

# Certificate of Analysis

## Reference Material OxM16

### Recommended Values and 95% Confidence Intervals

Gold concentration: 15.15 (+/- 0.13) µg/g

Silver concentration: 15.53 (+/- 0.46) µg/g

The above values apply only to product in jars or sachets which have an identification number within the following range: **60 328 to 61 119.**

### Prepared and Certified By:

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### Date of Certification:

23 May 2001

### 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:

Sodium feldspar with minor quantities of gold and silver-bearing quartz. The quartz has been finely ground and screened to ensure there is no nugget effect.

### Supplier of Reference Material:

ROCKLABS Ltd  
P O Box 18 142  
Auckland  
**NEW ZEALAND**  
Email: rocklabs@clear.net.nz  
Telephone: +64 9 634 7696  
Telefax: +64 9 634 6896

**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 <sub>2</sub>	72.74
Al <sub>2</sub> O <sub>3</sub>	16.14
Na <sub>2</sub> O	9.02
K <sub>2</sub> O	0.30
CaO	0.59
MgO	0.06
TiO <sub>2</sub>	0.06
MnO	0.01
P <sub>2</sub> O <sub>5</sub>	0.14
Fe <sub>2</sub> O <sub>3</sub>	0.47
L O I	0.39

**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. 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 for total gold (and/or silver) by normal procedure. Homogeneity testing has shown that consistent results are obtainable for gold when 30g portions are taken for analysis. Homogeneity cannot be guaranteed for gold if smaller weights are taken for analysis.

**Method of Preparation:**

Pulverized sodium feldspar was blended with finely pulverized and screened gold and silver-containing quartz. Once the powders were uniformly mixed the composite was placed into 792 wide-mouthed jars, each bearing a unique number. 30 jars were randomly selected from the packaging run and material from these jars was used for both homogeneity and consensus testing.

### **Homogeneity Test:**

30g portions were selected as follows for homogeneity testing for gold by an independent laboratory.

**Between Jar** - Samples from the top of each of the 30 randomly selected jars.

**Within Jar** - The contents of three jars were compacted by vibration (to simulate the effect of freighting) and five samples removed successively from top to bottom from each of the three jars.

**Reference Group** - 12 homogeneous sub-samples (ie a control group) were prepared from one jar by taking approximately 400g and mixing by mat rolling, followed by coning and quartering to obtain 30g (approximate) portions for analysis.

Statistical analysis of the data indicated no significant difference in variability between the *Reference Group* and each of the other groups of samples at the 0.05 level of significance. As the homogeneity test 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, 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 30 randomly selected jars and each laboratory received samples from two different jars. Indicative concentration ranges were given. One laboratory used neutron activation and the remainder used fire assay for gold analysis. Most laboratories used an acid digest/instrumental detection procedure for silver.

### **Calculation of Certified Values:**

Results for gold were returned from 24 laboratories and for silver, 23 laboratories. 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 this examination are available on request. As a result of these statistical analyses, two sets of results were excluded for the purpose of assigning gold and silver concentration values to this reference material. Recommended values were thus calculated from the average of the remaining n=22 sets of replicate results for gold and n=21 replicate sets of results for silver. The 95% confidence interval on each average 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 values are provided at the beginning of the certificate in µg/g (ppm) units. A summary of the results used to calculate the recommended values is listed on page 4 and the names of the laboratories that submitted results are listed on page 5.

**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.

### Summary of Results Used to Calculate Gold and Silver Values

(not related to order of laboratories listed on page 5)

Gold (ppm)			Silver (ppm)		
Sample 1	Sample 2	Average	Sample 1	Sample 2	Average
14.9	14.3	14.6	13.0	13.5	13.25
14.43	14.78	14.61	13.5	13.5	13.5
15.0	14.9	14.95	15.1	14.3	14.7
15.0	14.9	14.95	14.4	15.4	14.9
15.0	14.9	14.95	15	15	15
14.75	15.25	15.00	15	15	15
15.0	15.0	15.0	15.2	15.1	15.15
15.0	15.0	15.0	15.0	15.4	15.2
15.1	14.9	15.0	15.5	15.2	15.35
14.89	15.13	15.01	15.4	15.4	15.4
15.22	14.91	15.07	15.65	15.32	15.49
15.04	15.15	15.10	15	16	15.5
15.3	15.1	15.2	15.5	15.6	15.55
15.3	15.1	15.2	15.9	15.8	15.85
15.01	15.46	15.24	16.1	16.4	16.25
15.1	15.6	15.35	16.2	16.4	16.3
15.3	15.5	15.4	16.6	16.1	16.35
15.60	15.22	15.41	16.6	16.6	16.6
15.41	15.48	15.45	17.0	16.6	16.8
15.50	15.40	15.45	17.0	16.9	16.95
15.1	16.0	15.55	17	17	17
15.58	15.94	15.76			
Average of 22 sets = 15.15 ppm Standard deviation = 0.29 ppm Coefficient of variation = 1.9 % 95% Confidence interval = +/- 0.13 ppm			Average of 21 sets = 15.53 ppm Standard deviation = 1.00 ppm Coefficient of variation = 6.5 % 95% Confidence interval = +/- 0.46 ppm		

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

## Participating Laboratories

### Australia

Amdel Laboratories Ltd, Perth  
Amdel Laboratories Ltd, Adelaide  
Analabs Pty Ltd, Perth  
Analabs Pty Ltd, Townsville  
Becquerel Laboratories, Lucas Heights  
Genalysis Laboratory Services Pty Ltd, Perth  
Standard and Reference Laboratories, Perth

### Brazil

Lakefield Geosol Limitada

### Canada

ALS Chemex, British Columbia  
Acme Analytical Laboratories Ltd, British Columbia  
Activation Laboratories Ltd, Ontario  
Bondar Clegg, British Columbia  
Chimitec Bondar Clegg, Quebec  
Bourlamaque Assay Laboratories Ltd, Quebec  
Lakefield Research Limited, Ontario  
XRAL Laboratories, A Division of SGS Canada Inc, Ontario

### New Zealand

Amdel New Zealand Ltd, Otago  
SGS New Zealand Ltd, Waihi

### South Africa

Anglo American Research Laboratories (Pty) Ltd  
Anglogold, West Wits Operations  
Lakefield Research Africa (Pty) Ltd  
Mintek, Analytical Science Division

### United States of America

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

### 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)