



# 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 SQ44

### Recommended Values and 95% Confidence Intervals

Gold concentration: **39.76 ( $\pm 0.53$ )  $\mu\text{g/g}$**

Silver concentration: **121.8 ( $\pm 3.7$ )  $\mu\text{g/g}$**

The above values apply only to product in jars or sachets that have an identification number within the following Range: *153 766* to *154 067*.

**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 and iron pyrites 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 <sub>2</sub>	50.81
Al <sub>2</sub> O <sub>3</sub>	13.13
Na <sub>2</sub> O	5.63
Fe <sub>2</sub> O <sub>3</sub>	3.1
K <sub>2</sub> O	2.03
CaO	1.91
MgO	1.98
TiO <sub>2</sub>	0.56
MnO	0.05
P <sub>2</sub> O <sub>5</sub>	0.19
Fe	9.8
S	10.1

**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. Iron pyrites are likely to oxidize in the air but preliminary tests have shown that the increase in weight of an exposed reference material of comparable matrix, in the Auckland climate, is less than 0.3 % per year.

**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 barren iron pyrites were blended with finely pulverized and screened, gold and silver-containing minerals. Once the powders were uniformly mixed, the composite was placed into 302 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 302 jars in the batch. The results of analysis of the 14 samples produced a coefficient of variation of 0.4% for gold and 0.8% 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:**

12 laboratories returned results for gold and 13 laboratories returned results for 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)	
39.70	39.3	120.01	129
39.90	39.7	123.46	127
40.09	39.7	122.85	126
39.88		123.07	
39.86	37.2	122.16	131
39.88	38.9	122.85	123
39.93	38.7	122.84	126
40.02		123.64	
39.90	39.4	123.12	120
39.78	39.2	122.32	115
39.97	40.0	122.38	120
39.96	40.8	123.41	115
40.09		123.11	
40.30	39.30	123.88	116
	39.68		117
39.6	39.64	116	116
39.5		119	
39.4	41.5	119	123
39.1	40.1	117	127
39.5	40.8	118	126
39.3		117	
39.7	39.7	119	130
39.8	40.8	120	122
39.6	39.9	122	127
39.5	39.5	124	
	42.4		129
40.85	40.0	125	131
41.96		125	130
39.11	39.25	127	
39.13	39.11	124	124
	39.56		121
39.20		114.18	123
39.89		114.13	121
39.44		114.13	125
39.02		114.10	117
39.52		114.15	
39.38		114.11	
Average of 59 results = 39.76 ppm Between laboratory standard deviation = 0.67 ppm Between laboratory coefficient of variation = 1.7 % 95 % Confidence interval for average = 0.53 ppm		Average of 62 results = 121.8 ppm Between laboratory standard deviation = 4.97 ppm Between laboratory coefficient of variation = 4.1 % 95 % Confidence interval for average = 3.7 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 this 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.

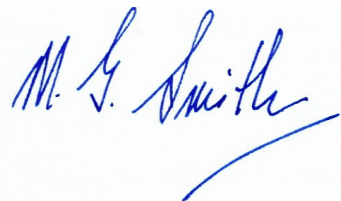
### **Legal Notice:**

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)