

CERTIFIED REFERENCE MATERIAL RRM LAu014

PRODUCT: LOW LEVEL GOLD CERTIFICATE OF ANALYSIS

Certificate Number: RRM CRM LAu014 REV:000

Date: 31 May 2017

Table 1 LAu014 – Summary of Results

Analyte (Unit)	Assigned value	Standard Deviation		95% Confidence Limits	
		Within Laboratory	Between Laboratory	Lower	Upper
Au ppm	0.028	0.002	0.004	0.026	0.030

Prepared and Supplied:

Certified Reference Material LAu014 has been prepared, certified and is supplied by;

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Certified Reference Materials (CRMs) are used by laboratories to prove the value of their service offerings and for clients of laboratories to evaluate and monitor laboratory performance. CRMs must comply with high metrological requirements and ensuring traceability of measurement results.

Since most techniques employing analytical instrumentation are comparative, these techniques require a sample of known composition (CRM) for accurate calibration. Grade and Matrix matched CRM's are thus vital to the core of the analytical chemistry industry.

Origin of Material:

RRM LAu014 was prepared from a range of siliceous gold bearing samples combined to provide the desired gold grade achieved and within a Silicate; low Carbon, low Iron, low Sulphur matrix.

Country of Origin: Australia.

Preparation of Material:

The material constituting RRM LAu014 has been prepared according to ISO 17034:2016, and includes the following:

- Drying to constant mass
- Crushing and dry milling to nominal 53µm particle size
- Homogenization
- Systematic rotary division of the entire lot
- Packaging
 - 200-1000g sealed tubs
 - 30g-150g geochem pouches, vacuum sealed in barrier foil

Method of Analysis:

The analysis of the test samples has been conducted according to routine analytical procedures at each of the participating laboratories. The 'industry standard' Fire assay procedure, with instrumental finish was employed by the participating laboratories.

Statistical Evaluation:

Results received from the inter-laboratory study have been subjected to statistical evaluation. Statistically invalid outliers were excluded from the final evaluation. Gold by Fire Assay achieved in this particular inter-laboratory study is regarded as acceptable; this is a certified value.

Table 2 LAu014 – Statistical Evaluation

Gold - Au	
Assigned value (ppm)	0.028
Number of Laboratories	11
Number of Analyses	38
Between Laboratory Standard Deviation	0.004
Within Laboratory Standard Deviation	0.002
Between Laboratory Relative Standard Deviation	13.7 %
Within Laboratory Relative Standard Deviation	7.59 %
Standard Uncertainty	0.001
Lower confidence limit	0.026
Upper confidence limit	0.030
Lower limit of tolerance	0.021
Upper limit of tolerance	0.036

Informational Values:

Gold by Aqua Regia digestion Instrumental Finish was conducted at 6 laboratories in order to provide informational values for this material for this particular method.

Table 3 LAu014 – Statistics (Au by Aqua Regia Digest)

Gold - Au (Aqua Regia)	
Assigned value (ppm)	0.031
Number of Laboratories	6
Number of Analyses	14
Between Laboratory Standard Deviation	0.020
Within Laboratory Standard Deviation	0.009
Between Laboratory Relative Standard Deviation	63 %
Within Laboratory Relative Standard Deviation	28 %
Standard Uncertainty	0.008
Lower confidence limit	0.016
Upper confidence limit	0.047
Lower limit of tolerance	-0.008
Upper limit of tolerance	0.071

Participating Laboratories:

A list of the 11 participating laboratories (not in the same order as the results on the data tables) is presented in the table below:

Table 4 LAu014 – Participating Laboratories

ALS Geochemistry (Brisbane), Australia
ALS Geochemistry (Loughrea), Ireland
ALS Geochemistry (Perth), Australia
ALS Geochemistry (Vancouver), Canada
Aurum Laboratories, Australia
Bureau Veritas (Perth), Australia
Bureau Veritas (Swakopmund), Namibia
Intertek Minerals (Maddington), Australia
MinAnalytical, Australia
Nagrom, Australia
SGS (Perth), Australia

Intended Use:

The Certified Reference Material RRM LAu014 is intended to be used in analytical laboratories that analyse samples of similar grades (as presented in this certificate of analysis) and matrix (silicate; low carbon, low iron, low sulphur).

- Monitoring of routine laboratory performance (both internal and external)
- Method development and method validation
- Instrument calibration

Instructions before Use:

Safety precautions (in-line with safe laboratory practices) for handling fine particulate matter are advised; such as the use of safety glasses, dust masks, gloves and a laboratory coats.

Minimum Sample Size:

Based on an the results of the homogeneity assessment and evaluation of results submitted by the laboratories contributing certification data, the minimum size of a test portion is recommended to be 25g.

Analysis Validity:

The property value for RRM LAu014 Certified Reference Material remains valid provided that good laboratory practice is observed during handling and storage.

The material is in fine powder form and may be hygroscopic in nature. The material may be required to be dried at 105°C until constant mass is achieved.

Traceability:

The characterization of this material has been achieved by inter-laboratory study, each laboratory using an appropriate analytical method. These methods are calibrated against traceable standard solutions and analysed against appropriate Certified Reference Materials.

Revisions:

This certificate is version 0.00 for the material RRM-LAu014; and is intended to be a 'live document' intended to reflect progress in analytical chemistry. In that, any significant new data and information could be added at any time to ensure the currency and relevance of the certification. Any revisions to this Certificate of Analysis will be made available via the company website (www.resourcereferencematerials.com).

Acknowledgements:

We would like to gratefully acknowledge the participating laboratories and the staff at RRM for their contributions to this certification exercise.

Legal Notice:

This material has been meticulously prepared and a comprehensive statistical evaluation conducted to assign the property value. The Purchaser, by receipt of this material and certificate, indemnifies and releases Resource Reference Materials (Pty) Ltd from and against any and all liability and costs arising from the use of this material and certificate and any actions taken thereupon.

References:

ISO 17034:2016 General requirements for the competence of reference material producers

DRAFT ISO GUIDE 35:2016 Reference materials — Guidance for the characterization and the assessment of the homogeneity and stability of the material

ISO 5725-2:1994 Accuracy (trueness and precision) of measurement methods and results - Part 2: Basic method for the determination of repeatability and reproducibility of a standard measurement method

ISO 13528:2015 Statistical methods for use in proficiency testing by interlaboratory comparison

ISO 17025:2005 General requirements for the competence of testing and calibration laboratories

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