



CCRMP  
Canadian Certified Reference Materials Project

CANMET Mining and Mineral Sciences Laboratories  
555 Booth Street, Ottawa, Ontario, Canada K1A 0G1  
Tel.: (613) 995-4738, Fax: (613) 943-0573  
E-mail: ccrmp@nrcan.gc.ca  
www.ccrmp.ca

PCMRC  
Projet canadien de matériaux de référence certifiés

Laboratoires des mines et des sciences minérales de CANMET  
555, rue Booth, Ottawa (Ontario) Canada K1A 0G1  
Tél. : (613) 995-4738, Téléc. : (613) 943-0573  
Courriel : pcmrc@nrcan.gc.ca  
www.pcmrc.ca

# Certificate of Analysis

First issued: July 2000

Version: December 2007

## MA-2c

### Gold Ore

**Table I - Certified value for gold and provisional value for silver**

Element	Ag ( $\mu\text{g/g}$ )	Au ( $\mu\text{g/g}$ )
Mean	0.51	3.02
Within-laboratory standard deviation	0.07	0.14
Between-laboratories standard deviation	0.13	0.13
95% confidence interval	$\pm 0.10$	$\pm 0.06$
Status	provisional	certified

*Informational values are in table 2 on page 4*

#### **Source**

The raw material for MA-2c was donated by Kinross Gold from its operation in Kirkland Lake, Ontario.

#### **Description**

MA-2c is the fourth generation in a series with predecessors, MA-2, MA-2a and MA-2b, which are no longer available. The deposits of the area are known to contain electrum in a relatively simple siliceous ore.

#### **Intended Use**

MA-2c is suitable for analysis of gold, silver, majors, minors, and trace elements in gold ores. Examples of intended use are: for quality control in the analysis of samples of a similar type, method development, arbitration and the calibration of equipment.



### **Instructions for Use**

The assigned values pertain to the date when issued. CCRMP is not responsible for changes occurring after receipt by the user. MA-2c should be used "as is". The contents of the bottle should be thoroughly mixed before taking samples.

### **Method of Preparation**

The raw material was dried, crushed, ground and sieved to produce a product with a mesh size of less than 75  $\mu\text{m}$ . After blending, the material was bottled in 400-g units. This is the only size available.

### **State of Homogeneity**

A homogeneity assessment for gold was performed by an independent laboratory on 30-g samples using instrumental neutron activation analysis. Thirty gram samples were analysed for silver using fire assay with lead collection and determination by atomic absorption spectroscopy. A one-way analysis of variance technique (ANOVA) was used to assess the homogeneity of gold and silver<sup>1</sup>. The ratio of the between-bottle to within-bottle mean squares was compared to the F statistic at the 95% level of probability. No evidence of inhomogeneity was observed for gold or silver. Use of a smaller sub-sample will invalidate the use of the certified value and associated parameters. Further details are available in the certification report.

### **Method of Certification**

Twenty industrial, commercial, and government laboratories participated in the 1998 interlaboratory certification program. Gold and silver were analysed by a variety of methods. A statistical analysis of the data yielded recommended values for gold, and a provisional value for silver. Informational values were derived from the mean of five results from up to six laboratories using one or more of instrumental neutron activation; acid digestion followed by atomic absorption spectroscopy, inductively coupled plasma - atomic emission spectroscopy, or inductively coupled plasma - mass spectrometry; fusion with lithium metaborate followed by x-ray fluorescence; and combustion methods. ANOVA was used to estimate the consensus value and other statistical parameters<sup>1</sup>. Full details of all phases of the work, including statistical analysis, the methods and the names of the participants are contained in CCRMP Report 2000-2E.

### **Legal Notice**

CCRMP 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.

### **Certification History**

MA-2c was originally released in July 2000. This version of the certificate, the second, was issued due to the expiration of the first version, and contains no changes in the values.

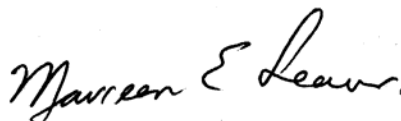
### **Period of Validity**

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

### **Certifying Officers**



Joseph Salley, Data Processor



Maureen E. Leaver, CCRMP Coordinator

### **For Further Information**

The preparation and certification procedures used for MA-2c, including methods and values obtained by individual laboratories, are given in CCRMP Report 2000-2E. This report is available free of charge upon request to:

**CCRMP**  
**CANMET-MMSL (NRCan)**  
**555 Booth Street**  
**Ottawa, Ontario, Canada K1A 0G1**  
**Telephone: (613) 995-4738**  
**Facsimile: (613) 943-0573**  
**E-mail: [ccrmp@nrcan.gc.ca](mailto:ccrmp@nrcan.gc.ca)**

### **Reference**

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

**Table 2 – Informational values for the mean of up to six sets using a variety of methods**

Analyte	Unit	Mean	SD
Al	%	6.70	0.29
As	µg/g	9.10	2.32
Ba	%	0.22	0.01
Be	µg/g	3.74	0.48
Bi	µg/g	0.66	0.05
C	%	1.78	0.07
Ca	%	4.76	0.05
Cd	µg/g	0.7	0.1
Ce	µg/g	141	2
Co	µg/g	25	2
Cr	µg/g	216	45
Cs	µg/g	9.09	0.73
Cu	µg/g	95	5
Dy	µg/g	5.16	0.05
Er	µg/g	2.26	0.02
Eu	µg/g	3.15	0.15
Fe	%	5.39	0.51
Ga	µg/g	17.62	0.48
Gd	µg/g	9.58	0.19
Hf	µg/g	5.40	0.14
Ho	µg/g	0.92	0.03
K	%	3.20	0.06
La	µg/g	61.49	8.48
Li	µg/g	27.71	1.94
Lu	µg/g	0.30	0.01
Mg	%	2.91	0.32
Mn	%	0.10	0.01
Mo	µg/g	14.3	1.4
Na	%	2.23	0.08
Nb	µg/g	6.52	0.13
Nd	µg/g	61.9	1.2
Ni	µg/g	64	8
P	%	0.24	0.02
Pb	µg/g	25	4
Pr	µg/g	16.26	0.20
Rb	µg/g	147	5
S	%	0.23	0.03
Sb	µg/g	3.31	0.20
Sc	µg/g	17.47	1.13
Si	%	24.40	0.20

Table 2 continued...

Analyte	Unit	Mean	SD
Sm	µg/g	12.0	0.4
Sr	µg/g	1471	16
Ta	µg/g	0.56	0.17
Tb	µg/g	1.10	0.13
Th	µg/g	9.2	2.6
Ti	%	0.40	0.02
Tl	µg/g	0.92	0.04
Tm	µg/g	0.30	0.02
U	µg/g	2.69	0.11
V	µg/g	155	29
W	µg/g	6.02	0.63
Y	µg/g	24.5	1.4
Yb	µg/g	2.00	0.09
Zn	µg/g	93	9
Zr	µg/g	211	38
LOI	%	7.55	0.04