P.O Box 18-142, Glen Innes 1743
Auckland, New Zealand.
P 64 9 634 7696
E rocklabs.sales@scottautomation.com
www.rocklabs.com

Certificate of Analysis

Reference Material OxG201

Recommended Gold Concentration: 1.224 µg/g
95% Confidence Interval: +/- 0.007 µg/g

The above values apply only to product in jars or sachets which have an identification number within the following range: ***584774–585623***

Prepared and Certified By:

Sadaf Sadaf
Rocklabs Reference Materials
Scott Technology
P.O. Box 18-142
Glen Innes
Auckland 1743
NEW ZEALAND
Email: s.sadaf@scottautomation.com
Telephone: +64 9 6347696

Date of Certification: 22 December 2023

Certificate Status: Version 1

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 and feldspar minerals 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
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NEW ZEALAND
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Website: www.Rocklabs.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	59.70
Al_2O_3	16.00
Na_2O	3.53
K_2O	6.66
CaO	3.55
MgO	3.37
TiO_2	1.05
MnO	0.08
P_2O_5	0.27
Fe_2O_3	5.25

Values expressed as weight % on an óven 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. If the container remains unopened, the reference material will maintain stability for over 10 years from the certification date. When exposed to the atmosphere, the reference material remains stable, with total weight changes of less than 0.5% at naturally occurring temperature and humidity extremes. 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 and basalt rock were blended with similarly pulversized and screened gold-containing minerals. After achieving a uniform mixture of the powders, the resulting composite was distributed into 850 wide-mouthed jars, each assigned a unique number. A random selection of 24 jars from the packaging run was used for both homogeneity and consensus testing.

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Homogeneity Assessment:

Sampling was performed by Rocklabs, and an independent laboratory carried out gold analysis by fire assay of 30 g portions, using an ICP-AES finish. Steps were taken to minimize laboratory method variation in order to better detect any variation in the candidate reference material.

Homogeneity: A sample was removed from the top of each of the 24 jars randomly selected from the 850 jars in the batch. The results of analysis of the 24 samples (randomly ordered then consecutively numbered before being sent to the laboratory) produced a relative standard deviation of 1.7%.

Settling: The contents of 3 randomly selected jars were compacted by vibration (to simulate the effect of freighting) and 5 samples were removed successively from top to bottom from each jar. In addition, 5 samples were removed from the last jar in the series. No top to bottom gradation in the gold values was observed.

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 24 randomly chosen jars, with each laboratory receiving samples from two distinct jars.

Laboratories were instructed to analyse 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 15 – 50 grams.

Calculation of Certified Value:

Each of the 39 participating laboratories returned replicate gold results using one finish method for both samples. To identify outliers, statistical analysis was carried out using the principles detailed in sections 7.3.2 – 7.3.4, ISO 5725-2: 2019. The evaluation of each laboratory's performance relied on z-scores, partly based on the concept described in ISO/IEC 17043:2010. Criteria details for these assessments are available upon request. Following the statistical analyses, 4 result sets were excluded in the process of determining gold concentration value for this reference material.

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Consequently, a recommended value was calculated based on the average of the remaining n = 35 sets of replicate results. The 95% confidence interval was estimated using the formula:

$$X \pm ts/\sqrt{n}$$

(where X is the estimated average, s is the estimated standard deviation of the laboratory averages, and t is the 0.025 tail-value from Student's t-distribution with n-1 degrees of freedom). The recommended value is provided at the beginning of the certificate in µg/g (ppm) units. A summary of the results used to calculate the recommended value is listed on page 4 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 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**	**Set average**
1.200	1.180	1.190
1.198	1.185	1.192
1.185	1.205	1.195
1.171	1.223	1.197
1.200	1.200	1.200
1.200	1.202	1.201
1.195	1.208	1.202
1.215	1.190	1.203
1.210	1.200	1.205
1.210	1.210	1.210
1.234	1.195	1.215
1.230	1.200	1.215
1.210	1.220	1.215
1.210	1.220	1.215
1.200	1.230	1.215
1.225	1.220	1.223
1.220	1.225	1.223
1.194	1.252	1.223
1.220	1.230	1.225
1.230	1.220	1.225
1.230	1.225	1.228
1.210	1.250	1.230
1.220	1.240	1.230
1.230	1.235	1.232
1.210	1.260	1.235
1.235	1.235	1.235
1.225	1.255	1.240
1.240	1.240	1.240
1.240	1.250	1.245
1.265	1.225	1.245
1.246	1.247	1.247
1.270	1.230	1.250
1.260	1.240	1.250
1.280	1.250	1.265
1.270	1.290	1.280
Average of the 35 sets		1.224 ppm
Standard deviation of the 35 sets		0.021 ppm
Relative standard deviation		1.7%
95% confidence interval for average		+/- 0.007 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 6).*

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Participating Laboratories

Australia	ALS Minerals, Kalgoorlie
	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 dÓr
	ALS Minerals, Vancouver
	ALS Minerals, Val d'Or
	Bourlamaque Assay Laboratories, Quebec
	Bureau Veritas Commodities Canada Ltd, Vancouver
	MSALABS Inc., Langley BC
	SGS Minerals Services, Lakefield, Ontario
	SGS Minerals Services, Vancouver
	Techni-lab, Ste-Germaine-Boule
Chile	ALS Minerals, Santiago
China	Fujian Zijin Mining and Metallurgical Testing, Xiamen
Côte d'Ivoire	Bureau Veritas Mineral Laboratories, Abidjan
	ENVAL, Yamoussoukro
Ghana	ALS Minerals, Kumasi
	Intertek Minerals, Samahu
Guyana	MSALABS, East Coast Demerara.
Ireland	ALS Minerals, Loughrea
Kyrgyz Republic	Stewart Assay and Environmental Laboratories LLC, Kara-Balta
Laos	ALS Geochemistry, Vientiane
Mali	Bureau Veritas, Mali
Mexico	BV Minerals, Hermosillo
Mangolia	ALS Minerals, Ulaanbaatar
Morocco	LABOMINE, Agadir
New Zealand	SGS New Zealand Ltd, Otago
Peru	ALS Minerals, Lima
	Minera Yanacocha SRL – Newmont, Lima
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
	McClelland Laboratories, Sparks

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Instructions and Recommendations for Use:

Weigh out quantity usually used for analysis and analyse 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 OxG201 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 declared value. This confidence interval reflects our 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 declared value were used again and again, then 95% of the trials would give intervals that contained the true value. It is a reflection of how precise the trial has been in estimating the declared value. It **does not** reflect the variability any particular 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.

Metrological Traceability

The certified values in this report are supported by interlaboratory results that can be traced back to the international measurement scale of mass. The data presented in the tables indicate mass fractions, expressed in either weight percent, parts per million, or parts per billion. 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 holding and maintaining ISO 17025 accreditation. The certified values provided in the Certificate of Analysis are derived from the means of accepted data following rigorous statistical treatment.

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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.

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.

Certifying Officer

Sadaf Sadaf

Sadaf Sadaf
Technical Chemist

Independent Statistician

Daniel Walsh

Dr Daniel Walsh, PhD