Certificate of Analysis

Reference Material SI25

Recommended Values and 95% Confidence Intervals
Gold Concentration: 1.801 (+/- 0.018) µg/g
Silver Concentration: 33.25 (+/- 0.61) µg/g

The above values apply only to product in jars or sachets which have an identification number within the following range: *(The unique number range is not published on website).*

Prepared and Certified By:

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Date of Certification: 13 March 2006

Certificate Status: Original

Available Packaging: This reference material has been packed in wide-mouthed jars that contain 2.5kg 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 gold nugget effect.

Supplier of Reference Material:

ROCKLABS Ltd
P O Box 18 142
Auckland
NEW ZEALAND
Email: sales@rocklabs.com
Website: www.rocklabs.com

Description: The component minerals have been well mixed and a homogeneity test carried out after the entire batch was packaged into wide-mouthed jars to ascertain that the gold is evenly distributed throughout the reference material. 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	63.07
Al_2O_3	18.02
Na_2O	7.86
K_2O	3.65
CaO	0.24
MgO	0.16
TiO_2	0.04
MnO	0.01
P_2O_5	0.11
Fe	3.0
S	2.9

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 container (jar or sachet) and its contents should not be heated to temperatures higher than 50 °C. Iron pyrites are likely to oxidize in the air but tests have shown that the increase in weight of an exposed reference material of similar matrix, in the Auckland climate, is less than 0.1% per year.

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 1355 wide-mouthed jars, each bearing a unique number. 40 jars were randomly selected from the packaging run and material from these jars was used for both homogeneity and consensus testing.

Homogeneity Assessment for Gold:

An independent laboratory carried out gold analysis by fire assay of 30g portions, using a gravimetric finish with a balance capable of reading to one microgram. Steps were taken to minimize laboratory method variation in order to better detect any variation in the reference material.

Homogeneity Assessment After Packaging

The contents of five of the randomly selected jars were compacted by vibration (to simulate the effect of freighting) and five samples removed successively from top to bottom from each of the five jars. In addition, five samples were removed from the last jar in the series. One sample was removed from the top of each of the 40 jars

randomly selected from the 1355 jars in the batch. The results of gold analysis of the 70 samples produced a coefficient of variation of 0.8%.

Analytical Methodology:

Once homogeneity had been established, two 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 40 randomly selected jars and each laboratory received samples from two different jars. Indicative concentration ranges were given. All laboratories used fire assay for gold analysis and either acid digestion/instrumental or fire assay methods for silver.

Calculation of Certified Value:

29 sets of results for gold and 24 sets of results for silver were returned. Statistical analysis to identify outliers was carried out using the principles detailed in sections 7.3.2 – 7.3.4, ISO 5725-2: 1994. One set of silver results was excluded on the basis of this examination. Assessment of each laboratory's performance for gold analysis 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 both these statistical analyses, four sets of results were excluded for the purpose of assigning a gold concentration value to this reference material. The recommended values were thus calculated from the average of the n = 25 sets of replicate results for gold and n = 23 sets of replicate results for silver. The 95% confidence intervals were 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 values for both gold and silver are provided at the beginning of the certificate in µg/g (ppm) units. Summaries of the results used to calculate the recommended values are 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)		
Sample 1	**Sample 2**	**Average**
1.69	1.71	1.700
1.72	1.75	1.733
1.73	1.75	1.740
1.740	1.750	1.745
1.745	1.755	1.750
1.77	1.76	1.765
1.765	1.77	1.768
1.795	1.785	1.790
1.783	1.800	1.792
1.82	1.78	1.800
1.80	1.80	1.800
1.797	1.803	1.800
1.818	1.783	1.801
1.81	1.80	1.805
1.800	1.820	1.810
1.81	1.82	1.816
1.83	1.81	1.820
1.830	1.815	1.823
1.845	1.820	1.833
1.86	1.82	1.840
1.85	1.83	1.840
1.84	1.86	1.850
1.83	1.88	1.857
1.831	1.896	1.864
1.85	1.90	1.875

Average of 25 sets = 1.801 ppm
Standard deviation of 25 sets = 0.044 ppm
Coefficient of variation = 2.5%
95% Confidence interval for average = 0.018 ppm

Silver (ppm)		
Sample 1	**Sample 2**	**Average**
30	30	30.0
29.9	31.9	30.90
30.25	32.0	31.125
31.8	31.8	31.80
32.4	32.0	32.20
32.35	32.50	32.425
32.6	32.6	32.60
32.7	32.7	32.70
32.775	32.765	32.770
33.1	33.2	33.15
33.0	33.5	33.25
34	33	33.5
34	33	33.5
33.90	33.80	33.850
33.2	34.6	33.90
34	34	34.0
34.25	34.25	34.250
34.0	35.0	34.50
34.5	34.5	34.50
34.44	34.95	34.695
34.8	34.6	34.70
34	36	35.0
36	35	35.5

Average of 23 sets = 33.25 ppm
Standard deviation of 23 sets = 1.40 ppm
Coefficient of variation = 4.2%
95% Confidence interval for average = 0.61 ppm

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

Participating Laboratories

Australia

ALS Chemex, Perth
Amdel Ltd, Adelaide
Amdel Laboratories Ltd, Perth
Amdel Ltd, Kalgoorlie
Genalysis Laboratory Services Pty Ltd, Perth
SGS Australia Pty Ltd, Perth
SGS Australia Pty Ltd, Townsville
Standard and Reference Laboratories, Perth
Ultra Trace Analytical Laboratories, Perth

Canada

Accurassay Laboratories, Ontario
Acme Analytical Laboratories Ltd, British Columbia
ALS Chemex, British Columbia
ALS Chemex, Quebec
Assayers Canada, British Columbia
Bourlamaque Assay Laboratories Ltd, Quebec
International Plasma Labs Ltd, British Columbia
Loring Laboratories Ltd, Alberta
TSL Laboratories Inc, Saskatchewan

Kyrgyzstan

Alex Stewart Assay and Environmental Laboratories Ltd

New Zealand

Amdel Ltd, Otago
SGS New Zealand Ltd, Waihi

Russia

Irgiredmet, Irkutsk
Norilsk Nickel, Trans-Polar Division
Russian Academy of Science, Karelia

South Africa

MINTEK, Analytical Science Division
SGS Lakefield Research Africa (Pty) Ltd

United States of America

ALS Chemex, Nevada
Barrick Goldstrike Mines Inc, Nevada
Newmont Mining Corporation, Nevada

Instructions and Recommendations for Use:

Weigh out quantity usually used for analysis and analyze for gold and silver by normal procedures. 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 values. The confidence intervals reflect our uncertainty in estimating the true values for the gold and silver contents 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 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 to set 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.
A much better way of determining the laboratory performance for testing 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

Tim Ball BSc (Hons)