Rocklabs Ltd, 81 Westney Road, Building B
Mangere, Auckland 2022, New Zealand
P.O. Box 18-142, Glen Innes 1743, Auckland
New Zealand
Tel: +64 9 634 7696
Website: www.rocklabs.com

Certificate of Analysis
Reference Material Si146

Analyte	Unit	Certified Value	95% Confidence Interval (CI)	k*
Au	ppm	1.780	+/- 0.018	2

Note 1: SI units equivalent: 1 ppm parts per million = gram per ton = mg/kg = ug/g = 0.0001wt% = 1000ppb, part per billion.
* Coverage factor.

The above values apply only to product in jars or sachets which have an identification number within the following range: ***593340–593932.***

Prepared and Certified By

Sadaf Sadaf
Rocklabs Reference Materials
Scott Technology
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Date of Certification

05 September 2025

Certificate Status

Version 2

Available Packaging

This reference material has been packed in wide-mouthed jars that contain 2.5 kg of product. The contents of some jars may be subsequently repacked into sealed polyethylene sachets.

Origin of Reference Material

Basalt, feldspar minerals and iron pyrites with minor quantities of finely divided gold-containing minerals that have been screened to ensure there is no gold nugget effect.

Supplier of Reference Material

ROCKLABS
P O Box 18-142, Glen Innes
Auckland 1743, **NEW ZEALAND**
Email: rocklabs.sales@scottautomation.com
Website: www.scottautomation.com

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Description

The reference material is a light grey powder that has been well mixed, and a homogeneity test carried out after the entire batch was packaged into wide-mouthed jars. There is no soil component. 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	57.03
Al_2O_3	15.42
Na_2O	3.34
K_2O	6.52
CaO	3.09
MgO	2.91
TiO_2	0.91
MnO	0.07
P_2O_5	0.24
Fe_2O_3	4.48
Fe	2.63
S	3.00

Values expressed as weight % on an oven dried basis. LOI = Loss on ignition for 1 hour at 1000°C.

Handling Instructions

Fine powders 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 ensure that it does not affect the integrity of the CRM. Unopened, the reference material has a shelf life of ten years from the certification date. When exposed to the atmosphere, it remains stable, with weight changes under 0.1% at natural temperature and humidity extremes. 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 closed after each use.

Method of Preparation

This reference material has been produced under quality management systems certified to ISO 9001:2015. Finely pulverized feldspar minerals, basalt rock and barren iron pyrites were blended with similarly pulverized and screened gold-containing minerals. After achieving a uniform mixture of the powders, the resulting composite was distributed into 593 wide-mouthed jars, each assigned a unique number. A random selection of 26 jars from the packaging run was used for both homogeneity and consensus testing.

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Homogeneity Assessment

Sampling was performed by Rocklabs, with gold analysis performed by an independent laboratory. The analysis utilized fire assay on 30g portions, followed by 30g - fa/ICP-AES finish. Measures were implemented to minimize methodological variations within the laboratory, thereby enhancing the detection of variations in the candidate reference material.

Homogeneity: Duplicate samples were collected from the top and middle of each of 26 jars randomly selected from the total of 593 jars in the batch. In total, 52 samples were analyzed. These samples were randomly ordered, then numbered consecutively before being sent to the laboratory for testing.

One large outlier was observed in Tank 1. This was investigated, and retesting confirmed that the original result was a laboratory error. The outlier was therefore excluded from the homogeneity analysis.

With the outlier removed, the ANOVA results showed that variability between tanks and between jars was not a significant source of inhomogeneity. The estimated variability between tanks was zero, confirming no inhomogeneity due to tanks. The variability between jars (SD = 0.009 ppm, RSD = 0.505%), and within-jars (SD = 0.015 ppm; RSD = 0.857%) were both less than 1%, confirming that the between and within jars components are not significant sources of inhomogeneity.

Analytical Methodology

Once homogeneity was verified, two sub-samples were distributed to a number of laboratories in a round-robin initiative for consensus testing to establish a gold value. The selection of participating laboratories was based on their continued good performance prior inter-laboratory programs facilitated by Rocklabs. The sub-samples were derived from a selection of 26 randomly chosen jars, with each laboratory receiving samples from two distinct jars.

Laboratories were instructed to analyze the samples for gold by fire assay using the finish method they deemed most effective. Indicative concentration ranges were provided to aid method selection.

Gold analysis was conducted by all participating laboratories using fire assay followed by either gravimetric or instrument finish (AAS or ICP). The quantity of sample used in the analyses varied among laboratories, ranging from 30–50 grams.

Calculation of Certified Value

Each of the 27 participating laboratories returned replicate gold results using one finish method for both samples. To identify 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, 4 result sets of results were excluded in the process of determining gold concentration value to this reference material.

Consequently, a recommended value was calculated based on the average of the remaining n = 23 sets of replicate results. The 95% confidence interval was estimated using the (18) of ISO 33405:2024:

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$$u_{CRM} = \sqrt{{u_{char}}^2 + {u_{hom}}^2 + {u_{trn}}^2 + {u_{lts}}^2}$$

Where u_{char} is uncertainty of characterization, u_{hom} is uncertainty due to inhomogeneity, u_{trn} 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 µg/g (ppm) units. 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 below. The results are listed in increasing order of the individual laboratory averages.

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

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

Gold ppm		
Sample 1	**Sample 2**	**Mean**
1.675	1.767	1.721
1.720	1.740	1.730
1.755	1.715	1.735
1.750	1.720	1.735
1.725	1.750	1.738
1.720	1.760	1.740
1.740	1.750	1.745
1.760	1.740	1.750
1.787	1.714	1.750
1.729	1.781	1.755
1.781	1.748	1.764
1.765	1.780	1.772
1.790	1.760	1.775
1.799	1.788	1.793
1.800	1.820	1.810
1.830	1.800	1.815
1.789	1.849	1.819
1.807	1.833	1.820
1.810	1.830	1.820
1.820	1.830	1.825
1.830	1.820	1.825
1.840	1.830	1.835
1.880	1.870	1.875
Average of the 23 sets		1.780 ppm
Standard deviation of the 23 sets		0.043 ppm
Relative standard deviation		2.4%
95% confidence interval for average		+/- 0.019 ppm

***Note:** Neither the Standard deviation nor the Confidence interval should be used as a basis to set control limits when plotting individual laboratory results. See notes under "Instructions and Recommendations for Use" (pg 5&6).*

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Participating Laboratories

Australia	ALS Minerals, Perth
	ALS Minerals, Townsville
	Bureau Veritas Amdel, Adelaide
	Intertek Genalysis Laboratory Services, Perth
Burkina Faso	ALS Minerals, Burkina Faso
Canada	Actlabs, Thunder Bay
	Actlabs Val d'Or
	ALS Minerals, Vancouver
	ALS Minerals, Val d'Or
	Bureau Veritas Commodities Canada Ltd, Vancouver
	MSALABS Inc., Langley BC, Canada
	SGS Minerals Services, Lakefield, Ontario
China	Fujian Zijin Mining and Metallurgical Testing, Xiamen
Côte d'Ivoire	Bureau Veritas Mineral Laboratories, Abidjan
	ENVAL, Yamoussoukro, Ivory Coast
Ghana	Intertek Minerals, Tarkwa
Guyana	MSALABS, East Coast Demerara.
Ireland	ALS Minerals, Loughrea
Kyrgyz Republic	Stewart Assay and Environmental Laboratories LLC, Kara-Balta
Laos	ALS Geochemistry, Vientiane
Mexico	BV Minerals, Hermosillo
Mongolia	ALS Minerals, Ulaanbaatar
Romania	ALS Minerals, Rosia Montana
South Africa	ALS Minerals, Edenvale – Johannesburg
Turkey	ALS Minerals, Izmir
USA	ALS Minerals, Reno
	Bureau Veritas Commodities and Trade, Sparks

Instructions and Recommendations for Use

Weigh out quantity usually used for analysis and analyze for total gold by normal procedure. Homogeneity testing has shown that consistent results are obtainable for gold when 30g portions are taken for analysis.

The certified value associated with Si146 pertains to the gold concentration in sealed packaging. Drying or mixing of the material is not required before the weighing and analysis process. While samples can be drawn multiple times from the jars, the jar should be re-closed after each use. This precaution is taken to safeguard the Certified Reference Material (CRM) from potential airborne contamination and moisture.

We quote a 95% confidence interval for our estimate of the certified value. This confidence interval reflects total uncertainty in estimating the true value for the gold content of the reference material. The interval is chosen such that, if the same procedure as used here to estimate the certified value were used again and again, then 95% of the trials would give intervals that contained the true value.

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The narrower the interval, the more precise is the certified value. The 95% CI should not be used for the determination of quality control gates as it **does not** reflect the variability any laboratory will experience in its own repetitive testing.

Our consensus testing statistical data should not be used to establish individual lab control limits. Our certification process produces precise statistical data derived from proficiency program rather than specific laboratory performance. Use of such data may lead to apparent out-of-control points, casting doubts about the laboratory's testing, or reference material itself.

We recommend adopting a best practice of gathering a record of the test results acquired and graphing them on a control chart. This approach allows for the identification of any laboratory bias and variability. It is advisable to set control limits for the chart by considering the average level and variation observed in the laboratory's own data. This empowers laboratories to establish more tailored control limits specific to their application, facilitating effective monitoring of bias. To help our customers do this, we can provide a free Excel template that will produce sensible graphs, with intelligently chosen limits, from the customer's own data.

Minimum Sample Mass Recommendation

This reference material has been certified using 30g to 50g aliquots for fire assay. It is recommended to use a minimum sample size of 30g when utilizing this reference material. The provided statement on uncertainty and homogeneity are 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 that can be traced back to the international measurement (SI) scale of mass. The data presented in the tables indicate mass fractions, expressed in either weight percent, milligrams per kilogram (mg/kg) expressed as parts per million. Analytical samples were carefully selected to adequately represent the entire batch of the prepared CRM. Each set of analytical data undergoes validation by the assayer, incorporating 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 being accredited to ISO 17025. The certified values provided in the Certificate of Analysis are derived from the means of accepted data following rigorous statistical treatment.

Commutability

The measurements forming the basis of the certified values in this report involved pre-treatment (fire assay) of the sample. This process simplified the sample to a well-understood form, allowing more accurate and meaningful comparisons and measurements in various testing and measurement processes. The effectiveness and understanding of these methods eliminate concerns regarding commutability for this CRM. All Rocklabs CRMs are derived from natural materials, ensuring their behavior aligns closely with routine 'field' samples in relevant measurement processes. The matrix characteristics of this CRM are detailed in the **'Origin of Reference Material' and 'Description' sections**. Determining the suitability of this product shall be the sole responsibility of the user.

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Legal Notice

This certificate and the reference material described in it have been prepared with due care and attention. However, Scott Technology Ltd and Nano Consulting Ltd accept 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 Certified Reference Material (CRM) has been produced under a quality management system accredited to ISO 17034:2016 – General requirements for the competence of reference material producers. Our accreditation has been granted by IANZ, under accreditation number 4.

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

- ISO 9001:2015 Quality Management System
- ISO 14001:2015 Environmental Management System
- ISO45001:2018 Occupational Health and Safety Management System

Certifying Officer

Sadaf Sadaf — 26th February 2026

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

Independent Statistician

Daniel Walsh

Dr. Daniel Walsh, PhD