



**CERTIFICATE OF ANALYSIS FOR  
NICKEL LATERITE ORE REFERENCE MATERIAL  
OREAS 183**

Constituent	Certified Value	1SD
<b>Fusion XRF</b>		
Nickel, Ni (wt.%)	0.995	0.018
Cobalt, Co (ppm)	225	14
Aluminium oxide, Al <sub>2</sub> O <sub>3</sub> (wt.%)	1.60	0.03
Calcium oxide, CaO (wt.%)	0.710	0.013
<i>Chlorine, Cl (ppm)</i>	<i>&lt;50</i>	IND
Copper, Cu (ppm)	<i>&lt;30</i>	IND
Chromium oxide, Cr <sub>2</sub> O <sub>3</sub> (wt.%)	0.653	0.013
Iron oxide, Fe <sub>2</sub> O <sub>3</sub> (wt.%)	12.73	0.11
<i>Potassium oxide, K<sub>2</sub>O (wt.%)</i>	<i>&lt;0.01</i>	IND
Magnesium oxide, MgO (wt.%)	27.31	0.28
Manganese oxide, MnO (wt.%)	0.180	0.002
<i>Sodium oxide, Na<sub>2</sub>O (wt.%)</i>	<i>~0.03</i>	IND
Phosphorus oxide, P <sub>2</sub> O <sub>5</sub> (wt.%)	0.005	0.003
Silicon dioxide, SiO <sub>2</sub> (wt.%)	44.49	0.25
Sulphur oxide, SO <sub>3</sub> (wt.%)	<i>&lt;0.01</i>	IND
Titanium oxide, TiO <sub>2</sub> (wt.%)	0.023	0.006
Zinc, Zn (ppm)	78	14
Loss on ignition, LOI (wt.%)	10.90	0.22
<b>Fusion ICP</b>		
Nickel, Ni (wt.%)	0.983	0.022
Cobalt, Co (ppm)	222	14
Aluminium oxide, Al <sub>2</sub> O <sub>3</sub> (wt.%)	1.60	0.05
Calcium oxide, CaO (wt.%)	0.72	0.042
<i>Copper, Cu (ppm)</i>	<i>21</i>	5
Chromium oxide, Cr <sub>2</sub> O <sub>3</sub> (wt.%)	0.651	0.024
Iron oxide, Fe <sub>2</sub> O <sub>3</sub> (wt.%)	12.72	0.29
<i>Potassium oxide, K<sub>2</sub>O (wt.%)</i>	<i>&lt;0.1</i>	IND
Magnesium oxide, MgO (wt.%)	27.43	0.68
Manganese oxide, MnO (wt.%)	0.181	0.005
Sodium oxide, Na <sub>2</sub> O (wt.%)	0.030	0.004
<i>Phosphorus oxide, P<sub>2</sub>O<sub>5</sub> (wt.%)</i>	<i>&lt;0.01</i>	IND
Silica dioxide, SiO <sub>2</sub> (wt.%)	44.13	0.81
<i>Sulphur oxide, SO<sub>3</sub> (wt.%)</i>	<i>&lt;0.02</i>	IND
Titanium oxide, TiO <sub>2</sub> (wt.%)	0.020	0.001
Zinc, Zn (ppm)	82	17
<b>IR Combustion Furnace</b>		
Carbon, C (wt.%)	0.22	0.03
<i>Sulphur, S (wt.%)</i>	<i>&lt;0.01</i>	IND

Note: italics - indicative values only; IND - indeterminate.

## INTRODUCTION

OREAS reference materials (RM) are intended to provide a low cost method of evaluating and improving the quality of analysis of geological samples. To the explorationist, they provide an important control in analytical data sets related to exploration from the grass roots level through to resource definition. To the mine geologist, they provide a tool for grade control in routine mining operations. To the analyst, they provide an effective means of calibrating analytical equipment, assessing new techniques and routinely monitoring in-house procedures.

## SOURCE MATERIAL

Reference material OREAS 183 is one of a suite of thirteen nickel laterite CRMs (OREAS 182 to OREAS 195) prepared from saprolitic ore source materials. These were supplied by Anglo American Brazil Limitada from the Codemin Nickel Mine located in the state of Goiás and ~300 kms from the port of Santos, Brazil.

## COMMINUTION AND HOMOGENISATION PROCEDURES

The material constituting OREAS 183 was prepared in the following manner:

- a) *drying to constant mass at 105°C;*
- b) *crushing;*
- c) *milling to 99.8% minus 75 microns;*
- d) *homogenisation and bagging into 20kg sublots;*
- e) *collection of 20 representative 300g samples during the bagging stage for the round robin program;*
- f) *packaging into 10g units in laminated foil pouches and 1kg units in wide mouth jars.*

## ANALYTICAL PROGRAM FOR OREAS 183

OREAS 183 is a nickel laterite reference material prepared by Ore Research & Exploration and has been certified for Ni, Co, Al<sub>2</sub>O<sub>3</sub>, C, CaO, Cl, Cu, Cr<sub>2</sub>O<sub>3</sub>, Fe<sub>2</sub>O<sub>3</sub>, K<sub>2</sub>O, MgO, MnO, Na<sub>2</sub>O, P<sub>2</sub>O<sub>5</sub>, SiO<sub>2</sub>, S, SO<sub>3</sub>, TiO<sub>2</sub>, Zn and LOI. Nineteen commercial analytical laboratories participated in the certification program with characterization of this suite of 20 analytes on a dry basis by the following methods:

- Ni, Co, Al<sub>2</sub>O<sub>3</sub>, CaO, Cl, Cu, Cr<sub>2</sub>O<sub>3</sub>, Fe<sub>2</sub>O<sub>3</sub>, K<sub>2</sub>O, MgO, MnO, Na<sub>2</sub>O, P<sub>2</sub>O<sub>5</sub>, SiO<sub>2</sub>, SO<sub>3</sub>, TiO<sub>2</sub> and Zn by lithium borate fusion with X-ray fluorescence (17 laboratories)
- Ni, Co, Al<sub>2</sub>O<sub>3</sub>, CaO, Cu, Cr<sub>2</sub>O<sub>3</sub>, Fe<sub>2</sub>O<sub>3</sub>, K<sub>2</sub>O, MgO, MnO, Na<sub>2</sub>O, P<sub>2</sub>O<sub>5</sub>, SiO<sub>2</sub>, SO<sub>3</sub>, TiO<sub>2</sub> and Zn by lithium borate or sodium peroxide fusion with ICP-OES (12 laboratories)\*
- carbon and sulphur by infra-red combustion furnace (11 laboratories)
- loss on ignition (LOI) at 1000°C (18 laboratories)

\*Departures from a fusion ICP method were Lab G, which used a modified aqua regia digestion with ICP to determine Ni, Co, Cu, SO<sub>3</sub> and Zn, and Lab H, which used 4-acid digestion ICP to determine Co and Cu.

Due to the hygroscopic nature of nickel laterites, the laboratories were instructed to dry all samples thoroughly at 105°C prior to analysis and place in a desiccator with fresh desiccant. The samples were then to be cooled to room temperature before weighing for analysis. Alternatively, all samples could be corrected to dry basis by allowing the samples to equilibrate to lab atmosphere before weighing for analysis and correction for moisture by determination at 105°C of this property on a separate portion.

For the evaluation program a total of twenty 300g test units were taken at predetermined intervals during the bagging stage and are considered representative of the entire batch. To evaluate and compensate for the effects of batch-to-batch variation at individual laboratories, samples were submitted to the laboratories in three batches of four 20g sample pulps at weekly intervals. The four samples received by each laboratory were obtained by taking two 20g scoop splits from each of two separate 300g test units.

All results, together with uncorrected means, medians, standard deviations, relative standard deviations and percent deviation of lab means from the corrected mean of means (PDM<sup>3</sup>) are presented in the Appendix (Tables A2 to A37). The analytical methods employed by each laboratory are given in the table captions and described in Table A1 of the Appendix. The parameter PDM<sup>3</sup> is a measure of laboratory accuracy while the relative standard deviation is an effective measure of analytical precision where homogeneity of the test material has been confirmed.

## STATISTICAL EVALUATION OF ANALYTICAL DATA FOR OREAS 183

### Certified Value and Confidence Interval

Each batch of results is treated as a separate data set in testing for outliers. The certified value is determined from the mean of lab means after filtering of individual and batch outliers. It is computed according to the formulae

$$\bar{x}_i = \frac{1}{n_i} \sum_{j=1}^{n_i} x_{ij}$$

$$\bar{\bar{x}} = \frac{1}{p} \sum_{i=1}^p \bar{x}_i$$

where

$x_{ij}$  is the  $j$ th result reported by laboratory  $i$ ;

$p$  is the number of participating laboratories;

$n_i$  is the number of results reported by laboratory  $i$ ;

$\bar{x}_i$  is the mean for laboratory  $i$ ;

$\bar{\bar{x}}$  is the mean of means.

The confidence intervals are obtained by calculation of the variance ( $\hat{V}$ ) of the consensus value ( $\bar{\bar{x}}$ ) (mean of means) and reference to Student's- $t$  distribution with degrees of freedom ( $p-1$ ).

$$\hat{V}(\bar{\bar{x}}) = \frac{1}{p(p-1)} \sum_{i=1}^p (\bar{x}_i - \bar{\bar{x}})^2$$

$$\text{Confidence Interval} = \ddot{x} \pm t_{1-x/2}(p-1)(\hat{V}(\ddot{x}))^{1/2}$$

where

$t_{1-x/2}(p-1)$  is the  $1-x/2$  fractile of the  $t$ -distribution with  $(p-1)$  degrees of freedom.

The distribution of the values is assumed to be symmetrical about the mean in the calculation of the confidence interval.

The test for rejection of individual outliers from each laboratory data set is based on  $z$  scores (rejected if  $|z_i| > 2.5$ ) computed from the robust estimators of location and scale,  $T$  and  $S$ , respectively, according to the formulae

$$S = 1.483 \frac{\text{median} / x_j - \text{median} (x_i)}{j=1, \dots, n \quad i=1, \dots, n}$$

$$z_i = \frac{x_i - T}{S}$$

where

$T$  is the median value in a data set;

$S$  is the median of all absolute deviations from the sample median multiplied by 1.483, a correction factor to make the estimator consistent with the usual parameter of a normal distribution.

The  $z$ -score test is used in combination with a second method of individual outlier detection that determines the percent deviation of the individual value from the median. Outliers in general are selected on the basis of  $z$ -scores  $> 2.5$  and with percent deviations  $> 1.5\%$  (XRF) and  $> 3.0\%$  (other methods). In certain instances statistician's prerogative has been employed in discriminating outliers.

Each laboratory data set is tested for outlying status based on  $z$ -score discrimination and rejected if  $|z_i| > 2.5$ . After individual and laboratory data set (batch) outliers have been eliminated a non-iterative 3 standard deviation filter is applied, with individual values lying outside this window also relegated to outlying status. Individual outliers and, more rarely, laboratory data sets (batches) deemed to be outlying are shown left justified and in bold in the tabulated results (see Appendix) and have been omitted in the determination of certified values.

The magnitude of the confidence interval is inversely proportional to the number of participating laboratories and interlaboratory agreement. It is a measure of the reliability of the certified value, i.e. the narrower the confidence interval the greater the certainty in the certified value (see Table 1).

Table 1. Certified Values and 95% Confidence Intervals for OREAS 183.

Constituent	Certified Value	95% Confidence Interval	
		Low	High
<b>Fusion XRF</b>			
Nickel, Ni (wt.%)	0.995	0.987	1.003
Cobalt, Co (ppm)	225	217	234
Aluminium oxide, Al <sub>2</sub> O <sub>3</sub> (wt.%)	1.60	1.58	1.61
Calcium oxide, CaO (wt.%)	0.710	0.704	0.716
<i>Chlorine, Cl (ppm)</i>	<50	IND	IND
<i>Copper, Cu (ppm)</i>	<30	IND	IND
Chromium oxide, Cr <sub>2</sub> O <sub>3</sub> (wt.%)	0.653	0.648	0.658
Iron oxide, Fe <sub>2</sub> O <sub>3</sub> (wt.%)	12.73	12.67	12.78
<i>Potassium oxide, K<sub>2</sub>O (wt.%)</i>	<0.01	IND	IND
Magnesium oxide, MgO (wt.%)	27.31	27.19	27.42
Manganese oxide, MnO (wt.%)	0.180	0.179	0.181
<i>Sodium oxide, Na<sub>2</sub>O (wt.%)</i>	~0.03	IND	IND
Phosphorus oxide, P <sub>2</sub> O <sub>5</sub> (wt.%)	0.005	0.002	0.007
Silicon dioxide, SiO <sub>2</sub> (wt.%)	44.49	44.38	44.60
<i>Sulphur oxide, SO<sub>3</sub> (wt.%)</i>	<0.01	IND	IND
Titanium oxide, TiO <sub>2</sub> (wt.%)	0.023	0.020	0.025
Zinc, Zn (ppm)	78	68	88
Loss on ignition, LOI (wt.%)	10.90	10.79	11.01
<b>Fusion ICP</b>			
Nickel, Ni (wt.%)	0.983	0.974	0.993
Cobalt, Co (ppm)	222	215	229
Aluminium oxide, Al <sub>2</sub> O <sub>3</sub> (wt.%)	1.60	1.58	1.63
Calcium oxide, CaO (wt.%)	0.716	0.690	0.742
Copper, Cu (ppm)	21	18	24
Chromium oxide, Cr <sub>2</sub> O <sub>3</sub> (wt.%)	0.651	0.641	0.662
Iron oxide, Fe <sub>2</sub> O <sub>3</sub> (wt.%)	12.72	12.61	12.83
<i>Potassium oxide, K<sub>2</sub>O (wt.%)</i>	<0.1	IND	IND
Magnesium oxide, MgO (wt.%)	27.43	27.15	27.71
Manganese oxide, MnO (wt.%)	0.181	0.179	0.183
<i>Sodium oxide, Na<sub>2</sub>O (wt.%)</i>	0.030	0.026	0.034
<i>Phosphorus oxide, P<sub>2</sub>O<sub>5</sub> (wt.%)</i>	<0.01	IND	IND
Silica dioxide, SiO <sub>2</sub> (wt.%)	44.13	43.74	44.51
<i>Sulphur oxide, SO<sub>3</sub> (wt.%)</i>	<0.02	IND	IND
Titanium oxide, TiO <sub>2</sub> (wt.%)	0.020	0.020	0.021
Zinc, Zn (ppm)	82	69	95
<b>IR Combustion Furnace</b>			
Carbon, C (wt.%)	0.22	0.20	0.24
<i>Sulphur, S (wt.%)</i>	<0.01	IND	IND

Note - italics: indicative value; IND: indeterminate; intervals may appear asymmetric due to rounding.

## Statement of Homogeneity

The standard deviation of each laboratory data set includes error due to both the imprecision of the analytical method employed and to possible inhomogeneity of the material analysed. The standard deviation of the pooled individual analyses of all participating laboratories includes error due to the imprecision of each analytical method, to possible inhomogeneity of the material analysed and, in particular, to deficiencies in accuracy of each analytical method. In determining tolerance intervals that component of error attributable to measurement inaccuracy was eliminated by transformation of the individual results of each data set to a common mean (the uncorrected grand mean) according to the formula

$$x'_{ij} = x_{ij} - \bar{x}_i + \frac{\sum_{i=1}^p \sum_{j=1}^{n_i} x_{ij}}{\sum_{i=1}^p n_i}$$

where

$x_{ij}$  is the  $j$ th raw result reported by laboratory  $i$ ;  
 $x'_{ij}$  is the  $j$ th transformed result reported by laboratory  $i$ ;  
 $n_i$  is the number of results reported by laboratory  $i$ ;  
 $p$  is the number of participating laboratories;  
 $\bar{x}_i$  is the raw mean for laboratory  $i$ .

The homogeneity of each constituent was determined from tables of factors for two-sided tolerance limits for normal distributions (ISO 3207) in which

Lower limit is  $\bar{x} - k'_2(n, p, 1 - \alpha) s_g''$

Upper limit is  $\bar{x} + k'_2(n, p, 1 - \alpha) s_g''$

where

$n$  is the number of results;  
 $1 - \alpha$  is the confidence level;  
 $p$  is the proportion of results expected within the tolerance limits;  
 $k'_2$  is the factor for two – sided tolerance limits ( $m, \alpha$  unknown);  
 $s_g''$  is the corrected grand standard deviation.

The meaning of these tolerance limits may be illustrated for nickel by lithium borate fusion XRF, where 99% of the time at least 95% of subsamples will have concentrations lying between 0.990 and 1.000 wt.%. Put more precisely, this means that if the same number of subsamples were taken and analysed in the same manner repeatedly, 99% of the tolerance intervals so constructed would cover at least 95% of the total population, and 1% of the tolerance intervals would cover less than 95% of the total population (ISO Guide 35).

The corrected grand standard deviation,  $s_g''$ , used to compute the tolerance intervals is the weighted means of standard deviations of all data sets for a particular constituent according to the formula

$$s_g'' = \frac{\sum_{i=1}^p (s_i (1 - \frac{s_i}{s_g'}))}{\sum_{i=1}^p (1 - \frac{s_i}{s_g'})}$$

where

$1 - (\frac{s_i}{2s_g'})$  is the weighting factor for laboratory  $i$  ;

$s_g'$  is the grand standard deviation computed from the transformed (i.e. means - adjusted) results

according to the formula

$$s_g' = \left[ \frac{\sum_{i=1}^p \sum_{j=i}^{n_i} (x'_{ij} - \bar{x}'_i)^2}{\sum_{i=1}^p n_i - 1} \right]^{1/2}$$

where  $\bar{x}'_i$  is the transformed mean for laboratory  $i$

The weighting factors were applied to compensate for the considerable variation in analytical precision amongst participating laboratories. Hence, weighting factors for each data set have been constructed so as to be inversely proportional to the standard deviation of that data set. Individual outliers (shown in bold in Tables A2 to A37) were removed prior to the calculation of tolerance intervals and a weighting factor of zero was applied to those data sets where  $s_i/2s_g' > 1$  (i.e. where the weighting factor  $1 - s_i/2s_g' < 0$ ). Data sets displaying poor resolution (i.e. where the ratio of the reading increment divided by the measured value is  $< 1/20$ ) were also omitted.

It should be noted that estimates of tolerance by this method are considered conservative as a significant proportion of the observed variance, even in those laboratories exhibiting the best analytical precision, can presumably be attributed to measurement error. Despite the limitations of this method, the tolerance intervals presented in Table 2 are considered to confirm a high level of homogeneity for this CRM.

Table 2. Certified Values and Tolerance Limits for OREAS 183.

Constituent	Certified Value	Tolerance limits 1- $\alpha$ =0.99, $\rho$ =0.95	
		Low	High
<b>Fusion XRF</b>			
Nickel, Ni (wt.%)	0.995	0.990	1.000
Cobalt, Co (ppm)	225	218	233
Aluminium oxide, Al <sub>2</sub> O <sub>3</sub> (wt.%)	1.60	1.58	1.62
Calcium oxide, CaO (wt.%)	0.710	0.708	0.713
<i>Chlorine, Cl (ppm)</i>	<50	IND	IND
<i>Copper, Cu (ppm)</i>	<30	IND	IND
Chromium oxide, Cr <sub>2</sub> O <sub>3</sub> (wt.%)	0.653	0.648	0.658
Iron oxide, Fe <sub>2</sub> O <sub>3</sub> (wt.%)	12.73	12.68	12.78
<i>Potassium oxide, K<sub>2</sub>O (wt.%)</i>	<0.01	IND	IND
Magnesium oxide, MgO (wt.%)	27.31	27.21	27.40
Manganese oxide, MnO (wt.%)	0.180	0.178	0.181
<i>Sodium oxide, Na<sub>2</sub>O (wt.%)</i>	~0.03	IND	IND
Phosphorus oxide, P <sub>2</sub> O <sub>5</sub> (wt.%)	0.005	IND	IND
Silicon dioxide, SiO <sub>2</sub> (wt.%)	44.49	44.36	44.61
Sulphur oxide, SO <sub>3</sub> (wt.%)	<0.01	IND	IND
Titanium oxide, TiO <sub>2</sub> (wt.%)	0.023	0.019	0.026
Zinc, Zn (ppm)	78	75	81
Loss on ignition, LOI (wt.%)	10.90	10.84	10.96
<b>Fusion ICP</b>			
Nickel, Ni (wt.%)	0.983	0.970	0.997
Cobalt, Co (ppm)	222	218	226
Aluminium oxide, Al <sub>2</sub> O <sub>3</sub> (wt.%)	1.60	1.58	1.63
Calcium oxide, CaO (wt.%)	0.716	0.699	0.734
Copper, Cu (ppm)	21	17	26
Chromium oxide, Cr <sub>2</sub> O <sub>3</sub> (wt.%)	0.651	0.639	0.664
Iron oxide, Fe <sub>2</sub> O <sub>3</sub> (wt.%)	12.72	12.55	12.89
<i>Potassium oxide, K<sub>2</sub>O (wt.%)</i>	<0.1	IND	IND
Magnesium oxide, MgO (wt.%)	27.43	27.21	27.65
Manganese oxide, MnO (wt.%)	0.181	0.179	0.184
<i>Sodium oxide, Na<sub>2</sub>O (wt.%)</i>	0.030	IND	IND
<i>Phosphorus oxide, P<sub>2</sub>O<sub>5</sub> (wt.%)</i>	<0.01	IND	IND
Silica dioxide, SiO <sub>2</sub> (wt.%)	44.13	43.61	44.64
<i>Sulphur oxide, SO<sub>3</sub> (wt.%)</i>	<0.02	IND	IND
Titanium oxide, TiO <sub>2</sub> (wt.%)	0.020	0.020	0.021
Zinc, Zn (ppm)	82	72	93
<b>IR Combustion Furnace</b>			
Carbon, C (wt.%)	0.22	IND	IND
<i>Sulphur, S (wt.%)</i>	<0.01	IND	IND

Note - intervals may appear asymmetric due to rounding; IND = indeterminate; italics = indicative value



## ANOVA Study

All laboratories and all 3 rounds of sample submission were included in the ANOVA study for nickel, cobalt, iron oxide and magnesium oxide. The sampling format for OREAS 183 was structured to enable nested ANOVA treatment of the round robin results. During the bagging stage, immediately following homogenization, twenty 300g samples were taken at regular intervals representative of the entire batch of OREAS 183. For each round of sample submissions, each laboratory received paired samples from two different, non-adjacent 300g samples. For example, the samples that any one of the seventeen (XRF) laboratories could have received are:

Round 1 (week 1)	Round 2 (week 2)	Round 3 (week 3)
Sample 1: Unit 1	Sample 1: Unit 10	Sample 1: Unit 6
Sample 2: Unit 11	Sample 2: Unit 20	Sample 2: Unit 16
Sample 3: Unit 1	Sample 3: Unit 10	Sample 3: Unit 6
Sample 4: Unit 11	Sample 4: Unit 20	Sample 4: Unit 16

The purpose of the ANOVA investigation was to compare the within-unit variance with that of the between-unit variance. This approach permitted an assessment of homogeneity across the entire batch of OREAS 183. The test was performed using the following parameters:

- Significance Level  $\alpha = P$  (type I error) = 0.05
- Null Hypothesis,  $H_0$ : Between-unit variance is no greater than within-unit variance (reject  $H_0$  if p-value < 0.05)
- Alternative Hypothesis,  $H_1$ : Between-unit variance is greater than within-unit variance

P-values are a measure of probability whereby values less than 0.05 indicate a greater than 95% probability that the observed differences in within-unit and between-unit variances are real. The dataset was filtered for both individual and batch (lab round) outliers prior to the calculation of the p-value. This process derived p-values of 1.00 for nickel, 1.00 for cobalt, 1.00 for iron oxide and 1.00 for magnesium oxide and indicates no evidence that between-unit variance is greater than within-unit variance. Conclusion: do not reject  $H_0$ .

Note that ANOVA is not an absolute measure of homogeneity. Rather, it establishes that the metals are distributed in a similar manner throughout OREAS 183 and that the variance between two subsamples from the same unit is statistically indistinguishable to the variance from two subsamples taken from any two separate units.

## Performance Gates

Performance gates provide an indication of a level of performance that might reasonably be expected from a laboratory being monitored by this CRM in a QA/QC program. They take into account errors attributable to measurement and CRM variability. For an effective CRM the contribution of the latter should be negligible in comparison to measurement errors. Sources of measurement error include inter-lab bias, analytical precision (repeatability) and inter-batch bias (reproducibility).

Two methods have been employed to calculate performance gates. The first method uses the same filtered data set used to determine the certified value, i.e. after removal of all individual, lab dataset (batch) and 3SD outliers (single iteration). These outliers can only be removed after the absolute homogeneity of the CRM has been independently established, i.e. the outliers must be confidently deemed to be analytical rather than arising from inhomogeneity of the CRM. The standard deviation is then calculated for each analyte from the pooled individual analyses generated from the certification program. Table 3 shows performance gates calculated for two and three standard deviations. As a guide these intervals may be regarded as warning or rejection for multiple 2SD outliers, or rejection for

individual 3SD outliers in QC monitoring, although their precise application should be at the discretion of the QC manager concerned.

Standard deviation is also shown in relative percent for one, two and three relative standard deviations (1RSD, 2RSD and 3RSD) to facilitate an appreciation of the magnitude of these numbers.

Table 3. Performance Gates for OREAS 183

Constituent	Certified Value	Absolute Standard Deviations					Relative Standard Deviations		
		1SD	2SD Low	2SD High	3SD Low	3SD High	1RSD	2RSD	3RSD
<b>Fusion XRF</b>									
Ni (wt.%)	0.995	0.018	0.960	1.030	0.942	1.048	1.77%	3.54%	5.32%
Co (ppm)	225	14	198	253	184	267	6.15%	12.29%	18.44%
Al <sub>2</sub> O <sub>3</sub> (wt.%)	1.60	0.03	1.54	1.65	1.52	1.68	1.71%	3.42%	5.12%
CaO (wt.%)	0.710	0.013	0.685	0.736	0.672	0.749	1.81%	3.61%	5.42%
Cl (ppm)	<50	IND	IND	IND	IND	IND	IND	IND	IND
Cu (ppm)	<30	IND	IND	IND	IND	IND	IND	IND	IND
Cr <sub>2</sub> O <sub>3</sub> (wt.%)	0.653	0.013	0.628	0.678	0.615	0.690	1.92%	3.83%	5.75%
Fe <sub>2</sub> O <sub>3</sub> (wt.%)	12.73	0.11	12.50	12.95	12.39	13.06	0.88%	1.76%	2.64%
K <sub>2</sub> O (wt.%)	<0.01	IND	IND	IND	IND	IND	IND	IND	IND
MgO (wt.%)	27.31	0.28	26.75	27.86	26.47	28.14	1.02%	2.05%	3.07%
MnO (wt.%)	0.180	0.002	0.175	0.184	0.172	0.187	1.33%	2.66%	3.99%
Na <sub>2</sub> O (wt.%)	~0.03	IND	IND	IND	IND	IND	IND	IND	IND
P <sub>2</sub> O <sub>5</sub> (wt.%)	0.005	0.003	-0.001	0.010	-0.003	0.013	59.00%	118.0%	177.0%
SiO <sub>2</sub> (wt.%)	44.49	0.25	43.98	44.99	43.73	45.25	0.57%	1.13%	1.70%
SO <sub>3</sub> (wt.%)	<0.01	IND	IND	IND	IND	IND	IND	IND	IND
TiO <sub>2</sub> (wt.%)	0.023	0.006	0.011	0.035	0.005	0.041	26.69%	53.38%	80.07%
Zn (ppm)	78	14	49	107	35	121	18.37%	36.75%	55.12%
LOI (wt.%)	10.90	0.22	10.46	11.35	10.24	11.57	2.04%	4.08%	6.12%
<b>Fusion ICP</b>									
Ni (wt.%)	0.983	0.022	0.940	1.027	0.919	1.048	2.19%	4.39%	6.58%
Co (ppm)	222	14	195	249	181	263	6.13%	12.26%	18.39%
Al <sub>2</sub> O <sub>3</sub> (wt.%)	1.60	0.05	1.51	1.69	1.47	1.74	2.84%	5.68%	8.52%
CaO (wt.%)	0.72	0.042	0.632	0.801	0.590	0.843	5.90%	11.80%	17.69%
Cu (ppm)	21	5	11	32	5	37	25.15%	50.30%	75.45%
Cr <sub>2</sub> O <sub>3</sub> (wt.%)	0.651	0.024	0.603	0.700	0.579	0.724	3.70%	7.41%	11.11%
Fe <sub>2</sub> O <sub>3</sub> (wt.%)	12.72	0.29	12.14	13.30	11.85	13.59	2.28%	4.56%	6.84%
K <sub>2</sub> O (wt.%)	<0.1	IND	IND	IND	IND	IND	IND	IND	IND
MgO (wt.%)	27.43	0.68	26.07	28.80	25.39	29.48	2.49%	4.97%	7.46%
MnO (wt.%)	0.181	0.005	0.171	0.192	0.166	0.197	2.85%	5.70%	8.55%
Na <sub>2</sub> O (wt.%)	0.030	0.004	0.022	0.038	0.018	0.043	13.69%	27.38%	41.07%
P <sub>2</sub> O <sub>5</sub> (wt.%)	<0.01	IND	IND	IND	IND	IND	IND	IND	IND
SiO <sub>2</sub> (wt.%)	44.13	0.81	42.50	45.75	41.69	46.56	1.84%	3.68%	5.53%
SO <sub>3</sub> (wt.%)	<0.02	IND	IND	IND	IND	IND	IND	IND	IND
TiO <sub>2</sub> (wt.%)	0.020	0.001	0.018	0.023	0.017	0.024	5.23%	10.45%	15.68%
Zn (ppm)	82	17	49	115	33	132	20.04%	40.08%	60.12%
<b>IR Combustion Furnace</b>									
C (wt.%)	0.22	0.03	0.16	0.28	0.13	0.31	13.67%	27.33%	41.00%
S (wt.%)	<0.01	IND	IND	IND	IND	IND	IND	IND	IND

Note - intervals may appear asymmetric due to rounding; IND = indeterminate; italics = indicative value

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Acme Analytical Laboratories, Vancouver, BC, Canada  
Activation Laboratories, Ancaster, Ontario, Canada  
ALS, Callao, Lima, Peru  
ALS, Malaga, WA, Australia  
ALS, Stafford, QLD, Australia  
ALS, Vancouver, BC, Canada  
BV Amdel, Cardiff, NSW, Australia  
BV Amdel, Stirling, SA, Australia  
BV Ultra Trace, Canning Vale, WA, Australia  
Inspectorate Kendari Laboratory, Kendari, Sulawesi, Indonesia  
Intertek Genalysis Laboratory Services, Maddington, WA, Australia  
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Société le Nickel SLN, Noumea, New Caledonia  
UIS Analytical Services, Centurion, South Africa

## PREPARER AND SUPPLIER OF THE REFERENCE MATERIAL

Nickel laterite ore reference material OREAS 183 has been prepared and certified and is supplied by:

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6-8 Gatwick Road  
Bayswater North VIC 3153  
AUSTRALIA*

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OREAS 183 is packaged in unit sizes of 10g (single-use laminated foil pouches) and 1kg (wide mouthed plastic jars).

## INTENDED USE

OREAS 183 is intended for the following uses:

- i) for the monitoring of laboratory performance in the analysis of Ni, Co, Al<sub>2</sub>O<sub>3</sub>, CaO, Cl, Cu, Cr<sub>2</sub>O<sub>3</sub>, Fe<sub>2</sub>O<sub>3</sub>, K<sub>2</sub>O, MgO, MnO, Na<sub>2</sub>O, P<sub>2</sub>O<sub>5</sub>, SiO<sub>2</sub>, SO<sub>3</sub>, TiO<sub>2</sub>, Zn, LOI, C and S in geological samples
- ii) for the verification of analytical methods for Ni, Co, Al<sub>2</sub>O<sub>3</sub>, CaO, Cl, Cu, Cr<sub>2</sub>O<sub>3</sub>, Fe<sub>2</sub>O<sub>3</sub>, K<sub>2</sub>O, MgO, MnO, Na<sub>2</sub>O, P<sub>2</sub>O<sub>5</sub>, SiO<sub>2</sub>, SO<sub>3</sub>, TiO<sub>2</sub>, Zn, LOI, C and S
- iii) for the calibration of instruments used in the determination of the concentration of Ni, Co, Al<sub>2</sub>O<sub>3</sub>, CaO, Cl, Cu, Cr<sub>2</sub>O<sub>3</sub>, Fe<sub>2</sub>O<sub>3</sub>, K<sub>2</sub>O, MgO, MnO, Na<sub>2</sub>O, P<sub>2</sub>O<sub>5</sub>, SiO<sub>2</sub>, SO<sub>3</sub>, TiO<sub>2</sub>, Zn, LOI, C and S

## **STABILITY AND STORAGE INSTRUCTIONS**

OREAS 183 has been sourced from a sample of saprolitic nickel ore. It has been packaged in robust laminated foil pouches and plastic jars. In its unopened state and under normal conditions of storage it has a shelf life beyond ten years. Once opened the jars should be re-sealed after sampling and the contents consumed within two years.

## **INSTRUCTIONS FOR THE CORRECT USE OF THE REFERENCE MATERIAL**

All certified values are reported on a dry basis after removal of hygroscopic moisture by drying in air at 105°C to constant mass. Users departing from these conventions should correct for moisture content.

## **LEGAL NOTICE**

Ore Research & Exploration Pty Ltd has prepared and statistically evaluated the property values of this reference material to the best of its ability. The Purchaser by receipt hereof releases and indemnifies Ore Research & Exploration Pty Ltd from and against all liability and costs arising from the use of this material and information.

## **CERTIFYING OFFICER**

Craig Hamlyn (B.Sc. Hons - Geology), Technical Manager

## **REFERENCES**

ISO Guide 35 (2006), Certification of reference materials - General and statistical principals.  
ISO Guide 31 (2000), Reference materials – Contents of certificates and labels.  
ISO Guide 3207 (1975), Statistical interpretation of data - Determination of a statistical tolerance interval.

**APPENDIX**

**Analytical Data for OREAS 183**

Table A1. Key to abbreviations used in Tables A2 – A37.

Abbreviation	Explanation
Std.Dev.	one sigma standard deviation
Rel.Std.Dev.	one sigma relative standard deviation
PDM <sup>3</sup>	percent deviation of lab mean from corrected mean of means
NR	not reported
BF	lithium metaborate fusion
PF	sodium peroxide fusion
4A	four acid (HF–HNO <sub>3</sub> –HClO <sub>4</sub> –HCl) digestion
MAR	modified aqua regia digestion
ICP	inductively coupled plasma OES or MS (unspecified)
OES	inductively coupled plasma optical emission spectrometry
XRF	x-ray fluorescence
LOI	loss on ignition
IRC	infra-red combustion furnace

Individual and batch outliers are left justified and in bold. Replicates 1 – 4 correspond to the first batch of samples submitted to labs, replicates 5 – 8 correspond to the second batch and replicates 9 – 12 correspond to the third batch.

Table A2. Fusion XRF results for Ni in OREAS 183 (abbreviations as in Table A1; values in wt.%).

Replicate No.	Lab A BF*XRF	Lab B BF*XRF	Lab C BF*XRF	Lab D BF*XRF	Lab E BF*XRF	Lab F BF*XRF	Lab G BF*XRF	Lab H BF*XRF	Lab I BF*XRF	Lab J BF*XRF	Lab K BF*XRF	Lab L BF*XRF	Lab N BF*XRF	Lab O BF*XRF	Lab P BF*XRF	Lab Q BF*XRF	Lab R BF*XRF
1	0.955	1.015	0.980	0.978	1.015	0.995	0.990	1.020	1.010	1.001	0.981	0.980	0.973	1.005	1.020	0.999	0.980
2	0.963	1.020	0.981	0.976	1.020	0.990	0.990	1.026	1.010	1.010	0.981	0.980	0.960	1.005	1.010	0.999	0.970
3	0.963	1.030	0.978	0.978	0.998	0.991	1.000	1.029	1.000	0.997	0.976	0.980	0.983	1.005	1.010	0.995	0.980
4	0.967	1.030	0.981	0.978	1.000	0.996	0.990	1.012	1.000	1.009	0.987	1.000	0.989	1.005	1.020	0.999	0.970
5	0.990	1.025	0.984	0.982	1.015	0.990	0.990	1.012	1.010	0.995	0.983	0.990	0.973	1.005	NR	NR	NR
6	0.982	1.025	0.974	0.979	1.025	0.998	0.980	1.016	1.000	1.008	0.977	1.000	0.974	1.010	NR	NR	NR
7	0.986	1.030	0.980	0.984	1.015	0.991	0.990	1.008	1.010	1.003	0.972	0.990	0.984	1.010	NR	NR	NR
8	0.994	1.025	0.979	0.985	1.025	0.995	0.980	1.013	1.000	1.004	0.978	0.990	0.996	1.005	NR	NR	NR
9	1.000	1.020	0.984	0.979	0.969	0.993	0.980	1.032	1.010	1.007	0.970	0.980	0.993	0.994	NR	NR	NR
10	1.000	1.023	0.990	0.978	0.968	0.999	0.970	1.025	1.010	0.996	0.974	0.980	0.983	0.994	NR	NR	NR
11	0.993	1.030	0.976	0.974	0.970	0.998	0.980	1.016	1.000	1.015	0.974	0.990	0.992	0.993	NR	NR	NR
12	0.993	1.035	0.981	0.975	0.970	0.992	0.980	1.037	1.010	1.004	0.975	0.980	1.002	0.992	NR	NR	NR
Mean	0.982	1.026	0.981	0.979	0.999	0.994	0.985	1.021	1.006	1.004	0.977	0.987	0.984	1.002	1.015	0.998	0.975
Median	0.988	1.025	0.981	0.978	1.008	0.994	0.985	1.018	1.010	1.004	0.977	0.985	0.984	1.005	1.015	0.999	0.975
Std.Dev.	0.016	0.006	0.004	0.003	0.024	0.003	0.008	0.009	0.005	0.006	0.005	0.008	0.012	0.007	0.006	0.002	0.006
Rel.Std.Dev.	1.62%	0.55%	0.42%	0.34%	2.36%	0.33%	0.81%	0.90%	0.51%	0.61%	0.50%	0.79%	1.21%	0.67%	0.57%	0.21%	0.59%
PDM <sup>3</sup>	-1.28%	3.09%	-1.43%	-1.62%	0.43%	-0.09%	-1.00%	2.57%	1.10%	0.92%	-1.77%	-0.83%	-1.15%	0.70%	2.02%	0.31%	-2.00%

Table A3. Fusion XRF results for Co in OREAS 183 (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A BF*XRF	Lab B BF*XRF	Lab C BF*XRF	Lab D BF*XRF	Lab E BF*XRF	Lab F BF*XRF	Lab G BF*XRF	Lab H BF*XRF	Lab I BF*XRF	Lab J BF*XRF	Lab K BF*XRF	Lab L BF*XRF	Lab N BF*XRF	Lab O BF*XRF	Lab P BF*XRF	Lab Q BF*XRF	Lab R BF*XRF
1	210	200	210	210	220	220	NR	<b>290</b>	230	240	220	200	230	240	200	<b>235</b>	200
2	210	200	210	210	240	210	NR	<b>290</b>	230	<b>280</b>	210	200	230	240	200	218	200
3	200	200	220	210	210	210	NR	<b>290</b>	230	260	210	200	240	240	200	212	200
4	210	200	220	220	200	210	NR	<b>290</b>	230	260	210	200	240	250	200	210	200
5	220	200	220	220	200	210	NR	<b>290</b>	230	<b>290</b>	230	200	230	240	NR	NR	NR
6	220	200	220	210	<b>230</b>	210	NR	<b>290</b>	230	240	230	200	220	250	NR	NR	NR
7	220	200	220	220	210	220	NR	<b>290</b>	230	240	220	200	230	240	NR	NR	NR
8	220	200	210	220	210	210	NR	<b>280</b>	230	270	220	200	240	240	NR	NR	NR
9	220	200	220	230	240	220	NR	<b>290</b>	230	<b>380</b>	220	200	240	250	NR	NR	NR
10	220	200	220	230	230	220	NR	<b>290</b>	220	<b>290</b>	220	200	230	260	NR	NR	NR
11	220	200	210	230	230	220	NR	<b>290</b>	230	<b>210</b>	220	200	240	250	NR	NR	NR
12	220	200	210	220	240	220	NR	<b>290</b>	220	<b>240</b>	220	200	240	250	NR	NR	NR
Mean	216	<b>200</b>	216	219	222	215		<b>289</b>	228	267	219	<b>200</b>	234	246	<b>200</b>	219	<b>200</b>
Median	220	200	220	220	225	215		290	230	260	220	200	235	245	200	215	200
Std.Dev.	7	0	5	8	15	5		3	4	43	7	0	7	7	0	11	0
Rel.Std.Dev.	3.10%	0.00%	2.39%	3.62%	6.89%	2.43%		1.00%	1.70%	16.10%	3.05%	0.00%	2.86%	2.72%	0.00%	5.19%	0.00%
PDM <sup>3</sup>	-4.24%	-11.26%	-4.24%	-2.76%	-1.65%	-4.61%		28.30%	1.31%	18.32%	-2.76%	-11.26%	3.90%	9.07%	-11.26%	-2.94%	-11.26%

Table A4. Fusion XRF results for Al<sub>2</sub>O<sub>3</sub> in OREAS 183 (abbreviations as in Table A1; values in wt.%).

Replicate No.	Lab A BF*XRF	Lab B BF*XRF	Lab C BF*XRF	Lab D BF*XRF	Lab E BF*XRF	Lab F BF*XRF	Lab G BF*XRF	Lab H BF*XRF	Lab I BF*XRF	Lab J BF*XRF	Lab K BF*XRF	Lab L BF*XRF	Lab N BF*XRF	Lab O BF*XRF	Lab P BF*XRF	Lab Q BF*XRF	Lab R BF*XRF
1	1.57	<b>1.53</b>	1.59	1.60	1.62	1.58	<b>1.51</b>	1.59	1.67	1.59	1.60	1.59	1.59	1.63	1.57	1.58	1.61
2	1.58	<b>1.58</b>	1.58	1.60	1.62	1.57	<b>1.51</b>	1.62	1.66	1.59	1.60	1.61	1.57	1.62	1.58	1.59	1.62
3	1.58	<b>1.54</b>	1.61	1.59	1.62	1.58	<b>1.53</b>	1.59	1.65	1.60	1.61	1.61	1.56	1.64	1.58	1.65	1.62
4	1.60	<b>1.52</b>	1.60	1.60	1.63	1.57	<b>1.52</b>	1.62	1.63	<b>1.56</b>	1.60	1.61	1.57	1.61	1.59	1.64	1.62
5	1.60	1.55	1.60	1.61	1.60	1.58	<b>1.51</b>	1.59	<b>1.68</b>	1.57	1.58	1.59	<b>1.54</b>	1.62	NR	NR	NR
6	1.58	1.54	1.57	1.62	1.60	1.59	<b>1.50</b>	1.59	<b>1.70</b>	1.60	1.58	1.60	1.59	1.66	NR	NR	NR
7	1.61	1.53	1.58	1.62	1.59	1.58	<b>1.51</b>	1.57	<b>1.69</b>	<b>1.70</b>	1.60	1.57	1.60	1.66	NR	NR	NR
8	1.62	1.53	1.58	1.62	1.62	1.58	<b>1.50</b>	1.60	<b>1.70</b>	1.52	1.60	1.59	1.59	1.63	NR	NR	NR
9	1.60	1.56	1.59	1.61	<b>1.70</b>	1.57	<b>1.49</b>	1.64	<b>1.72</b>	1.55	1.59	1.65	1.63	1.62	NR	NR	NR
10	1.60	1.53	1.56	1.62	<b>1.68</b>	1.58	<b>1.48</b>	1.60	<b>1.74</b>	<b>1.71</b>	1.59	1.59	1.61	1.62	NR	NR	NR
11	1.60	1.55	1.60	1.60	<b>1.68</b>	1.59	<b>1.49</b>	1.59	<b>1.72</b>	1.56	1.58	1.59	1.60	1.63	NR	NR	NR
12	1.60	1.54	1.61	1.60	<b>1.66</b>	1.58	<b>1.49</b>	1.62	<b>1.70</b>	<b>1.72</b>	1.59	1.59	1.62	1.63	NR	NR	NR
Mean	1.60	1.54	1.59	1.61	1.64	1.58	<b>1.50</b>	1.60	1.69	1.61	1.59	1.60	1.59	1.63	1.58	1.62	1.62
Median	1.60	1.54	1.59	1.61	1.62	1.58	1.51	1.60	1.70	1.59	1.60	1.59	1.59	1.63	1.58	1.62	1.62
Std.Dev.	0.01	0.02	0.02	0.01	0.04	0.01	0.01	0.02	0.03	0.07	0.01	0.02	0.03	0.02	0.01	0.03	0.01
Rel.Std.Dev.	0.91%	1.06%	0.98%	0.66%	2.21%	0.48%	0.95%	1.22%	1.89%	4.21%	0.62%	1.24%	1.63%	0.96%	0.52%	2.10%	0.31%
PDM <sup>3</sup>	-0.23%	-3.74%	-0.59%	0.56%	2.28%	-1.23%	-5.96%	0.19%	5.61%	0.42%	-0.33%	0.03%	-0.59%	2.02%	-1.16%	1.17%	1.18%



Table A5. Fusion XRF results for CaO in OREAS 183 (abbreviations as in Table A1; values in wt.%).

Replicate No.	Lab A BF*XRF	Lab B BF*XRF	Lab C BF*XRF	Lab D BF*XRF	Lab E BF*XRF	Lab F BF*XRF	Lab G BF*XRF	Lab H BF*XRF	Lab I BF*XRF	Lab J BF*XRF	Lab K BF*XRF	Lab L BF*XRF	Lab N BF*XRF	Lab O BF*XRF	Lab P BF*XRF	Lab Q BF*XRF	Lab R BF*XRF
1	0.690	0.700	0.710	0.720	0.700	0.702	0.720	0.710	0.730	0.720	0.720	0.710	0.719	0.720	0.720	0.680	0.710
2	0.690	0.695	0.710	0.720	0.700	0.695	0.700	0.700	0.720	0.716	0.720	0.710	0.719	0.720	0.710	<b>0.666</b>	0.700
3	0.690	0.700	0.700	0.720	0.690	0.698	0.710	0.700	0.730	0.720	0.720	0.710	0.729	0.720	0.710	0.692	0.710
4	0.700	0.695	0.700	0.720	0.690	0.700	0.720	0.700	0.730	0.719	0.720	0.710	0.737	0.720	0.710	0.685	0.720
5	0.720	0.700	0.700	0.720	0.710	0.698	0.700	0.700	0.720	0.706	0.720	0.710	0.725	0.720	NR	NR	NR
6	0.720	0.695	0.700	0.710	0.710	0.702	0.700	0.700	0.730	0.704	0.710	0.730	0.731	0.740	NR	NR	NR
7	0.720	0.705	0.700	0.720	0.700	0.697	0.710	0.690	0.730	0.722	0.710	0.710	0.736	0.720	NR	NR	NR
8	0.720	0.700	0.710	0.720	0.720	0.698	0.710	0.700	0.730	0.712	0.720	0.730	0.738	0.720	NR	NR	NR
9	0.720	0.700	0.700	0.730	0.710	0.693	0.700	0.700	0.730	0.713	0.710	0.730	0.743	0.710	NR	NR	NR
10	0.720	0.700	0.710	0.730	0.710	0.705	0.700	0.700	0.730	0.706	0.710	0.710	0.733	0.720	NR	NR	NR
11	0.710	0.700	0.700	0.720	0.710	0.702	0.700	0.690	0.740	0.725	0.710	0.700	0.734	0.720	NR	NR	NR
12	0.720	0.705	0.700	0.720	0.700	0.699	0.700	0.700	0.740	0.725	0.710	0.710	0.737	0.710	NR	NR	NR
Mean	0.710	0.700	0.703	0.721	0.704	0.699	0.706	0.699	0.730	0.716	0.715	0.714	0.73	0.72	0.71	0.68	0.71
Median	0.720	0.700	0.700	0.720	0.705	0.699	0.700	0.700	0.730	0.718	0.715	0.710	0.73	0.72	0.71	0.68	0.71
Std.Dev.	0.013	0.003	0.005	0.005	0.009	0.003	0.008	0.005	0.006	0.007	0.005	0.010	0.01	0.01	0.01	0.01	0.01
Rel.Std.Dev.	1.90%	0.48%	0.70%	0.71%	1.28%	0.48%	1.12%	0.74%	0.83%	1.04%	0.73%	1.39%	1.03%	1.03%	0.70%	1.62%	1.15%
PDM <sup>3</sup>	-0.05%	-1.52%	-0.99%	1.47%	-0.88%	-1.59%	-0.64%	-1.58%	2.76%	0.74%	0.65%	0.53%	3.01%	1.35%	0.30%	-4.21%	-0.05%

Table A6. Fusion XRF results for Cl in OREAS 183 (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A BF*XRF	Lab B BF*XRF	Lab C BF*XRF	Lab D BF*XRF	Lab E BF*XRF	Lab F BF*XRF	Lab G BF*XRF	Lab H BF*XRF	Lab I BF*XRF	Lab J BF*XRF	Lab K BF*XRF	Lab L BF*XRF	Lab N BF*XRF	Lab O BF*XRF	Lab P BF*XRF	Lab Q BF*XRF	Lab R BF*XRF
1	50	NR	NR	50	<10	NR	NR	NR	NR	NR	<50	<50	NR	NR	<50	<50	NR
2	140	NR	NR	50	10	NR	NR	NR	NR	NR	<50	<50	NR	NR	<50	<50	NR
3	60	NR	NR	50	10	NR	NR	NR	NR	NR	<50	<50	NR	NR	<50	<50	NR
4	120	NR	NR	50	10	NR	NR	NR	NR	NR	<50	<50	NR	NR	<50	<50	NR
5	<50	NR	NR	100	100	NR	NR	NR	NR	NR	<50	NR	NR	NR	NR	NR	NR
6	<50	NR	NR	50	120	NR	NR	NR	NR	NR	<50	NR	NR	NR	NR	NR	NR
7	<50	NR	NR	100	100	NR	NR	NR	NR	NR	<50	NR	NR	NR	NR	NR	NR
8	<50	NR	NR	100	110	NR	NR	NR	NR	NR	<50	NR	NR	NR	NR	NR	NR
9	<50	NR	NR	<50	20	NR	NR	NR	NR	NR	<50	NR	NR	NR	NR	NR	NR
10	<50	NR	NR	50	60	NR	NR	NR	NR	NR	<50	NR	NR	NR	NR	NR	NR
11	50	NR	NR	50	30	NR	NR	NR	NR	NR	<50	NR	NR	NR	NR	NR	NR
12	<50	NR	NR	<50	20	NR	NR	NR	NR	NR	<50	NR	NR	NR	NR	NR	NR
Mean	84			65	54												
Median	60			50	30												
Std.Dev.	43			24	45												
Rel.Std.Dev.	50.93%			37.16%	84.32%												
PDM <sup>3</sup>	24.36%			-3.77%	-20.59%												

Table A7. Fusion XRF results for Cu in OREAS 183 (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A BF*XRF	Lab B BF*XRF	Lab C BF*XRF	Lab D BF*XRF	Lab E BF*XRF	Lab F BF*XRF	Lab G BF*XRF	Lab H BF*XRF	Lab I BF*XRF	Lab J BF*XRF	Lab K BF*XRF	Lab L BF*XRF	Lab N BF*XRF	Lab O BF*XRF	Lab P BF*XRF	Lab Q BF*XRF	Lab R BF*XRF
1	<50	<30	<50	10	<10	22	<10	<10	40	<100	<10	<b>90</b>	NR	50	<100	<20	NR
2	<50	<30	<50	5	<10	22	<10	40	50	<100	<10	<b>90</b>	NR	50	<100	<20	NR
3	<50	<30	<50	15	<10	20	20	20	40	<100	10	<b>60</b>	NR	50	<100	<20	NR
4	<50	<30	<50	15	<10	22	<10	30	40	<100	<10	<b>80</b>	NR	50	<100	<20	NR
5	<50	<30	<50	10	<10	22	<10	<10	40	<100	<10	50	NR	50	NR	NR	NR
6	<50	<30	<50	5	30	22	10	<10	<40	<100	10	60	NR	50	NR	NR	NR
7	<50	<30	<50	10	<10	22	<10	<10	40	<100	<10	40	NR	50	NR	NR	NR
8	<50	<30	<50	10	<10	22	<10	<10	40	<100	10	40	NR	50	NR	NR	NR
9	<50	<30	<50	10	20	22	<10	40	<50	<100	<10	<b>80</b>	NR	40	NR	NR	NR
10	<50	<30	<50	10	10	22	<10	20	<50	<100	<10	<b>&lt;20</b>	NR	40	NR	NR	NR
11	<50	<30	<50	15	20	22	10	<10	<50	<100	<10	<b>80</b>	NR	40	NR	NR	NR
12	<50	<30	<50	10	20	22	10	<10	<50	<100	10	<b>80</b>	NR	40	NR	NR	NR
Mean				10	20	22	13	30	41		10	68		47			
Median				10	20	22	10	30	40		10	80		50			
Std.Dev.				3	7	1	5	10	4		0	19		5			
Rel.Std.Dev.				32.09%	35.36%	3.28%	40.00%	33.33%	9.12%		0.00%	27.69%		10.55%			
PDM <sup>3</sup>				-61.00%	-25.13%	-18.01%	-53.21%	12.31%	55.09%		-62.56%	155%		74.70%			

Table A8. Fusion XRF results for Cr<sub>2</sub>O<sub>3</sub> in OREAS 183 (abbreviations as in Table A1; values in wt.%).

Replicate No.	Lab A BF*XRF	Lab B BF*XRF	Lab C BF*XRF	Lab D BF*XRF	Lab E BF*XRF	Lab F BF*XRF	Lab G BF*XRF	Lab H BF*XRF	Lab I BF*XRF	Lab J BF*XRF	Lab K BF*XRF	Lab L BF*XRF	Lab N BF*XRF	Lab O BF*XRF	Lab P BF*XRF	Lab Q BF*XRF	Lab R BF*XRF
1	0.648	0.640	0.650	0.661	0.646	0.666	<b>0.950</b>	0.680	0.640	<b>0.681</b>	0.654	0.660	0.647	0.664	0.650	0.650	0.660
2	0.649	0.640	0.646	0.653	0.646	0.659	<b>0.950</b>	0.680	0.650	<b>0.700</b>	0.655	0.660	0.657	0.662	0.650	0.653	0.650
3	0.643	0.635	0.651	0.650	0.630	0.659	<b>0.965</b>	0.670	0.640	<b>0.696</b>	0.651	0.660	0.659	0.665	0.650	0.660	0.670
4	0.656	0.640	0.647	0.658	0.633	0.663	<b>0.965</b>	0.670	0.650	<b>0.698</b>	0.647	0.670	0.673	0.665	0.640	0.651	0.660
5	0.650	0.640	0.647	0.659	<b>0.639</b>	0.663	0.642	0.660	0.640	<b>0.709</b>	0.644	0.650	0.663	0.668	NR	NR	NR
6	0.645	0.635	0.641	0.667	0.661	0.664	0.642	0.670	0.640	<b>0.694</b>	0.636	<b>0.690</b>	0.666	0.672	NR	NR	NR
7	0.649	0.640	0.647	0.663	0.656	0.660	0.649	0.660	0.650	<b>0.687</b>	0.631	0.650	0.672	0.669	NR	NR	NR
8	0.647	0.640	0.647	0.668	0.657	0.664	0.642	0.670	0.640	<b>0.698</b>	0.633	0.660	0.677	0.664	NR	NR	NR
9	0.661	0.640	0.649	0.648	0.673	0.658	0.642	0.670	0.640	<b>0.695</b>	0.626	0.640	0.668	0.652	NR	NR	NR
10	0.667	0.640	0.655	0.652	0.649	0.664	0.634	0.670	0.640	<b>0.684</b>	0.626	0.640	0.668	0.652	NR	NR	NR
11	0.664	0.640	0.648	0.654	0.667	0.667	0.647	0.680	0.640	<b>0.715</b>	0.620	0.640	0.669	0.655	NR	NR	NR
12	0.661	0.640	0.650	0.652	0.654	0.662	0.643	0.680	0.640	<b>0.713</b>	0.630	0.630	0.673	0.652	NR	NR	NR
Mean	0.653	0.639	0.648	0.657	0.651	0.662	0.747	0.672	0.643	<b>0.698</b>	0.638	0.654	0.666	0.662	0.648	0.653	0.660
Median	0.650	0.640	0.648	0.656	0.652	0.663	0.645	0.670	0.640	0.697	0.635	0.655	0.668	0.664	0.650	0.652	0.660
Std.Dev.	0.008	0.002	0.003	0.007	0.013	0.003	0.155	0.007	0.005	0.011	0.012	0.016	0.008	0.007	0.005	0.004	0.008
Rel.Std.Dev.	1.24%	0.30%	0.52%	1.01%	2.00%	0.43%	20.75%	1.07%	0.70%	1.54%	1.88%	2.48%	1.26%	1.10%	0.77%	0.68%	1.24%
PDM <sup>3</sup>	0.07%	-2.10%	-0.72%	0.64%	-0.30%	1.46%	14.49%	2.88%	-1.59%	6.83%	-2.32%	0.20%	2.01%	1.34%	-0.82%	0.09%	1.09%

Table A9. Fusion XRF results for Fe<sub>2</sub>O<sub>3</sub> in OREAS 183 (abbreviations as in Table A1; values in wt.%).

Replicate No.	Lab A BF*XRF	Lab B BF*XRF	Lab C BF*XRF	Lab D BF*XRF	Lab E BF*XRF	Lab F BF*XRF	Lab G BF*XRF	Lab H BF*XRF	Lab I BF*XRF	Lab J BF*XRF	Lab K BF*XRF	Lab L BF*XRF	Lab N BF*XRF	Lab O BF*XRF	Lab P BF*XRF	Lab Q BF*XRF	Lab R BF*XRF
1	<b>12.30</b>	12.72	12.93	12.81	<b>12.40</b>	12.81	12.77	12.72	12.85	12.59	12.60	12.62	12.50	12.75	<b>13.20</b>	12.82	12.80
2	<b>12.40</b>	12.75	12.95	12.82	<b>12.45</b>	12.74	12.77	12.81	12.87	12.70	12.65	12.70	12.46	12.70	<b>13.20</b>	12.81	12.70
3	<b>12.40</b>	12.69	12.92	12.79	<b>12.30</b>	12.74	12.87	12.80	12.84	12.63	12.60	12.58	12.65	12.75	<b>13.10</b>	12.79	12.80
4	<b>12.45</b>	12.69	12.94	12.82	<b>12.30</b>	12.81	12.85	12.63	12.92	12.74	12.65	12.75	12.71	12.70	<b>13.20</b>	12.79	12.80
5	12.65	12.76	12.90	12.87	<b>12.40</b>	12.74	12.77	12.59	12.82	12.62	12.65	12.80	12.49	12.75	NR	NR	NR
6	12.60	12.77	12.87	12.85	<b>12.45</b>	12.83	12.72	12.68	12.82	12.60	12.65	12.73	12.61	12.80	NR	NR	NR
7	12.65	12.77	12.88	12.89	<b>12.40</b>	12.76	12.81	12.44	12.88	12.50	12.65	12.76	12.68	12.80	NR	NR	NR
8	12.75	12.68	12.95	12.91	<b>12.40</b>	12.73	12.69	12.59	12.82	12.61	12.65	12.72	12.81	12.75	NR	NR	NR
9	12.70	12.78	12.99	12.76	12.50	12.74	12.63	12.78	12.87	12.63	12.65	12.62	12.79	12.70	NR	NR	NR
10	12.65	12.78	12.96	12.77	12.50	12.86	12.57	12.67	12.81	12.56	12.70	12.72	12.66	12.70	NR	NR	NR
11	12.55	12.79	12.88	12.86	12.50	12.84	12.70	12.59	12.80	12.70	12.70	12.83	12.73	12.70	NR	NR	NR
12	12.55	12.75	12.92	12.80	12.50	12.79	12.65	12.77	12.87	12.76	12.70	12.72	12.85	12.75	NR	NR	NR
Mean	12.55	12.74	12.92	12.83	12.43	12.78	12.73	12.67	12.85	12.64	12.65	12.71	12.66	12.74	13.18	12.80	12.78
Median	12.58	12.75	12.93	12.82	12.43	12.78	12.75	12.68	12.85	12.62	12.65	12.72	12.67	12.75	13.20	12.80	12.80
Std.Dev.	0.14	0.04	0.04	0.05	0.07	0.05	0.09	0.11	0.04	0.08	0.03	0.07	0.13	0.04	0.05	0.02	0.05
Rel.Std.Dev.	1.11%	0.31%	0.28%	0.37%	0.58%	0.35%	0.71%	0.87%	0.28%	0.61%	0.26%	0.58%	1.02%	0.30%	0.38%	0.13%	0.39%
PDM <sup>3</sup>	-1.37%	0.11%	1.54%	0.80%	-2.38%	0.43%	0.04%	-0.44%	0.94%	-0.72%	-0.58%	-0.12%	-0.53%	0.08%	3.51%	0.58%	0.37%

Table A10. Fusion XRF results for K<sub>2</sub>O in OREAS 183 (abbreviations as in Table A1; values in wt.%).

Replicate No.	Lab A BF*XRF	Lab B BF*XRF	Lab C BF*XRF	Lab D BF*XRF	Lab E BF*XRF	Lab F BF*XRF	Lab G BF*XRF	Lab H BF*XRF	Lab I BF*XRF	Lab J BF*XRF	Lab K BF*XRF	Lab L BF*XRF	Lab N BF*XRF	Lab O BF*XRF	Lab P BF*XRF	Lab Q BF*XRF	Lab R BF*XRF
1	<0.01	<0.01	<0.01	0.005	0.003	NR	<0.001	<0.01	0.010	<0.01	<0.01	<0.01	NR	0.010	<0.01	0.008	<0.01
2	<0.01	<0.01	<0.01	0.005	0.003	NR	<0.001	<0.01	0.010	<0.01	<0.01	<0.01	NR	0.010	<0.01	0.007	<0.01
3	<0.01	<0.01	<0.01	0.006	0.003	NR	<0.001	<0.01	0.010	0.010	<0.01	<0.01	NR	0.010	<0.01	0.006	<0.01
4	<0.01	<0.01	<0.01	0.007	0.002	NR	<0.001	0.010	0.010	0.015	<0.01	<0.01	NR	0.010	<0.01	0.006	<0.01
5	<0.01	<0.01	<0.05	0.006	0.007	NR	<0.001	<0.01	0.020	<0.01	<0.01	<0.01	NR	0.010	NR	NR	NR
6	<0.01	<0.01	<0.05	0.006	0.009	NR	<0.001	<0.01	0.010	<0.01	<0.01	<0.01	NR	0.010	NR	NR	NR
7	<0.01	<0.01	<0.05	0.006	0.007	NR	<0.001	<0.01	0.010	<0.01	<0.01	<0.01	NR	0.010	NR	NR	NR
8	<0.01	<0.01	<0.05	0.005	0.008	NR	<0.001	<0.01	<b>0.030</b>	<0.01	<0.01	<0.01	NR	0.010	NR	NR	NR
9	<0.01	<0.01	<0.01	0.006	0.002	NR	<0.001	<0.01	0.010	<0.01	<0.01	<0.01	NR	0.010	NR	NR	NR
10	<0.01	<0.01	<0.01	0.006	0.003	NR	<0.001	<0.01	0.010	<0.01	<0.01	<0.01	NR	0.010	NR	NR	NR
11	<0.01	<0.01	<0.01	0.007	0.001	NR	<0.001	<0.01	0.010	<0.01	<0.01	<0.01	NR	0.010	NR	NR	NR
12	<0.01	<0.01	<0.01	0.006	0.002	NR	<0.001	0.010	0.010	<0.01	<0.01	<0.01	NR	0.010	NR	NR	NR
Mean				0.006	0.004			0.010	0.013	0.013				0.01		0.01	
Median				0.006	0.003			0.010	0.010	0.013				0.01		0.01	
Std.Dev.				0.001	0.003			0.000	0.006	0.004				0.00		0.00	
Rel.Std.Dev.				11.30%	66.19%			0.00%	49.73%	28.28%				0.00%		12.88%	
PDM <sup>3</sup>				-31.31%	-51.62%			16.10%	45.13%	45.13%				16.10%		-21.05%	

Table A11. Fusion XRF results for MgO in OREAS 183 (abbreviations as in Table A1; values in wt.%).

Replicate No.	Lab A BF*XRF	Lab B BF*XRF	Lab C BF*XRF	Lab D BF*XRF	Lab E BF*XRF	Lab F BF*XRF	Lab G BF*XRF	Lab H BF*XRF	Lab I BF*XRF	Lab J BF*XRF	Lab K BF*XRF	Lab L BF*XRF	Lab N BF*XRF	Lab O BF*XRF	Lab P BF*XRF	Lab Q BF*XRF	Lab R BF*XRF
1	26.90	27.63	27.32	27.20	27.00	27.13	<b>26.19</b>	27.99	27.46	<b>28.18</b>	27.10	27.26	26.70	27.40	27.30	27.22	27.20
2	27.00	27.73	27.25	27.23	26.90	27.00	<b>26.10</b>	28.03	27.46	<b>27.73</b>	27.20	27.34	26.59	27.40	27.20	27.29	27.10
3	27.10	27.71	27.32	27.23	27.00	27.06	<b>26.34</b>	27.78	27.32	<b>28.16</b>	27.10	27.14	26.97	27.30	27.30	27.17	27.20
4	27.20	27.68	27.25	27.23	27.10	27.15	<b>26.37</b>	27.76	27.15	<b>28.17</b>	27.10	27.46	26.99	27.40	27.30	27.11	27.20
5	27.20	27.68	27.31	27.24	27.00	27.04	27.20	27.96	27.53	<b>27.75</b>	27.20	27.35	26.67	27.40	NR	NR	NR
6	27.10	27.71	27.18	27.17	26.70	27.18	27.05	27.61	27.40	<b>28.11</b>	27.30	27.36	26.86	27.40	NR	NR	NR
7	27.20	27.72	27.20	27.25	26.90	27.03	27.25	27.77	27.58	<b>28.06</b>	27.20	27.26	27.07	27.40	NR	NR	NR
8	27.40	27.76	27.19	27.27	26.90	27.02	27.11	27.83	27.42	<b>27.90</b>	27.30	27.35	27.21	27.50	NR	NR	NR
9	27.40	27.84	27.31	27.37	27.80	26.88	27.09	27.95	27.51	27.36	27.20	27.35	27.16	27.40	NR	NR	NR
10	27.40	27.73	27.30	27.34	27.80	27.16	26.81	27.84	27.44	27.60	27.20	27.25	27.00	27.50	NR	NR	NR
11	27.20	27.85	27.19	27.29	27.80	27.07	27.24	27.53	27.34	27.74	27.10	27.27	27.12	27.50	NR	NR	NR
12	27.20	27.65	27.31	27.24	27.80	26.94	27.12	27.95	27.49	27.66	27.20	27.20	27.29	27.50	NR	NR	NR
Mean	27.19	27.72	27.26	27.26	27.23	27.05	26.82	27.83	27.43	27.87	27.18	27.30	26.97	27.43	27.28	27.20	27.18
Median	27.20	27.71	27.28	27.24	27.00	27.05	27.07	27.84	27.45	27.82	27.20	27.31	26.99	27.40	27.30	27.20	27.20
Std.Dev.	0.16	0.07	0.06	0.06	0.44	0.09	0.44	0.15	0.11	0.27	0.07	0.09	0.22	0.06	0.05	0.07	0.05
Rel.Std.Dev.	0.58%	0.24%	0.21%	0.21%	1.60%	0.34%	1.65%	0.55%	0.42%	0.96%	0.26%	0.31%	0.83%	0.23%	0.18%	0.27%	0.18%
PDM <sup>3</sup>	-0.42%	1.53%	-0.16%	-0.19%	-0.30%	-0.92%	-1.77%	1.93%	0.44%	2.06%	-0.45%	-0.02%	-1.23%	0.44%	-0.11%	-0.39%	-0.48%

Table A12. Fusion XRF results for MnO in OREAS 183 (abbreviations as in Table A1; values in wt.%).

Replicate No.	Lab A BF*XRF	Lab B BF*XRF	Lab C BF*XRF	Lab D BF*XRF	Lab E BF*XRF	Lab F BF*XRF	Lab G BF*XRF	Lab H BF*XRF	Lab I BF*XRF	Lab J BF*XRF	Lab K BF*XRF	Lab L BF*XRF	Lab N BF*XRF	Lab O BF*XRF	Lab P BF*XRF	Lab Q BF*XRF	Lab R BF*XRF
1	0.176	0.180	0.180	0.180	0.176	0.179	0.180	0.180	0.183	<b>0.196</b>	0.179	<b>0.190</b>	0.177	<b>0.190</b>	0.180	0.179	<b>0.190</b>
2	0.177	0.175	0.180	0.180	0.179	0.177	0.180	0.180	0.184	<b>0.193</b>	0.180	<b>0.190</b>	0.174	<b>0.189</b>	0.180	0.177	0.180
3	0.176	0.175	0.180	0.180	0.172	0.177	0.180	0.180	0.185	<b>0.190</b>	0.180	<b>0.190</b>	0.182	<b>0.191</b>	0.180	0.177	0.180
4	0.176	0.175	0.180	0.180	0.175	0.178	0.180	0.180	<b>0.189</b>	<b>0.195</b>	0.180	<b>0.190</b>	0.182	<b>0.190</b>	0.180	0.178	<b>0.190</b>
5	0.182	0.180	0.180	0.180	0.176	0.178	0.180	0.180	0.186	<b>0.187</b>	0.180	0.180	0.177	<b>0.191</b>	NR	NR	NR
6	0.180	0.175	0.180	0.180	0.183	0.179	0.180	0.180	0.185	<b>0.191</b>	0.180	0.180	0.181	<b>0.191</b>	NR	NR	NR
7	0.181	0.180	0.180	0.180	0.178	0.178	0.180	0.180	0.186	<b>0.191</b>	0.178	0.180	0.179	<b>0.192</b>	NR	NR	NR
8	0.183	0.175	0.180	0.180	0.180	0.178	0.180	0.180	0.183	<b>0.193</b>	0.180	0.180	0.185	<b>0.191</b>	NR	NR	NR
9	0.178	0.180	0.180	0.180	0.178	0.177	0.180	0.180	0.183	<b>0.194</b>	0.180	<b>0.160</b>	0.183	<b>0.192</b>	NR	NR	NR
10	0.178	0.180	0.180	0.180	0.178	0.178	0.180	0.180	0.183	<b>0.193</b>	0.182	0.180	0.182	<b>0.192</b>	NR	NR	NR
11	0.178	0.180	0.180	0.180	0.180	0.179	0.180	0.180	0.181	<b>0.195</b>	0.182	0.180	0.185	<b>0.191</b>	NR	NR	NR
12	0.176	<b>0.173</b>	0.180	0.180	0.178	0.178	0.180	0.180	0.185	<b>0.198</b>	0.183	0.180	0.187	<b>0.194</b>	NR	NR	NR
Mean	0.178	0.177	0.180	0.180	0.178	0.178	0.180	0.180	0.184	<b>0.193</b>	0.180	0.182	0.181	<b>0.191</b>	0.180	0.178	0.185
Median	0.178	0.177	0.180	0.180	0.178	0.178	0.180	0.180	0.185	0.193	0.180	0.180	0.182	0.191	0.180	0.177	0.185
Std.Dev.	0.003	0.003	0.000	0.000	0.003	0.001	0.000	0.000	0.002	0.003	0.001	0.008	0.004	0.001	0.000	0.001	0.006
Rel.Std.Dev.	1.40%	1.58%	0.00%	0.00%	1.58%	0.41%	0.00%	0.00%	1.12%	1.53%	0.76%	4.60%	2.07%	0.73%	0.00%	0.45%	3.12%
PDM <sup>3</sup>	-0.69%	-1.32%	0.19%	0.19%	-1.06%	-0.92%	0.19%	0.19%	2.65%	7.42%	0.37%	1.12%	0.86%	6.43%	0.19%	-1.19%	2.97%



Table A13. Fusion XRF results for Na<sub>2</sub>O in OREAS 183 (abbreviations as in Table A1; values in wt.%).

Replicate No.	Lab A BF*XRF	Lab B BF*XRF	Lab C BF*XRF	Lab D BF*XRF	Lab E BF*XRF	Lab F BF*XRF	Lab G BF*XRF	Lab H BF*XRF	Lab I BF*XRF	Lab J BF*XRF	Lab K BF*XRF	Lab L BF*XRF	Lab N BF*XRF	Lab O BF*XRF	Lab P BF*XRF	Lab Q BF*XRF	Lab R BF*XRF
1	0.049	0.010	0.040	NR	<b>0.148</b>	NR	<0.01	0.020	0.030	<0.1	0.021	0.030	NR	0.050	0.030	0.027	0.020
2	0.049	0.010	0.040	NR	<b>0.154</b>	NR	<0.01	0.030	0.040	<0.1	0.015	0.020	NR	0.050	0.040	0.035	0.030
3	0.055	0.010	0.040	NR	<b>0.144</b>	NR	<0.01	0.030	0.030	<0.1	0.020	0.010	NR	0.050	0.040	0.025	0.030
4	0.054	0.010	0.030	NR	<b>0.142</b>	NR	<0.01	0.030	0.040	<0.1	0.017	0.020	NR	0.050	0.040	0.015	0.010
5	0.066	0.010	0.040	NR	<b>0.152</b>	NR	<0.01	0.030	0.050	<0.1	0.027	0.030	NR	0.040	NR	NR	NR
6	0.056	0.010	0.030	NR	<b>0.173</b>	NR	<0.01	0.020	0.040	<0.1	0.021	0.040	NR	0.050	NR	NR	NR
7	0.070	0.010	0.040	NR	<b>0.153</b>	NR	<0.01	0.020	0.050	<0.1	0.025	0.030	NR	0.050	NR	NR	NR
8	0.075	0.010	0.040	NR	<b>0.160</b>	NR	<0.01	0.020	<b>0.080</b>	<0.1	0.022	0.020	NR	0.040	NR	NR	NR
9	0.079	0.010	0.040	NR	<b>0.199</b>	NR	<0.01	0.030	0.030	<0.1	0.023	<0.01	NR	0.050	NR	NR	NR
10	0.076	0.010	0.030	NR	<b>0.218</b>	NR	<0.01	0.030	0.040	<0.1	0.022	<0.01	NR	0.050	NR	NR	NR
11	0.083	0.010	0.040	NR	<b>0.198</b>	NR	<0.01	0.020	0.040	<0.1	0.026	<0.01	NR	0.050	NR	NR	NR
12	0.080	0.010	0.050	NR	<b>0.201</b>	NR	<0.01	0.030	0.040	<0.1	0.024	<0.01	NR	0.050	NR	NR	NR
Mean	0.066	0.010	0.038		<b>0.170</b>			0.026	0.043		0.022	0.025		0.048	0.038	0.026	0.023
Median	0.068	0.010	0.040		0.157			0.030	0.040		0.022	0.025		0.050	0.040	0.026	0.025
Std.Dev.	0.013	0.000	0.006		0.027			0.005	0.014		0.004	0.009		0.004	0.005	0.008	0.010
Rel.Std.Dev.	19.35%	0.00%	15.06%		15.66%			19.93%	31.92%		15.98%	37.03%		8.05%	13.33%	31.74%	42.55%
PDM <sup>3</sup>	101%	-69.45%	17.09%		419%			-21.09%	29.82%		-33.05%	-23.63%		47.64%	14.55%	-21.80%	-31.27%

Table A14. Fusion XRF results for P<sub>2</sub>O<sub>5</sub> in OREAS 183 (abbreviations as in Table A1; values in wt.%).

Replicate No.	Lab A BF*XRF	Lab B BF*XRF	Lab C BF*XRF	Lab D BF*XRF	Lab E BF*XRF	Lab F BF*XRF	Lab G BF*XRF	Lab H BF*XRF	Lab I BF*XRF	Lab J BF*XRF	Lab K BF*XRF	Lab L BF*XRF	Lab N BF*XRF	Lab O BF*XRF	Lab P BF*XRF	Lab Q BF*XRF	Lab R BF*XRF
1	0.003	<0.01	0.004	0.006	<0.001	NR	<0.01	<0.01	0.010	<b>0.015</b>	<0.001	<0.01	NR	<0.01	<0.01	<0.002	<0.01
2	0.004	<0.01	0.005	0.006	<0.001	NR	<0.01	<0.01	0.010	<b>&lt;0.01</b>	<0.001	<0.01	NR	<0.01	<0.01	0.002	<0.01
3	0.003	<0.01	0.005	0.005	<0.001	NR	<0.01	<0.01	0.010	<b>&lt;0.01</b>	<0.001	<0.01	NR	<0.01	<0.01	<0.002	<0.01
4	0.003	0.005	0.005	0.006	<0.001	NR	<0.01	<0.01	<0.01	<b>0.013</b>	<0.001	<0.01	NR	<0.01	<0.01	<0.002	<0.01
5	0.005	0.005	0.003	0.006	0.003	NR	<0.01	<0.01	0.010	<0.01	0.003	<0.01	NR	<0.01	NR	NR	NR
6	0.005	0.005	0.005	0.007	0.002	NR	<0.01	<0.01	0.010	<0.01	0.002	<0.01	NR	<0.01	NR	NR	NR
7	0.005	0.005	0.005	0.006	<0.001	NR	<0.01	<0.01	0.010	<0.01	0.002	<0.01	NR	<0.01	NR	NR	NR
8	0.005	<0.01	0.004	0.006	0.003	NR	<0.01	<0.01	0.010	<0.01	0.003	<0.01	NR	<0.01	NR	NR	NR
9	0.006	<0.01	0.005	0.006	0.001	NR	<0.01	<0.01	<0.01	<0.01	<0.001	<0.01	NR	<0.01	NR	NR	NR
10	0.006	<0.01	0.004	0.008	<0.001	NR	<0.01	<0.01	0.010	<0.01	0.001	<0.01	NR	<0.01	NR	NR	NR
11	0.006	<0.01	0.005	0.007	0.001	NR	<0.01	<0.01	0.010	<0.01	0.001	<0.01	NR	<0.01	NR	NR	NR
12	0.006	<0.01	0.004	0.008	0.001	NR	<0.01	<0.01	0.010	<0.01	0.001	<0.01	NR	<0.01	NR	NR	NR
Mean	0.005	0.005	0.005	0.006	0.002				0.010	0.014	0.002					0.002	
Median	0.005	0.005	0.005	0.006	0.002				0.010	0.014	0.002					0.002	
Std.Dev.	0.001	0.000	0.001	0.001	0.001				0.000	0.001	0.001						
Rel.Std.Dev.	25.59%	0.00%	14.98%	14.03%	53.63%				0.00%	10.10%	48.45%						
PDM <sup>3</sup>	4.52%	10.02%	-0.98%	41.19%	-59.66%				120%	208%	-59.14%					-55.99%	

Table A15. Fusion XRF results for SiO<sub>2</sub> in OREAS 183 (abbreviations as in Table A1; values in wt.%).

Replicate No.	Lab A BF*XRF	Lab B BF*XRF	Lab C BF*XRF	Lab D BF*XRF	Lab E BF*XRF	Lab F BF*XRF	Lab G BF*XRF	Lab H BF*XRF	Lab I BF*XRF	Lab J BF*XRF	Lab K BF*XRF	Lab L BF*XRF	Lab N BF*XRF	Lab O BF*XRF	Lab P BF*XRF	Lab Q BF*XRF	Lab R BF*XRF
1	44.30	44.71	44.74	44.53	<b>43.90</b>	44.65	<b>45.20</b>	44.70	44.35	44.08	44.70	44.37	<b>43.53</b>	45.10	44.40	44.52	44.20
2	44.50	44.84	44.66	44.53	<b>43.70</b>	44.42	<b>45.14</b>	44.70	44.32	44.06	44.80	44.58	<b>43.35</b>	45.00	44.50	44.59	44.10
3	44.60	44.79	44.74	44.58	<b>43.80</b>	44.46	<b>45.48</b>	44.50	44.13	44.38	44.70	44.26	<b>43.87</b>	45.00	44.40	44.54	44.20
4	44.80	44.83	44.63	44.55	<b>43.80</b>	44.64	<b>45.53</b>	44.40	44.30	44.36	44.70	44.66	<b>44.03</b>	44.90	44.50	44.38	44.30
5	44.60	44.66	44.66	44.61	44.00	44.56	<b>44.03</b>	44.50	44.41	44.14	44.50	44.71	<b>43.39</b>	45.00	NR	NR	NR
6	44.40	44.90	44.58	44.68	44.00	44.79	<b>43.81</b>	44.40	44.18	44.18	44.40	44.50	<b>43.81</b>	44.70	NR	NR	NR
7	44.60	44.71	44.69	44.61	44.00	44.48	<b>44.08</b>	44.20	44.31	<b>43.66</b>	44.50	44.58	<b>44.10</b>	45.00	NR	NR	NR
8	44.90	44.81	44.70	44.64	44.00	44.45	<b>43.79</b>	44.50	44.19	44.16	44.40	44.55	<b>44.41</b>	45.10	NR	NR	NR
9	44.90	44.89	44.76	44.56	44.30	44.31	44.71	44.80	44.50	44.12	44.60	44.44	44.44	44.70	NR	NR	NR
10	45.00	44.89	44.71	44.61	44.30	44.75	44.16	44.50	44.49	44.12	44.60	44.28	44.05	44.80	NR	NR	NR
11	44.60	44.77	44.55	44.48	44.30	44.64	44.84	44.20	44.28	44.05	44.60	44.20	44.08	44.60	NR	NR	NR
12	44.70	44.90	44.59	44.51	44.30	44.42	44.64	44.70	44.45	44.16	44.50	44.07	44.57	44.50	NR	NR	NR
Mean	44.66	44.81	44.67	44.57	44.03	44.55	44.62	44.51	44.33	44.12	44.58	44.43	43.97	44.87	44.45	44.50	44.20
Median	44.60	44.82	44.68	44.57	44.00	44.52	44.68	44.50	44.32	44.13	44.60	44.47	44.04	44.95	44.45	44.53	44.20
Std.Dev.	0.21	0.08	0.07	0.06	0.22	0.15	0.63	0.19	0.12	0.18	0.13	0.20	0.40	0.20	0.06	0.09	0.08
Rel.Std.Dev.	0.47%	0.18%	0.15%	0.13%	0.50%	0.33%	1.42%	0.43%	0.27%	0.41%	0.28%	0.45%	0.91%	0.45%	0.13%	0.20%	0.18%
PDM <sup>3</sup>	0.38%	0.71%	0.40%	0.19%	-1.02%	0.13%	0.29%	0.04%	-0.37%	-0.83%	0.21%	-0.12%	-1.17%	0.85%	-0.09%	0.04%	-0.65%

Table A16. Fusion XRF results for SO<sub>3</sub> in OREAS 183 (abbreviations as in Table A1; values in wt.%).

Replicate No.	Lab A BF*XRF	Lab B BF*XRF	Lab C BF*XRF	Lab D BF*XRF	Lab E BF*XRF	Lab F BF*XRF	Lab G BF*XRF	Lab H BF*XRF	Lab I BF*XRF	Lab J BF*XRF	Lab K BF*XRF	Lab L BF*XRF	Lab N BF*XRF	Lab O BF*XRF	Lab P BF*XRF	Lab Q BF*XRF	Lab R BF*XRF
1	0.007	<0.01	0.004	0.002	<0.001	NR	0.001	<0.002	NR	NR	0.010	NR	NR	NR	<0.01	0.004	NR
2	0.007	<0.01	0.004	0.003	<0.001	NR	0.001	0.006	NR	NR	0.008	NR	NR	NR	<0.01	0.003	NR
3	0.008	<0.01	0.003	0.002	<0.001	NR	<0.001	0.005	NR	NR	0.008	NR	NR	NR	<0.01	0.004	NR
4	0.008	<0.01	0.004	0.003	<0.001	NR	0.001	<b>0.024</b>	NR	NR	0.008	NR	NR	NR	<0.01	0.003	NR
5	0.003	<0.01	0.003	0.004	<0.001	NR	<0.001	<b>0.015</b>	NR	NR	0.010	NR	NR	NR	NR	NR	NR
6	0.002	<0.01	0.004	0.005	<0.001	NR	<0.001	<b>0.012</b>	NR	NR	0.010	NR	NR	NR	NR	NR	NR
7	0.006	<0.01	0.003	0.004	<0.001	NR	<0.001	<b>0.016</b>	NR	NR	0.010	NR	NR	NR	NR	NR	NR
8	0.002	<0.01	0.004	0.004	<0.001	NR	<0.001	<b>0.018</b>	NR	NR	0.009	NR	NR	NR	NR	NR	NR
9	0.012	<0.01	0.004	0.004	<b>0.014</b>	NR	0.004	0.011	NR	NR	0.009	NR	NR	NR	NR	NR	NR
10	0.013	<0.01	0.005	0.002	<b>0.015</b>	NR	0.003	0.011	NR	NR	0.007	NR	NR	NR	NR	NR	NR
11	0.014	<0.01	0.005	0.002	<b>0.015</b>	NR	0.004	0.010	NR	NR	0.006	NR	NR	NR	NR	NR	NR
12	0.012	<0.01	0.006	0.004	<b>0.016</b>	NR	0.001	0.014	NR	NR	0.006	NR	NR	NR	NR	NR	NR
Mean	0.008		0.004	0.003	0.015		0.002	0.013			0.008					0.004	
Median	0.008		0.004	0.004	0.015		0.001	0.012			0.009					0.004	
Std.Dev.	0.004		0.001	0.001	0.001		0.001	0.005			0.002					0.001	
Rel.Std.Dev.	53.84%		22.05%	32.47%	5.44%		68.31%	41.78%			17.88%					16.50%	
PDM <sup>3</sup>	41.59%		-26.19%	-41.25%	171%		-61.27%	133%			52.14%					-36.74%	

Table A17. Fusion XRF results for TiO<sub>2</sub> in OREAS 183 (abbreviations as in Table A1; values in wt.%).

Replicate No.	Lab A BF*XRF	Lab B BF*XRF	Lab C BF*XRF	Lab D BF*XRF	Lab E BF*XRF	Lab F BF*XRF	Lab G BF*XRF	Lab H BF*XRF	Lab I BF*XRF	Lab J BF*XRF	Lab K BF*XRF	Lab L BF*XRF	Lab N BF*XRF	Lab O BF*XRF	Lab P BF*XRF	Lab Q BF*XRF	Lab R BF*XRF
1	0.030	0.020	0.020	0.019	0.020	NR	0.020	0.040	0.030	0.024	0.030	<b>0.040</b>	NR	0.020	0.020	0.011	0.010
2	0.030	0.020	0.020	0.020	0.040	NR	0.020	0.010	0.030	0.021	0.020	<b>0.040</b>	NR	0.020	0.020	0.021	0.020
3	0.030	0.020	0.020	0.021	0.020	NR	0.020	0.020	0.020	0.019	0.040	<b>0.030</b>	NR	0.020	0.020	0.012	0.020
4	0.040	0.020	0.020	0.020	<b>0.050</b>	NR	0.020	0.040	0.020	0.014	0.030	<b>0.030</b>	NR	0.020	0.020	0.018	0.020
5	<b>0.040</b>	0.020	0.020	0.023	0.020	NR	0.020	<b>0.080</b>	0.020	0.024	0.020	0.030	NR	0.020	NR	NR	NR
6	<b>0.040</b>	0.020	0.020	0.022	0.020	NR	0.020	<b>0.050</b>	0.030	0.031	0.040	0.040	NR	0.020	NR	NR	NR
7	<b>0.040</b>	0.020	0.020	0.024	0.020	NR	0.020	<b>0.090</b>	0.030	0.019	0.030	0.030	NR	0.020	NR	NR	NR
8	<b>0.050</b>	0.020	0.020	0.023	0.020	NR	0.020	<b>0.060</b>	0.030	0.020	0.040	0.030	NR	0.020	NR	NR	NR
9	<b>0.040</b>	0.020	0.020	0.020	0.030	NR	0.020	<b>0.030</b>	0.030	0.015	0.020	0.020	NR	0.020	NR	NR	NR
10	<b>0.030</b>	0.020	0.020	0.019	0.020	NR	0.020	<b>0.030</b>	0.030	0.026	0.020	0.020	NR	0.020	NR	NR	NR
11	<b>0.040</b>	0.020	0.020	0.021	0.020	NR	0.020	<b>0.050</b>	0.020	0.021	0.020	0.030	NR	0.020	NR	NR	NR
12	<b>0.040</b>	0.020	0.020	0.021	0.020	NR	0.020	<b>0.030</b>	0.030	0.022	0.020	0.020	NR	0.020	NR	NR	NR
Mean	0.038	0.020	0.020	0.021	0.025		0.020	0.044	0.027	0.021	0.028	0.030		0.02	0.02	0.02	0.02
Median	0.040	0.020	0.020	0.021	0.020		0.020	0.040	0.030	0.021	0.025	0.030		0.02	0.02	0.01	0.02
Std.Dev.	0.006	0.000	0.000	0.002	0.010		0.000	0.024	0.005	0.005	0.009	0.007		0.00	0.00	0.00	0.00
Rel.Std.Dev.	16.58%	0.00%	0.00%	7.69%	40.00%		0.00%	53.28%	18.46%	21.74%	31.49%	24.62%		0.00%	0.00%	30.53%	28.57%
PDM <sup>3</sup>	65.61%	-11.68%	-11.68%	-6.89%	10.40%		-11.68%	95.05%	17.76%	-5.79%	21.44%	32.49%		-11.68%	-11.68%	-32.21%	-22.72%

Table A18. Fusion XRF results for Zn in OREAS 183 (abbreviations as in Table A1; values in wt.%).

Replicate No.	Lab A BF*XRF	Lab B BF*XRF	Lab C BF*XRF	Lab D BF*XRF	Lab E BF*XRF	Lab F BF*XRF	Lab G BF*XRF	Lab H BF*XRF	Lab I BF*XRF	Lab J BF*XRF	Lab K BF*XRF	Lab L BF*XRF	Lab N BF*XRF	Lab O BF*XRF	Lab P BF*XRF	Lab Q BF*XRF	Lab R BF*XRF
1	70	76	90	85	70	80	40	100	90	<100	60	<b>140</b>	NR	100	<100	72	NR
2	80	75	90	80	80	78	40	100	90	<100	60	<b>150</b>	NR	90	<100	63	NR
3	80	77	80	80	60	77	50	100	90	<100	60	<b>140</b>	NR	100	<100	68	NR
4	80	83	80	85	60	79	40	100	90	<100	60	<b>150</b>	NR	100	<100	64	NR
5	70	79	90	85	60	80	<b>20</b>	90	90	110	70	70	NR	100	NR	NR	NR
6	70	73	80	75	90	80	<b>20</b>	90	90	<100	70	60	NR	100	NR	NR	NR
7	60	70	90	80	70	80	<b>20</b>	90	90	110	70	60	NR	100	NR	NR	NR
8	70	76	80	85	70	80	<b>20</b>	100	<b>190</b>	110	60	60	NR	100	NR	NR	NR
9	70	74	90	90	80	80	<b>10</b>	90	90	<100	70	<b>20</b>	NR	80	NR	NR	NR
10	60	73	90	90	80	81	<b>30</b>	90	90	100	70	60	NR	90	NR	NR	NR
11	60	72	80	85	80	82	<b>40</b>	100	90	110	70	60	NR	100	NR	NR	NR
12	60	80	90	90	80	80	<b>20</b>	90	90	<100	80	60	NR	90	NR	NR	NR
Mean	69	75	86	84	73	80	29	95	98	108	67	86		96		67	
Median	70	75	90	85	75	80	25	95	90	110	70	60		100		66	
Std.Dev.	8	4	5	5	10	1	12	5	29	4	7	45		7		4	
Rel.Std.Dev.	11.46%	4.93%	6.00%	5.57%	13.43%	1.61%	42.52%	5.50%	29.36%	4.14%	9.77%	52.92%		6.98%		6.16%	
PDM <sup>3</sup>	-11.45%	-3.51%	9.88%	7.75%	-6.12%	1.81%	-62.66%	21.62%	25.89%	38.26%	-14.65%	9.88%		22.69%		-14.55%	

Table A19. Results for LOI at 1000°C in OREAS 183 (abbreviations as in Table A1; values in wt.%).

Replicate No.	Lab A LOI	Lab B LOI	Lab C LOI	Lab D LOI	Lab E LOI	Lab F LOI	Lab G LOI	Lab H LOI	Lab I LOI	Lab J LOI	Lab K LOI	Lab L LOI	Lab M LOI	Lab O LOI	Lab P LOI	Lab Q LOI	Lab R LOI
1	10.70	10.96	10.87	10.95	10.60	11.18	NR	10.96	10.55	<b>11.93</b>	11.01	10.90	<b>11.97</b>	10.55	10.80	11.06	10.80
2	10.65	10.96	10.84	10.93	10.80	11.12	NR	10.96	10.66	<b>12.09</b>	10.95	10.80	<b>12.00</b>	10.45	10.90	11.03	10.90
3	10.70	10.94	10.82	10.85	10.90	11.12	NR	10.91	10.60	<b>11.19</b>	10.99	10.80	<b>11.98</b>	10.45	10.80	11.09	10.80
4	10.65	10.93	10.80	10.87	10.75	11.09	NR	11.00	10.49	<b>11.23</b>	10.99	10.80	<b>11.97</b>	10.45	10.80	11.10	10.80
5	10.80	11.00	10.84	10.85	10.50	<b>11.52</b>	10.86	10.87	10.77	<b>11.82</b>	11.18	10.60	11.13	10.35	NR	NR	NR
6	10.85	11.00	10.85	10.87	10.60	<b>11.47</b>	10.91	10.82	10.72	11.24	11.21	10.60	11.12	10.40	NR	NR	NR
7	10.85	10.99	10.85	10.82	10.55	<b>11.44</b>	10.98	10.91	10.80	11.23	11.17	10.60	11.16	10.45	NR	NR	NR
8	10.85	11.02	10.86	10.80	10.50	<b>11.67</b>	11.01	10.93	10.77	11.38	11.14	10.60	11.07	10.40	NR	NR	NR
9	10.95	11.01	10.91	10.87	10.45	<b>11.68</b>	11.03	10.99	10.59	<b>11.73</b>	11.13	11.30	<b>12.21</b>	10.40	NR	NR	NR
10	10.95	11.02	10.91	10.83	10.45	<b>11.72</b>	11.02	10.96	10.67	<b>11.98</b>	11.10	11.10	<b>12.22</b>	10.40	NR	NR	NR
11	10.90	10.97	10.89	10.84	10.45	<b>11.74</b>	10.97	10.99	10.83	<b>11.72</b>	11.12	11.10	<b>12.12</b>	10.35	NR	NR	NR
12	10.90	11.02	10.90	10.86	10.45	<b>11.81</b>	11.08	10.93	10.80	<b>11.45</b>	11.11	11.10	<b>12.11</b>	10.35	NR	NR	NR
Mean	10.81	10.98	10.86	10.86	10.58	11.46	10.98	10.94	10.69	11.58	11.09	10.86	11.75	10.42	10.83	11.07	10.83
Median	10.85	10.99	10.86	10.86	10.53	11.49	11.00	10.95	10.70	11.58	11.12	10.80	11.97	10.40	10.80	11.07	10.80
Std.Dev.	0.11	0.03	0.04	0.04	0.15	0.27	0.07	0.05	0.11	0.33	0.09	0.24	0.48	0.06	0.05	0.03	0.05
Rel.Std.Dev.	1.03%	0.29%	0.33%	0.39%	1.46%	2.37%	0.64%	0.48%	1.04%	2.87%	0.77%	2.24%	4.05%	0.55%	0.46%	0.29%	0.46%
PDM <sup>3</sup>	-0.82%	0.76%	-0.37%	-0.37%	-2.92%	5.15%	0.74%	0.31%	-1.96%	6.25%	1.74%	-0.40%	7.82%	-4.45%	-0.70%	1.54%	-0.70%

Table A20. Fusion ICP results for Ni in OREAS 183 (abbreviations as in Table A1; values in wt.%).

Replicate No.	Lab A PF*OES	Lab C PF*OES	Lab D PF*OES	Lab E PF*OES	Lab G MAR*OES	Lab H BF*OES	Lab I PF*ICP	Lab J BF*OES	Lab M PF*OES	Lab O PF*OES	Lab P PF*OES	Lab S PF*OES
1	1.00	0.99	0.98	0.99	0.98	0.97	0.99	0.98	1.00	0.97	0.97	0.96
2	0.99	1.02	0.99	0.95	0.97	0.97	1.00	1.00	1.01	0.96	0.98	0.96
3	1.00	1.02	0.99	1.02	0.95	0.98	0.98	0.96	1.03	0.97	0.96	0.98
4	1.01	1.01	0.98	0.98	0.96	0.97	0.99	<b>0.88</b>	1.02	0.96	0.99	0.95
5	1.01	0.99	0.99	0.99	0.98	0.99	1.03	<b>0.91</b>	1.01	1.00	NR	NR
6	0.99	1.00	0.99	0.99	0.96	0.98	1.03	1.01	1.03	1.00	NR	NR
7	0.98	0.99	0.98	1.01	0.98	0.98	1.02	0.95	1.02	1.00	NR	NR
8	0.98	0.99	1.00	<b>1.05</b>	0.98	0.98	1.03	0.94	<b>1.06</b>	1.02	NR	NR
9	1.01	0.96	0.96	0.96	0.98	0.98	1.00	<b>0.85</b>	<b>1.02</b>	0.97	NR	NR
10	1.01	0.94	0.97	0.98	0.99	0.94	0.99	<b>0.82</b>	<b>1.05</b>	0.97	NR	NR
11	1.01	0.94	0.98	1.01	0.99	0.95	0.99	<b>0.84</b>	<b>1.12</b>	0.96	NR	NR
12	1.00	0.95	0.98	0.98	0.98	0.95	0.99	<b>0.96</b>	<b>1.12</b>	0.96	NR	NR
Mean	1.00	0.98	0.98	0.99	0.97	0.97	1.00	0.92	1.04	0.98	0.98	0.96
Median	1.00	0.99	0.98	0.99	0.98	0.97	1.00	0.94	1.02	0.97	0.98	0.96
Std.Dev.	0.01	0.03	0.01	0.03	0.01	0.01	0.02	0.06	0.04	0.02	0.01	0.01
Rel.Std.Dev.	1.06%	2.95%	1.09%	2.56%	1.06%	1.52%	1.94%	6.92%	4.09%	1.98%	1.48%	1.17%
PDM <sup>3</sup>	1.50%	0.12%	-0.23%	0.76%	-0.92%	-1.43%	1.93%	-6.05%	5.77%	-0.59%	-0.53%	-2.14%



Table A21. Fusion ICP results for Co in OREAS 183 (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A PF*OES	Lab C PF*OES	Lab D PF*OES	Lab E PF*OES	Lab G MAR*OES	Lab H BF*OES	Lab I PF*ICP	Lab J BF*OES	Lab M PF*OES	Lab O PF*OES	Lab P PF*OES	Lab S PF*OES
1	190	213	220	210	214	220	230	252	206	210	210	224
2	190	214	220	200	216	220	230	251	204	220	216	226
3	200	216	220	220	218	210	220	<b>271</b>	231	220	212	227
4	210	214	220	210	211	210	230	242	221	210	210	224
5	220	<b>225</b>	240	220	214	220	230	<b>262</b>	227	240	NR	NR
6	220	236	220	230	<b>223</b>	200	220	<b>270</b>	237	240	NR	NR
7	230	237	220	230	215	210	220	<b>273</b>	237	230	NR	NR
8	220	234	240	240	213	210	230	<b>253</b>	237	230	NR	NR
9	210	244	220	190	221	210	210	<b>181</b>	206	220	NR	NR
10	220	236	260	210	<b>232</b>	210	210	<b>183</b>	215	230	NR	NR
11	220	232	240	190	221	210	210	<b>177</b>	225	220	NR	NR
12	210	246	260	200	222	210	210	<b>187</b>	227	220	NR	NR
Mean	212	229	232	213	218	212	221	233	223	224	212	225
Median	215	233	220	210	217	210	220	251	226	220	211	225
Std.Dev.	13	12	16	16	6	6	9	39	13	10	3	2
Rel.Std.Dev.	5.99%	5.27%	6.85%	7.54%	2.67%	2.73%	4.08%	16.81%	5.62%	4.44%	1.33%	0.70%
PDM <sup>3</sup>	-4.76%	3.00%	4.23%	-4.39%	-1.76%	-4.76%	-0.64%	5.02%	0.34%	0.86%	-4.61%	1.37%

Table A22. Fusion ICP results for Al<sub>2</sub>O<sub>3</sub> in OREAS 183 (abbreviations as in Table A1; values in wt.%).

Replicate No.	Lab A	Lab C	Lab D	Lab E	Lab G	Lab H	Lab I	Lab J	Lab M	Lab O	Lab P	Lab S
	PF*OES	PF*OES	PF*OES	PF*OES	MAR*OES	BF*OES	PF*ICP	BF*OES	PF*OES	PF*OES	PF*OES	PF*OES
1	1.62	1.59	1.61	1.62	1.59	1.62	1.62	1.51	1.72	1.56	1.62	1.64
2	1.62	1.59	1.57	1.59	1.60	1.61	1.63	1.51	1.68	1.55	1.64	1.63
3	1.62	1.62	1.59	1.67	1.59	1.62	1.66	1.50	1.66	1.56	1.69	1.66
4	1.61	1.60	1.59	1.61	1.64	1.61	1.65	1.49	1.70	1.56	<b>1.75</b>	1.65
5	1.65	1.52	1.59	1.67	1.55	1.63	1.61	1.56	1.62	1.57	NR	NR
6	1.63	1.56	1.57	1.66	1.59	1.64	1.61	1.58	1.61	1.59	NR	NR
7	1.61	1.60	1.59	1.68	1.57	1.62	1.58	1.53	1.59	1.59	NR	NR
8	1.61	1.57	1.57	<b>1.60</b>	1.56	1.61	1.62	1.52	1.57	1.61	NR	NR
9	1.65	1.53	1.57	<b>1.57</b>	1.56	1.61	1.65	<b>1.45</b>	1.57	1.58	NR	NR
10	1.64	1.51	1.59	1.64	1.55	1.58	<b>1.54</b>	<b>1.44</b>	1.58	1.59	NR	NR
11	1.63	1.50	1.57	1.66	1.58	1.58	1.64	<b>1.40</b>	1.53	1.58	NR	NR
12	1.63	1.51	1.55	1.65	1.57	1.58	1.64	<b>1.53</b>	1.52	1.58	NR	NR
Mean	1.63	1.56	1.58	1.64	1.58	1.61	1.62	1.50	1.61	1.58	1.68	1.65
Median	1.63	1.57	1.58	1.65	1.58	1.61	1.63	1.51	1.60	1.58	1.67	1.65
Std.Dev.	0.01	0.04	0.02	0.04	0.03	0.02	0.03	0.05	0.06	0.02	0.06	0.01
Rel.Std.Dev.	0.88%	2.72%	1.01%	2.21%	1.61%	1.23%	2.08%	3.34%	4.00%	1.09%	3.46%	0.68%
PDM <sup>3</sup>	1.47%	-2.79%	-1.44%	1.99%	-1.49%	0.38%	1.10%	-6.34%	0.57%	-1.65%	4.48%	2.74%

Table A23. Fusion ICP results for CaO in OREAS 183 (abbreviations as in Table A1; values in wt.%).

Replicate No.	Lab A PF*OES	Lab C PF*OES	Lab D PF*OES	Lab E PF*OES	Lab G MAR*OES	Lab H BF*OES	Lab I PF*ICP	Lab J BF*OES	Lab M PF*OES	Lab O PF*OES	Lab P PF*OES	Lab S PF*OES
1	<b>0.870</b>	0.740	0.700	0.650	0.700	0.710	0.700	0.788	<b>0.619</b>	0.700	<b>0.600</b>	0.787
2	<b>0.860</b>	0.770	0.700	0.620	0.710	0.710	0.710	0.787	<b>0.606</b>	0.730	<b>0.600</b>	0.776
3	<b>0.820</b>	0.770	0.700	0.660	0.710	0.710	0.720	0.744	<b>0.661</b>	<b>0.640</b>	<b>0.600</b>	0.791
4	<b>0.730</b>	0.750	0.700	0.640	0.710	0.700	0.720	0.779	<b>0.640</b>	0.730	<b>0.600</b>	0.791
5	<b>0.790</b>	0.670	0.700	0.620	0.720	0.710	0.710	0.739	0.692	0.720	NR	NR
6	<b>0.880</b>	0.700	0.700	0.640	0.710	0.710	0.700	0.754	0.692	0.720	NR	NR
7	<b>0.800</b>	0.700	0.700	0.660	0.720	0.710	0.740	0.746	0.702	0.710	NR	NR
8	<b>0.820</b>	0.720	0.700	0.630	0.710	0.700	0.730	0.731	0.681	<b>0.850</b>	NR	NR
9	0.750	0.700	0.800	<b>0.550</b>	0.690	0.720	0.720	0.736	0.646	0.750	NR	NR
10	0.730	0.670	0.800	0.630	0.700	0.710	0.700	0.719	0.656	0.800	NR	NR
11	0.700	0.660	0.700	0.660	0.700	0.710	0.700	0.701	0.646	0.740	NR	NR
12	0.750	0.660	0.800	0.640	0.700	0.710	0.720	0.746	0.635	0.810	NR	NR
Mean	0.792	0.709	0.725	0.633	0.707	0.709	0.714	0.748	0.656	0.742	0.600	0.786
Median	0.795	0.700	0.700	0.640	0.710	0.710	0.715	0.745	0.651	0.730	0.600	0.789
Std.Dev.	0.060	0.041	0.045	0.030	0.009	0.005	0.013	0.026	0.030	0.056	0.000	0.007
Rel.Std.Dev.	7.59%	5.75%	6.24%	4.73%	1.26%	0.73%	1.84%	3.54%	4.63%	7.51%	0.00%	0.90%
PDM <sup>3</sup>	10.50%	-1.01%	1.20%	-11.60%	-1.36%	-1.01%	-0.32%	4.34%	-8.40%	3.52%	-16.25%	9.72%

Table A24. Fusion ICP results for Cu in OREAS 183 (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A PF*OES	Lab C PF*OES	Lab D PF*OES	Lab E PF*OES	Lab G MAR*OES	Lab H BF*OES	Lab I PF*ICP	Lab J BF*OES	Lab M PF*OES	Lab O PF*OES	Lab P PF*OES	Lab S PF*OES
1	<50	22	<50	<50	<50	30	<50	<10	20	<50	19	23
2	<50	22	<50	<50	<50	30	<50	<10	20	<50	13	21
3	<50	24	<50	<50	<50	30	<50	<10	22	<50	19	23
4	<50	23	<50	<50	<50	20	<50	<10	36	<50	19	18
5	<50	<20	<50	<50	<50	30	<50	<10	16	<50	NR	NR
6	<50	<20	<50	<50	<50	30	<50	<10	9	<50	NR	NR
7	<50	<20	50	<50	<50	20	<50	<10	15	<50	NR	NR
8	<50	<20	50	<50	<50	20	100	<10	14	<50	NR	NR
9	<50	<20	50	<50	<50	20	<50	<10	22	<50	NR	NR
10	<50	<20	<50	<50	50	20	<50	<10	22	<50	NR	NR
11	<50	<20	<50	<50	<50	20	<50	<10	23	<50	NR	NR
12	<50	<20	50	<50	<50	20	<50	<10	24	<50	NR	NR
Mean		23	50		50	24	100		20		18	21
Median		23	50		50	20	100		21		19	22
Std.Dev.		1	0			5			7		3	2
Rel.Std.Dev.		4.21%	0.00%			21.31%			32.63%		17.14%	11.21%
PDM <sup>3</sup>		7.49%	136.25%		136.25%	14.19%	372.50%		-4.65%		-17.31%	0.28%

Table A25. Fusion ICP results for Cr<sub>2</sub>O<sub>3</sub> in OREAS 183 (abbreviations as in Table A1; values in wt.%).

Replicate No.	Lab A PF*OES	Lab C PF*OES	Lab D PF*OES	Lab E PF*OES	Lab G MAR*OES	Lab H BF*OES	Lab I PF*ICP	Lab J BF*OES	Lab M PF*OES	Lab O PF*OES	Lab P PF*OES	Lab S PF*OES
1	0.660	0.679	0.685	0.610	0.607	0.653	0.630	0.659	<b>0.576</b>	0.658	0.646	0.667
2	0.660	0.689	0.695	0.610	0.616	0.639	0.640	0.653	0.603	0.672	0.663	0.668
3	0.660	0.699	0.695	0.610	0.627	0.651	0.620	0.640	0.678	0.643	0.668	0.685
4	0.660	0.689	0.695	0.610	0.618	0.651	0.630	0.641	0.626	0.658	0.675	0.670
5	0.670	0.627	0.630	0.610	0.643	0.656	<b>0.730</b>	0.663	0.654	0.672	NR	NR
6	0.640	0.636	0.660	0.610	0.632	0.645	<b>0.720</b>	0.669	0.670	0.687	NR	NR
7	0.630	0.653	0.645	0.610	0.646	0.661	<b>0.720</b>	0.647	0.650	0.672	NR	NR
8	0.640	0.628	0.645	0.590	0.629	0.646	<b>0.720</b>	0.645	0.665	0.672	NR	NR
9	0.670	0.658	0.630	0.580	0.629	0.640	0.670	0.621	0.645	0.658	NR	NR
10	0.670	0.640	0.635	0.630	0.627	0.653	0.670	0.627	0.655	0.658	NR	NR
11	0.690	0.647	0.630	0.660	0.640	0.659	0.690	0.604	0.680	0.658	NR	NR
12	0.670	0.644	0.635	0.630	0.637	0.667	0.670	0.657	0.677	0.643	NR	NR
Mean	0.660	0.657	0.657	0.613	0.629	0.652	0.676	0.644	0.648	0.663	0.663	0.672
Median	0.660	0.650	0.645	0.610	0.629	0.652	0.670	0.646	0.655	0.658	0.666	0.669
Std.Dev.	0.017	0.025	0.028	0.020	0.012	0.008	0.040	0.019	0.032	0.013	0.012	0.009
Rel.Std.Dev.	2.50%	3.85%	4.25%	3.29%	1.83%	1.29%	5.93%	2.93%	4.94%	1.96%	1.86%	1.26%
PDM <sup>3</sup>	1.31%	0.92%	0.80%	-5.85%	-3.42%	0.05%	3.74%	-1.17%	-0.50%	1.71%	1.77%	3.22%

Table A26. Fusion ICP results for Fe<sub>2</sub>O<sub>3</sub> in OREAS 183 (abbreviations as in Table A1; values in wt.%).

Replicate No.	Lab A PF*OES	Lab C PF*OES	Lab D PF*OES	Lab E PF*OES	Lab G MAR*OES	Lab H BF*OES	Lab I PF*ICP	Lab J BF*OES	Lab M PF*OES	Lab O PF*OES	Lab P PF*OES	Lab S PF*OES
1	12.55	12.83	12.60	12.90	12.45	12.86	<b>12.97</b>	12.89	12.06	12.60	12.80	12.97
2	12.55	13.16	12.60	<b>12.05</b>	12.73	12.79	12.06	13.04	12.29	12.50	12.90	13.00
3	12.60	13.30	12.60	13.20	12.67	13.06	12.23	12.55	13.53	12.55	13.10	13.06
4	12.60	13.03	12.70	12.85	12.74	12.80	12.11	12.77	12.74	12.55	12.90	12.98
5	12.40	12.31	12.30	<b>12.00</b>	13.21	12.92	12.58	12.94	12.74	12.55	NR	NR
6	12.75	12.37	12.50	<b>11.75</b>	13.27	12.94	12.83	13.02	13.09	12.55	NR	NR
7	12.60	12.47	12.40	<b>11.75</b>	12.88	12.96	12.35	12.84	12.88	12.60	NR	NR
8	12.70	12.45	12.40	<b>11.55</b>	12.74	12.83	12.53	12.75	13.12	12.70	NR	NR
9	12.35	12.86	12.90	11.90	12.74	12.76	12.75	12.21	12.24	12.55	NR	NR
10	12.35	12.74	12.80	12.60	12.86	12.94	12.43	12.00	12.40	12.70	NR	NR
11	12.30	12.63	13.00	12.95	12.79	12.90	<b>11.38</b>	<b>11.74</b>	12.79	12.55	NR	NR
12	12.30	12.77	12.70	12.35	12.88	12.97	12.44	12.70	12.69	12.55	NR	NR
Mean	12.50	12.74	12.63	12.32	12.83	12.89	12.39	12.62	12.71	12.58	12.93	13.00
Median	12.55	12.76	12.60	12.20	12.77	12.91	12.44	12.76	12.74	12.55	12.90	12.99
Std.Dev.	0.16	0.31	0.21	0.56	0.22	0.09	0.42	0.42	0.42	0.06	0.13	0.04
Rel.Std.Dev.	1.26%	2.47%	1.66%	4.55%	1.74%	0.68%	3.40%	3.32%	3.31%	0.49%	0.97%	0.30%
PDM <sup>3</sup>	-1.69%	0.19%	-0.74%	-3.13%	0.87%	1.38%	-2.60%	-0.77%	-0.03%	-1.10%	1.62%	2.23%

Table A27. Fusion ICP results for K<sub>2</sub>O in OREAS 183 (abbreviations as in Table A1; values in wt.%).

Replicate No.	Lab A PF*OES	Lab C PF*OES	Lab D PF*OES	Lab E PF*OES	Lab G MAR*OES	Lab H BF*OES	Lab I PF*ICP	Lab J BF*OES	Lab M PF*OES	Lab O PF*OES	Lab P PF*OES	Lab S PF*OES
1	0.100	<0.1	<0.02	<0.1	0.010	<0.01	<0.01	<0.1	0.043	0.120	<0.2	0.085
2	0.100	<0.1	<0.02	<0.1	0.010	<0.01	<0.01	0.103	<0.01	0.120	<0.2	0.071
3	<0.1	<0.1	<0.02	<0.1	0.010	<0.01	<0.01	0.149	0.023	<0.1	<0.2	0.086
4	<0.1	<0.1	<0.02	<0.1	0.010	<0.01	<0.01	<0.1	0.035	<0.1	<0.2	0.079
5	0.100	0.100	0.100	<0.1	0.020	<0.01	0.020	<0.1	0.007	0.120	NR	NR
6	0.100	<0.1	0.100	<0.1	0.020	<0.01	<0.01	<0.1	0.006	0.120	NR	NR
7	0.100	0.100	0.100	<0.1	0.020	<0.01	<0.01	0.137	0.007	0.120	NR	NR
8	0.100	0.200	<0.1	<0.1	0.020	<0.01	0.030	0.146	0.007	0.120	NR	NR
9	0.100	<b>0.241</b>	<0.1	<0.1	0.010	<0.01	<0.01	0.119	0.006	0.120	NR	NR
10	0.100	<b>0.253</b>	<0.1	<0.1	0.010	<0.01	<0.01	<0.1	0.007	0.120	NR	NR
11	<0.1	<b>0.241</b>	<0.1	<0.1	0.020	<0.01	<0.01	0.137	0.007	0.120	NR	NR
12	0.100	<b>0.205</b>	<0.1	<0.1	0.010	<0.01	<0.01	<0.1	0.007	0.120	NR	NR
Mean	0.100	0.191	0.100		0.014		0.025	0.132	0.014	0.120		0.080
Median	0.100	0.205	0.100		0.010		0.025	0.137	0.007	0.120		0.082
Std.Dev.	0.000	0.065	0.000		0.005		0.007	0.018	0.013	0.000		0.007
Rel.Std.Dev.	0.00%	34.17%	0.00%		36.35%		28.28%	13.33%	94.43%	0.00%		8.51%
PDM <sup>3</sup>	25.16%	139.51%	25.16%		-82.27%		-68.71%	65.00%	-82.50%	50.76%		0.53%

Table A28. Fusion ICP results for MgO in OREAS 183 (abbreviations as in Table A1; values in wt.%).

Replicate No.	Lab A	Lab C	Lab D	Lab E	Lab G	Lab H	Lab I	Lab J	Lab M	Lab O	Lab P	Lab S
	PF*OES	PF*OES	PF*OES	PF*OES	MAR*OES	BF*OES	PF*ICP	BF*OES	PF*OES	PF*OES	PF*OES	PF*OES
1	26.40	27.01	26.90	28.10	27.48	27.37	26.89	28.57	27.62	26.90	<b>24.10</b>	28.00
2	26.40	27.42	27.00	28.20	28.03	27.41	27.18	<b>29.44</b>	27.69	26.90	<b>23.90</b>	27.96
3	26.40	27.78	27.00	<b>29.00</b>	28.20	27.33	27.06	28.29	<b>23.67</b>	26.80	<b>23.70</b>	28.06
4	26.30	27.18	27.20	27.90	28.65	27.35	27.38	28.49	26.32	26.90	<b>23.90</b>	27.99
5	<b>28.50</b>	28.69	26.70	26.10	27.92	26.68	26.81	<b>29.21</b>	27.46	28.10	NR	NR
6	27.30	28.51	27.20	26.00	27.88	26.68	27.15	<b>29.64</b>	<b>26.13</b>	28.20	NR	NR
7	27.10	28.70	26.90	25.70	27.59	26.67	27.05	<b>29.03</b>	27.39	28.50	NR	NR
8	27.30	28.74	26.90	<b>24.90</b>	27.36	26.68	27.71	<b>28.98</b>	27.20	28.50	NR	NR
9	28.40	27.74	26.90	27.00	27.24	26.19	27.12	28.05	28.02	26.80	NR	NR
10	28.40	27.43	27.20	27.80	27.54	26.69	26.44	27.35	26.95	27.10	NR	NR
11	28.30	27.36	26.50	28.30	27.37	26.60	26.60	27.04	26.91	26.90	NR	NR
12	28.40	27.61	27.00	27.80	27.42	26.70	26.83	28.38	27.62	26.90	NR	NR
Mean	27.43	27.85	26.95	27.23	27.72	26.86	27.02	28.54	26.91	27.38	23.90	28.00
Median	27.30	27.68	26.95	27.80	27.57	26.69	27.06	28.53	27.29	26.90	23.90	27.99
Std.Dev.	0.92	0.64	0.21	1.27	0.42	0.40	0.34	0.79	1.16	0.71	0.16	0.04
Rel.Std.Dev.	3.36%	2.29%	0.77%	4.66%	1.51%	1.48%	1.26%	2.78%	4.32%	2.61%	0.68%	0.15%
PDM <sup>3</sup>	0.01%	1.52%	-1.75%	-0.72%	1.06%	-2.07%	-1.51%	4.04%	-1.88%	-0.20%	-12.87%	2.08%



Table A29. Fusion ICP results for MnO in OREAS 183 (abbreviations as in Table A1; values in wt.%).

Replicate No.	Lab A PF*OES	Lab C PF*OES	Lab D PF*OES	Lab E PF*OES	Lab G MAR*OES	Lab H BF*OES	Lab I PF*ICP	Lab J BF*OES	Lab M PF*OES	Lab O PF*OES	Lab P PF*OES	Lab S PF*OES
1	0.180	0.181	0.180	<b>0.180</b>	0.170	0.180	0.186	0.173	0.165	0.180	0.176	0.189
2	0.180	0.185	0.180	<b>0.160</b>	0.180	0.180	0.177	0.177	0.170	0.180	0.176	0.187
3	0.180	0.187	0.178	<b>0.220</b>	0.170	0.180	0.179	0.175	0.191	0.180	0.178	0.188
4	0.180	0.185	0.180	<b>0.220</b>	0.180	0.180	0.181	0.172	0.180	0.180	0.175	0.187
5	0.180	0.176	0.186	0.180	0.190	0.180	0.180	0.183	0.186	0.190	NR	NR
6	0.190	0.178	0.184	<b>0.160</b>	0.190	0.190	0.186	0.186	0.190	0.190	NR	NR
7	0.180	0.178	0.184	0.170	0.190	0.190	0.185	0.183	0.188	0.190	NR	NR
8	0.190	0.177	0.184	<b>0.160</b>	0.180	0.180	0.182	0.183	0.193	0.190	NR	NR
9	0.180	0.185	0.186	0.170	0.180	0.180	0.186	0.183	0.188	0.180	NR	NR
10	0.180	0.179	0.186	0.180	0.180	0.180	0.181	0.178	0.188	0.180	NR	NR
11	0.180	0.179	0.180	0.180	0.180	0.180	0.181	0.175	0.184	0.180	NR	NR
12	0.180	0.182	0.186	0.180	0.180	0.180	0.181	0.185	0.184	0.180	NR	NR
Mean	0.182	0.181	0.183	0.180	0.181	0.182	0.182	0.179	0.184	0.183	0.176	0.188
Median	0.180	0.180	0.184	0.180	0.180	0.180	0.181	0.181	0.187	0.180	0.176	0.188
Std.Dev.	0.004	0.004	0.003	0.020	0.007	0.004	0.003	0.005	0.008	0.005	0.001	0.001
Rel.Std.Dev.	2.14%	2.09%	1.65%	11.36%	3.70%	2.14%	1.65%	2.76%	4.56%	2.69%	0.71%	0.39%
PDM <sup>3</sup>	0.12%	-0.25%	0.76%	-0.80%	-0.34%	0.12%	0.35%	-1.12%	1.35%	1.03%	-2.87%	3.51%

Table A30. Fusion ICP results for Na<sub>2</sub>O in OREAS 183 (abbreviations as in Table A1; values in wt.%).

Replicate No.	Lab A PF*OES	Lab C PF*OES	Lab D PF*OES	Lab E PF*OES	Lab G MAR*OES	Lab H BF*OES	Lab I PF*ICP	Lab J BF*OES	Lab M PF*OES	Lab O PF*OES	Lab P PF*OES	Lab S PF*OES
1	NR	NR	NR	NR	0.030	0.030	0.030	<b>0.013</b>	0.029	NR	NR	NR
2	NR	NR	NR	NR	0.030	0.030	0.030	<b>&lt;0.01</b>	0.030	NR	NR	NR
3	NR	NR	NR	NR	0.030	0.030	0.030	<b>0.021</b>	0.033	NR	NR	NR
4	NR	NR	NR	NR	0.040	0.030	0.030	<b>0.012</b>	0.031	NR	NR	NR
5	NR	NR	NR	NR	0.040	0.030	0.040	0.023	0.034	NR	NR	NR
6	NR	NR	NR	NR	0.040	0.030	0.030	0.026	0.034	NR	NR	NR
7	NR	NR	NR	NR	0.030	0.030	0.030	0.023	0.035	NR	NR	NR
8	NR	NR	NR	NR	0.030	0.030	<b>0.050</b>	0.021	0.035	NR	NR	NR
9	NR	NR	NR	NR	0.030	0.020	0.030	0.033	0.033	NR	NR	NR
10	NR	NR	NR	NR	0.030	0.030	0.030	0.023	0.034	NR	NR	NR
11	NR	NR	NR	NR	0.030	0.030	0.030	0.024	0.033	NR	NR	NR
12	NR	NR	NR	NR	0.030	0.030	0.030	0.030	0.035	NR	NR	NR
Mean					0.033	0.029	0.033	0.023	0.033			
Median					0.030	0.030	0.030	0.023	0.033			
Std.Dev.					0.005	0.003	0.006	0.006	0.002			
Rel.Std.Dev.					13.92%	9.90%	19.13%	27.47%	5.86%			
PDM <sup>3</sup>					7.66%	-3.38%	7.66%	-25.02%	9.28%			

Table A31. Fusion ICP results for P<sub>2</sub>O<sub>5</sub> in OREAS 183 (abbreviations as in Table A1; values in wt.%).

Replicate No.	Lab A PF*OES	Lab C PF*OES	Lab D PF*OES	Lab E PF*OES	Lab G MAR*OES	Lab H BF*OES	Lab I PF*ICP	Lab J BF*OES	Lab M PF*OES	Lab O PF*OES	Lab P PF*OES	Lab S PF*OES
1	NR	<0.03	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	0.015	NR	NR	<0.011
2	NR	<0.03	<0.02	<0.02	<0.01	0.010	<0.01	<0.01	<0.01	NR	NR	<0.014
3	NR	<0.03	<0.02	<0.02	<0.01	0.010	<0.01	<0.01	0.017	NR	NR	0.003
4	NR	<0.03	<0.02	<0.02	<0.01	0.020	<0.01	<0.01	0.021	NR	NR	0.001
5	NR	<0.03	<0.02	0.020	0.010	<0.01	<0.01	<0.01	<0.01	NR	NR	NR
6	NR	<0.03	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	NR	NR	NR
7	NR	<0.03	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	NR	NR	NR
8	NR	<0.03	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	NR	NR	NR
9	NR	<0.03	<b>0.040</b>	<0.02	0.010	<0.01	<0.01	<0.01	<0.01	NR	NR	NR
10	NR	<0.03	0.020	<0.02	0.010	<0.01	<0.01	<0.01	<0.01	NR	NR	NR
11	NR	<0.03	<0.02	0.020	0.010	<0.01	<0.01	<0.01	<0.01	NR	NR	NR
12	NR	<0.03	0.020	0.020	0.010	<0.01	0.010	<0.01	<0.01	NR	NR	NR
Mean			0.027	0.020	0.010	0.013	0.010		0.018			0.002
Median			0.020	0.020	0.010	0.010	0.010		0.017			0.002
Std.Dev.			0.012	0.000	0.000	0.006			0.003			0.001
Rel.Std.Dev.			43.30%	0.00%	0.00%	43.30%			15.93%			70.71%
PDM <sup>3</sup>			100.54%	50.41%	-24.80%	0.27%	-24.80%		33.47%			-84.96%

Table A32. Fusion ICP results for SiO<sub>2</sub> in OREAS 183 (abbreviations as in Table A1; values in wt.%).

Replicate No.	Lab A	Lab C	Lab D	Lab E	Lab G	Lab H	Lab I	Lab J	Lab M	Lab O	Lab P	Lab S
	PF*OES	PF*OES	PF*OES	PF*OES	MAR*OES	BF*OES	PF*ICP	BF*OES	PF*OES	PF*OES	PF*OES	PF*OES
1	43.30	44.80	44.50	43.10	44.09	43.78	44.54	43.37	44.57	44.40	43.20	<b>46.90</b>
2	43.80	45.40	43.80	45.40	44.60	43.82	44.50	44.40	44.16	44.40	43.10	<b>45.42</b>
3	43.70	45.30	44.50	44.50	44.36	43.67	44.17	42.94	<b>45.82</b>	44.20	44.00	<b>47.00</b>
4	42.70	44.90	44.50	43.00	44.61	43.85	44.22	43.32	44.46	44.30	43.20	<b>45.50</b>
5	41.90	44.90	43.20	43.80	44.85	44.52	44.46	46.33	44.33	44.40	NR	NR
6	<b>41.30</b>	45.30	44.50	44.20	44.37	44.53	44.84	45.93	44.81	44.90	NR	NR
7	43.80	45.80	43.80	43.60	44.73	44.44	44.43	44.67	44.20	44.90	NR	NR
8	44.10	45.60	43.80	<b>41.40</b>	44.38	44.59	45.17	45.34	44.49	45.80	NR	NR
9	42.40	<b>49.80</b>	43.20	<b>41.10</b>	43.90	45.09	44.97	<b>36.47</b>	43.90	43.10	NR	NR
10	43.40	<b>47.00</b>	43.40	42.90	43.92	44.46	42.55	<b>36.41</b>	44.23	43.70	NR	NR
11	43.20	<b>48.70</b>	<b>44.50</b>	43.60	44.50	44.57	43.19	<b>35.67</b>	44.29	43.20	NR	NR
12	42.50	<b>49.20</b>	43.20	43.00	43.82	44.46	44.85	<b>37.52</b>	43.97	43.00	NR	NR
Mean	43.01	46.39	43.91	43.30	44.34	44.32	44.32	41.86	44.44	44.19	43.38	46.20
Median	43.25	45.50	43.80	43.35	44.38	44.46	44.48	43.34	44.31	44.35	43.20	46.20
Std.Dev.	0.86	1.82	0.57	1.20	0.34	0.43	0.75	4.09	0.50	0.83	0.42	0.86
Rel.Std.Dev.	1.99%	3.93%	1.29%	2.78%	0.77%	0.97%	1.70%	9.78%	1.14%	1.88%	0.97%	1.86%
PDM <sup>3</sup>	-2.53%	5.14%	-0.49%	-1.87%	0.50%	0.43%	0.45%	-5.13%	0.71%	0.15%	-1.70%	4.71%

Table A33. Fusion ICP results for SO<sub>3</sub> in OREAS 183 (abbreviations as in Table A1; values in wt.%).

Replicate No.	Lab A PF*OES	Lab C PF*OES	Lab D PF*OES	Lab E PF*OES	Lab G MAR*OES	Lab H BF*OES	Lab I PF*ICP	Lab J BF*OES	Lab M PF*OES	Lab O PF*OES	Lab P PF*OES	Lab S PF*OES
1	0.020	<0.05	<0.1	<0.02	<0.01	NR	NR	NR	NR	0.075	0.150	NR
2	<0.02	<0.05	<0.1	<0.02	<0.01	NR	NR	NR	NR	0.025	<0.01	NR
3	<0.02	<0.05	<0.1	<0.02	<0.01	NR	NR	NR	NR	0.125	0.100	NR
4	<0.02	<0.05	<0.1	<0.02	<0.01	NR	NR	NR	NR	0.075	<0.01	NR
5	0.020	<0.05	<0.02	<0.02	NR	NR	NR	NR	NR	<0.01	NR	NR
6	<0.02	<0.05	<0.02	0.020	NR	NR	NR	NR	NR	<0.01	NR	NR
7	0.020	<0.05	<0.02	<0.02	NR	NR	NR	NR	NR	0.025	NR	NR
8	<0.02	<0.05	<0.02	<0.02	NR	NR	NR	NR	NR	<0.01	NR	NR
9	<0.02	<0.05	0.040	<0.02	<0.02	NR	NR	NR	NR	0.075	NR	NR
10	<0.02	<0.05	0.040	<0.02	<0.02	NR	NR	NR	NR	0.025	NR	NR
11	<0.02	<0.05	0.080	0.020	<0.02	NR	NR	NR	NR	0.025	NR	NR
12	<0.02	<0.05	0.040	0.020	<0.02	NR	NR	NR	NR	0.100	NR	NR
Mean	0.020		0.050	0.020						0.061	0.125	
Median	0.020		0.040	0.020						0.075	0.125	
Std.Dev.	0.000		0.020	0.000						0.038	0.035	
Rel.Std.Dev.	0.00%		40.00%	0.00%						61.74%	28.28%	
PDM <sup>3</sup>	-7.65%		130.88%	-7.65%						181.84%	476.50%	

Table A34. Fusion ICP results for TiO<sub>2</sub> in OREAS 183 (abbreviations as in Table A1; values in wt.%).

Replicate No.	Lab A PF*OES	Lab C PF*OES	Lab D PF*OES	Lab E PF*OES	Lab G MAR*OES	Lab H BF*OES	Lab I PF*ICP	Lab J BF*OES	Lab M PF*OES	Lab O PF*OES	Lab P PF*OES	Lab S PF*OES
1	<0.01	<0.02	0.020	0.020	0.020	0.020	0.021	<0.01	<b>0.017</b>	0.020	<0.02	0.023
2	<0.01	<0.02	0.020	0.020	0.021	0.020	0.021	<0.01	<b>0.018</b>	0.020	<0.02	0.023
3	<0.01	<0.02	0.020	0.020	0.021	0.020	0.021	0.016	0.020	0.020	<0.02	0.024
4	<0.01	<0.02	0.020	0.020	0.021	0.020	0.021	<0.01	0.020	0.020	0.020	0.024
5	<0.01	0.020	0.020	0.020	0.021	0.020	0.020	0.022	0.021	0.020	NR	NR
6	<0.01	0.020	<b>0.030</b>	0.020	0.021	0.020	0.021	0.022	0.021	0.020	NR	NR
7	<0.01	0.020	0.020	0.020	0.022	0.020	0.020	0.021	0.020	0.020	NR	NR
8	<0.01	0.020	<b>0.030</b>	0.020	0.021	0.020	0.021	0.021	0.020	0.020	NR	NR
9	<0.01	<0.02	<b>0.030</b>	0.020	0.021	0.020	0.020	0.022	0.020	0.020	NR	NR
10	<0.01	<0.02	<b>0.030</b>	0.020	0.021	0.020	0.020	0.020	0.020	0.020	NR	NR
11	<0.01	<0.02	0.020	0.020	0.021	0.020	0.021	0.018	0.022	0.020	NR	NR
12	<0.01	<0.02	0.020	0.020	0.021	0.020	0.020	0.020	0.022	0.020	NR	NR
Mean		0.020	0.023	0.020	0.021	0.020	0.021	0.020	0.020	0.020	0.020	0.024
Median		0.020	0.020	0.020	0.021	0.020	0.021	0.021	0.020	0.020	0.020	0.024
Std.Dev.		0.000	0.005	0.000	0.000	0.000	0.001	0.002	0.001	0.000		0.000
Rel.Std.Dev.		0.00%	21.10%	0.00%	2.03%	0.00%	2.50%	10.13%	6.55%	0.00%		1.13%
PDM <sup>3</sup>		-2.36%	13.92%	-2.36%	2.53%	-2.36%	0.49%	-1.27%	-2.44%	-2.36%	-2.36%	14.82%

Table A35. Fusion ICP results for Zn in OREAS 183 (abbreviations as in Table A1; values in wt.%).

Replicate No.	Lab A	Lab C	Lab D	Lab E	Lab G	Lab H	Lab I	Lab J	Lab M	Lab O	Lab P	Lab S
	PF*OES	PF*OES	PF*OES	PF*OES	MAR*OES	BF*OES	PF*ICP	BF*OES	PF*OES	PF*OES	PF*OES	PF*OES
1	100	85	100	100	<50	NR	<100	94	<b>33</b>	100	74	NR
2	100	80	50	100	<50	NR	<100	86	<b>50</b>	100	87	NR
3	100	76	100	100	<50	NR	<100	87	<b>42</b>	100	100	NR
4	100	78	50	100	<50	NR	<100	81	<b>63</b>	100	NR	NR
5	100	70	<b>150</b>	100	50	NR	<100	92	<b>52</b>	100	NR	NR
6	100	81	<b>150</b>	100	70	NR	<100	90	<b>52</b>	100	NR	NR
7	100	85	<b>150</b>	100	60	NR	<100	92	<b>41</b>	100	NR	NR
8	100	79	<b>150</b>	100	60	NR	<100	<b>86</b>	<b>52</b>	100	NR	NR
9	100	58	<b>150</b>	100	<50	NR	<100	86	51	100	NR	NR
10	100	69	<b>150</b>	100	60	NR	<100	85	63	100	NR	NR
11	100	60	<b>150</b>	100	<50	NR	<100	80	66	100	NR	NR
12	100	73	<b>150</b>	100	<50	NR	<100	92	48	100	NR	NR
Mean	100	75	125	100	60			88	51	100	87	
Median	100	77	150	100	60			87	51	100	87	
Std.Dev.	0	9	40	0	7			5	10	0	13	
Rel.Std.Dev.	0.00%	11.89%	31.91%	0.00%	11.79%			5.23%	18.89%	0.00%	14.94%	
PDM <sup>3</sup>	21.43%	-9.53%	51.79%	21.43%	-27.14%			6.41%	-38.10%	21.43%	5.65%	

Table A36. Results for C in OREAS 183 (abbreviations as in Table A1; values in wt. %).

Replicate No.	Lab A IRC	Lab C IRC	Lab D IRC	Lab E IRC	Lab H IRC	Lab I IRC	Lab J IRC	Lab K IRC	Lab L IRC	Lab M IRC	Lab O IRC
1	0.220	0.240	0.190	0.150	0.220	0.210	0.237	0.170	0.230	0.235	0.220
2	0.230	<b>0.330</b>	0.190	0.170	0.250	0.220	0.252	0.170	0.250	0.235	0.210
3	0.220	0.220	0.200	0.170	0.300	0.200	0.230	0.170	0.230	0.241	0.220
4	0.230	0.220	0.200	0.150	0.250	0.230	0.237	0.180	0.230	0.235	0.220
5	0.180	0.240	0.200	0.180	0.220	0.210	0.236	0.190	0.250	0.258	0.230
6	0.220	0.270	0.210	0.180	<b>0.350</b>	0.210	0.250	0.200	0.230	0.258	0.220
7	0.210	0.220	0.210	0.190	0.250	0.190	0.233	0.190	0.240	0.258	0.220
8	0.200	0.230	0.200	0.180	0.230	0.210	0.253	0.190	0.240	0.248	0.220
9	0.210	0.200	0.180	0.180	0.240	0.200	0.256	0.180	0.240	0.246	0.200
10	0.210	0.160	0.180	0.180	0.240	0.210	0.280	0.180	0.230	0.246	0.210
11	0.200	0.190	0.180	0.180	0.280	0.220	0.292	0.180	0.240	0.246	0.200
12	0.220	0.200	0.180	0.180	0.240	0.220	0.273	0.180	0.250	0.236	0.220
Mean	0.213	0.227	0.193	0.174	0.256	0.211	0.252	0.182	0.238	0.245	0.216
Median	0.215	0.220	0.195	0.180	0.245	0.210	0.251	0.180	0.240	0.246	0.220
Std.Dev.	0.014	0.043	0.012	0.012	0.038	0.011	0.020	0.009	0.008	0.009	0.009
Rel.Std.Dev.	6.69%	18.94%	5.97%	7.12%	14.67%	5.14%	7.92%	5.16%	3.50%	3.73%	4.17%
PDM <sup>3</sup>	-2.15%	4.38%	-10.97%	-19.80%	17.81%	-2.92%	16.23%	-16.35%	9.75%	12.90%	-0.61%



Table A37. Results for S in OREAS 183 (abbreviations as in Table A1; values in wt.%).

Replicate No.	Lab A IRC	Lab C IRC	Lab D IRC	Lab E IRC	Lab H IRC	Lab I IRC	Lab J IRC	Lab K IRC	Lab L IRC	Lab M IRC	Lab O IRC
1	0.010	<0.005	<0.01	<0.01	<0.02	<0.01	0.020	<0.01	<0.01	<0.003	<0.01
2	0.010	<0.005	<0.01	<0.01	<0.02	<0.01	0.020	<0.01	<0.01	<0.003	<0.01
3	0.010	<0.005	<0.01	<0.01	<0.02	<0.01	0.020	<0.01	<0.01	<0.003	<0.01
4	0.010	<0.005	<0.01	<0.01	<0.02	<0.01	0.020	<0.01	<0.01	<0.003	<0.01
5	<0.01	0.019	<0.01	0.010	<0.02	<0.01	0.010	<0.01	<0.01	0.014	0.010
6	<0.01	0.020	<0.01	<b>0.050</b>	<0.02	<0.01	0.010	<0.01	<0.01	0.013	0.010
7	0.010	0.018	<0.01	0.010	<0.02	<0.01	<0.01	<0.01	<0.01	0.019	0.010
8	0.010	0.020	<0.01	0.020	<0.02	<0.01	0.020	<0.01	<0.01	0.034	<0.01
9	0.010	<0.005	<0.01	0.010	<0.02	<0.01	0.010	<0.01	<0.01	0.013	<0.01
10	<0.01	<0.005	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	0.014	<0.01
11	<0.01	<0.005	<0.01	0.010	<0.02	<0.01	0.010	<0.01	<0.01	0.019	<0.01
12	<0.01	<0.005	<0.01	0.020	<0.02	<0.01	0.010	<0.01	<0.01	0.011	<0.01
Mean	0.010	0.019		0.019			0.015			0.017	0.010
Median	0.010	0.020		0.010			0.015			0.014	0.010
Std.Dev.	0.000	0.001		0.015			0.005			0.007	0.000
Rel.Std.Dev.	0.00%	4.97%		78.82%			35.14%			41.95%	0.00%
PDM <sup>3</sup>	-29.37%	35.96%		31.17%			5.94%			22.66%	-29.37%