



ROCKLABS

WORLD LEADERS IN SAMPLE PREPARATION EQUIPMENT AND REFERENCE MATERIALS FOR USE IN GOLD ASSAYING

ROCKLABS LIMITED

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Certificate of Analysis

Reference Material OxQ70

Recommended Values and 95% Confidence Intervals

Gold concentration: 49.18 (\pm 0.52) μ g/g

Silver concentration: 151.5 (\pm 4.6) μ g/g

The above values apply only to product in jars or sachets that have an identification number within the following Range: *153 494* to *153 763*.

Prepared and Certified By:

Malcolm Smith BSc, FNZIC
Malcolm Smith Reference Materials Ltd
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NEW ZEALAND
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Date of Certification:

16 May 2008

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:

Feldspars with minor quantities of finely divided gold and silver-containing minerals that have been screened to ensure there is no nugget effect.

Supplier of Reference Material:

ROCKLABS Ltd
P O Box 18 142
Auckland
NEW ZEALAND
Email: sales@rocklabs.com
Telephone: +64 9 634 7696

Description:

The component minerals have been well mixed and a homogeneity test carried out after the entire batch was packaged into the jars to ascertain that homogeneity has been achieved. 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	60.95
Al ₂ O ₃	17.37
Na ₂ O	7.42
Fe ₂ O ₃	4.12
K ₂ O	2.83
CaO	2.59
MgO	2.70
TiO ₂	0.75
MnO	0.06
P ₂ O ₅	0.25
LOI	0.37

Intended Use:

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

Stability:

The jars and their contents should not be heated to temperatures higher than 50 °C. The reference material is stable, with weight changes of less than 0.5% at extremes of naturally occurring temperature and humidity conditions.

Instructions for Use:

Weigh out quantity usually used for analysis and analyze by normal procedure. Do not dry before weighing.

Method of Preparation:

Pulverized feldspar minerals and basalt were blended with finely pulverized and screened, gold and silver-containing minerals. Once the powders were uniformly mixed, the composite was placed into 270 wide-mouthed jars, each bearing a unique number. 9 jars were selected at regular intervals from the packaging run and material from these jars was used for both homogeneity assessment and assignment of gold and silver values.

Homogeneity Assessment for Gold and Silver:

An independent laboratory carried out all gold and silver analyses by fire assay of 30g portions, using a gravimetric finish. The homogeneity assessment was carried out after the material had been packaged into jars.

The contents of a randomly selected jar were compacted by vibration (to simulate the effect of freighting) and five samples removed successively from top to bottom from the jar. One sample was also removed from the top of each of 9 jars selected at regular intervals from the 270 jars in the batch. The results of analysis of the 14 samples produced a coefficient of variation of 0.2% for gold and 0.4% for silver.

As the homogeneity testing was carried out using 30g analytical portions, the same degree of homogeneity cannot be guaranteed if smaller weights are taken for analysis.

Analytical Methodology:

Once homogeneity had been established, sub-samples were submitted to a number of well-recognized laboratories in order to assign gold and silver values by consensus testing. The sub-samples were drawn from the 9 randomly selected jars. Indicative concentration ranges were given. Laboratories used different procedures for the analyses. Some used fire assay for both elements and others used fire assay for gold and acid digestion followed by instrumental determination for silver. A minimum of three results was returned from each laboratory.

Calculation of Certified Value:

13 laboratories returned results for both gold and silver. Statistical analysis to identify outliers was carried out and all results from one laboratory were excluded because they were consistently low and variable. Recommended values for gold and silver were calculated from the average of the individual results from all the other laboratories. 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 n laboratory averages, and t is the 0.025 tail-value from Student's t-distribution with n - 1 degrees of freedom). The recommended values are 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.

Summary of Results Used to Calculate Gold and Silver Values
(not related to order of laboratories listed on page 5)

Gold (ppm)		Silver (ppm)	
49.66	49.3	152.54	161
49.66	49.2	152.65	161
49.78	49.3	153.63	156
49.82		152.43	
49.78	50.3	151.58	150
49.76	49.2	151.85	152
49.78	50.2	152.45	153
49.73		152.78	
49.62	49.7	151.93	150
49.70	49.4	151.81	150
49.72	48.0	151.94	150
49.70	49.8	151.75	145
49.75		153.13	
49.54	47.76	152.21	142
	49.32		141
49.5	49.30	147	146
49.4		148	
49.1	49.8	144	156
49.3	49.7	147	156
49.6	49.8	148	155
49.6		152	
49.4	47.9	148	153
49.6	47.1	148	159
49.7	47.3	163	154
48.9		152	
	48.6		162
48.51	49.7	154	165
51.10	47.4	153	158
48.37	48.6	155	162
	48.3		
	49.3		154
48.91		140.21	154
48.42	49.02	140.78	155
48.08	48.72	140.15	154
48.60	49.22	140.19	153
48.37		140.92	152
48.01		140.79	
Average of 61 results = 49.18 ppm Between laboratory standard deviation = 0.69 ppm Between laboratory coefficient of variation = 1.4 % 95 % Confidence interval for average = 0.52 ppm		Average of 62 results = 151.5 ppm Between laboratory standard deviation = 6.1 ppm Between laboratory coefficient of variation = 4.0 % 95 % Confidence interval for average = 4.6 ppm	

Statistical analysis of consensus test results has been carried out by independent statistician, Tim Ball.

Participating Laboratories

Australia

ALS Chemex, Perth
Genalysis Laboratory Services Pty Ltd, Perth
SGS Welshpool Minerals, Perth
Standard and Reference Laboratories, Perth
Ultra Trace Analytical Laboratories, Perth

Canada

Acme Analytical Laboratories Ltd, British Columbia
ALS Chemex, British Columbia
ALS Chemex, Quebec
Bourlamaque Assay Laboratories Ltd, Quebec

New Zealand

SGS Minerals, Waihi

Peru

Minera Yanacocha SRL – Newmont

South Africa

MINTEK: Analytical Services Division

United States of America

ALS Chemex, Nevada

Instructions and Recommendations for Use:

Weigh out quantity usually used for analysis and analyze for total gold and silver by normal procedure. Homogeneity testing has shown that consistent results are obtainable 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 values for the gold and silver 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 values. It **does not** reflect the variability any particular laboratory will experience in its own repetitive testing.

Some users in the past have misinterpreted the confidence interval as a guide as to how different an individual test result should be from the declared value. Some mistakenly use this interval, or the standard deviation from the consensus test, to calculate limits for control charts on their own routine test results using the reference material. 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.

Instructions and Recommendations for Use (ctd):

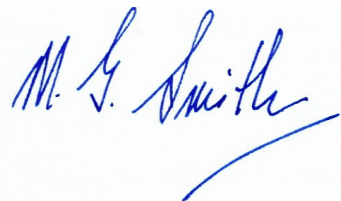
A much better way of determining the laboratory performance when analysing the reference material is to accumulate a history of the test results obtained, and plot them on a control chart. The appropriate centre line and control limits for this chart should be based on the average level and variability 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 more simply for themselves, we can provide a free Excel template that will produce sensible graphs, with intelligently chosen limits, from the customer's own data.

Legal Notice:

This certificate and the reference material described in it have been prepared with due care and attention. However ROCKLABS Ltd, Malcolm Smith Reference Materials Ltd and Tim Ball 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 Malcolm Smith.

Certifying Officer

M G Smith BSc, FNZIC

Independent Statistician

Tim Ball BSc (Hons)