

Certificate of Analysis for Certified Reference Material (CRM) – SK150

Analyte	Unit	Certified value	Expanded uncertainty (U)	k
Au	ppm	4.131	+/- 0.038	2

Note 1.

- SI units equivalent: 1 ppm (parts per million) = 1 mg/kg = 1 µg/g = 1 g/t.
- The expanded uncertainty (U) is reported at an approximate 95% level of confidence and was calculated in accordance with ISO 33405:2024, using coverage factor k = 2.

The above values apply only to the product in jars or sachets which have an identification number within the following range: **601160 - 601741**.

Prepared and Certified By

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Rocklabs Reference Materials

Scott Technology Ltd

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Date of Certification: 27 June 2026

Certificate Version: 1

Available Packaging

This reference material has been packed in wide-mouth jars containing 2.5kg of material. Some jars may subsequently be repacked into sealed polyethylene sachets.

Source Material

The CRM consists of basalt, feldspar minerals and iron pyrite with minor quantities of finely divided gold-containing minerals, screened to minimise gold nugget effects.

Supplier

ROCKLABS, P.O. Box 18-142, Glen Innes,

Auckland 1743, NEW ZEALAND

Email: rocklabs.sales@scottautomation.com

Website: www.scottautomation.com

Description

The reference material is a light grey powder that has been homogenised. Homogeneity testing was carried out after the entire batch was packaged into wide-mouth jars. The product contains crystalline quartz and therefore dust from it should not be inhaled.

The approximate chemical composition is:

Method used: Borate Fusion XRF - (Uncertified Values)

Constituent	wt. %
SiO ₂	57.18
Al ₂ O ₃	15.47
Na ₂ O	2.71
K ₂ O	7.41
CaO	3.02
MgO	2.91
TiO ₂	0.90
MnO	0.06
P ₂ O ₅	0.23
Fe ₂ O ₃	4.56
Fe	2.63
S	3.00

Handling Instructions

Fine powders may present potential hazards to both the eyes and lungs. Therefore, it is recommended to take standard precautions, including the use of safety glasses and dust masks.

Intended Use

This reference material is designed to be included with every batch of samples analysed and the results plotted for quality monitoring and assessment purposes.

Stability and Storage Instructions

The material must be kept in a cool, dry environment to maintain the integrity of the CRM. When unopened and stored under recommended conditions, the reference material has a shelf life of ten years from the certification date. Stability will be regularly assessed, and any observed changes will be promptly communicated to purchasers. The material should be retained in its original packaging, and the jars must be securely re-closed after each use.

Method of Preparation

This reference material was produced under quality management systems certified to ISO 9001:2015. Finely pulverised feldspar minerals, basalt rock, iron pyrite, and gold-containing mineral concentrate were blended using a controlled preparation process. The total batch was prepared in two separate blending iterations using the same formulation and preparation conditions. After each blending iteration was completed, the material from that blend was transferred into a separate dedicated storage tank prior to packaging. The material was subsequently packaged into 581 wide-mouth jars, each assigned a unique identification number. A random selection of 26 jars from the packaging run was used for homogeneity and characterisation testing.

Homogeneity Assessment

Samples were collected from the top and middle of each of the 26 jars, resulting in 52 samples being analysed. These samples were randomly ordered, then numbered consecutively before being sent to the laboratory for testing. Gold analysis was performed by an independent laboratory using fire assay on 30g aliquots followed by an ICP-AES finish. Measures were implemented to minimise methodological variations within the laboratory, thereby improving the sensitivity for detecting potential inhomogeneity.

No outliers were identified in the homogeneity data. ANOVA results indicated that there was no statistically significant variability between tanks. The variability between jars (SD = 0.010 ppm; RSD = 0.250%) and within jars (SD = 0.027 ppm; RSD = 0.647%) was less than 1%, confirming that the material is sufficiently homogeneous for its intended use at the specified minimum sample mass.

Analytical Methodology

Once homogeneity was verified, two subsamples were distributed to participating laboratories as part of a round-robin interlaboratory study to establish a certified gold concentration value. The selection of participating laboratories was based on their continued good performance in prior inter-laboratory programs facilitated by Rocklabs. The subsamples were derived from a selection of 26 randomly chosen jars, with each laboratory receiving samples from two distinct jars.

Participating laboratories were instructed to determine gold concentrations by fire assay using validated finish methods routinely employed within their laboratories. Indicative concentration ranges were provided to aid with the selection of appropriate analytical procedures.

Gold analysis was conducted using fire assay followed by either gravimetric or instrument finish methods, including Atomic Absorption Spectroscopy (AAS) or Inductively Coupled Plasma Atomic Emission Spectroscopy (ICP-AES). The sample mass used in the analyses varied among laboratories, ranging from 30g to 50g.

Calculation of Certified Value

Each of the 26 participating laboratories returned replicate gold results using the same analytical finish method for both samples. The identification of outliers was carried out using the principles detailed in sections 7.3.2–7.3.4, ISO 5725-2:2025. The evaluation of each laboratory's performance relied on z-scores, partly based on the concept described in ISO/IEC 17043:2023. Criteria details for these assessments are available on request. Following the statistical analyses, two sets of results were excluded in the process of determining the certified gold concentration value for this reference material.

Consequently, a certified value was evaluated in accordance with ISO 33405:2024 and incorporates contributions from characterisation, between- and within-unit homogeneity, transport stability, and long-term stability. The combined standard uncertainty was expanded using a coverage factor $k = 2$ to obtain the expanded uncertainty (U), corresponding to an approximate 95% level of confidence.

$$u_{CRM} = \sqrt{u_{char}^2 + u_{homo}^2 + u_{trans}^2 + u_{lts}^2}$$

Where u_{char} is uncertainty due to characterisation, u_{homo} is uncertainty due to inhomogeneity, u_{trans} is uncertainty due to transport instability and u_{lts} is uncertainty due to long-term storage instability.

The certified value is provided at the beginning of the certificate in $\mu\text{g/g}$ (ppm). A summary of the results used to calculate the certified value is listed below and the names of the laboratories that submitted results are listed on page 5. The results are listed in increasing order of the individual laboratory averages.

Statistical analysis of the consensus test results has been carried out by an independent statistician, Dr Daniel Walsh.

Summary of Results Used to Calculate Certified Gold Concentration Value (Listed in increasing order of individual laboratory averages)

Gold ppm		
Sample 1	Sample 2	Set average
4.040	3.910	3.975
3.990	3.990	3.990
4.050	4.010	4.030
4.010	4.060	4.035
4.061	4.025	4.043
4.060	4.060	4.060
4.060	4.070	4.065
4.090	4.050	4.070
4.079	4.097	4.088
4.098	4.107	4.102
4.180	4.070	4.125
4.110	4.140	4.125
4.108	4.150	4.129
4.140	4.130	4.135
4.130	4.150	4.140
4.170	4.120	4.145
4.199	4.198	4.198
4.120	4.310	4.215
4.220	4.230	4.225
4.240	4.220	4.230
4.204	4.285	4.244
4.250	4.240	4.245
4.312	4.205	4.258
4.260	4.270	4.265
Average of the 24 sets		4.131 ppm
SD of the 24 sets		0.088 ppm
RSD		2.1%

Participating Laboratories

Australia	ALS Geochemistry, Perth ALS Geochemistry, Townsville Genalysis Laboratory Services, Perth
Burkina Faso	ALS Geochemistry, Ouagadougou, Burkina Faso Lab
Canada	Bureau Veritas Commodities Canada Ltd ALS Geochemistry, Vancouver ALS Geochemistry, Val d'Or, Canada Actlabs Thunder Bay SGS Mineral Services, Vancouver MSALABS INC. Langley Canada
China	Fujian Zijin Mining, China
Côte d'Ivoire	Bureau Veritas, Cote d'Ivoire
Ghana	ALS Geochemistry, Kumasi Intertek Minerals Limited, Tarkwa
Ireland	ALS Geochemistry, Loughrea
Kyrgyz Republic	Stewart Assay, Kyrgyz Republic
Laos	ALS Geochemistry, Vientiane
Mali	Bureau Veritas
Mexico	BV Minerals, Hermosillo
Mangolia	ALS Geochemistry, Ulaanbaatar
Morocco	LABOMINE, Morocco
Peru	ALS Geochemistry, Lima Inspectorate Services Peru Minera Yanacocha, Peru
Turkey	ALS Geochemistry, Izmir
USA	Bureau Veritas Commodities and Trade, Sparks

Instructions and Recommendations for Use

Weigh the quantity of CRM normally used for analysis and determine total gold using laboratory routine procedure. Homogeneity testing has shown that consistent results are obtainable for gold when 30g aliquots are taken for analysis.

The certified value is accompanied by an expanded uncertainty (U), which represents total uncertainty associated with the certified gold concentration in the sealed packaging. The expanded uncertainty has been calculated in accordance with ISO 33405:2024 using a coverage factor of $k = 2$, corresponding to an approximate 95% level of confidence.

Drying or mixing of the material is not required before the weighing and analysis. Samples may be drawn multiple times from a jar; however, the container must be securely re-closed after each use to maintain the integrity of the Certified Reference Material.

The expanded uncertainty associated with the certified value shall not be used to establish laboratory control limits. The uncertainty reflects the certification process and interlaboratory characterisation program, rather than the repeatability or reproducibility of individual laboratory measurement systems.

Laboratories are encouraged to establish their own quality control limits by routinely analysing this CRM, recording results over time, and plotting them on an appropriate control chart. This approach enables effective monitoring of laboratory bias and analytical variability based on internally generated data.

Minimum Sample Mass Recommendation

This CRM has been certified using 30-50g aliquots for fire assay. It is recommended to use a minimum sample size of 30g when using this CRM. The provided statement on uncertainty and homogeneity is valid only if a sample mass of at least 30g is used.

Metrological Traceability

The certified values in this report are supported by interlaboratory results traceable to the International System of Units (SI) through measurement of mass. The data presented in the tables represent mass fractions, expressed as weight percent, milligrams per kilogram (mg/kg) or parts per million (ppm), as applicable. Analytical samples were carefully selected to adequately represent the entire batch of the prepared CRM. Each set of analytical data is validated by the assayer using reference materials and quality control checks during analysis. The selection of laboratories was based on their proven performance in previous inter-laboratory programs conducted by Rocklabs, with many of these laboratories complying with the requirements of ISO/IEC 17025:2017. The certified values provided in the Certificate of Analysis are derived from the means of accepted data following rigorous statistical treatment.

Commutability

This CRM is intended for quality control applications involving the determination of analytes in geological materials. It has been prepared from natural mineral matrices and has demonstrated suitable performance in interlaboratory analytical programs. All Rocklabs CRMs are produced from natural geological materials to provide analytical behaviour closely aligned with routine field samples in relevant measurement processes.

A formal commutability study has not been performed for this CRM. However, the material is considered suitable for its intended purpose based on its natural mineral composition, method of preparation, and successful use of comparable materials in interlaboratory analytical programs.

The matrix characteristics of this CRM are described in the 'Source Material' and 'Description' sections. Users are responsible for determining the suitability of this CRM for their specific analytical procedures and measurement systems.

Legal Notice

This certificate and the reference material described in it have been prepared with due care and attention. However, Scott Technology Ltd accepts no liability for any decisions or actions taken following the use of the reference material.

References

For further information on the preparation and validation of this reference material please contact Sadaf Sadaf.

QMS Accreditation

This CRM has been produced under a quality management system accredited to ISO 17034:2016 – General requirements for the competence of reference material producers, under accreditation number 4.

Rocklabs is accredited by IANZ as a reference material producer for the production of certified reference materials. The use of the IANZ/ISO 17034 accreditation symbol applies to the certified reference material activities covered under the Rocklabs scope of accreditation.

All Rocklabs products are manufactured under management systems certified by Telarc to the following standards:

- **ISO 9001:2015** Quality Management System
- **ISO 14001:2015** Environmental Management System
- **ISO 45001:2018** Occupational Health and Safety Management System



Certifying Officer

Sadaf Sadaf

27 June 2026

Sadaf Sadaf (PhD – Earth Science), Technical Chemist – Rocklabs

Independent Statistician

Daniel Walsh

Dr. Daniel Walsh, PhD