

## Certificate of Analysis for Certified Reference Material (CRM) – O<sub>x</sub>H209

| Analyte | Unit | Certified value | Expanded uncertainty (U) | k |
|---------|------|-----------------|--------------------------|---|
| Au      | ppm  | 1.301           | +/- 0.011                | 2 |

Note 1.

- SI units equivalent: 1 ppm (parts per million) = 1 mg/kg = 1 µg/g = 1 g/t.
- The expanded uncertainty (U) is reported at an approximate 95% level of confidence and was calculated in accordance with ISO 33405:2024, using coverage factor k = 2.

The above values apply only to material in jars or sachets which have an identification number within the following range: **598244–598819**.

### Prepared and Certified By

Sadaf Sadaf

Rocklabs Reference Materials

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**Date of Certification:** 27 May 2026

**Certificate Version:** 1

### Available Packaging

This reference material has been packed in wide-mouth jars containing 2.5 kg of material. Some jars may subsequently be repacked into sealed polyethylene sachets.

### Origin of Reference Material

The CRM consists of basalt and feldspar minerals with minor quantities of finely divided gold-containing minerals, screened to minimise gold nugget effects.

### Supplier

ROCKLABS, P.O. Box 18-142, Glen Innes,

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Email: [rocklabs.sales@scottautomation.com](mailto:rocklabs.sales@scottautomation.com)

Website: [www.scottautomation.com](http://www.scottautomation.com)

## Description

The reference material is a light grey powder that has been homogenised. Homogeneity testing was carried out after the entire batch was packaged into wide-mouth jars. The product contains crystalline quartz and therefore dust from it should not be inhaled. The approximate chemical composition is:

### Method used: Borate Fusion XRF - (Uncertified Values)

| Constituent                    | wt. % |
|--------------------------------|-------|
| SiO <sub>2</sub>               | 60.65 |
| Al <sub>2</sub> O <sub>3</sub> | 16.38 |
| Na <sub>2</sub> O              | 2.70  |
| K <sub>2</sub> O               | 8.11  |
| CaO                            | 3.09  |
| MgO                            | 3.00  |
| TiO <sub>2</sub>               | 0.93  |
| MnO                            | 0.07  |
| P <sub>2</sub> O <sub>5</sub>  | 0.24  |
| Fe <sub>2</sub> O <sub>3</sub> | 4.66  |

## Handling Instructions

Fine powders present potential hazards to both the eyes and lungs. Therefore, it is recommended to take standard precautions, including the use of safety glasses and dust masks.

## 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 and Storage instructions

The material must be kept in a cool, dry environment to maintain the integrity of the CRM. Unopened, the reference material has a shelf life of ten years from the certification date. Stability will be regularly assessed, and any observed changes will be promptly communicated to purchasers. The material should be retained in its original packaging, and the jars must be securely re-closed after each use.

## Method of Preparation

This reference material was produced under quality management systems certified to ISO 9001:2015. Finely pulverised feldspar minerals, basalt rock, and gold-containing mineral concentrate were blended using a controlled preparation process. Due to production volume requirements, the total batch was prepared in three separate blending iterations using the same formulation and preparation conditions. After each blending iteration was completed, the material from that blend was transferred into a separate dedicated storage tank prior to packaging. The material was subsequently packaged into 848 wide-mouth jars, each assigned a unique identification number. A random selection of 30 jars from the packaging run was used for homogeneity and characterisation testing.

## Homogeneity Assessment

Duplicate samples were collected from the top and middle of each of the 30 jars, resulting in 60 samples being analysed. These samples were randomly ordered, then numbered consecutively before

being sent to the laboratory for testing. Gold analysis was performed by an independent laboratory using fire assay on 30 g portions followed by an ICP-AES finish. Measures were implemented to minimise methodological variations within the laboratory, thereby improving the sensitivity for detecting potential inhomogeneity.

During statistical evaluation, two outlying results were identified and, following investigation, confirmed as analytical errors. These results were excluded from the data set prior to statistical analysis.

The homogeneity study indicated a slight difference in mean gold concentration associated with one production tank. Jars packaged from this tank were excluded from this batch and are not included within the range of jar identification numbers stated in this COA. Following exclusion of this tank, analysis of variance (ANOVA) showed that the variability between the remaining two tanks and between-jars was not statistically significant. The estimated variability between tanks (SD = 0.005 ppm; RSD = 0.358%), between jars (SD = 0.004 ppm; RSD = 0.280%) and within jars (SD = 0.010 ppm; RSD = 0.773%) was less than 1%, confirming that the material is sufficiently homogeneous for its intended use at the specified minimum sample mass.

### **Analytical Methodology**

Once homogeneity was verified, two subsamples were distributed to 9 laboratories in a round-robin initiative for consensus testing to establish a gold value. The selection of participating laboratories was based on their continued good performance in prior inter-laboratory programs facilitated by Rocklabs. The subsamples were derived from a selection of 30 randomly chosen jars, with each laboratory receiving samples from two distinct jars.

Participating laboratories were instructed to determine gold concentrations by fire assay using validated finish methods routinely employed within their laboratories. Indicative concentration ranges were provided to aid with the selection of appropriate analytical procedures.

Gold analysis was conducted by all participating laboratories using fire assay followed by either gravimetric or instrument finish, including Atomic Absorption Spectroscopy (AAS) or Inductively Coupled Plasma Atomic Emission Spectroscopy (ICP-AES). The sample mass used in the analyses varied among laboratories, ranging from 30-50 g.

### **Calculation of Certified Value**

Each of the 9 participating laboratories returned replicate gold results using the same analytical finish method for both samples. The identification of outliers was carried out using the principles detailed in sections 7.3.2–7.3.4, ISO 5725-2:2025. The evaluation of each laboratory's performance relied on z-scores, partly based on the concept described in ISO/IEC 17043:2023. Criteria details for these assessments are available on request. One laboratory data set was excluded following statistical evaluation.

Consequently, a certified value was evaluated in accordance with ISO 33405:2024 and incorporates contributions from characterisation, between- and within-unit homogeneity, transport stability, and long-term stability. The combined standard uncertainty was expanded using a coverage factor  $k = 2$  to obtain the expanded uncertainty (U), corresponding to an approximate 95% level of confidence.

$$u_{CRM} = \sqrt{u_{char}^2 + u_{homo}^2 + u_{trns}^2 + u_{lts}^2}$$

Where  $u_{char}$  is uncertainty due to characterization,  $u_{homo}$  is uncertainty due to inhomogeneity,  $u_{trns}$  is uncertainty due to transport instability and  $u_{lts}$  is uncertainty due to long-term (storage) instability.

The certified value is provided at the beginning of the certificate in  $\mu\text{g/g}$  (ppm). A summary of the results used to calculate the certified value and the names of the laboratories that submitted results are listed below. The results are listed in increasing order of the individual laboratory averages.

Statistical analysis of the consensus test results has been carried out by an 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 | Mean      |
| 1.270                 | 1.300    | 1.285     |
| 1.290                 | 1.295    | 1.292     |
| 1.305                 | 1.280    | 1.292     |
| 1.289                 | 1.298    | 1.293     |
| 1.302                 | 1.297    | 1.300     |
| 1.300                 | 1.310    | 1.305     |
| 1.320                 | 1.300    | 1.310     |
| 1.320                 | 1.335    | 1.328     |
| Average of the 8 sets |          | 1.301 ppm |
| SD of the 8 sets      |          | 0.013 ppm |
| RSD                   |          | 1.0%      |

**Participating Laboratories**

|           |                                                   |
|-----------|---------------------------------------------------|
| Australia | ALS Geochemistry, Perth                           |
|           | ALS Geochemistry, Townsville, Australia           |
| Canada    | ALS Geochemistry, Val d'Or                        |
|           | Actlabs Thunder Bay                               |
| Laos      | ALS Geochemistry, Vientiane                       |
| Morocco   | LABOMINE, Morocco                                 |
| Peru      | Inspectorate Services                             |
| USA       | Bureau Veritas Commodities and Trade, Sparks, USA |
|           | McClelland Laboratories, Inc., USA                |

**Instructions and Recommendations for Use**

Weigh out the quantity of CRM usually used for analysis and analyse for total gold by normal procedure. Homogeneity testing has shown that consistent results are obtainable for gold when 30 g portions are taken for analysis. The certified value is accompanied by an expanded uncertainty (U), which represents total uncertainty associated with the certified gold concentration in the sealed packaging. The expanded uncertainty has been calculated in accordance with ISO 33405:2024 using a coverage factor of  $k = 2$ , corresponding to an approximate 95% level of confidence.

Drying or mixing of the material is not required before the weighing and analysis. Samples may be drawn multiple times from a jar; however, the container must be securely re-closed after each use to maintain the integrity of the Certified Reference Material.

The expanded uncertainty associated with the certified value shall not be used to establish laboratory control limits. The uncertainty reflects the certification process and interlaboratory characterisation program, rather than the repeatability or reproducibility of individual laboratory measurement systems.

Laboratories are encouraged to establish their own quality control limits by routinely analysing this CRM, recording results over time, and plotting them on an appropriate control chart. This approach enables effective monitoring of laboratory bias and analytical variability based on internally generated data.

### **Minimum Sample Mass Recommendation**

This CRM has been certified using 30-50 g aliquots for fire assay. It is recommended to use a minimum sample size of 30 g when utilizing this CRM. The provided statement on uncertainty and homogeneity is valid only if a sample mass of at least 30 g is used.

### **Metrological Traceability**

The certified values in this report are supported by interlaboratory results traceable to the International System of Units (SI) through measurement of mass. The data presented in the tables represent mass fractions, expressed as weight percent, milligrams per kilogram (mg/kg) or parts per million (ppm), as applicable. Analytical samples were carefully selected to adequately represent the entire batch of the prepared CRM. Each set of analytical data undergoes validation by the assayer, incorporating reference materials and quality control checks during analysis. The selection of laboratories was based on their proven performance in previous inter-laboratory programs conducted by Rocklabs, with many of these laboratories complying with the requirements of ISO/IEC 17025:2017. The certified values provided in the Certificate of Analysis are derived from the means of accepted data following rigorous statistical treatment.

### **Commutability**

This CRM is intended for use in quality control applications involving the determination of analytes in geological materials. The CRM is prepared from natural mineral matrices and has demonstrated suitable performance in interlaboratory analytical programs. All Rocklabs CRMs are produced from natural geological materials to provide analytical behaviour closely aligned with routine field samples in relevant measurement processes.

A formal commutability study has not been performed for this CRM. However, the material is considered suitable for its intended purpose based on its natural mineral composition, method of preparation, and successful use of comparable materials in interlaboratory analytical programs.

The matrix characteristics of this CRM are described in the 'Origin of Reference Material' and 'Description' sections. Users are responsible for determining the suitability of this CRM for their specific analytical procedures and measurement systems.

## 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 this CRM.

## References

For further information on the preparation and validation of this reference material please contact Sadaf Sadaf.

## QMS Accreditation

This CRM has been produced under a quality management system accredited to ISO 17034:2016– General requirements for the competence of reference material producers, under accreditation number 4.

Rocklabs is accredited by IANZ as a reference material producer for the production of certified reference materials. The use of the IANZ/ISO 17034 accreditation symbol applies to the certified reference material activities covered under the Rocklabs scope of accreditation.

All Rocklabs products are manufactured under management systems certified by Telarc to the following standards:

- **ISO 9001:2015** Quality Management System
- **ISO 14001:2015** Environmental Management System
- **ISO 45001:2018** Occupational Health and Safety Management System



## Certifying Officer

*Sadaf Sadaf*

27<sup>th</sup> May 2026

Sadaf Sadaf (PhD – Earth Science), Technical Chemist - Rocklabs

## Independent Statistician

*Daniel Walsh*

Dr. Daniel Walsh, PhD