



## Reference Material Data Sheet

# IAG OU-9 Separation Lake Pegmatite

**International Association of Geoanalysts**  
13 Belvedere Close, Keyworth, Nottingham NG12 5JF, UK  
e-mail: [iageo.ltd@ntlworld.com](mailto:iageo.ltd@ntlworld.com)  
Telephone: +44 (0)115 9375219

---

### Status of this reference material data sheet

*This data sheet is a revision of the original that was issued on 21<sup>st</sup> December 2015. The original GeoPT23 proficiency testing data have been re-assessed using more comprehensive statistical procedures described in the 2018 GeoPT protocol (IAG, 2018) that includes the option of calculating a mode as the consensus value. Additional minor revisions have been made to the text.*

### Description of the reference material

*IAG OU-9 is a pegmatite, from the Separation Lake Pegmatite Field, Canada and was supplied as a coarsely crushed bulk sample by Fred Breaks of the Ontario Geological Survey, Canada, working in collaboration with Andy Tindle (Open University). The material was ground, homogenised and sealed in packets at The Open University. The test material was analysed by WDXRF at the Open University for a range of major and trace elements and the data assessed for homogeneity using the Fearn test. In none of the cases for which valid data were obtained was any significant lack of homogeneity found, and therefore the sample was considered suitable for use in the GeoPT proficiency testing programme. The material was characterised as a reference material using results from the GeoPT23/2008 round of the International Association of Geoanalysts' GeoPT proficiency testing scheme (Webb et al., 2008). The Proficiency Testing Steering Committee for this round was Prof. M. Thompson (statistician), Dr P.C. Webb (results coordinator), Prof. P.J. Potts, J.S. Watson and C. Kriete.*

### Intended use

*This reference material is designed for use by laboratories undertaking the determination of the major and trace element mass fractions in silicate rocks and materials of similar matrix type for the calibration of a measurement system, the assessment of a measurement procedure, assigning values to other materials, and quality control. Note that the material may be used only for a single purpose in the same measurement process. For example, it must not be used for calibration and method validation at the same time.*

### Minimum sample size

*On the basis of the homogeneity results and an assessment of the methods used to contribute results to the GeoPT23 round, the minimum sample size recommended for use as a test portion is 0.2 g.*

### Period of validity

*Provided the storage and handling conditions are met, this reference material is not expected to deteriorate with time. On exposure to air, the material may absorb moisture, and instructions for handling must be*

followed. Evidence for the stability of comparable GeoPT test materials and of the scheme itself have been presented by Thompson et al. (2018) and Webb et al. (2019).

## **Storage information**

Store in a sealed container in a cool dry environment.

## **Instructions for handling**

Before any measurements are made, every test portion of the material must be dried at  $105 \pm 5$  °C for at least 2 hours. Avoid contamination and cross-contamination of the test material.

## **Assessment of reference values**

The reference values (**Table 1**) were derived as consensus values from a rigorous assessment of measurement results submitted by participating laboratories to the GeoPT23 proficiency testing round. Consensus values were determined as a robust mean if the distribution of results was unimodal and, outliers aside, close to symmetrical. If some asymmetry was apparent in a unimodal distribution, the median was usually preferred as the consensus value. Sometimes, especially when a noteworthy skew was apparent in the data distribution and an objective explanation for this outcome was forthcoming, the mode of the results might be used. If the number of valid results contributing to the location of the consensus was less than 15 or their dispersion was unusually great, no reference value was assigned, although values may be reported as indicative values (**Table 2**). These judgements were made by the IAG Proficiency Testing Steering Committee in accordance with the revised GeoPT protocol (IAG, 2018), which facilitated more comprehensive statistical modelling of the source data in comparison with the original 2015 reference material data sheet.

## **Metrological traceability**

Traceability was not formally demonstrated for this reference material. However, traceability can be demonstrated through laboratories participating in this round using certified reference materials as calibrators or for data assessment (although this information is not currently recorded by the GeoPT programme). Traceability is also implied in datasets where a robust consensus value can be estimated from measurement results submitted by the diverse range of laboratories contributing to this programme. A review of all the factors that contribute to demonstrating the traceability of consensus values derived from the GeoPT proficiency testing scheme has been described by Potts et al. (2019).

## **Reference material characterisation report**

Further details of the results and organisation of the round can be found in the report of the GeoPT23 proficiency testing round (<http://www.geoanalyst.org/geopt-previous-rounds/>), noting that a reassessment of data and the application of statistical procedures were undertaken in accordance with the revised GeoPT protocol (IAG, 2018).

## **Safety information**

Silicate powders containing heavy metals can cause harm especially if inhaled or in contact with the skin. User organisations must undertake a health and safety risk assessment and ensure that the appropriate procedures are followed in the handling and use of this material. Further details are available on the relevant Material Safety Data Sheet.

## **Legal notice – terms and conditions**

1. The IAG shall not be liable to the user of this material for loss (whether direct or indirect) of profits, business, anticipated savings or reputation or for any indirect or consequential loss or damage whatsoever even if previously advised thereof and whether arising from negligence, breach of these Terms and Conditions or howsoever occurring.
2. In any event, and notwithstanding anything contained in these Terms and Conditions, IAG's liability in contract, tort (including negligence, defamation or breach of statutory duty) or otherwise arising by reason of or in connection with these Terms and Conditions (including as a result of proficiency testing) shall be limited to the price paid for the material giving rise to such liability.
3. The IAG does not grant any warranties in relation to GeoPT products or the supply of analytical services or distribution of the proficiency test, and all other conditions, warranties, stipulations or other statements whatsoever, whether express or implied, by statute, at common law or otherwise howsoever, relating to the GeoPT products, analytical services or proficiency tests are hereby excluded. In particular, (but without limitation to the foregoing) no warranties are granted regarding the fitness for purpose, performance, use, quality or merchantability of the GeoPT products, whether express or implied, by statute, at common law or otherwise howsoever.

## Revisions

This Reference Material Data Sheet is Version 2.00. Any further revisions to this reference material data sheet will be made available on the IAGeo Ltd web site ([www.iageo.com](http://www.iageo.com)).

## Acknowledgements

The contributions of Fred Breaks (Ontario Geological Survey, Canada) and Andy Tindle (Open University, UK) in providing the sample are gratefully acknowledged.

## Approvals

This reference material information sheet was approved on behalf of the International Association of Geoanalysts.

Name Philip J. Potts  
Peter C. Webb

Date 12<sup>th</sup> June 2020

## References

### **IAG (2018)**

Protocol for the operation of the GeoPT proficiency testing scheme.  
International Association of Geoanalysts (Keyworth, Nottingham), 18pp.

### **Potts P.J., Webb P.C. and Thompson M. (2019)**

GeoPT proficiency testing programme as a scheme for the certification of geological reference materials.  
*Geostandards and Geoanalytical Research*, 43, 409-418.

### **Thompson M., Webb P.C., Potts P.J. and Wilson S. (2018)**

The stability of 57 consensus values in a proficiency test material re-issued blind after an interval of 18 years.  
*Analytical Methods*, 10, 1547-1551.

### **Webb P.C., Potts P.J., Thompson M., Wilson S.A. and Gowing C.J.B. (2019)**

The long term robustness and stability of consensus values as composition location estimators for a typical geochemical test material in the GeoPT proficiency testing programme.  
*Geostandards and Geoanalytical Research*, 43, 397-408.

### **Webb P.C., Thompson M., Potts P.J., Watson J.S. and Kriete C. (2008)**

GeoPT23 - an international proficiency test for analytical geochemistry laboratories - report on round 23 / September 2008 (Separation Lake pegmatite, OU-9) and 23A (Manganese nodule, FeMn-1). International Association of Geoanalysts, 64pp (<http://www.geoanalyst.org/wp-content/uploads/2017/10/GeoPT23FullReport.pdf>).

©2020 International Association of Geoanalysts.

**Table 1**

<b>IAG OU-9 Separation Lake Pegmatite</b>								
<b>Reference values</b>								
<i>Reference values for elemental/oxide concentrations and uncertainties on a dried (105 °C) basis</i>								
Oxide / element	Reference value g 100g <sup>-1</sup>	Uncertainty g 100g <sup>-1</sup>	p		Element	Reference value mg kg <sup>-1</sup>	Uncertainty mg kg <sup>-1</sup>	p
<b>SiO<sub>2</sub></b>	79.60	0.23	71		<b>Hf</b>	1.02	0.11	40
<b>Al<sub>2</sub>O<sub>3</sub></b>	12.36	0.07	74		<b>Ho</b>	0.16	0.01	33
<b>Fe<sub>2</sub>O<sub>3</sub>T</b>	0.74	0.01	76		<b>La</b>	2.00	0.11	44
<b>MnO</b>	0.107	0.001	73		<b>Lu</b>	0.040	0.002	30
<b>CaO</b>	0.30	0.01	72		<b>Nd</b>	5.03	0.35	40
<b>Na<sub>2</sub>O</b>	4.17	0.03	72		<b>Pr</b>	1.22	0.08	34
<b>K<sub>2</sub>O</b>	1.37	0.01	73		<b>Rb</b>	2520	25	65
	<b>mg kg<sup>-1</sup></b>	<b>mg kg<sup>-1</sup></b>			<b>Sb</b>	7.76	0.32	30
<b>Ba</b>	8.19	0.48	53		<b>Sc</b>	2.70	0.12	37
<b>Ce</b>	7.32	0.46	44		<b>Tb</b>	0.48	0.03	38
<b>Cs</b>	403	12	48		<b>Th</b>	5.08	0.33	50
<b>Dy</b>	1.70	0.08	38		<b>Tl</b>	13.9	0.8	27
<b>Er</b>	0.31	0.02	34		<b>Tm</b>	0.050	0.002	27
<b>Eu</b>	0.044	0.004	30		<b>U</b>	4.53	0.26	52
<b>Ga</b>	57.0	0.9	56		<b>Yb</b>	0.338	0.020	32
<b>Gd</b>	2.57	0.21	37		<b>Zn</b>	27.7	0.9	65

**Reference values** are the GeoPT assigned values assessed from the robust statistical analysis of results submitted to the GeoPT23 round, following an assessment of both the consistency of data distribution and the agreement between methods, where possible.

**Uncertainties** are the robust standard deviation of the mean, median or mode of the assigned value expanded by a coverage factor of two, and rounded up.

**p** is the number of laboratories reporting results for that element/oxide in the GeoPT23 round.

**Fe<sub>2</sub>O<sub>3</sub>T** is the total iron expressed as Fe<sub>2</sub>O<sub>3</sub>.

**Table 2**

<b>IAG OU-9 Separation Lake Pegmatite</b>								
<b>Indicative values</b>								
<i>Indicative values for elemental/oxide concentrations and uncertainties on a dried (105 °C) basis</i>								
Oxide / element	Indicative value g 100g <sup>-1</sup>	Uncertainty g 100g <sup>-1</sup>	p		Element	Indicative value mg kg <sup>-1</sup>	Uncertainty mg kg <sup>-1</sup>	p
<b>TiO<sub>2</sub></b>	0.055	0.002	70		<b>Li</b>	698	25	34
<b>P<sub>2</sub>O<sub>5</sub></b>	0.030	0.002	60		<b>Sm</b>	3.41	0.33	39
<b>LOI</b>	0.76	0.03	60		<b>Sr</b>	36.0	1.5	62
	<b>mg kg<sup>-1</sup></b>	<b>mg kg<sup>-1</sup></b>			<b>Ta</b>	132	12	50
<b>Be</b>	72	6	29		<b>W</b>	6.4	0.6	27
<b>Cr</b>	12.0	1.1	56		<b>Y</b>	7.9	0.7	58
<b>Ge</b>	5.0	0.5	21		<b>Zr</b>	5.7	1.0	53

**Indicative values** are 'provisional' data from the GeoPT23 report where data distributions were judged **not** to be good enough to meet the criteria for designation as reference values. These data are provided for information purposes only and **not** for the calibration of methods or the assessment of data.

**Uncertainties** are the robust standard deviation of the mean, median or mode expanded by a coverage factor of two, and rounded up.

**p** is the number of laboratories reporting results for that element/oxide in the GeoPT23 round.

**LOI** is the loss on ignition.