African Mineral Standards

REFERENCE MATERIAL FOR AFRICAN ORES

African Mineral Standards

Certificate of Analysis

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

AMIS0031

Recommended Concentration and two "Between Laboratory" Standard Deviations

Certified Concentrations

Cu (F)	3.078	±	0.232	%
Cu (P)	3.051	±	0.162	%
Cu (T/ICP)	3.084	±	0.176	%
Cu (XRF)	3.283	±	0.254	%
Co (T/ICP)	48	±	6.4	ppm
Ni (T/ICP)	96	±	13.4	ppm
Zn (P)	201	±	17.0	ppm
Au (Pb Collection)	0.26	±	0.02	g/t

Provisional Concentrations

Ag (T)	8.1	±	1.6	ppm
Co (P)	43	±	9	ppm
Ni (P)	80	±	14	ppm
Pb (P)	38	±	10	ppm
Zn (T/ICP)	210	±	38	ppm
U (T/ICP)	12.4	±	1.26	ppm
Specific Gravity	2.90	±	0.20	g.cc

Indicated Means

As (T/ICP)	25	ppm
Co (XRF)	49	ppm
Pb (T/ICP)	45	ppm

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Intended Use: AMIS0031 is suitable to monitor the accuracy of a single analysis of 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 is a sediment hosted, structurally controlled deposit of Copperbelt type. In contrast to other Copperbelt deposits, Lonshi is interpreted to occur at or near the upper contact of the Upper Roan Group where a sheared and tectonised clastic unit, the Lonshi Conglomerate, is in thrust contact with overlying carbonaceous, silty, dolomitic marbles. This folded and thrusted contact is the locus for mineralization which occurs in both the conglomerate and the intensely weathered dolomite.

Primary sulphide mineralization, mainly chalcopyrite, occurs as carbonate clast replacement in the conglomerate, and as disseminations and rare veinlets in both conglomerate and dolomite. Supergene enrichment and subsequent deep oxidation, has resulted in complete carbonate destruction in the dolomite, within the weathering zone, and formation of chalcocite now largely oxidized to malachite and black Cu oxide minerals.

(for more information, refer to Form 43-101F1 Technical Report, The Lonshi Copper Mine, Katanga Province, Democratic Republic of the Congo, March 26th 2003, Alan J. Stephens Vice President, Exploration, and G. Clive Newall, President, First Quantum Minerals Ltd.)

Approximate Mineral and Chemical Composition:

The major element chemistry has been determined by analyses from 5 laboratories using a mixture of ICP and X-Ray Fluorescence techniques. The mean values, confidence limits at two standard deviations and number of analyses are presented below.

	Al_2O_3	CaO	Fe_2O_3	K_2O	LOI	MgO
	%	%	%	%	%	%
mean	13.50	0.73	9.09	2.04	10.13	1.66
2SD	0.55	0.03	0.47	0.27	0.66	0.07
RSD %	2.04	2.25	2.58	6.56	3.27	2.10
n	33	32	33	25	23	33
	MnO	Na_2O	P_2O_5	S	SiO_2	TiO_2
	%	%	%	%	%	%
mean	3.95	0.10	0.12	0.03	55.22	0.69
2SD	0.20	0.00	0.01	0.002	3.01	0.04
RSD %	2.55	0.00	5.43	4.10	2.72	2.74
n	33	6	31	15	33	24

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

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: Co, Cu, As, Ni, Pb, Zn and Ag; multi-acid digestion, including HF, with ICP-OES or ICP-MS (T). Cu; fusion ICP-OES or MS (F). Co, Cu, As, Ni, Pb, Zn by XRF. Co, Cu, As, Ni, Pb, Zn, aqua regia digestion with ICP-OES or ICP-MS (P). 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 from the sixteen laboratories that reported back were used for the Au and SG determinations below:

	Ag (T) ppm	Au g/t (Pb Collection)	Co (P) ppm	Co (T/ICP) ppm	Cu (F) ppm	Cu (P) ppm	Cu (T/ICP) ppm	Cu (XRF)	Ni (P)	Ni (T/ICP)	Pb (P)	Specific Gravity	U (T/ICP)	Zn (P)	Zn (T/ICP)
A	3.5						27700								592
A	3.4						28000								629
A	3.4						27700								527
A	3.2						27900								515
A	3.2						27700								470
A	3.4						28000								481
A	3.2						28700								508
A	3.3						29300								467
B	7.0			40	32000		31400		79	9	30	3.18		200	220
B	7.0			40	32500		32000		78	94	30	3.15		196	222
B	8.0			40	28800		31000		77	94	30	3.20		193	224
B	8.0			40	30300		30700		77	99	30	3.22		193	225
B	8.0			40	28400		31000		79	92	30	3.19		198	222
B	8.0			40	28600		31300		79	91	30	3.20		198	223
B	7.0			40	29300		30500		79	90	30	3.25		197	218
B	8.0			40	29900		31400		79	92	30	3.23		200	222
C	8.0			52	32800	30000	35996		71	97	14			197	194
C	8.0			46	30000	29600	30294		71	92	18			192	194
C	7.0			48	30200	29700	30559		68	86	17			192	182
C	7.0			50	30100	30300	29794		71	91	16			194	187
C	7.0			50	30300	30000	29764		69	91	17			191	194
C	7.0			48	30800	30200	30427		72	93	18			196	194
C	7.0			48	30400	29700	29855		70	88	18			192	184
C	7.0			52	30800	30600	29700		78	90	18			198	191
D		0.251		46		30300		33190	78		40	2.71	13.0	214	
D		0.240		48		30800		33280	78		40	2.88	14.0	214	
D		0.253		48		30800		33280	78		40	2.93	13.0	208	
D		0.254		50		31200		33140	78		40	2.78	13.5	206	
D		0.249		48		29700		33120	78		35	2.78	13.5	206	
D		0.251		48		31000		33320	76		40	2.95	14.0	202	
D		0.249		50		30900		33260	84		40	2.94	14.0	206	
D		0.245		48		31000		33330	84		40	2.97	13.5	204	
E	7.6	0.251				29800	30500			90			12.5		205
E	8.1	0.255				28500	30500			91			12.4		201
E	8.6	0.268				28700	30100			92			12.1		209
E	8.1	0.274				29000	30400			96			12.7		215
E	8.1	0.266				31100	30400			92			12.5		218
E	8.4	0.249				28300	29800			98			12.5		204
E	8.9	0.263				29500	30600			91			12.5		207
E	8.1	0.280				29700	29800			85			12.9		200
F															
F															
F															
F															
F															
F															
F															
F															

	Ag (T) ppm	Au g/t (Pb Collection)	Co (P) ppm	Co (T/ICP) ppm	Cu (F) ppm	Cu (P) ppm	Cu (T/ICP) ppm	Cu (XRF)	Ni (P)	Ni (T/ICP)	Pb (P)	Specific Gravity	U (T/ICP)	Zn (P)	Zn (T/ICP)
G	7.2			36			30300		67	99	36			183	210
G	7.2			36			30700		68	101	35			186	215
G	6.7			37			30800		69	96	37			192	204
G	6.8			36			30800		68	97	36			190	209
G	7.0			36			31900		69	98	36			190	209
G	7.0			36			32100		68	98	34			189	210
G	6.8			37			31800		70	98	37			194	209
G	6.8			37			30500		70	100	37			195	200
H															
H															
H															
H															
H															
H															
H															
H															
I	9.0	0.269		40	30800	29000	30010		80	90			12.4	200	200
I	9.0	0.248		40	30400	29910	30520		80	90			12.7	200	200
I	10.0	0.265		40	29500	30380	30580		80	90			12.9	200	200
I	8.0	0.254		40	30200	29690	30180		80	90			12.0	200	200
I	8.0	0.251		50	30100	30190	29900		90	90			11.4	200	200
I	9.0	0.257		40	29800	30030	29110		80	90			11.7	200	200
I	9.0	0.256		40	29800	30420	29920		80	90			12.8	200	200
I	8.0	0.264		40	30200	29150	30250		80	90			13.0	200	200
J	7.7	0.262		43	30500	31100	31400		81		42	2.92		199	197
J	7.8	0.243		42	30200	31100	31600		79		40	2.84		194	199
J	7.7	0.254		43	29800	31100	31500		80		43	2.80		197	198
J	8.1	0.263		42	30100	31200	31400		79		41	2.80		195	205
J	8.3	0.265		41	30100	31200	31500		77		40	2.88		191	198
J	7.8	0.265		42	30000	31400	31600		78		41	3.15		197	197
J	7.7	0.249		43	29600	30700	31300		80		41	2.82		195	189
J	8.1	0.261		43	30700	30900	31400		81		40	2.82		195	195
K		0.261		42		31400			83		36		11.4	200	
K		0.265		42		31900			83		36		11.6	203	
K		0.255		41		31100			83		35		13.1	199	
K		0.244		41		30900			85		36		11.1	198	
K		0.253		41		31600			82		36		11.8	198	
K		0.238		42		31600			82		36		11.2	201	
K		0.261		41		31700			82		36		13.2	203	
K		0.257		41		31500			82		35		12.3	202	
L	7.0	0.260		49	31735	29191	30347		89	94	37	2.93	12.4	210	206
L	7.5	0.310		49	31638	29394	30087	31130	90	93	37	2.95	12.6	217	203
L	7.8	0.300		49	31798	29349	29806	31080	90	93	39	3.37	12.2	216	204
L	8.1	0.270		50	32310	29634	29743	30980	90	93	37	2.96	12.2	217	203
L	7.8	0.260		47	31984	28406	30089	31260	84	94	34	2.94	12.4	200	201
L	8.0	0.270		48	32014	29204	30163	31590	88	93	34	2.94	13.4	207	205
L	7.8	0.280		49	31853	29441	30424	31280	89	94	34	2.93	12.5	221	206
L	8.2	0.260		49	31979	29445	30054	31410	90	94	40	3.10	12.5	214	201
M	15.1	0.303		40	37600	30800			92	105			13.1	217	293
M	14.8	0.287		40	34100	30500			89	109			13.0	215	300
M	15.2	0.270		40	30500	30800			92	111			12.3	215	293
M	14.3	0.275		39	29500	31200			90	104			12.4	217	282
M	13.8	0.278		40	34200	30700			87	107			11.9	215	285
M	14.0	0.281		38	33000	31200			89	101			11.5	217	272
M	14.0	0.279		40	32100	31300			90	99			13.0	215	261
M	12.8	0.282		40	34900	31400			90	98			11.6	217	250
N	8.5				30900		30700	33090		91					205
N	8.9				30800		30800	32990		91					206
N	8.7				31200		30000	33330		88					203
N	9.0				31100		30800	33240		91					201
N	8.9				31200		30500	32770		93					210
N	9.2				31500		30700	33320		94					211
N	9.1				31600		30500	33140		88					198
N	8.8				31600		30600	33230		90					199
O	10.2					30367	33307	34250		144	46	2.81		305	257
O	4.5					31374	30790	34540		131	56	2.80		345	218
O	8.6					30065	33966	34550		148	43	2.80		315	263
O	9.4					30445	34310	34920		154	50	2.83		340	260
O	10.2					31943	33446	34520		148	61	2.82		359	252
O	8.2					30637	33936	34720		138	47	2.80		342	265
O	7.9					32026	33420	34840		137	52	2.79		367	249
O	9.5					30916	32644	34830		134	51	2.82		345	246
P	8.7	0.300						31300		120	40	3.08	15.0		200
P	8.4	0.280						31300		110	40	2.91	18.0		180
P	8.4	0.270						28000		110	40	3.05	18.0		200
P	8.4	0.280						31800		100	50	3.03	20.0		180
P	8.3	0.270						31500		100	40	3.04	19.0		200
P	8.3	0.250						31900		110	40	2.95	18.0		190
P	8.5	0.270						31500		110	40	2.94	15.0		190
P	8.6	0.270						31400		110	50	2.94	16.0		200

	Ag (T) ppm	Au g/t (Pb Collection)	Co (P) ppm	Co (T/ICP) ppm	Cu (F) ppm	Cu (P) ppm	Cu (T/ICP) ppm	Cu (XRF)	Ni (P)	Ni (T/ICP)	Pb (P)	Specific Gravity	U (T/ICP)	Zn (P)	Zn (T/ICP)
Q															
Q															
Q															
Q															
Q															
Q															
Q															
Q															
R															
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R															
S															
S															
S															
S															
S															
S															
S															
S															
T	8.8					30900	31700			104					
T	8.8					30900	31800			108					
T	8.2					31100	31800			96					
T	9.8					31000	30900			100					
T	10.4					30800	31600			100					
T	10.2					30800	31600			104					
T	10.0					30900	31600			104					
T	10.6					29000	31700			104					

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. Total results from some laboratories that reported significant failures were also removed. 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)

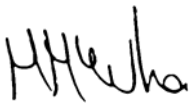
1. ACME Analytical Laboratories Ltd., (Canada).
2. Alex Stewart (Assayers) Limited, (ASA, Johannesburg, South Africa).
3. ALS Chemex South Africa (Pty) Ltd.
4. ALS Chemex, (Vancouver, Canada).
5. Ammtec Ltd., (Western Australia).
6. Assayers Canada, (Vancouver).
7. Genalysis Laboratory Services (Pty) Ltd., (Australia).
8. Geoscience Laboratories, (Geo Labs, Sudbury, Canada).
9. Geoservice Centre, Geolaboratory, (GTK. Finland).
10. Mintek (South Africa)
11. Pt Intertek Utama Services (Intertek, Indonesia)
12. Set Point Laboratories (Pty) Ltd (South Africa)
13. SGS Lakefield Research Africa (Pty) Ltd. (Joburg, South Africa)
14. SGS Welshpool (Australia).
15. SRC Labs., (Canada).
16. 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.

17 May 2007

Certifying Officers:



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Geochemist:_____

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