

African Mineral Standards

Certificate of Analysis

Copper and Cobalt Oxide Ore
Reference Material from the Village Project, DRC.

AMIS0037

**Recommended Concentration and two “Between
Laboratory” Standard Deviations**

Certified Concentrations

Cu (P)	3647	±	222	ppm
Cu (T/ICP)	3699	±	234	ppm
Co (P)	4511	±	324	ppm
Co (T/ICP)	4462	±	420	ppm

Intended Use: AMIS0037 is suitable to monitor the accuracy of a single analysis of copper/cobalt 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 Village Project, located in the Congo Pedicle region of the Province of Katanga, Democratic Republic of the Congo.

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% <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	3770	3530	4280	4210
A	3770	3520	4260	4240
A	3700	3450	4220	4100
A	3750	3510	4220	4240
A	3740	3490	4270	4190
A	3790	3530	4250	4150
A	3780	3540	4170	4230
A	3740	3490	4150	4130
B				
B				
B				
B				
B				
B				
B				
B				
C	3390	3280	4420	4410
C	3160	3310	4220	4640
C	3290	3240	4490	4560
C	3280	3210	4380	4500
C	3250	3090	4330	4370
C	3230	3270	4190	4350
C	3270	3200	4180	4460
C	3220	3130	4180	4490
D	3540	3750	4550	4420
D	3320	3660	4160	4320
D	3600	3710	3970	4350
D	3420	3630	4460	4310
D	3680	3680	4390	4330
D	3530	3640	4200	4300
D	3560	3800	4190	4470
D	3510	3640	4500	4250
E	3680	3510	4400	4230
E	3670	3570	4400	4200
E	3680	3610	4460	4260
E	3630	3560	4400	4250
E	3600	3500	4390	4200
E	3730	3620	4550	4350
E	3680	3470	4410	4120
E	3630	3560	4420	4280
F	3440		4200	
F	3630		4400	
F	3910		4560	
F	3480		4210	
F	3390		4150	
F	3350		4010	
F	3580		4290	
F	3330		4050	
G				
G				
G				
G				
G				
G				
G				
G				
H	3850	3540	4980	4420
H	3760	3540	4850	4420
H	3800	3580	4850	4460
H	3760	3600	4860	4500
H	3740	3660	4800	4570
H	3670	3640	4750	4530
H	3680	3590	4780	4490
H	3850	3580	4920	4470
I	3791	3592	5011	4606
I	3814	3618	4889	4700
I	3680	3670	4869	4660
I	3744	3667	4884	4727
I	3685	3508	4798	4555
I	3718	3682	4871	4734
I	3694	3514	4777	4670
I	3777	3722	4928	4891

Lab Code	Cu (T) ppm	Cu (P) ppm	Co (T) ppm	Co (P) ppm
J	3700	3810	4420	4700
J	3560	3750	4270	4560
J	3630	3730	4260	4540
J	3690	3710	4270	4510
J	3590	3700	4280	4500
J	3590	3740	4270	4530
J	3580	3760	4240	4560
J	3520	3830	4200	4600
K	3640	3480	4680	4280
K	3720	3560	4800	4370
K	3720	3640	4720	4450
K	3790	3490	4790	4500
K	3710	3600	4650	4420
K	3700	3670	4710	4500
K	3660	3530	4630	4470
K	3720	3610	4710	4430
L				
L				
L				
L				
L				
L				
L				
M	3824	3674	4559	4606
M	3995	3909	4701	4697
M	3699	3986	4476	4751
M	3891	3797	4581	4585
M	3458	3940	4549	4742
M	3839	3861	4531	4682
M	3710	3766	4587	4527
M	3724	3851	4497	4634
N	3680	3650	4540	4410
N	3680	3490	4560	4310
N	3690	3610	4550	4390
N	3510	3590	4450	4550
N	3490	3640	4480	4440
N	3530	3600	4420	4430
N	3440	3570	4300	4410
N	3580	3560	4490	4390
O	3830	3800	4510	4780
O	3840	3830	4650	4760
O	3820	3870	4560	4800
O	3860	3920	4720	4840
O	3840	3800	4720	4720
O	3850	3790	4720	4710
O	3730	3740	4610	4700
O	3780	3930	4680	4900
P				
P				
P				
P				
P				
P				
P				
P				
Q	3880	3600	4770	4680
Q	3890	3710	4840	4600
Q	3870	3720	4860	4610
Q	3850	3740	4830	4640
Q	3760	3770	4780	4660
Q	3760	3750	4800	4690
Q	3740	3620	4750	4650
Q	3800	3780	4800	4660

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. 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

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