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Certificate of Analysis

Reference Material OxD183

Recommended Gold Concentration: 0.453 µg/g
95% Confidence Interval: +/- 0.003 µg/g

The above values apply only to product in jars or sachets which have an identification number within the following range: ***539251–541985***

Prepared and Certified By:	Eoin Foster Rocklabs Reference Materials Scott Technology P.O. Box 18-142 Glen Innes Auckland 1743 **NEW ZEALAND** Email: e.foster@scottautomation.com Telephone: +64 9 6347696
Date of Certification:	20 June 2022
Certificate Status:	Original
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 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 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**:**

(Uncertified Values)

	%
SiO_2	59.20
Al_2O_3	15.40
Na_2O	2.58
K_2O	7.72
CaO	3.57
MgO	3.64
TiO_2	1.07
MnO	0.07
P_2O_5	0.28
Fe_2O_3	5.51
L O I	0.59

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:

The container (jar or sachet) should not be heated to, or stored at temperatures higher than 50 °C. Where the container remains unopened, the reference material will remain stable for more than 10 years from the date of certification. When exposed to atmosphere the reference material is stable, with total weight changes of less than 0.5 % at naturally occurring temperature and humidity extremes.

Method of Preparation:

This reference material has been produced under quality management systems certified to ISO 9001:2015

Following ILAC Guidelines G12:2000 and G13:2000, pulverized feldspar minerals, basalt rock and barren iron pyrites were blended with finely pulverized and screened gold-containing minerals. Once the powders were uniformly mixed the composite was placed into 2735 wide-mouthed jars, each bearing a unique number. 50 jars were randomly selected from the packaging run and material from these jars was used for both homogeneity and consensus testing.

Homogeneity Assessment:

Sampling was performed by Rocklabs Reference Materials, and an independent laboratory carried out gold analysis by fire assay of 30 g portions, using an ICP 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 50 jars randomly selected from the 2735 jars in the batch. The results of analysis of the 50 samples (randomly ordered then consecutively numbered before being sent to the laboratory) produced a relative standard deviation of 1.3%

Settling: The contents of 6 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, neither was there a significant difference between the last jar and the other jars.

Analytical Methodology:

Once homogeneity had been established, two sub-samples were submitted to a number of well-recognized laboratories in order to assign a gold value by consensus testing. The sub-samples were drawn from 50 randomly selected jars and each laboratory received samples from two different jars.

Each laboratory was instructed to analyse the samples for gold using the method they believed would give the best results. Indicative concentration ranges were given.

The samples were analysed for gold by all participating laboratories using fire assay followed by either gravimetric or instrument finish (AAS or ICP). The amount of sample used in the analyses varied between laboratories, (range 15 - 50g).

Calculation of Certified Value:

The 47 participating laboratories each returned replicate gold results using one finish method for both samples. Statistical analysis to identify outliers was carried out using the principles detailed in sections 7.3.2 – 7.3.4, ISO 5725-2: 1994. Assessment of each laboratory's performance was carried out on the basis of z-scores, partly based on the concept described in ISO/IEC Guide 43-1. Details of the criteria used in these examinations are available on request. As a result of these statistical analyses, 10 sets of results were excluded for the purpose of assigning a gold concentration value to this reference material. A recommended value was thus calculated from the average of the remaining n = 37 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**
0.434	0.439	0.4365
0.442	0.438	0.44
0.441	0.441	0.441
0.44	0.444	0.442
0.443	0.447	0.445
0.44	0.45	0.445
0.444	0.447	0.4455
0.446	0.446	0.446
0.448	0.446	0.447
0.454	0.4405	0.44725
0.452	0.444	0.448
0.449	0.4505	0.44975
0.44	0.46	0.45
0.452	0.448	0.45
0.451	0.45	0.4505
0.449	0.454	0.4515
0.455	0.45	0.4525
0.45	0.457	0.4535
0.456	0.452	0.454
0.459	0.449	0.454
0.465	0.444	0.4545
0.45	0.464	0.457
0.458	0.456	0.457
0.452	0.463	0.4575
0.455	0.46	0.4575
0.458	0.457	0.4575
0.451	0.469	0.46
0.467	0.453	0.46
0.46	0.46	0.46
0.46	0.46	0.46
0.46	0.46	0.46
0.461	0.46	0.4605
0.464	0.462	0.463
0.469	0.459	0.464
0.47	0.46	0.465
0.468	0.462	0.465
0.471	0.461	0.466
Average of the 37 sets		0.453 ppm
Standard deviation of the 37 sets		0.008 ppm
Relative standard deviation		1.7%
95% confidence interval for average		+/- 0.003 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)***

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 Endeavor Mana, Burkina Faso
Canada	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, Val d'Or Techni-lab, Ste-Germaine-Boule
Chile	Bureau Veritas, Antofagasta Bureau Veritas, Coquimbo 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.
Kyrgyz Republic	Stewart Assay and Environmental Laboratories LLC, Kara-Balta
Laos	ALS Geochemistry, Vientiane
Mali	MSALABS, Bamako
Mauritania	MS Analytical, Nouakchott
Mexico	BV Minerals, Hermosillo
Mongolia	ALS Minerals. Ulaanbaatar ALS Minerals, Oyu Tolgoi
Morocco	REMINEX Research Center, Casablanca
New Zealand	SGS New Zealand Ltd, Otago SGS New Zealand Ltd, Waihi
Peru	ALS Minerals, Lima Inspectorate Services Perú S.A.C., Callao Minera Yanacocha SRL – Newmont, Lima
Romania	ALS Minerals, Rosia Montana
South Africa	ALS Minerals, Edenvale – Johannesburg
Tanzania	MSA Laboratories, Mwanza
Turkey	Acme Analitik Laboratuar Hizmetleri Ltd, Sirketi ALS Minerals, Izmir
USA	ALS Minerals, Reno Nevada Gold Mines,Goldstrike McClelland Laboratories, Sparks
Zimbabwe	Performance Laboratories, Ruwa

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.

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.

Some users have used our consensus testing statistical data to establish control limits for assessing acceptance of laboratory results. Our certification process produces precise statistical data based on the proficiency program and not on an individual laboratory. Such use inevitably leads to many apparent out-of-control points, leading to doubts about the laboratory's testing, or of the reference material itself.

Our suggested best practice would be to accumulate a history of the test results obtained, and plot them on a control chart to determine any laboratory bias and variability. The appropriate centre line and control limits for this chart should be based on the average level and variation exhibited in the laboratory's **own** data. This chart will provide a clear picture of the long-term stability or otherwise of the laboratory testing process, providing good clues as to the causes of any problems. 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.

Our instructions are recommendations for appropriate use of reference materials. If our statistical data is used for control limits due to practicality and particular circumstances, please consult with us and we will be happy to assist and advise.

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 Eoin Foster.

Certifying Officer

Eoin Foster
Manufacturing Manager

Independent Statistician

Dr Daniel Walsh, PhD