

African Mineral Standards

Certificate of Analysis

Copper Oxide Ore
Reference Material from Kansanshi, Zambia.

AMIS0038

Recommended Concentration and two "Between Laboratory" Standard Deviations

Certified Concentrations

Cu (P)	2.090	±	0.090	%
Cu (T/ICP)	2.073	±	0.125	%
Co (P)	41	±	4	ppm

Provisional Concentrations

Co (T/ICP)	44	±	6	ppm
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Intended Use: AMIS0038 is suitable to monitor the accuracy of a single analysis of copper oxide 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 Kansanshi project, located in the North Western Province of Zambia, approximately 15 kilometres north of the town of Solwezi and 16 kilometres south of the Democratic Republic of Congo border. The Kansanshi project is majority owned by Cyprus Amax Kansanshi Holdings Limited, which is 100% owned by First Quantum Minerals Ltd (FQM).

The Kansanshi deposit occurs within the Lufilian arc, a major tectonic province characterized by broadly north directed fold and thrust structures, which hosts the world class Central African Copperbelt. The property geology is dominated by the northwest-trending Kansanshi Antiform, which exposes rocks of the Late Proterozoic Kansanshi Mine Formation in the core of a major refolded fold. Copper mineralization occurs both in and between steeply dipping, generally north-south trending quartz-carbonate veins and vein swarms, and as foliation parallel stratabound mineralization, within albite and carbonate altered phyllitic rocks of the Mine Formation.

Deep tropical weathering has resulted in supergene enrichment and subsequent partial oxidation of the deposit. Mineralization comprises copper oxide and mixed copper oxide/chalcocite mineralization hosted by saprolitized phyllites, decalcified marbles and schists. This secondary mineralization is underlain by a large tonnage of primary sulphide mineralization, with chalcopyrite and subordinate bornite as the dominant minerals. Oxide and mixed oxide/sulphide copper mineralization grading plus 0.5% copper occurs principally within two essentially flat lying orebodies, separated by a mostly barren marble unit. In some areas, the marble unit has been completely decalcified during weathering and in these cases the two ore bodies are combined. Deeper primary sulphide mineralization occurs in other discrete flat lying phyllite units.

(for more information, refer to the First Quantum Minerals Ltd Kansanshi Fact Sheet, Sept 2006, www.first-quantum.com.)

Appearance: The material is a very fine blueish grey powder (Corstor Colour Gauge – 5PB 5/1).

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 an independent statistician.

Methods of Analysis: Co, Cu by multi-acid digestion, including HF, with ICP-OES or ICP-MS (T). Also aqua regia digestion with ICP-OES or ICP-MS (P).

Method of Certification: Eighteen laboratories were each given eight randomly selected packages of sample. Results from the thirteen laboratories that reported back timeously were used for the determinations below:

Lab Code	Cu (T) ppm	Cu (P) ppm	Co (T) ppm	Co (P) ppm
A				
A				
A				
A				
A				
A				
A				
B	21582	22367	53	40
B	21847	21189	55	39
B	21126	21230	53	38
B	22748	21353	56	38
B	20956	21537	53	39
B	22143	21219	55	39
B	21454	20707	53	38
B	21232	20625	52	38
C	21328	21709	45	44
C	20865	21216	43	45
C	20642	21215	43	45
C	20550	21416	42	44
C	20404	20581	42	43
C	20201	21079	42	44
C	19858	20617	41	44
C	20644	20687	42	43
D		21800		43
D		21700		42
D		21700		42
D		21200		41
D		21600		41
D		21000		42
D		21600		42
D		22000		42
E		20550		40
E		20640		40
E		20640		40
E		20710		40
E		20390		40
E		20260		40
E		20870		40
E		20240		40
F	20900	20700	70	
F	21400	20900	70	
F	21300	20900	70	
F	21300	21000	80	
F	21600	20700	70	
F	20800	21000	70	
F	20600	20400	60	
F	20000	20700	70	
G				
G				
G				
G				
G				
G				
G				
G				
H	19800			
H	20000			
H	19700			
H	20100			
H	18800			
H	19200			
H	19600			
H	19100			
I	21600		62	40
I	21400		63	40
I	21600		65	40
I	21800		67	40
I	20900		66	40
I	21900		64	40
I	22000		66	40
I	21100		65	40

Lab Code	Cu (T) ppm	Cu (P) ppm	Co (T) ppm	Co (P) ppm
J	20900		44	42
J	21400		46	45
J	21400		48	42
J	21100		44	42
J	20100		44	42
J	20600		46	42
J	20400		43	44
J	19800		42	44
K	20900	21100	30	47
K	20700	21300	30	38
K	20500	21200	30	36
K	20400	20900	30	39
K	21000	20800	30	45
K	20900	21300	40	42
K	21200	20400	40	35
K	21000	21000	40	39
L	20600	20600	45	43
L	20700	20500	40	45
L	20400	20700	45	42
L	20800	20800	40	43
L	20800	20400	40	43
L	20600	20100	45	44
L	20500	20400	45	42
L	20900	20600	45	43
M	19700	19100	44	40
M	21600	20900	44	40
M	20400	21100	44	40
M	20100	20600	45	40
M	20000	20400	44	40
M	21300	20400	44	40
M	20500	21100	44	40
M	21300	20300	44	40
N				
N				
N				
N				
N				
N				
N				
N				
N				
N				
N				
N				
O	20000	20800	40	38
O	19950	20800	40	40
O	19850	21800	40	41
O	19900	22100	40	44
O	19900	20600	40	40
O	19600	21000	40	44
O	20200	21600	40	42
O	20800	20900	40	41
P				
P				
P				
P				
P				
P				
P				
P				
P				
P				
Q	21102	20300	47	42
Q	20342	21560	45	42
Q	20100	20840	44	41
Q	21518	19430	46	39
Q	21382	20210	45	41
Q	20145	19450	44	39
Q	20020	20560	46	44
Q	21258	20310	46	39
R				
R				
R				
R				
R				
R				
R				
R				
R				
R				

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 International Corporation (Zambia)
3. ALS Chemex South Africa (Pty) Ltd.
4. ALS Chemex, (Vancouver, Canada).
5. Ammtec Ltd., (Western Australia).
6. Anglo Research (Crown Campus, South Africa).
7. Assayers Canada, (Vancouver).
8. Genalysis Laboratory Services (Pty) Ltd., (Australia).
9. Geoservice Centre, Geolaboratory, (GTK. Finland).
10. Set Point Laboratories (Pty) Ltd (South Africa)
11. SGS Lakefield Research Africa (Pty) Ltd. (Joburg, South Africa)
12. SGS Welshpool (Australia).
13. 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.

28 May 2007

Certifying Officers:



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