

African Mineral Standards

Certificate of Analysis

Copper Oxide Ore
Reference Material from Kansanshi, Zambia.

AMIS0039

Recommended Concentration and two "Between
Laboratory" Standard Deviations

Certified Concentrations

Cu (P)	8652	±	386	ppm
Cu (T/ICP)	8643	±	560	ppm

Provisional Concentrations

Co (P)	38	±	4	ppm
Co (T/ICP)	40	±	7	ppm

Intended Use: AMIS0039 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 pale yellowish brown to pale red powder (Corstor Colour Gauge - 10R 6/2).

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 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: Seventeen 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	8810	8430	40	40
A	8650	8660	30	40
A	8740	8430	40	40
A	8670	8630	30	40
A	8690	8690	40	40
A	8760	8500	30	40
A	8600	8640	40	40
A	8820	8660	40	40
B				
B				
B				
B				
B				
B				
B				
B				
B				
C	7430	7320	70	30
C	7380	7510	60	40
C	7720	7760	80	40
C	7870	7840	80	50
C	7730	7840	90	50
C	7920	7880	80	30
C	7550	8130	100	30
C	8130	7540	20	30
D	8280	8780	42	42
D	8560	8900	39	36
D	8620	8950	42	35
D	7100	8950	38	35
D	8670	9010	38	35
D	8440	8960	38	34
D	8450	8950	37	33
D	8260	8960	35	34
E	8810	8600	50	46
E	8720	8850	50	38
E	8750	8600	40	35
E	9030	8660	50	35
E	8840	8470	40	34
E	9080	8730	40	35
E	8730	8610	40	35
E	8670	8760	40	35
F	7770		40	
F	8130		38	
F	7940		35	
F	8030		34	
F	8080		35	
F	7930		33	
F	8040		34	
F	8100		34	
G				
G				
G				
G				
G				
G				
G				
G				
H	8320	8380	45	40
H	8440	8490	41	38
H	8540	8450	41	37
H	8340	8570	41	39
H	8410	8580	40	41
H	8170	8550	40	35
H	8360	8490	40	39
H	8480	8490	42	38
I	8759	8584	43	42
I	8744	8597	39	41
I	8861	8645	39	42
I	8762	8441	39	39
I	8697	8515	40	41
I	8828	8561	40	40
I	8461	8621	39	41
I	8527	8472	38	40

Lab Code	Cu (T) ppm	Cu (P) ppm	Co (T) ppm	Co (P) ppm
J	8470	8870	43	38
J	8960	9060	41	38
J	8530	8650	42	36
J	8380	8700	40	37
J	8480	8760	41	37
J	8520	8860	40	38
J	8530	8670	37	38
J	8420	8950	41	38
K	8990	8330	45	41
K	9080	8560	44	39
K	9010	8310	48	37
K	9260	8390	46	37
K	9060	8680	48	37
K	9090	8460	42	37
K	9000	8540	40	36
K	8870	8480	41	37
L				
L				
L				
L				
L				
L				
L				
M	9026	8566	45	42
M	9063	8986	45	42
M	8784	9097	44	41
M	8887	8825	44	39
M	8677	8126	42	35
M	8669	8136	40	35
M	8864	8964	40	40
M	8890	9253	39	40
N	8290	8290	40	41
N	8370	8270	40	40
N	8300	8480	42	40
N	8420	8640	40	42
N	8310	8580	39	40
N	8420	8390	40	40
N	8570	8340	41	40
N	8470	8330	40	40
O	8620	8860	37	41
O	8700	8530	38	38
O	8750	8700	36	38
O	8710	8590	36	38
O	8440	8960	35	40
O	8920	8760	36	38
O	8790	8800	35	39
O	9150	8720	36	38
P				
P				
P				
P				
P				
P				
P				
P				
P				
Q	8750	8730	40	39
Q	8710	8850	40	39
Q	8830	8660	40	38
Q	8870	8710	40	40
Q	8730	8810	40	42
Q	8730	8780	40	41
Q	8870	8740	40	39
Q	8910	8780	40	39

The mean and standard deviation for all data was calculated. Outliers were defined as samples beyond the mean ± 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. Amdel Limited, (Perth, Australia).
6. Assayers Canada, (Vancouver).
7. Genalysis Laboratory Services (Pty) Ltd., (Australia).
8. Geoservice Centre, Geolaboratory, (GTK. Finland).
9. Pt Intertek Utama Services (Intertek, Indonesia)
10. Set Point Laboratories (Pty) Ltd (South Africa)
11. SGS Lakefield Research (Canada)
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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