CCRMP
Canadian Certified Reference Materials Project

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PCMRC
Projet canadien de matériaux de référence certifiés

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Certificate of Analysis

First issued: December 2003 Version: January 2009

CUPD-1

Copper Anode Certified Reference Material

Table 1 - CUPD-1 Certified Values

Element	Unit	Mean	Within-lab Standard Deviation	Between-labs Standard Deviation	Extended standard uncertainty at 95% confidence
Ag	µg/g	216	8	5	± 4
As	µg/g	306	9	19	± 14
Au	µg/g	3.9	0.3	0.4	± 0.3
Bi	µg/g	62	3	8	± 4
Fe	µg/g	40	3	5	± 3
Ni	µg/g	153	6	8	± 5
Pb	µg/g	69	6	10	± 7
Sb	µg/g	147	10	18	± 9
Se	µg/g	237	14	23	± 13
Sn	µg/g	5	1	2	± 2

Table 2 - CUPD-1 Provisional Value

Element	Unit	Mean	Within-lab Standard Deviation	Between-labs Standard Deviation	95% Confidence Interval
Te	µg/g	56	3	7	± 4

Table 3 - CUPD-1 Informational Values

Element	Unit	Mean	Standard Deviation	No. of Values
Cu	%	99.5	0.1	15
Zn	µg/g	11	1	10

SOURCE
CUPD-1 is a copper anode donated by Phelps Dodge, El Paso, Texas, USA in January 1994.

DESCRIPTION
The material is in the form of sawings and contains approximately 99% copper, plus several elements at trace levels.

INTENDED USE
CUPD-1 is suitable for the analysis of elements at trace levels. Examples of intended use are for quality control in the analysis of samples of a similar type, method development and arbitration.

INSTRUCTIONS FOR USE
The assigned values pertain to the date when issued. CANMET-MMSL is not responsible for changes occurring after receipt by the user. CUPD-1 should be used "as is", without pre-treatment. The contents of the bottle should be thoroughly mixed before taking samples.

METHOD OF PREPARATION
A magnetic separation was performed on the copper anode sawings. The resulting product was blended, degreased and bottled in 448 units, each containing 425 grams. This is the only size available.

STATE OF HOMOGENEITY
The homogeneity of the stock was investigated using twenty-one bottles of CUPD-1 chosen according to a stratified random sampling scheme. Two samples were analyzed from each bottle. The analyses were performed by the analytical laboratory of Cyprus Miami Mining Corporation, Claypool, Arizona. Samples of 1.25 g were digested in nitric and perchloric acids and the determination was performed using inductively coupled plasma - atomic emission spectroscopy. A one–way analysis of variance technique (ANOVA) was used to assess the homogeneity of these elements[1]. The ratio of the between-bottles to within-bottle mean squares is compared to the F statistic at the 95% level of probability. No evidence of inhomogeneity was observed for iron, nickel, lead, selenium and silver. Further details are available in the certification report. Use of a smaller sample size will invalidate the statistical parameters contained herein.

CERTIFICATION

Eighteen industrial, commercial, and government laboratories participated in an interlaboratory measurement program. Various elements were analyzed by methods of each laboratory's choice. A one-way analysis of variance technique was used to estimate the consensus value and other statistical parameters[1]. Antimony, arsenic, bismuth, gold, iron, lead, nickel, silver, selenium and tin were given recommended values. Tellurium had a provisional value assigned. Informational values were given for copper and zinc. The extended standard uncertainty at 95% confidence was calculated only for the certified values from the variance from the interlaboratory measurement program and the homogeneity assessment. Full details of all phases of the work, including statistical analysis, the methods and the names of the participants are contained in CCRMP Report 03-1E.

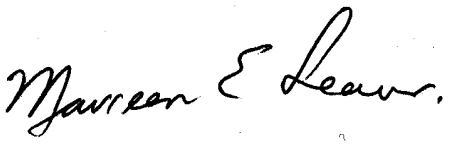
PERIOD OF VALIDITY

These certified values are valid until December 31, 2030. Updates will be published on the CCRMP web site.

LEGAL NOTICE

CANMET-MMSL has prepared this reference material and statistically evaluated the analytical data of the interlaboratory certification program to the best of its ability. The purchaser, by receipt hereof, releases and indemnifies CANMET-MMSL from and against all liability and costs arising out of the use of this material and information.

CERTIFYING OFFICERS



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FOR FURTHER INFORMATION

The certification report is available free of charge upon request to:

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REFERENCE

1. Brownlee, K.A., Statistical Theory and Methodology in Science and Engineering; John-Wiley and Sons, Inc.; New York; 1960.