	29.40
B		4490	4120	4700		35.30
B		4450	4200	4700		35.90
B		4460	4220	4700		35.00
B		4460	4210	4700		35.90
B		4440	4260	4700		36.30
B		4500	4280	4700		39.80
B		4510	4220	4700		36.50
B		4420	4280	4700		35.40
C	4700	4560	4050			
C	4500	4720	4000			
C	4600	4600	3970			
C	4600	4570	3980			
C	4500	4730	3990			
C	4700	4670	4120			
C	4600	4670	4100			
C	4500	4550	4080			
D		4500	4110	4700	2.80	
D		4800	4030	5100	2.78	
D		4600	4060	4900	2.77	
D		4500	3990	4800	2.76	
D		4700	4070	5200	2.76	
D		4600	4110	5000	2.79	
D		4700	4050	4800	2.76	
D		4500	4050	5000	2.77	

Lab Code	Cu (F) ppm	Cu (M/ICP) ppm	Cu (P) ppm	Cu (XRF) ppm	SG g/cc	U (M/ICP) ppm
E	4270	4380	4890	4330	2.70	31.10
E	4190	4190	4880	4350	2.65	28.50
E	4260	4330	4840	4290	2.78	30.00
E	4270	4430	4440	4360	2.67	29.10
E	4270	4590	4610	4340	2.81	31.20
E	4260	4740	5100	4330	2.82	32.20
E	4310	4850	4870	4320	2.70	32.70
E	4270	4690	4650	4340	2.74	31.60
F		4880	3990			
F		4880	3950			
F		4830	4000			
F		4890	3950			
F		4850	4030			
F		4870	4080			
F		4850	3960			
F		4850	3960			
G	4620	4620	4190	4875		27.30
G	4610	4670	4050	4996		27.80
G	4650	4630	4170	4963		28.60
G	4620	4620	4150	4983		28.10
G	4630	4640	4140	4955		28.30
G	4560	4640	4050	4996		30.70
G	4630	4620	4140	4895		30.30
G	4580	4590	4150	4974		29.70
H		4476				
H		4557				
H		4454				
H		4682				
H		4659				
H		4584				
H		4517				
H		4590				

Assay Data (cont):

Lab Code	Cu (F) ppm	Cu (M/ICP) ppm	Cu (P) ppm	Cu (XRF) ppm	SG g/cc	U (M/ICP) ppm
I	5200	4654	3712	4907		31.60
I	5200	4760	3751	4887	2.89	32.70
I	5200	4812	3797	4898	2.92	31.97
I	5200	4631	3782	4900	2.93	32.40
I	5300	5019	3734	4928	2.93	31.73
I	5200	5003	3907	4899	2.92	32.21
I	5200	4969	3750	4908	2.87	32.95
I	5200	5053	3827	4807	2.92	31.74
J	4644			5009		30.66
J	4597			4996		29.82
J	4705			5010		31.95
J	4697			5011		30.73
J	4623			5018		29.82
J	4635			5006		29.78
J	4344			5008		29.82
J	4661			4974		30.44
K	4700	4500		4600	2.73	43.00
K	4700	4400		4500	2.73	35.00
K	4600	4300		4600	2.74	35.00
K	4600	4200		4600	2.70	34.00
K	4500	4400		4700	2.73	35.00
K	4600	4300		4500	2.74	33.00
K	4700	4300		4400	2.72	31.00
K	4700	4200		4300	2.72	33.00
L	4440	4600	3740		2.68	10.00
L	4480	4860	3730		2.61	10.00
L	4450	4710	3890		2.71	10.00
L	4410	4620	3610		2.55	10.00
L	4510	4630	3740		2.61	10.00
L	4550	4630	3790		2.71	10.00
L	4520	4680	3810		2.72	10.00
L	4680	4670	3810		2.57	10.00
M	5003	4981	4661	4758		
M	5229	4870	4602	4746		
M	5137	4806	4816	4750		
M	5039	4744	4777	4774		
M	5056	5005	4646	4723		
M	4971	5189	4591	4712		
M	4904	5169	4735	4739		
M	4968	5000	4551	4771		
N		4600		4830	2.91	
N		4600		4850	2.93	
N		4700		4900	2.93	
N		4600		4890	2.95	
N		4600		4880	2.93	
N		4600		4830	2.94	
N		4700		4920	2.94	
N		4700		4810	2.91	
O		4617	3880			
O		4551	3960			
O		4750	3940			
O		4866	3810			
O		4705	3870			
O		4823	3940			
O		4473	3860			
O		4195	3930			

Lab Code	Cu (F) ppm	Cu (M/ICP) ppm	Cu (P) ppm	Cu (XRF) ppm	SG g/cc	U (M/ICP) ppm
P						
P						
P						
P						
P						
P						
P						
P						
P						
Q						
Q						
Q						
Q						
Q						
Q						
Q						
Q						
R		4550	4280			
R		4580	4100			
R		4690	4080			
R		4640	4120			
R		4500	3890			
R		4550	3950			
R		4600	3960			
R		4560	3870			
S	4600	4530	4390			29.30
S	4500	4510	4410			30.00
S	4550	4610	4360			29.30
S	4450	4530	4430			29.70
S	4550	4510	4470			30.50
S	4450	4550	4220			29.60
S	4500	4410	4270			28.90
S	4600	4520	4300			28.70
T	4300	4270	4167			
T	4200	4152	4263			
T	4200	4161	4163			
T	4300	4287	4214			
T	4200	4307	4147			
T	4100	4256	4167			
T	4100	4119	4078			
T	4100	4479	4134			
U		5086	4193			19.22
U		4999	4202			19.83
U		4947	4205			19.79
U		4930	4237			20.07
U		4932	4219			20.60
U		4865	4205			19.76
U		4878	4176			19.37
U		5069	4177			20.62

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.

25 August 2008

Certifying Officers:



African Mineral Standards: _____

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



Geochemist: _____

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

APPENDIX

16 laboratories supplied additional ICP trace element data. The iterated but uncertified statistics are presented below.

	unit	mean	2SD	RSD%	n
Al	%	9.13	0.76	4.17	94
As	ppm	3.82	1.63	21.34	54
Ba	ppm	122	12.6	5.18	99
Be	ppm	3.62	0.72	9.96	76
Bi	ppm	2.64	0.64	12.09	57
Ca	%	0.362	0.04	5.00	92
Ce	ppm	252	58.4	11.60	62
Co	ppm	162	18.4	5.68	119
Cr	ppm	211	41.5	9.86	88
Cs	ppm	0.826	0.15	9.28	55
Dy	ppm	12.8	1.32	5.17	46
Er	ppm	6.40	0.47	3.70	38
Eu	ppm	4.52	0.75	8.28	46
Fe	%	9.17	0.81	4.43	94
Ga	ppm	26.6	3.99	7.50	72
Gd	ppm	17.7	2.99	8.47	48
Hf	ppm	5.17	1.34	13.00	39
Ho	ppm	2.42	0.33	6.74	47
K	%	0.535	0.04	3.39	76
La	ppm	145	25.0	8.65	94
Li	ppm	8.85	1.44	8.14	62
Lu	ppm	0.892	0.12	6.90	47
Mg	%	0.381	0.05	6.02	102
Mn	ppm	712	71.7	5.03	92
Mo	ppm	4.73	1.14	12.09	93
Na	%	0.111	0.02	8.43	94
Nb	ppm	14.1	8.91	31.59	78
Nd	ppm	117	20.8	8.90	46
P	ppm	918	148	8.07	88
Pr	ppm	31.0	5.87	9.46	46
Rb	ppm	25.1	5.08	10.14	55
Sb	ppm	2.83	0.96	16.91	54
Sc	ppm	19.5	1.88	4.84	83
Sm	ppm	20.3	2.83	6.99	46
Sn	ppm	5.12	0.81	7.88	52
Sr	ppm	40.5	5.81	7.18	109
Ta	ppm	6.30	2.84	22.51	62
Tb	ppm	2.36	0.35	7.47	46
Te	ppm	3.50	0.61	8.71	45
Th	ppm	12.0	1.61	6.71	55
Ti	%	0.251	0.16	32.19	88
Tl	ppm	0.111	0.02	8.00	36
Tm	ppm	0.950	0.17	9.05	47
V	ppm	229	36.6	8.02	93
W	ppm	2.75	1.11	20.21	46
Y	ppm	60.9	6.29	5.16	74
Yb	ppm	6.11	0.79	6.42	46
Zr	ppm	184	56.8	15.46	79