



**CERTIFICATE OF ANALYSIS FOR  
NICKEL LATERITE ORE REFERENCE MATERIAL  
OREAS 185**

Constituent	Certified Value	1SD
<b>Fusion XRF</b>		
Nickel, Ni (wt.%)	1.14	0.02
Cobalt, Co (ppm)	388	17
Aluminium oxide, Al <sub>2</sub> O <sub>3</sub> (wt.%)	2.48	0.04
Calcium oxide, CaO (wt.%)	0.385	0.008
<i>Chlorine, Cl (ppm)</i>	<50	IND
<i>Copper, Cu (ppm)</i>	<50	IND
Chromium oxide, Cr <sub>2</sub> O <sub>3</sub> (wt.%)	0.914	0.018
Iron oxide, Fe <sub>2</sub> O <sub>3</sub> (wt.%)	18.42	0.17
<i>Potassium oxide, K<sub>2</sub>O (wt.%)</i>	<0.01	IND
Magnesium oxide, MgO (wt.%)	20.22	0.23
Manganese oxide, MnO (wt.%)	0.297	0.005
Sodium oxide, Na <sub>2</sub> O (wt.%)	0.027	0.011
Phosphorus oxide, P <sub>2</sub> O <sub>5</sub> (wt.%)	<0.01	IND
Silicon dioxide, SiO <sub>2</sub> (wt.%)	45.93	0.36
<i>Sulphur oxide, SO<sub>3</sub> (wt.%)</i>	<0.01	IND
Titanium oxide, TiO <sub>2</sub> (wt.%)	0.033	0.006
Zinc, Zn (ppm)	143	12
Loss on ignition, LOI (wt.%)	9.61	0.18
<b>Fusion ICP</b>		
Nickel, Ni (wt.%)	1.12	0.03
Cobalt, Co (ppm)	385	20
Aluminium oxide, Al <sub>2</sub> O <sub>3</sub> (wt.%)	2.47	0.06
Calcium oxide, CaO (wt.%)	0.39	0.01
<i>Copper, Cu (ppm)</i>	<50	IND
Chromium oxide, Cr <sub>2</sub> O <sub>3</sub> (wt.%)	0.91	0.03
Iron oxide, Fe <sub>2</sub> O <sub>3</sub> (wt.%)	18.27	0.47
<i>Potassium oxide, K<sub>2</sub>O (wt.%)</i>	<0.01	IND
Magnesium oxide, MgO (wt.%)	20.17	0.53
Manganese oxide, MnO (wt.%)	0.295	0.007
Sodium oxide, Na <sub>2</sub> O (wt.%)	0.024	0.004
<i>Phosphorus oxide, P<sub>2</sub>O<sub>5</sub> (wt.%)</i>	<0.02	IND
Silica dioxide, SiO <sub>2</sub> (wt.%)	45.58	1.05
<i>Sulphur oxide, SO<sub>3</sub> (wt.%)</i>	<0.05	IND
Titanium oxide, TiO <sub>2</sub> (wt.%)	0.031	0.001
Zinc, Zn (ppm)	128	37
<b>IR Combustion Furnace</b>		
Carbon, C (wt.%)	0.10	0.02
<i>Sulphur, S (wt.%)</i>	<0.01	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 185 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.

## COMMUNITION AND HOMOGENISATION PROCEDURES

The material constituting OREAS 185 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 185

OREAS 185 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 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 185

### 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 ( $p-1$ ).

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

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

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 185.

Constituent	Certified Value	95% Confidence Interval	
		Low	High
<b>Fusion XRF</b>			
Nickel, Ni (wt.%)	1.14	1.13	1.15
Cobalt, Co (ppm)	388	379	397
Aluminium oxide, Al <sub>2</sub> O <sub>3</sub> (wt.%)	2.48	2.47	2.50
Calcium oxide, CaO (wt.%)	0.385	0.381	0.388
<i>Chlorine, Cl (ppm)</i>	<50	IND	IND
<i>Copper, Cu (ppm)</i>	<50	IND	IND
Chromium oxide, Cr <sub>2</sub> O <sub>3</sub> (wt.%)	0.914	0.907	0.920
Iron oxide, Fe <sub>2</sub> O <sub>3</sub> (wt.%)	18.42	18.34	18.50
<i>Potassium oxide, K<sub>2</sub>O (wt.%)</i>	<0.01	IND	IND
Magnesium oxide, MgO (wt.%)	20.22	20.11	20.33
Manganese oxide, MnO (wt.%)	0.297	0.295	0.298
<i>Sodium oxide, Na<sub>2</sub>O (wt.%)</i>	~0.03	IND	IND
<i>Phosphorus oxide, P<sub>2</sub>O<sub>5</sub> (wt.%)</i>	<0.01	IND	IND
Silicon dioxide, SiO <sub>2</sub> (wt.%)	45.93	45.77	46.08
<i>Sulphur oxide, SO<sub>3</sub> (wt.%)</i>	<0.01	IND	IND
Titanium oxide, TiO <sub>2</sub> (wt.%)	0.033	0.030	0.036
Zinc, Zn (ppm)	143	136	150
Loss on ignition, LOI (wt.%)	9.61	9.50	9.71
<b>Fusion ICP</b>			
Nickel, Ni (wt.%)	1.12	1.11	1.13
Cobalt, Co (ppm)	385	379	391
Aluminium oxide, Al <sub>2</sub> O <sub>3</sub> (wt.%)	2.47	2.44	2.50
Calcium oxide, CaO (wt.%)	0.39	0.38	0.40
<i>Copper, Cu (ppm)</i>	<50	IND	IND
Chromium oxide, Cr <sub>2</sub> O <sub>3</sub> (wt.%)	0.91	0.90	0.92
Iron oxide, Fe <sub>2</sub> O <sub>3</sub> (wt.%)	18.27	18.03	18.51
<i>Potassium oxide, K<sub>2</sub>O (wt.%)</i>	<0.01	IND	IND
Magnesium oxide, MgO (wt.%)	20.17	19.91	20.44
Manganese oxide, MnO (wt.%)	0.295	0.291	0.299
<i>Sodium oxide, Na<sub>2</sub>O (wt.%)</i>	0.024	0.021	0.027
<i>Phosphorus oxide, P<sub>2</sub>O<sub>5</sub> (wt.%)</i>	<0.02	IND	IND
Silica dioxide, SiO <sub>2</sub> (wt.%)	45.58	45.00	46.16
<i>Sulphur oxide, SO<sub>3</sub> (wt.%)</i>	<0.05	IND	IND
Titanium oxide, TiO <sub>2</sub> (wt.%)	0.031	0.030	0.031
Zinc, Zn (ppm)	128	112	143
<b>IR Combustion Furnace</b>			
Carbon, C (wt.%)	0.10	0.09	0.12
<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

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

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 1.13 and 1.15 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 185.

Constituent	Certified Value	Tolerance limits 1- $\alpha$ =0.99, $\rho$ =0.95	
		Low	High
<b>Fusion XRF</b>			
Nickel, Ni (wt.%)	1.14	1.13	1.15
Cobalt, Co (ppm)	388	381	395
Aluminium oxide, Al <sub>2</sub> O <sub>3</sub> (wt.%)	2.48	2.47	2.50
Calcium oxide, CaO (wt.%)	0.385	0.383	0.386
<i>Chlorine, Cl (ppm)</i>	<50	IND	IND
<i>Copper, Cu (ppm)</i>	<50	IND	IND
Chromium oxide, Cr <sub>2</sub> O <sub>3</sub> (wt.%)	0.914	0.907	0.920
Iron oxide, Fe <sub>2</sub> O <sub>3</sub> (wt.%)	18.42	18.35	18.49
<i>Potassium oxide, K<sub>2</sub>O (wt.%)</i>	<0.01	IND	IND
Magnesium oxide, MgO (wt.%)	20.22	20.14	20.30
Manganese oxide, MnO (wt.%)	0.297	0.295	0.298
<i>Sodium oxide, Na<sub>2</sub>O (wt.%)</i>	~0.03	IND	IND
<i>Phosphorus oxide, P<sub>2</sub>O<sub>5</sub> (wt.%)</i>	<0.01	IND	IND
Silicon dioxide, SiO <sub>2</sub> (wt.%)	45.93	45.80	46.05
<i>Sulphur oxide, SO<sub>3</sub> (wt.%)</i>	<0.01	IND	IND
Titanium oxide, TiO <sub>2</sub> (wt.%)	0.033	0.029	0.037
Zinc, Zn (ppm)	143	141	146
Loss on ignition, LOI (wt.%)	9.61	9.56	9.66
<b>Fusion ICP</b>			
Nickel, Ni (wt.%)	1.12	1.11	1.13
Cobalt, Co (ppm)	385	375	395
Aluminium oxide, Al <sub>2</sub> O <sub>3</sub> (wt.%)	2.47	2.41	2.52
Calcium oxide, CaO (wt.%)	0.39	0.38	0.41
<i>Copper, Cu (ppm)</i>	<50	IND	IND
Chromium oxide, Cr <sub>2</sub> O <sub>3</sub> (wt.%)	0.91	0.90	0.93
Iron oxide, Fe <sub>2</sub> O <sub>3</sub> (wt.%)	18.27	18.04	18.49
<i>Potassium oxide, K<sub>2</sub>O (wt.%)</i>	<0.01	IND	IND
Magnesium oxide, MgO (wt.%)	20.17	19.92	20.43
Manganese oxide, MnO (wt.%)	0.295	0.293	0.298
<i>Sodium oxide, Na<sub>2</sub>O (wt.%)</i>	0.024	IND	IND
<i>Phosphorus oxide, P<sub>2</sub>O<sub>5</sub> (wt.%)</i>	<0.02	IND	IND
Silica dioxide, SiO <sub>2</sub> (wt.%)	45.58	44.88	46.28
<i>Sulphur oxide, SO<sub>3</sub> (wt.%)</i>	<0.05	IND	IND
Titanium oxide, TiO <sub>2</sub> (wt.%)	0.031	0.029	0.032
Zinc, Zn (ppm)	128	116	139
<b>IR Combustion Furnace</b>			
Carbon, C (wt.%)	0.10	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 185 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 185. 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 185. 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 0.953 for nickel, 1.00 for cobalt, 0.999 for iron oxide and 0.957 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 185 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 185

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.%)	1.14	0.02	1.10	1.18	1.08	1.20	1.87%	3.73%	5.60%
Co (ppm)	388	17	355	422	338	438	4.30%	8.60%	12.90%
Al <sub>2</sub> O <sub>3</sub> (wt.%)	2.48	0.04	2.41	2.56	2.38	2.59	1.47%	2.94%	4.40%
CaO (wt.%)	0.385	0.008	0.368	0.401	0.360	0.410	2.16%	4.31%	6.47%
Cl (ppm)	<50	IND	IND	IND	IND	IND	IND	IND	IND
Cu (ppm)	<50	IND	IND	IND	IND	IND	IND	IND	IND
Cr <sub>2</sub> O <sub>3</sub> (wt.%)	0.914	0.018	0.878	0.949	0.861	0.967	1.94%	3.88%	5.82%
Fe <sub>2</sub> O <sub>3</sub> (wt.%)	18.42	0.17	18.08	18.76	17.91	18.92	0.91%	1.83%	2.74%
K <sub>2</sub> O (wt.%)	<0.01	IND	IND	IND	IND	IND	IND	IND	IND
MgO (wt.%)	20.22	0.23	19.76	20.67	19.53	20.90	1.13%	2.26%	3.38%
MnO (wt.%)	0.297	0.005	0.287	0.306	0.282	0.311	1.62%	3.24%	4.86%
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.%)	<0.01	IND	IND	IND	IND	IND	IND	IND	IND
SiO <sub>2</sub> (wt.%)	45.93	0.36	45.21	46.64	44.85	47.00	0.78%	1.56%	2.35%
SO <sub>3</sub> (wt.%)	<0.01	IND	IND	IND	IND	IND	IND	IND	IND
TiO <sub>2</sub> (wt.%)	0.033	0.006	0.020	0.046	0.014	0.052	19.16%	38.32%	57.48%
Zn (ppm)	143	12	119	168	106	180	8.62%	17.24%	25.86%
LOI (wt.%)	9.61	0.18	9.24	9.97	9.06	10.15	1.89%	3.79%	5.68%
<b>Fusion ICP</b>									
Ni (wt.%)	1.12	0.03	1.06	1.18	1.03	1.21	2.55%	5.11%	7.66%
Co (ppm)	385	20	344	426	323	446	5.33%	10.65%	15.98%
Al <sub>2</sub> O <sub>3</sub> (wt.%)	2.47	0.06	2.35	2.59	2.28	2.65	2.50%	5.00%	7.50%
CaO (wt.%)	0.39	0.01	0.36	0.42	0.35	0.43	3.66%	7.31%	10.97%
Cu (ppm)	<50	IND	IND	IND	IND	IND	IND	IND	IND
Cr <sub>2</sub> O <sub>3</sub> (wt.%)	0.91	0.03	0.85	0.97	0.82	1.00	3.37%	6.74%	10.11%
Fe <sub>2</sub> O <sub>3</sub> (wt.%)	18.27	0.47	17.33	19.20	16.87	19.67	2.55%	5.11%	7.66%
K <sub>2</sub> O (wt.%)	<0.01	IND	IND	IND	IND	IND	IND	IND	IND
MgO (wt.%)	20.17	0.53	19.11	21.24	18.58	21.77	2.64%	5.29%	7.93%
MnO (wt.%)	0.295	0.007	0.282	0.309	0.275	0.316	2.27%	4.55%	6.82%
Na <sub>2</sub> O (wt.%)	0.024	0.004	0.015	0.032	0.011	0.037	18.39%	36.78%	55.17%
P <sub>2</sub> O <sub>5</sub> (wt.%)	<0.02	IND	IND	IND	IND	IND	IND	IND	IND
SiO <sub>2</sub> (wt.%)	45.58	1.05	43.48	47.68	42.43	48.73	2.30%	4.61%	6.91%
SO <sub>3</sub> (wt.%)	<0.05	IND	IND	IND	IND	IND	IND	IND	IND
TiO <sub>2</sub> (wt.%)	0.031	0.001	0.029	0.033	0.028	0.034	3.29%	6.59%	9.88%
Zn (ppm)	128	37	54	201	18	238	28.76%	57.52%	86.28%
<b>IR Combustion Furnace</b>									
C (wt.%)	0.10	0.02	0.06	0.15	0.03	0.17	22.36%	44.73%	67.09%
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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Activation Laboratories, Ancaster, Ontario, Canada  
ALS, Callao, Lima, Peru  
ALS, Malaga, WA, Australia  
ALS, Stafford, QLD, Australia  
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BV Amdel, Cardiff, NSW, Australia  
BV Amdel, Stirling, SA, Australia  
BV Ultra Trace, Canning Vale, WA, Australia  
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UIS Analytical Services, Centurion, South Africa

## PREPARER AND SUPPLIER OF THE REFERENCE MATERIAL

Nickel laterite ore reference material OREAS 185 has been prepared and certified and is supplied by:

*Ore Research & Exploration Pty Ltd*  
*6-8 Gatwick Road*  
*Bayswater North VIC 3153*  
*AUSTRALIA*

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OREAS 185 is packaged in unit sizes of 10g (single-use laminated foil pouches) and 1kg (wide mouthed plastic jars).

## INTENDED USE

OREAS 185 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 185 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 185**

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 185 (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	1.12	1.17	1.12	1.12	1.16	1.13	1.12	1.17	1.15	1.17	1.12	1.13	1.09	1.15	1.15	1.14	1.11
2	1.13	1.18	1.12	1.12	1.18	1.14	<b>1.16</b>	1.17	1.15	1.17	1.11	1.14	1.11	1.15	1.15	1.15	1.12
3	1.13	1.17	1.12	1.13	1.16	1.14	1.13	1.17	1.15	1.17	1.12	1.16	1.10	1.14	1.15	1.15	1.11
4	1.13	1.17	1.13	1.12	1.16	1.13	1.13	1.16	1.15	1.16	1.12	1.14	1.11	1.14	1.16	1.15	1.11
5	1.11	1.17	1.12	1.12	1.18	1.13	1.12	1.14	1.15	1.17	1.12	1.12	1.12	1.14	NR	NR	NR
6	1.11	1.17	1.11	1.12	1.17	1.13	1.15	1.13	1.16	1.17	1.13	1.13	1.12	1.15	NR	NR	NR
7	1.12	1.16	1.12	1.12	1.19	1.13	1.13	1.16	1.15	1.17	1.13	1.12	1.12	1.15	NR	NR	NR
8	1.11	1.16	1.12	1.13	1.17	1.12	1.15	1.16	1.15	1.16	1.12	1.13	1.12	1.13	NR	NR	NR
9	1.14	1.17	1.13	1.12	1.19	1.14	1.14	1.17	1.15	1.18	1.12	1.13	1.13	1.14	NR	NR	NR
10	1.14	1.16	1.13	1.12	1.19	1.13	1.15	1.15	1.14	1.18	1.11	1.13	1.12	1.15	NR	NR	NR
11	1.13	1.17	1.13	1.12	1.18	1.12	1.13	1.18	1.15	1.18	1.12	1.13	1.12	1.15	NR	NR	NR
12	1.13	1.16	1.13	1.13	1.19	1.12	1.14	1.16	1.14	1.19	1.12	1.13	1.14	1.16	NR	NR	NR
Mean	1.12	1.17	1.12	1.12	1.18	1.13	1.14	1.16	1.15	1.17	1.12	1.13	1.12	1.14	1.15	1.15	1.11
Median	1.13	1.17	1.12	1.12	1.18	1.13	1.14	1.16	1.15	1.17	1.12	1.13	1.12	1.15	1.15	1.15	1.11
Std.Dev.	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.01
Rel.Std.Dev.	0.95%	0.41%	0.49%	0.40%	0.99%	0.61%	1.13%	1.18%	0.45%	0.73%	0.43%	0.93%	1.18%	0.60%	0.43%	0.22%	0.45%
PDM <sup>3</sup>	-1.37%	2.27%	-1.41%	-1.52%	3.09%	-0.79%	-0.20%	1.65%	0.82%	2.75%	-2.07%	-0.64%	-1.94%	0.24%	1.11%	0.58%	-2.40%

Table A3. Fusion XRF results for Co in OREAS 185 (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	370	400	380	380	400	380	NR	<b>470</b>	410	360	380	400	390	420	400	356	400
2	380	400	380	380	400	380	NR	<b>490</b>	400	440	370	400	400	420	400	380	<b>300</b>
3	370	400	380	380	400	380	NR	<b>490</b>	390	340	380	400	390	420	400	401	400
4	370	400	380	380	390	380	NR	<b>480</b>	390	<b>490</b>	370	400	390	430	400	403	400
5	370	400	370	390	400	380	NR	<b>470</b>	400	<b>340</b>	380	400	400	420	NR	NR	NR
6	360	400	370	390	390	380	NR	<b>470</b>	400	<b>510</b>	390	400	400	410	NR	NR	NR
7	370	400	360	390	410	380	NR	<b>470</b>	400	<b>350</b>	390	400	400	420	NR	NR	NR
8	370	400	370	390	380	380	NR	<b>480</b>	390	<b>320</b>	390	400	400	420	NR	NR	NR
9	390	400	380	390	400	380	NR	<b>480</b>	390	<b>440</b>	380	400	400	420	NR	NR	NR
10	380	400	380	390	400	380	NR	<b>480</b>	400	<b>420</b>	380	400	400	420	NR	NR	NR
11	380	400	380	380	390	380	NR	<b>490</b>	400	<b>530</b>	380	400	400	410	NR	NR	NR
12	380	400	380	390	400	380	NR	<b>480</b>	390	<b>470</b>	370	400	400	430	NR	NR	NR
Mean	374	<b>400</b>	376	386	397	380		<b>479</b>	397	418	380	<b>400</b>	398	420	<b>400</b>	385	<b>375</b>
Median	370	400	380	390	400	380		480	400	430	380	400	400	420	400	391	400
Std.Dev.	8	0	7	5	8	0		8	7	74	7	0	5	6	0	22	50
Rel.Std.Dev.	2.12%	0.00%	1.78%	1.33%	1.96%	0.00%		1.65%	1.64%	17.63%	1.94%	0.00%	1.14%	1.44%	0.00%	5.70%	13.33%
PDM <sup>3</sup>	-3.65%	3.00%	-3.22%	-0.64%	2.15%	-2.15%		23.39%	2.15%	7.51%	-2.15%	3.00%	2.36%	8.15%	3.00%	-0.86%	-3.43%

Table A4. Fusion XRF results for Al<sub>2</sub>O<sub>3</sub> in OREAS 185 (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	2.51	<b>2.38</b>	2.48	2.50	2.52	2.47	2.41	2.53	2.54	2.42	2.48	2.50	2.48	2.50	2.48	2.52	2.51
2	2.51	<b>2.39</b>	2.47	2.50	2.50	2.48	<b>2.49</b>	2.50	2.58	<b>2.67</b>	2.51	2.52	2.49	2.51	2.49	2.50	2.50
3	2.50	<b>2.40</b>	2.48	2.49	2.51	2.48	2.42	2.48	2.58	2.43	2.51	2.50	2.42	2.51	2.48	2.46	2.50
4	2.51	<b>2.39</b>	2.47	2.50	2.51	2.47	2.40	2.54	2.52	2.47	2.50	2.49	2.44	2.52	2.47	2.54	2.51
5	2.50	2.42	2.48	2.47	2.52	2.49	2.37	2.47	<b>2.60</b>	2.43	2.49	2.49	2.49	2.50	NR	NR	NR
6	2.49	2.41	2.47	2.48	2.53	2.50	2.43	2.51	<b>2.58</b>	2.53	2.48	2.48	2.48	2.51	NR	NR	NR
7	2.49	2.42	2.48	2.48	2.54	2.48	2.41	2.51	<b>2.60</b>	<b>2.61</b>	2.48	2.49	2.44	2.51	NR	NR	NR
8	2.49	2.44	2.46	2.49	2.54	2.49	2.46	2.47	<b>2.55</b>	<b>2.63</b>	2.47	2.48	2.45	2.52	NR	NR	NR
9	2.51	2.44	2.46	2.48	<b>2.59</b>	2.48	<b>2.41</b>	2.52	<b>2.64</b>	2.46	2.48	2.49	2.49	2.54	NR	NR	NR
10	2.51	2.42	2.47	2.50	<b>2.61</b>	2.47	<b>2.41</b>	2.49	<b>2.55</b>	2.38	2.48	2.48	2.47	2.54	NR	NR	NR
11	2.50	2.41	2.47	2.47	<b>2.61</b>	2.44	<b>2.40</b>	2.50	<b>2.60</b>	2.40	2.48	2.49	2.48	2.52	NR	NR	NR
12	2.50	2.41	2.47	2.49	<b>2.59</b>	2.44	<b>2.39</b>	2.55	<b>2.59</b>	2.45	2.48	2.50	2.51	2.54	NR	NR	NR
Mean	2.50	2.41	2.47	2.49	2.55	2.47	2.42	2.51	2.58	2.49	2.49	2.49	2.47	2.52	2.48	2.50	2.51
Median	2.50	2.41	2.47	2.49	2.54	2.48	2.41	2.51	2.58	2.45	2.48	2.49	2.48	2.52	2.48	2.51	2.51
Std.Dev.	0.01	0.02	0.01	0.01	0.04	0.02	0.03	0.03	0.03	0.10	0.01	0.01	0.03	0.01	0.01	0.04	0.01
Rel.Std.Dev.	0.33%	0.77%	0.29%	0.46%	1.61%	0.75%	1.31%	1.04%	1.27%	3.83%	0.52%	0.46%	1.08%	0.58%	0.33%	1.41%	0.23%
PDM <sup>3</sup>	0.67%	-3.07%	-0.54%	0.10%	2.52%	-0.49%	-2.75%	0.84%	3.72%	0.16%	0.07%	0.30%	-0.62%	1.34%	-0.20%	0.74%	0.81%



Table A5. Fusion XRF results for CaO in OREAS 185 (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	0.380	0.375	0.390	0.400	0.390	0.385	0.380	0.380	<b>0.400</b>	0.380	0.390	0.390	0.385	0.380	0.390	0.363	0.380
2	0.380	0.375	0.380	0.390	0.380	0.385	0.390	0.370	<b>0.410</b>	0.369	0.390	0.390	0.391	0.380	0.390	0.372	0.380
3	0.380	0.375	0.380	0.390	0.390	0.384	0.380	0.380	<b>0.400</b>	0.406	0.390	0.380	0.389	0.390	0.380	0.384	0.390
4	0.370	0.370	0.380	0.390	0.390	0.383	0.380	0.380	<b>0.410</b>	0.387	0.390	0.380	0.388	0.380	0.390	0.376	0.380
5	0.390	0.375	0.380	0.390	0.370	0.386	0.380	0.370	<b>0.420</b>	0.392	0.380	0.390	0.396	0.390	NR	NR	NR
6	0.390	0.370	0.380	0.400	0.380	0.382	0.390	0.370	<b>0.410</b>	0.389	0.390	0.400	0.390	0.390	NR	NR	NR
7	0.390	0.365	0.380	0.390	0.380	0.384	0.390	0.370	<b>0.400</b>	0.380	0.390	0.390	0.392	0.390	NR	NR	NR
8	0.390	0.385	0.380	0.390	0.370	0.391	0.390	0.370	<b>0.400</b>	0.394	0.390	0.390	0.398	0.390	NR	NR	NR
9	0.390	0.370	0.380	0.400	0.390	0.385	0.390	0.370	0.400	0.376	0.380	0.390	0.397	0.380	NR	NR	NR
10	0.390	0.370	0.380	0.390	0.400	0.382	0.390	0.370	0.400	0.379	0.380	0.390	0.398	0.390	NR	NR	NR
11	0.390	0.375	0.380	0.390	0.390	0.380	0.390	0.380	0.400	0.388	0.380	0.380	0.389	0.390	NR	NR	NR
12	0.390	0.373	0.380	0.400	0.390	0.381	0.380	0.370	0.390	0.386	0.380	0.380	0.400	0.390	NR	NR	NR
Mean	0.386	0.373	0.381	0.393	0.385	0.384	0.386	0.373	0.403	0.386	0.386	0.388	0.393	0.387	0.388	0.374	0.383
Median	0.390	0.374	0.380	0.390	0.390	0.384	0.390	0.370	0.400	0.387	0.390	0.390	0.392	0.390	0.390	0.374	0.380
Std.Dev.	0.007	0.005	0.003	0.005	0.009	0.003	0.005	0.005	0.008	0.010	0.005	0.006	0.005	0.005	0.005	0.009	0.005
Rel.Std.Dev.	1.73%	1.31%	0.76%	1.25%	2.35%	0.74%	1.33%	1.32%	1.93%	2.50%	1.33%	1.60%	1.23%	1.27%	1.29%	2.42%	1.31%
PDM <sup>3</sup>	0.28%	-3.00%	-1.02%	2.23%	0.06%	-0.20%	0.28%	-2.97%	4.83%	0.19%	0.28%	0.71%	2.08%	0.50%	0.71%	-2.87%	-0.59%

Table A6. Fusion XRF results for Cl in OREAS 185 (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	20	NR	NR	NR	NR	NR	<50	<50	NR	NR	<50	<50	NR
2	<50	NR	NR	50	40	NR	NR	NR	NR	NR	<50	<50	NR	NR	<50	<50	NR
3	<50	NR	NR	<50	30	NR	NR	NR	NR	NR	<50	<50	NR	NR	<50	<50	NR
4	<50	NR	NR	50	30	NR	NR	NR	NR	NR	<50	<50	NR	NR	<50	<50	NR
5	<50	NR	NR	50	<b>20</b>	NR	NR	NR	NR	NR	<50	NR	NR	NR	NR	NR	NR
6	<50	NR	NR	<50	<b>20</b>	NR	NR	NR	NR	NR	<50	NR	NR	NR	NR	NR	NR
7	<50	NR	NR	50	<b>10</b>	NR	NR	NR	NR	NR	<50	NR	NR	NR	NR	NR	NR
8	<50	NR	NR	50	<b>10</b>	NR	NR	NR	NR	NR	<50	NR	NR	NR	NR	NR	NR
9	<50	NR	NR	<50	30	NR	NR	NR	NR	NR	<50	NR	NR	NR	NR	NR	NR
10	<50	NR	NR	50	70	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	30	NR	NR	NR	NR	NR	<50	NR	NR	NR	NR	NR	NR
Mean				50	28												
Median				50	30												
Std.Dev.				0	16												
Rel.Std.Dev.				0.00%	55.97%												
PDM <sup>3</sup>				17.65%	-33.33%												

Table A7. Fusion XRF results for Cu in OREAS 185 (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	15	<10	30	10	<10	60	<100	20	<b>90</b>	NR	50	<100	<20	NR
2	<50	<30	<50	20	30	30	10	60	50	<100	<10	<b>90</b>	NR	50	<100	29	NR
3	<50	<30	<50	20	10	30	10	<10	60	<100	10	<b>70</b>	NR	50	<100	25	NR
4	<50	<30	<50	20	<10	30	10	20	60	<100	<10	<b>70</b>	NR	50	<100	33	NR
5	<50	<30	<50	20	<b>80</b>	30	10	<10	60	<b>160</b>	<10	50	NR	60	NR	NR	NR
6	<50	<30	<50	25	20	30	70	<10	60	<b>&lt;100</b>	<10	70	NR	50	NR	NR	NR
7	<50	<30	<50	25	30	31	40	<10	70	<b>&lt;100</b>	<10	60	NR	60	NR	NR	NR
8	<50	<30	<50	25	10	30	40	<10	60	<b>&lt;100</b>	<10	60	NR	50	NR	NR	NR
9	<50	<30	<50	25	10	30	10	<10	<50	<100	<10	40	NR	40	NR	NR	NR
10	<50	<30	<50	25	20	30	20	10	<50	<100	<10	40	NR	40	NR	NR	NR
11	<50	<30	<50	20	<10	30	10	60	<50	<100	<10	40	NR	40	NR	NR	NR
12	<50	<30	<50	25	20	30	20	30	<50	<100	<10	<20	NR	50	NR	NR	NR
Mean				22	26	30	22	36	60	160	15	62		49		29	
Median				23	20	30	10	30	60	160	15	60		50		29	
Std.Dev.				3	22	1	19	23	5		7	18		7		4	
Rel.Std.Dev.				15.14%	85.53%	1.73%	87.64%	63.95%	8.91%		47.14%	29.67%		13.60%		13.79%	
PDM <sup>3</sup>				-33.72%	-23.30%	-9.69%	-34.97%	8.05%	80.08%	380.21%	-54.98%	85.54%		47.57%		-12.96%	

Table A8. Fusion XRF results for Cr<sub>2</sub>O<sub>3</sub> in OREAS 185 (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	0.901	0.905	0.913	0.918	0.881	0.930	<b>1.330</b>	0.940	0.900	<b>0.987</b>	0.888	0.950	0.922	0.927	0.900	0.925	0.930
2	0.888	0.895	0.913	0.927	0.908	0.933	<b>1.374</b>	0.950	0.900	<b>0.978</b>	0.902	0.960	0.923	0.928	0.910	0.921	0.930
3	0.887	0.900	0.912	0.921	0.879	0.937	<b>1.345</b>	0.930	0.900	<b>0.970</b>	0.913	0.960	0.914	0.931	0.910	0.916	0.920
4	0.893	0.905	0.913	0.920	0.890	0.931	<b>1.330</b>	0.950	0.900	<b>0.966</b>	0.903	0.950	0.918	0.922	0.900	0.922	0.920
5	0.911	0.895	0.907	0.923	<b>0.846</b>	0.917	0.892	0.930	0.900	<b>0.970</b>	0.896	0.900	0.927	0.928	NR	NR	NR
6	0.910	0.890	0.903	0.925	<b>0.909</b>	0.932	0.919	0.910	0.900	<b>0.982</b>	0.913	0.890	0.934	0.928	NR	NR	NR
7	0.908	0.905	0.909	0.920	<b>0.857</b>	0.921	0.911	0.930	0.910	<b>0.969</b>	0.909	0.890	0.921	0.925	NR	NR	NR
8	0.905	0.895	0.909	0.926	<b>0.859</b>	0.920	0.933	0.940	0.900	<b>0.974</b>	0.888	0.900	0.929	0.927	NR	NR	NR
9	0.933	0.905	0.904	0.912	0.908	0.927	0.912	0.950	0.890	<b>1.003</b>	<b>0.878</b>	0.890	0.944	0.911	NR	NR	NR
10	0.918	0.900	0.913	0.914	<b>0.930</b>	0.928	0.916	0.930	0.880	<b>0.986</b>	0.909	0.870	0.938	0.909	NR	NR	NR
11	0.917	0.900	0.913	0.912	0.906	0.916	0.906	0.960	0.890	<b>1.007</b>	0.912	0.870	0.924	0.909	NR	NR	NR
12	0.917	0.893	0.915	0.917	0.902	0.915	0.925	0.950	0.880	<b>1.030</b>	0.900	0.880	0.932	0.911	NR	NR	NR
Mean	0.907	0.899	0.910	0.920	0.890	0.926	1.058	0.939	0.896	<b>0.985</b>	0.901	0.909	0.927	0.921	0.905	0.921	0.925
Median	0.909	0.900	0.913	0.920	0.896	0.928	0.922	0.940	0.900	0.980	0.903	0.895	0.926	0.926	0.905	0.921	0.925
Std.Dev.	0.014	0.005	0.004	0.005	0.026	0.007	0.212	0.014	0.009	0.019	0.011	0.035	0.009	0.009	0.006	0.004	0.006
Rel.Std.Dev.	1.49%	0.59%	0.43%	0.56%	2.87%	0.81%	20.08%	1.47%	1.01%	1.96%	1.27%	3.88%	0.93%	0.95%	0.64%	0.42%	0.62%
PDM <sup>3</sup>	-0.70%	-1.60%	-0.37%	0.64%	-2.64%	1.30%	15.76%	2.79%	-1.95%	7.82%	-1.40%	-0.50%	1.47%	0.83%	-0.95%	0.81%	1.24%

Table A9. Fusion XRF results for Fe<sub>2</sub>O<sub>3</sub> in OREAS 185 (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	18.25	18.53	18.70	18.47	<b>18.00</b>	18.36	18.52	18.42	18.57	18.22	18.35	18.31	18.00	18.25	<b>19.00</b>	18.56	18.50
2	18.30	18.52	18.66	18.54	<b>18.10</b>	18.51	<b>19.06</b>	18.53	18.46	18.22	18.35	18.43	18.20	18.30	<b>18.80</b>	18.58	18.60
3	18.20	18.51	18.63	18.54	<b>18.00</b>	18.60	18.49	18.43	18.55	18.27	18.35	18.36	17.97	18.30	<b>18.90</b>	18.58	18.50
4	18.25	18.41	18.71	18.53	<b>18.00</b>	18.43	18.43	18.37	18.51	18.20	18.35	18.32	18.13	18.30	<b>19.00</b>	18.67	18.50
5	18.15	18.54	18.60	18.65	18.20	18.38	<b>18.22</b>	18.13	18.59	18.35	18.30	18.49	18.42	18.25	NR	NR	NR
6	18.15	18.57	18.61	18.67	18.05	18.43	<b>18.88</b>	<b>17.85</b>	18.66	18.16	18.40	18.51	18.31	18.30	NR	NR	NR
7	18.25	18.50	18.64	18.62	18.30	18.43	<b>18.75</b>	18.23	18.68	18.04	18.35	18.43	18.38	18.25	NR	NR	NR
8	18.15	18.49	18.67	18.67	18.05	18.28	<b>18.91</b>	18.22	18.53	17.96	18.35	18.53	18.41	18.25	NR	NR	NR
9	18.50	18.59	18.72	18.53	18.20	18.48	18.55	18.45	18.47	18.37	18.30	18.45	18.57	18.25	NR	NR	NR
10	18.45	18.56	18.68	18.54	18.15	18.42	18.54	18.20	18.42	18.35	18.30	18.49	18.39	18.20	NR	NR	NR
11	18.40	18.53	18.73	18.53	18.15	18.26	18.48	18.50	18.43	18.35	18.35	18.44	18.33	18.20	NR	NR	NR
12	18.35	18.57	18.77	18.59	18.30	18.25	18.49	18.37	18.40	18.44	18.35	18.49	18.57	18.25	NR	NR	NR
Mean	18.28	18.52	18.68	18.57	18.13	18.40	18.61	18.31	18.52	18.24	18.34	18.44	18.31	18.26	18.93	18.60	18.53
Median	18.25	18.53	18.68	18.54	18.13	18.42	18.53	18.37	18.52	18.24	18.35	18.45	18.35	18.25	18.95	18.58	18.50
Std.Dev.	0.12	0.05	0.05	0.07	0.11	0.10	0.24	0.19	0.09	0.14	0.03	0.07	0.20	0.04	0.10	0.05	0.05
Rel.Std.Dev.	0.65%	0.26%	0.28%	0.35%	0.61%	0.56%	1.29%	1.05%	0.49%	0.78%	0.16%	0.40%	1.08%	0.20%	0.51%	0.25%	0.27%
PDM <sup>3</sup>	-0.74%	0.57%	1.40%	0.83%	-1.60%	-0.10%	1.03%	-0.60%	0.56%	-0.96%	-0.42%	0.10%	-0.62%	-0.88%	2.74%	0.95%	0.57%

Table A10. Fusion XRF results for K<sub>2</sub>O in OREAS 185 (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	0.002	NR	<0.001	<0.01	0.010	<0.01	<0.01	<0.01	NR	0.010	<0.01	0.005	<0.01
2	<0.01	<0.01	<0.01	0.004	0.003	NR	<0.001	<0.01	0.010	<0.01	<0.01	<0.01	NR	0.010	<0.01	0.006	<0.01
3	<0.01	<0.01	<0.01	0.005	0.002	NR	<0.001	<0.01	<0.01	<0.01	<0.01	<0.01	NR	0.010	<0.01	0.006	<0.01
4	<0.01	<0.01	<0.01	0.004	0.001	NR	<0.001	<0.01	0.010	<0.01	<0.01	<0.01	NR	0.010	<0.01	0.007	<0.01
5	<0.01	<0.01	<0.05	0.004	0.001	NR	<0.001	<0.01	<b>0.020</b>	<0.01	<0.01	<0.01	NR	0.010	NR	NR	NR
6	<0.01	<0.01	<0.05	0.004	<0.001	NR	<0.001	<0.01	<b>0.020</b>	<0.01	<0.01	<0.01	NR	0.010	NR	NR	NR
7	<0.01	<0.01	<0.05	0.004	0.001	NR	<0.001	<0.01	<b>0.020</b>	<0.01	<0.01	<0.01	NR	0.010	NR	NR	NR
8	<0.01	<0.01	<0.05	0.004	<0.001	NR	<0.001	<0.01	<b>0.020</b>	<0.01	<0.01	<0.01	NR	0.010	NR	NR	NR
9	<0.01	<0.01	<0.01	0.005	0.005	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	0.005	NR	<0.001	<0.01	0.020	<0.01	<0.01	<0.01	NR	0.010	NR	NR	NR
11	<0.01	<0.01	<0.01	0.006	0.005	NR	<0.001	<0.01	0.020	<0.01	<0.01	<0.01	NR	0.010	NR	NR	NR
12	<0.01	<0.01	<0.01	0.005	0.006	NR	<0.001	0.010	0.010	<0.01	<0.01	<0.01	NR	0.010	NR	NR	NR
Mean				0.005	0.003			0.010	0.015					0.010		0.006	
Median				0.005	0.003			0.010	0.020					0.010		0.006	
Std.Dev.				0.001	0.002				0.005					0.000		0.001	
Rel.Std.Dev.				16.68%	63.52%				33.79%					0.00%		16.94%	
PDM <sup>3</sup>				-39.94%	-60.11%			28.69%	98.88%					28.69%		-22.79%	

Table A11. Fusion XRF results for MgO in OREAS 185 (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	20.20	20.53	20.19	20.13	20.00	19.94	<b>19.34</b>	20.68	20.28	<b>20.91</b>	20.20	20.09	19.76	20.40	20.10	20.02	20.10
2	20.20	20.48	20.18	20.13	19.90	19.98	<b>19.93</b>	20.55	20.26	<b>20.81</b>	20.10	20.24	19.86	20.50	20.20	20.12	20.20
3	20.10	20.45	20.14	20.10	19.95	19.96	<b>19.34</b>	20.63	20.30	<b>20.91</b>	20.10	20.12	19.63	20.40	20.10	20.02	20.10
4	20.10	20.62	20.22	20.15	20.00	19.88	<b>19.29</b>	20.64	20.23	<b>20.93</b>	20.20	20.08	19.73	20.40	20.10	20.20	20.10
5	20.30	20.48	20.09	20.13	20.50	19.86	19.95	20.57	20.48	<b>20.60</b>	20.20	20.25	19.88	20.40	NR	NR	NR
6	20.20	20.44	20.04	20.12	20.60	19.88	20.33	20.54	20.44	<b>20.93</b>	20.20	20.26	19.94	20.40	NR	NR	NR
7	20.30	20.63	20.13	20.06	20.50	19.80	20.20	20.53	20.44	<b>20.85</b>	20.20	20.18	19.78	20.40	NR	NR	NR
8	20.30	20.41	20.13	20.09	20.50	19.70	20.52	20.46	20.21	<b>20.76</b>	20.10	20.25	19.84	20.40	NR	NR	NR
9	20.40	20.51	20.18	20.25	20.00	19.90	20.36	20.55	20.20	20.61	20.10	20.21	20.09	20.40	NR	NR	NR
10	20.40	20.58	20.14	20.23	20.10	19.90	20.33	20.44	20.16	20.61	20.00	20.19	19.94	20.30	NR	NR	NR
11	20.30	20.44	20.16	20.16	20.10	19.70	20.26	20.58	20.21	20.69	20.10	20.19	19.84	20.30	NR	NR	NR
12	20.30	20.49	20.18	20.24	20.10	19.68	20.25	20.44	20.12	20.53	20.10	20.23	20.09	20.30	NR	NR	NR
Mean	20.26	20.50	20.15	20.15	20.19	19.85	20.01	20.55	20.28	20.76	20.13	20.19	19.86	20.38	20.13	20.09	20.13
Median	20.30	20.48	20.15	20.13	20.10	19.88	20.23	20.55	20.25	20.78	20.10	20.20	19.85	20.40	20.10	20.07	20.10
Std.Dev.	0.10	0.07	0.05	0.06	0.26	0.11	0.44	0.08	0.12	0.15	0.07	0.06	0.14	0.06	0.05	0.09	0.05
Rel.Std.Dev.	0.49%	0.35%	0.24%	0.30%	1.28%	0.53%	2.22%	0.38%	0.58%	0.71%	0.32%	0.31%	0.69%	0.28%	0.25%	0.43%	0.25%
PDM <sup>3</sup>	0.20%	1.40%	-0.35%	-0.34%	-0.15%	-1.83%	-1.04%	1.64%	0.29%	2.69%	-0.42%	-0.14%	-1.75%	0.81%	-0.46%	-0.64%	-0.46%

Table A12. Fusion XRF results for MnO in OREAS 185 (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	0.294	0.290	0.290	0.300	0.291	0.292	0.300	0.300	0.299	<b>0.308</b>	0.296	0.300	0.287	0.300	0.300	0.294	0.300
2	0.295	0.290	0.300	0.300	0.297	0.294	0.310	0.300	0.298	<b>0.315</b>	0.294	0.310	0.296	0.298	0.300	0.296	0.300
3	0.293	0.290	0.290	0.300	0.292	0.295	0.300	0.300	0.298	<b>0.318</b>	0.295	0.300	0.289	0.305	0.290	0.297	0.300
4	0.294	0.290	0.300	0.300	0.292	0.293	0.300	0.300	0.296	<b>0.308</b>	0.295	0.300	0.294	0.303	0.300	0.298	0.300
5	0.289	0.295	0.290	0.300	0.304	0.292	0.300	0.290	0.299	<b>0.310</b>	0.293	0.300	0.297	0.302	NR	NR	NR
6	0.289	0.300	0.290	0.300	0.297	0.292	0.300	0.290	0.301	<b>0.315</b>	0.292	0.300	0.297	0.302	NR	NR	NR
7	0.292	0.290	0.290	0.300	0.307	0.291	0.300	0.290	0.300	<b>0.312</b>	0.293	0.300	0.297	0.298	NR	NR	NR
8	0.291	0.295	0.290	0.300	0.297	0.289	0.310	0.290	<b>0.293</b>	<b>0.302</b>	0.295	0.300	0.297	0.303	NR	NR	NR
9	0.296	<b>0.285</b>	0.290	0.300	0.297	0.292	0.300	0.290	0.295	<b>0.312</b>	0.295	0.300	0.301	0.303	NR	NR	NR
10	0.295	0.293	0.290	0.300	0.298	0.292	0.300	0.290	0.296	<b>0.310</b>	0.292	0.300	0.296	0.305	NR	NR	NR
11	0.295	0.290	0.300	0.290	0.295	0.290	0.300	0.300	0.297	<b>0.317</b>	0.296	0.300	0.300	0.303	NR	NR	NR
12	0.293	0.293	0.290	0.300	0.299	0.289	0.300	0.290	0.295	<b>0.318</b>	0.295	0.290	0.300	0.306	NR	NR	NR
Mean	0.293	0.292	0.293	0.299	0.297	0.292	0.302	0.294	0.297	<b>0.312</b>	0.294	0.300	0.296	0.302	0.298	0.296	0.300
Median	0.294	0.290	0.290	0.300	0.297	0.292	0.300	0.290	0.298	0.312	0.295	0.300	0.297	0.303	0.300	0.296	0.300
Std.Dev.	0.002	0.004	0.005	0.003	0.005	0.002	0.004	0.005	0.002	0.005	0.001	0.004	0.004	0.003	0.005	0.002	0.000
Rel.Std.Dev.	0.80%	1.30%	1.55%	0.96%	1.58%	0.62%	1.29%	1.75%	0.79%	1.54%	0.48%	1.42%	1.40%	0.84%	1.68%	0.63%	0.00%
PDM <sup>3</sup>	-1.21%	-1.62%	-1.38%	0.87%	0.19%	-1.64%	1.71%	-0.82%	0.22%	5.22%	-0.79%	1.15%	-0.27%	1.98%	0.30%	-0.16%	1.15%



Table A13. Fusion XRF results for Na<sub>2</sub>O in OREAS 185 (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	0.034	0.010	0.030	NR	<b>0.112</b>	NR	<0.01	0.030	0.030	<0.1	0.021	0.020	NR	0.020	0.030	0.021	0.020
2	0.045	0.010	0.040	NR	<b>0.126</b>	NR	<0.01	0.020	0.040	<0.1	0.017	0.020	NR	0.020	0.030	0.028	0.020
3	0.044	0.010	0.030	NR	<b>0.108</b>	NR	<0.01	0.020	0.010	<0.1	0.016	0.010	NR	0.020	0.030	0.034	0.020
4	0.038	0.010	0.030	NR	<b>0.108</b>	NR	<0.01	0.030	0.020	<0.1	0.016	0.020	NR	0.020	0.040	0.033	0.020
5	0.041	0.010	0.040	NR	<b>0.166</b>	NR	<0.01	0.020	0.040	<0.1	0.017	0.030	NR	0.020	NR	NR	NR
6	0.036	0.010	0.030	NR	<b>0.168</b>	NR	<0.01	0.020	0.040	<0.1	0.014	0.030	NR	0.030	NR	NR	NR
7	0.039	0.010	0.040	NR	<b>0.172</b>	NR	<0.01	0.020	0.040	<0.1	0.020	0.030	NR	0.020	NR	NR	NR
8	0.037	0.010	0.030	NR	<b>0.166</b>	NR	<0.01	0.020	0.040	<0.1	0.015	0.030	NR	0.020	NR	NR	NR
9	0.040	0.010	0.040	NR	<b>0.175</b>	NR	<0.01	0.030	0.030	<0.1	0.025	0.030	NR	0.040	NR	NR	NR
10	0.041	0.010	0.040	NR	<b>0.182</b>	NR	<0.01	0.030	0.030	<0.1	0.017	0.040	NR	0.040	NR	NR	NR
11	0.040	0.010	0.030	NR	<b>0.174</b>	NR	<0.01	0.020	0.040	<0.1	0.017	0.010	NR	0.040	NR	NR	NR
12	0.043	0.010	0.040	NR	<b>0.179</b>	NR	<0.01	0.040	0.030	<0.1	0.017	0.030	NR	0.050	NR	NR	NR
Mean	0.040	0.010	0.035		<b>0.153</b>			0.025	0.033		0.018	0.025		0.028	0.033	0.029	0.020
Median	0.040	0.010	0.035		0.167			0.020	0.035		0.017	0.030		0.020	0.030	0.030	0.020
Std.Dev.	0.003	0.000	0.005		0.030			0.007	0.010		0.003	0.009		0.011	0.005	0.006	0.000
Rel.Std.Dev.	8.21%	0.00%	14.92%		19.53%			26.97%	29.70%		16.95%	36.18%		39.34%	15.38%	20.66%	0.00%
PDM <sup>3</sup>	48.70%	-62.67%	30.66%		471.17%			-6.67%	21.33%		-34.05%	-6.67%		5.77%	21.33%	7.61%	-25.34%

Table A14. Fusion XRF results for P<sub>2</sub>O<sub>5</sub> in OREAS 185 (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	0.006	<0.01	0.006	0.007	0.002	NR	<0.01	<0.01	0.010	<0.01	0.003	<0.01	NR	0.010	<0.01	<0.002	<0.01
2	0.006	0.005	0.005	0.007	0.003	NR	0.010	<0.01	0.010	<0.01	0.003	<0.01	NR	0.020	<0.01	0.002	<0.01
3	0.006	0.005	0.006	0.007	0.002	NR	<0.01	<0.01	0.010	<0.01	0.003	<0.01	NR	0.010	<0.01	0.003	<0.01
4	0.006	0.010	0.006	0.007	0.003	NR	<0.01	<0.01	0.010	0.012	0.003	<0.01	NR	0.010	<0.01	0.002	<0.01
5	0.005	0.010	<0.002	0.008	0.002	NR	<0.01	<0.01	0.010	<0.01	0.005	<0.01	NR	0.020	NR	NR	NR
6	0.006	0.005	0.003	0.008	0.002	NR	0.010	<0.01	0.010	<0.01	0.005	<0.01	NR	0.010	NR	NR	NR
7	0.006	0.010	0.003	0.008	0.002	NR	0.010	<0.01	0.010	<0.01	0.005	<0.01	NR	0.020	NR	NR	NR
8	0.006	<0.01	0.003	0.007	0.003	NR	0.010	<0.01	0.010	<0.01	0.005	<0.01	NR	0.020	NR	NR	NR
9	0.005	0.010	0.006	0.007	0.003	NR	0.010	<0.01	0.010	<0.01	0.003	<0.01	NR	0.010	NR	NR	NR
10	0.006	<0.01	0.007	0.007	0.002	NR	<0.01	<0.01	0.010	<0.01	0.003	<0.01	NR	0.010	NR	NR	NR
11	0.006	0.005	0.007	0.008	0.003	NR	<0.01	<0.01	0.010	<0.01	0.003	<0.01	NR	0.010	NR	NR	NR
12	0.005	<0.01	0.005	0.009	0.002	NR	<0.01	<0.01	0.010	0.010	0.003	<0.01	NR	0.010	NR	NR	NR
Mean	0.006	0.008	0.005	0.008	0.002		0.010		0.010	0.011	0.004			0.013		0.002	
Median	0.006	0.008	0.006	0.007	0.002		0.010		0.010	0.011	0.003			0.010		0.002	
Std.Dev.	0.000	0.003	0.002	0.001	0.001		0.000		0.000	0.001	0.001			0.005		0.001	
Rel.Std.Dev.	7.87%	35.63%	29.67%	8.99%	21.31%		0.00%		0.00%	12.86%	26.86%			36.93%		24.74%	
PDM <sup>3</sup>	-17.43%	7.70%	-25.59%	7.70%	-65.30%		43.61%		43.61%	57.97%	-47.34%			91.47%		-66.49%	

Table A15. Fusion XRF results for SiO<sub>2</sub> in OREAS 185 (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	46.30	46.26	46.22	45.97	45.30	45.89	46.65	46.20	45.69	45.76	46.10	45.69	<b>44.69</b>	46.50	45.70	45.90	45.60
2	46.30	46.29	46.02	45.97	45.20	46.07	46.20	45.90	45.49	45.53	46.10	46.01	<b>45.16</b>	46.70	45.80	45.94	45.90
3	46.10	46.26	45.96	46.06	45.40	46.06	46.64	46.00	45.78	45.68	46.10	45.84	<b>44.33</b>	46.70	45.90	45.84	45.60
4	46.10	46.21	46.20	45.99	45.40	45.83	46.54	46.30	45.52	45.89	46.10	45.75	<b>44.72</b>	46.80	45.80	46.08	45.60
5	46.50	46.16	46.03	45.92	45.60	45.83	45.89	45.70	45.88	45.64	45.90	45.92	45.43	46.70	NR	NR	NR
6	46.50	46.08	45.88	46.06	45.70	45.96	45.70	45.70	45.91	45.81	45.80	45.99	45.27	46.60	NR	NR	NR
7	46.60	46.33	46.08	45.91	45.70	45.85	45.47	45.70	45.97	45.30	45.80	45.83	45.09	46.60	NR	NR	NR
8	46.50	46.26	46.11	46.04	45.70	45.55	45.92	45.60	45.66	45.21	45.80	45.94	45.30	46.60	NR	NR	NR
9	46.50	46.35	45.98	46.00	46.00	45.95	46.49	45.90	45.51	45.67	45.90	45.79	45.68	46.70	NR	NR	NR
10	46.40	46.32	45.98	46.09	45.90	45.86	46.36	45.60	45.48	45.78	45.90	45.78	45.34	46.70	NR	NR	NR
11	46.30	46.29	45.89	45.97	46.10	45.42	45.86	46.00	45.48	45.64	45.90	45.86	45.24	46.50	NR	NR	NR
12	46.10	46.28	46.13	46.10	45.90	45.45	46.52	46.10	45.46	45.55	46.00	46.04	45.72	46.70	NR	NR	NR
Mean	46.35	46.25	46.04	46.01	45.66	45.81	46.19	45.89	45.65	45.62	45.95	45.87	45.16	46.65	45.80	45.94	45.68
Median	46.35	46.27	46.03	46.00	45.70	45.86	46.28	45.90	45.59	45.66	45.90	45.85	45.25	46.70	45.80	45.92	45.60
Std.Dev.	0.18	0.08	0.11	0.06	0.29	0.22	0.40	0.24	0.19	0.20	0.12	0.11	0.41	0.09	0.08	0.10	0.15
Rel.Std.Dev.	0.38%	0.17%	0.24%	0.14%	0.63%	0.48%	0.87%	0.51%	0.42%	0.44%	0.27%	0.24%	0.90%	0.19%	0.18%	0.22%	0.33%
PDM <sup>3</sup>	0.92%	0.72%	0.25%	0.18%	-0.58%	-0.25%	0.57%	-0.07%	-0.59%	-0.66%	0.05%	-0.12%	-1.66%	1.58%	-0.27%	0.02%	-0.55%

Table A16. Fusion XRF results for SO<sub>3</sub> in OREAS 185 (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	0.004	<0.01	0.002	0.002	<0.001	NR	<0.001	<0.002	NR	NR	0.007	NR	NR	NR	<0.01	<0.002	NR
2	0.006	<0.01	0.004	0.002	<0.001	NR	0.001	<0.002	NR	NR	0.008	NR	NR	NR	<0.01	<0.002	NR
3	0.005	<0.01	0.003	0.003	<0.001	NR	<0.001	<0.002	NR	NR	0.006	NR	NR	NR	<0.01	<0.002	NR
4	0.006	<0.01	0.002	0.004	<0.001	NR	0.002	<0.002	NR	NR	0.008	NR	NR	NR	<0.01	<0.002	NR
5	0.007	<0.01	0.002	0.004	0.007	NR	<b>0.009</b>	<b>0.040</b>	NR	NR	0.005	NR	NR	NR	NR	NR	NR
6	0.007	<0.01	0.002	0.005	0.007	NR	<b>0.028</b>	<b>0.031</b>	NR	NR	0.004	NR	NR	NR	NR	NR	NR
7	0.007	<0.01	0.002	0.004	0.007	NR	<b>0.022</b>	<b>0.034</b>	NR	NR	0.005	NR	NR	NR	NR	NR	NR
8	0.008	<0.01	0.002	0.003	0.006	NR	<b>0.007</b>	<b>0.028</b>	NR	NR	0.005	NR	NR	NR	NR	NR	NR
9	0.005	<0.01	0.004	0.002	0.003	NR	<b>0.016</b>	<0.002	NR	NR	0.005	NR	NR	NR	NR	NR	NR
10	0.003	<0.01	0.003	0.003	0.005	NR	<b>0.014</b>	<0.002	NR	NR	0.004	NR	NR	NR	NR	NR	NR
11	0.005	<0.01	0.004	0.004	0.003	NR	<b>&lt;0.001</b>	<0.002	NR	NR	0.002	NR	NR	NR	NR	NR	NR
12	0.004	<0.01	0.004	0.002	0.004	NR	<b>0.018</b>	<0.002	NR	NR	0.002	NR	NR	NR	NR	NR	NR
Mean	0.006		0.003	0.003	0.005		0.013	0.033			0.005						
Median	0.006		0.003	0.003	0.006		0.014	0.033			0.005						
Std.Dev.	0.002		0.001	0.001	0.002		0.009	0.005			0.002						
Rel.Std.Dev.	26.96%		33.09%	32.52%	33.38%		69.76%	15.41%			38.86%						
PDM <sup>3</sup>	43.06%		-27.40%	-18.86%	34.52%		233.10%	751.96%			30.25%						

Table A17. Fusion XRF results for TiO<sub>2</sub> in OREAS 185 (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>0.050</b>	0.035	0.030	0.030	0.030	NR	0.030	0.050	0.040	0.034	0.040	0.050	NR	0.030	0.030	0.024	0.030
2	<b>0.050</b>	0.035	0.030	0.031	0.030	NR	0.030	0.020	0.040	0.033	0.030	0.050	NR	0.030	0.030	0.022	0.030
3	<b>0.050</b>	0.030	0.030	0.030	0.030	NR	0.030	0.040	0.040	0.026	0.040	0.040	NR	0.030	0.030	0.033	0.020
4	<b>0.050</b>	0.035	0.030	0.031	0.030	NR	0.030	<b>0.060</b>	0.040	0.031	0.040	0.040	NR	0.030	0.040	0.021	0.030
5	0.040	0.040	0.030	0.033	0.030	NR	0.030	<b>0.090</b>	0.040	0.037	<b>0.050</b>	0.040	NR	0.030	NR	NR	NR
6	0.040	0.030	0.030	0.031	0.020	NR	0.030	<b>0.130</b>	0.040	0.028	<b>0.040</b>	0.050	NR	0.030	NR	NR	NR
7	0.040	0.035	0.030	0.030	0.020	NR	0.030	<b>0.060</b>	0.040	0.025	<b>0.050</b>	0.050	NR	0.030	NR	NR	NR
8	0.050	0.030	0.030	0.032	0.020	NR	0.030	<b>0.060</b>	0.030	0.035	<b>0.050</b>	0.040	NR	0.030	NR	NR	NR
9	<b>0.050</b>	0.030	0.030	0.031	0.040	NR	0.030	0.030	0.040	0.035	0.040	0.040	NR	0.030	NR	NR	NR
10	<b>0.040</b>	0.040	0.030	0.032	0.040	NR	0.030	0.050	0.040	0.034	0.030	0.040	NR	0.030	NR	NR	NR
11	<b>0.050</b>	0.030	0.030	0.030	0.030	NR	0.030	0.030	0.040	0.038	0.040	0.030	NR	0.030	NR	NR	NR
12	<b>0.050</b>	0.033	0.030	0.032	0.030	NR	0.030	0.030	0.040	0.032	0.030	0.030	NR	0.030	NR	NR	NR
Mean	0.047	0.034	0.030	0.031	0.029		0.030	0.054	0.039	0.032	0.040	0.042		0.03	0.03	0.03	0.03
Median	0.050	0.034	0.030	0.031	0.030		0.030	0.050	0.040	0.034	0.040	0.040		0.03	0.03	0.02	0.03
Std.Dev.	0.005	0.004	0.000	0.001	0.007		0.000	0.031	0.003	0.004	0.007	0.007		0.00	0.01	0.01	0.01
Rel.Std.Dev.	10.55%	11.15%	0.00%	3.20%	22.92%		0.00%	56.47%	7.37%	12.81%	18.46%	17.23%		0.00%	15.38%	20.65%	18.18%
PDM <sup>3</sup>	40.99%	1.55%	-9.36%	-6.09%	-11.88%		-9.36%	63.65%	18.33%	-2.31%	20.85%	25.88%		-9.36%	-1.81%	-24.47%	-16.92%

Table A18. Fusion XRF results for Zn in OREAS 185 (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	140	136	150	140	140	142	<b>90</b>	170	150	160	130	<b>200</b>	NR	<b>230</b>	<100	125	NR
2	140	135	140	145	160	145	<b>100</b>	150	150	170	120	<b>200</b>	NR	<b>210</b>	<100	138	NR
3	140	134	140	145	140	145	<b>100</b>	160	150	160	130	<b>200</b>	NR	<b>200</b>	<100	150	NR
4	140	141	140	140	140	144	<b>90</b>	150	150	140	120	<b>200</b>	NR	<b>210</b>	<100	161	NR
5	140	139	140	145	160	144	<b>80</b>	150	150	160	120	120	NR	<b>220</b>	NR	NR	NR
6	140	133	140	145	150	146	<b>90</b>	140	150	170	130	120	NR	<b>230</b>	NR	NR	NR
7	140	139	140	145	160	145	<b>80</b>	170	150	160	130	120	NR	<b>220</b>	NR	NR	NR
8	140	132	140	145	160	144	<b>110</b>	150	150	130	130	130	NR	<b>230</b>	NR	NR	NR
9	140	148	140	145	160	146	<b>90</b>	150	150	160	130	120	NR	<b>210</b>	NR	NR	NR
10	140	143	140	145	160	145	<b>80</b>	160	150	170	130	120	NR	<b>210</b>	NR	NR	NR
11	140	135	150	135	150	143	<b>50</b>	170	150	160	130	120	NR	<b>210</b>	NR	NR	NR
12	140	140	150	140	160	141	<b>110</b>	150	150	180	130	120	NR	<b>220</b>	NR	NR	NR
Mean	140	138	143	143	153	144	<b>89</b>	156	150	160	128	148		<b>217</b>		144	
Median	140	137	140	145	160	144	90	150	150	160	130	120		215		144	
Std.Dev.	0.000	4.678	4.523	3.343	8.876	1.659	16.214	9.962	0.000	13.484	4.523	38.876		9.85		15.50	
Rel.Std.Dev.	0.00%	3.40%	3.17%	2.34%	5.79%	1.15%	18.18%	6.39%	0.00%	8.43%	3.55%	26.36%		4.54%		10.80%	
PDM <sup>3</sup>	-2.25%	-3.89%	-0.50%	-0.21%	7.06%	0.64%	-37.74%	8.81%	4.74%	11.72%	-10.98%	2.99%		51.28%		0.20%	

Table A19. Results for LOI at 1000°C in OREAS 185 (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	9.67	9.73	9.58	9.64	9.47	<b>10.53</b>	NR	9.75	9.22	<b>10.14</b>	9.76	9.80	<b>10.14</b>	<b>9.11</b>	NR	9.66	9.86
2	9.64	9.76	9.56	9.65	9.45	<b>10.50</b>	NR	9.74	9.14	<b>10.33</b>	9.75	9.80	<b>10.25</b>	<b>9.15</b>	NR	9.69	9.85
3	9.62	9.75	9.60	9.63	9.46	<b>10.40</b>	NR	9.75	9.23	<b>10.31</b>	9.73	9.70	<b>10.24</b>	<b>9.16</b>	NR	9.66	9.75
4	9.54	9.76	9.57	9.67	9.41	<b>10.43</b>	NR	9.76	<b>9.53</b>	<b>10.38</b>	9.71	9.80	<b>10.22</b>	<b>9.15</b>	NR	9.65	9.79
5	9.61	9.75	9.60	9.65	9.64	<b>10.77</b>	9.77	9.64	9.53	<b>10.14</b>	9.97	9.50	<b>9.96</b>	9.19	9.36	NR	NR
6	9.53	9.74	9.65	9.62	9.65	<b>10.63</b>	9.98	9.76	9.49	<b>10.17</b>	9.98	9.50	9.40	9.16	9.28	NR	NR
7	9.55	9.75	9.59	9.67	9.41	<b>10.63</b>	9.80	9.59	9.43	<b>10.69</b>	9.96	9.50	9.45	9.31	9.28	NR	NR
8	9.55	9.75	9.67	9.63	9.84	<b>10.81</b>	9.78	9.82	9.64	<b>10.95</b>	10.11	9.50	9.53	9.25	<b>9.75</b>	NR	NR
9	9.68	9.78	9.64	9.60	9.63	<b>10.15</b>	9.83	9.62	9.69	<b>10.26</b>	10.11	9.50	<b>11.42</b>	<b>9.12</b>	NR	NR	NR
10	9.64	9.77	9.62	9.63	9.61	<b>10.07</b>	9.89	9.62	9.57	<b>10.24</b>	10.12	9.50	<b>11.42</b>	<b>9.13</b>	NR	NR	NR
11	9.62	9.78	9.61	9.58	9.55	<b>10.24</b>	9.66	9.51	9.74	<b>10.39</b>	10.01	9.50	<b>11.51</b>	<b>9.00</b>	NR	NR	NR
12	9.63	9.78	9.63	9.61	9.50	<b>10.89</b>	9.73	9.51	9.65	<b>10.62</b>	9.91	9.50	<b>11.46</b>	<b>9.10</b>	NR	NR	NR
Mean	9.61	9.76	9.61	9.63	9.55	<b>10.50</b>	9.81	9.67	9.49	<b>10.38</b>	9.93	9.59	10.42	9.15	9.42	9.67	9.81
Median	9.62	9.76	9.61	9.63	9.53	10.52	9.79	9.69	9.53	10.32	9.97	9.50	10.23	9.15	9.32	9.66	9.82
Std.Dev.	0.05	0.02	0.03	0.03	0.13	0.26	0.10	0.10	0.20	0.25	0.15	0.14	0.82	0.08	0.22	0.02	0.05
Rel.Std.Dev.	0.54%	0.18%	0.35%	0.28%	1.33%	2.46%	1.00%	1.08%	2.08%	2.41%	1.56%	1.44%	7.87%	0.84%	2.39%	0.18%	0.53%
PDM <sup>3</sup>	-0.01%	1.55%	0.02%	0.25%	-0.58%	9.32%	2.05%	0.67%	-1.24%	8.08%	3.32%	-0.17%	8.41%	-4.74%	-1.98%	0.62%	2.13%

Table A20. Fusion ICP results for Ni in OREAS 185 (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	1.14	1.15	1.09	1.13	1.11	1.10	1.13	<b>1.08</b>	1.17	1.12	1.16	1.10
2	1.13	<b>1.12</b>	1.10	1.15	1.12	1.11	1.13	<b>1.00</b>	1.15	1.12	1.06	1.10
3	1.15	1.15	1.11	1.12	1.09	1.10	1.13	<b>1.01</b>	1.13	1.12	1.10	1.09
4	1.14	1.15	1.10	1.18	1.13	1.12	1.14	<b>0.99</b>	1.18	1.12	1.14	1.08
5	1.12	1.16	1.10	1.09	1.13	1.10	1.19	<b>1.03</b>	<b>1.19</b>	1.12	NR	NR
6	1.11	1.14	1.11	1.09	1.12	1.11	1.18	<b>1.05</b>	<b>1.23</b>	1.13	NR	NR
7	1.11	1.18	1.13	1.12	1.11	1.10	1.19	<b>1.07</b>	<b>1.22</b>	1.13	NR	NR
8	1.13	1.15	1.12	1.10	1.12	1.10	1.18	<b>1.02</b>	<b>1.18</b>	1.14	NR	NR
9	1.15	1.07	<b>1.05</b>	1.10	1.10	1.15	1.16	1.08	1.12	1.12	NR	NR
10	1.15	1.07	<b>1.05</b>	1.12	1.16	1.13	1.14	1.08	1.19	1.13	NR	NR
11	1.12	1.07	<b>1.06</b>	1.10	1.15	1.12	1.14	1.11	1.17	1.11	NR	NR
12	1.12	1.07	<b>1.03</b>	1.08	1.13	1.10	1.13	<b>0.92</b>	1.17	1.12	NR	NR
Mean	1.13	1.12	1.09	1.11	1.12	1.11	1.15	1.04	1.18	1.12	1.12	1.09
Median	1.13	1.14	1.10	1.11	1.12	1.11	1.14	1.04	1.18	1.12	1.12	1.09
Std.Dev.	0.01	0.04	0.03	0.03	0.02	0.02	0.02	0.05	0.03	0.01	0.04	0.01
Rel.Std.Dev.	1.31%	3.68%	2.94%	2.55%	1.54%	1.43%	2.17%	5.12%	2.74%	0.61%	3.98%	0.84%
PDM <sup>3</sup>	0.77%	0.36%	-2.95%	-0.64%	0.18%	-0.71%	2.93%	-7.35%	4.95%	0.07%	-0.49%	-2.46%



Table A21. Fusion ICP results for Co in OREAS 185 (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	<b>340</b>	381	400	380	373	380	390	435	390	380	388	388
2	<b>340</b>	380	380	350	381	380	380	428	373	380	357	390
3	<b>330</b>	393	380	360	374	380	390	<b>451</b>	368	390	365	385
4	<b>340</b>	382	400	360	368	360	400	395	363	390	370	384
5	410	436	360	390	391	360	390	410	381	390	NR	NR
6	370	401	380	380	388	360	400	435	388	390	NR	NR
7	390	423	380	410	399	360	410	412	387	400	NR	NR
8	430	400	380	390	382	360	390	420	380	390	NR	NR
9	360	403	400	370	421	370	360	340	360	390	NR	NR
10	340	393	400	420	430	380	360	358	375	380	NR	NR
11	400	393	400	400	425	380	370	364	372	390	NR	NR
12	380	400	400	380	425	380	360	339	369	380	NR	NR
Mean	369	399	388	383	396	371	383	399	375	388	370	387
Median	365	397	390	380	390	375	390	411	374	390	368	387
Std.Dev.	33	17	13	21	23	10	17	39	10	6	13	3
Rel.Std.Dev.	8.91%	4.17%	3.44%	5.48%	5.78%	2.69%	4.50%	9.83%	2.65%	1.60%	3.55%	0.67%
PDM <sup>3</sup>	-4.10%	3.59%	0.88%	-0.63%	2.98%	-3.66%	-0.42%	3.63%	-2.46%	0.66%	-3.88%	0.52%

Table A22. Fusion ICP results for Al<sub>2</sub>O<sub>3</sub> in OREAS 185 (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	2.54	2.44	2.32	<b>2.34</b>	2.55	2.49	2.45	2.35	<b>2.49</b>	2.46	2.49	2.53
2	2.51	2.45	2.44	<b>2.24</b>	2.51	2.50	2.51	2.38	<b>2.73</b>	2.51	2.47	2.56
3	2.52	2.45	2.42	<b>2.29</b>	2.54	2.49	2.48	2.40	<b>2.81</b>	2.50	<b>2.56</b>	2.59
4	2.53	2.46	2.38	<b>2.28</b>	2.52	2.53	2.53	2.31	<b>2.68</b>	2.46	2.48	2.57
5	2.47	2.50	2.46	2.32	2.51	2.52	2.46	2.31	2.48	2.39	NR	NR
6	2.44	2.53	2.51	2.44	2.49	2.52	2.54	2.39	2.48	2.43	NR	NR
7	2.45	2.53	2.48	2.51	2.51	2.48	2.48	<b>2.27</b>	<b>2.41</b>	2.46	NR	NR
8	2.46	2.46	2.51	2.41	2.55	2.48	2.50	2.42	2.51	2.43	NR	NR
9	<b>3.11</b>	<b>2.31</b>	2.44	<b>2.20</b>	2.54	2.48	2.42	<b>2.28</b>	2.49	2.45	NR	NR
10	<b>3.50</b>	<b>2.33</b>	2.40	<b>2.44</b>	2.58	2.46	2.39	<b>2.30</b>	2.42	2.45	NR	NR
11	<b>2.52</b>	<b>2.31</b>	2.31	<b>2.38</b>	2.55	2.50	2.46	<b>2.37</b>	2.46	2.44	NR	NR
12	<b>2.51</b>	<b>2.34</b>	2.32	<b>2.20</b>	2.56	2.50	2.49	<b>2.30</b>	2.46	2.42	NR	NR
Mean	2.63	2.43	2.42	2.34	2.53	2.50	2.48	2.34	2.53	2.45	2.50	2.56
Median	2.52	2.45	2.43	2.33	2.54	2.50	2.48	2.33	2.48	2.45	2.49	2.57
Std.Dev.	0.33	0.08	0.07	0.10	0.03	0.02	0.04	0.05	0.13	0.03	0.04	0.02
Rel.Std.Dev.	12.46%	3.39%	2.96%	4.30%	1.03%	0.81%	1.75%	2.20%	5.12%	1.34%	1.63%	0.91%
PDM <sup>3</sup>	6.49%	-1.78%	-2.18%	-5.35%	2.61%	1.06%	0.25%	-5.26%	2.61%	-0.80%	1.23%	3.75%

Table A23. Fusion ICP results for CaO in OREAS 185 (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	<b>0.540</b>	0.360	0.400	<b>0.360</b>	0.390	0.380	0.400	0.411	<b>0.337</b>	0.350	0.400	<b>0.455</b>
2	<b>0.470</b>	0.380	0.400	<b>0.280</b>	0.390	0.380	0.400	0.409	<b>0.323</b>	0.400	<b>0.300</b>	<b>0.432</b>
3	<b>0.430</b>	0.380	0.400	<b>0.290</b>	0.390	0.380	0.400	0.414	<b>0.318</b>	0.420	<b>0.300</b>	<b>0.468</b>
4	<b>0.450</b>	0.400	0.400	<b>0.290</b>	0.390	0.390	0.400	0.396	<b>0.314</b>	0.360	0.400	<b>0.473</b>
5	<b>0.550</b>	0.400	0.400	<b>0.330</b>	0.390	0.390	0.400	<b>0.437</b>	0.384	<b>0.310</b>	NR	NR
6	<b>0.490</b>	0.410	0.400	<b>0.260</b>	0.400	0.390	0.400	0.399	0.374	0.330	NR	NR
7	<b>0.490</b>	0.400	0.400	<b>0.310</b>	0.390	0.390	0.390	0.396	0.376	0.410	NR	NR
8	<b>0.430</b>	0.380	0.400	<b>0.300</b>	0.380	0.390	0.400	0.407	0.391	0.400	NR	NR
9	<b>0.560</b>	0.320	0.400	<b>0.310</b>	0.380	0.380	0.400	0.394	<b>0.337</b>	<b>0.460</b>	NR	NR
10	<b>0.510</b>	0.350	0.400	<b>0.390</b>	0.380	0.370	0.380	0.394	<b>0.337</b>	<b>0.570</b>	NR	NR
11	<b>0.450</b>	0.350	0.400	<b>0.330</b>	0.390	0.380	0.370	0.400	<b>0.337</b>	<b>0.440</b>	NR	NR
12	<b>0.490</b>	0.280	0.400	<b>0.300</b>	0.380	0.380	0.400	0.398	<b>0.327</b>	<b>0.380</b>	NR	NR
Mean	<b>0.488</b>	0.368	0.400	<b>0.313</b>	0.388	0.383	0.395	0.405	0.346	0.403	0.350	0.457
Median	0.490	0.380	0.400	0.305	0.390	0.380	0.400	0.400	0.337	0.400	0.350	0.462
Std.Dev.	0.045	0.038	0.000	0.036	0.006	0.007	0.010	0.012	0.027	0.069	0.058	0.018
Rel.Std.Dev.	9.19%	10.39%	0.00%	11.43%	1.60%	1.70%	2.53%	3.05%	7.90%	17.09%	16.50%	4.02%
PDM <sup>3</sup>	24.90%	-6.01%	2.30%	-20.07%	-0.89%	-1.96%	1.03%	3.48%	-11.46%	2.94%	-10.48%	16.89%

Table A24. Fusion ICP results for Cu in OREAS 185 (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	30	50	<50	<50	30	<50	<10	33	<50	15	33
2	<50	32	<50	<50	<50	40	<50	23	30	<50	18	27
3	<50	31	<50	<50	<50	30	<50	<10	31	<50	30	28
4	<50	34	<50	<50	<50	20	<50	<10	32	<50	28	37
5	<50	<20	<50	<50	<50	30	<50	<10	18	<50	NR	NR
6	<50	<20	<50	<50	<50	30	<50	<10	21	<50	NR	NR
7	<50	<20	<50	<50	<50	40	<50	<10	18	<50	NR	NR
8	<50	<20	<50	<50	<50	30	<50	<10	21	<50	NR	NR
9	<50	<20	<50	<50	<50	30	<50	<10	31	<50	NR	NR
10	<50	<20	<50	<50	<50	30	<50	<10	38	<50	NR	NR
11	<50	21	<50	<50	<50	20	<50	<10	39	<50	NR	NR
12	<50	21	<50	<50	<50	20	<50	<10	34	<50	NR	NR
Mean		28	50			29		23	29		23	31
Median		31	50			30		23	31		23	31
Std.Dev.		6				7			7		7	4
Rel.Std.Dev.		20.26%				22.92%			25.19%		32.38%	13.73%
PDM <sup>3</sup>		3.76%	84.18%			7.44%		-16.48%	6.18%		-16.20%	15.30%

Table A25. Fusion ICP results for Cr<sub>2</sub>O<sub>3</sub> in OREAS 185 (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	0.940	0.953	0.935	0.880	0.916	0.884	0.870	0.917	<b>0.922</b>	0.921	0.966	0.940
2	0.920	0.944	0.950	0.820	0.909	0.896	0.890	0.930	<b>0.817</b>	0.921	0.885	0.952
3	0.940	0.952	0.945	0.860	0.914	0.888	0.870	0.936	<b>0.818</b>	0.921	0.915	0.934
4	0.940	0.957	0.945	0.850	0.921	<b>0.920</b>	0.880	0.920	<b>0.830</b>	0.906	0.915	0.944
5	0.940	0.916	0.900	0.880	0.893	0.894	<b>1.010</b>	0.903	0.950	0.921	NR	NR
6	0.920	0.894	0.885	<b>0.800</b>	0.890	0.893	<b>1.020</b>	0.929	0.928	0.935	NR	NR
7	0.920	0.915	0.885	0.880	0.889	0.873	<b>1.020</b>	0.877	0.934	0.935	NR	NR
8	0.920	0.885	0.890	0.860	0.903	0.879	<b>1.020</b>	0.930	0.939	0.935	NR	NR
9	0.940	0.894	0.865	<b>0.800</b>	0.897	0.893	0.970	0.868	0.925	0.921	NR	NR
10	0.950	0.894	0.855	0.860	0.910	0.891	0.950	0.877	0.904	0.921	NR	NR
11	0.920	0.898	0.840	0.860	0.912	0.895	0.950	0.881	0.918	0.906	NR	NR
12	0.920	0.899	0.850	0.820	0.901	0.901	0.950	0.888	0.900	0.906	NR	NR
Mean	0.931	0.917	0.895	0.848	0.905	0.892	0.950	0.905	0.899	0.921	0.920	0.942
Median	0.930	0.907	0.888	0.860	0.906	0.893	0.950	0.910	0.920	0.921	0.915	0.942
Std.Dev.	0.012	0.027	0.040	0.030	0.011	0.012	0.060	0.025	0.049	0.011	0.034	0.008
Rel.Std.Dev.	1.25%	2.98%	4.44%	3.53%	1.18%	1.31%	6.35%	2.78%	5.40%	1.17%	3.65%	0.82%
PDM <sup>3</sup>	2.26%	0.71%	-1.63%	-6.90%	-0.63%	-1.98%	4.36%	-0.62%	-1.27%	1.16%	1.09%	3.53%

Table A26. Fusion ICP results for Fe<sub>2</sub>O<sub>3</sub> in OREAS 185 (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	18.40	18.79	18.30	<b>17.50</b>	18.84	18.68	<b>17.67</b>	19.38	<b>19.35</b>	18.50	17.50	18.93
2	18.30	18.32	18.20	<b>16.25</b>	18.68	18.77	18.34	19.21	17.86	18.50	17.30	19.00
3	18.50	18.72	18.40	<b>17.25</b>	18.75	18.83	18.30	19.57	18.02	18.50	17.80	18.96
4	18.35	18.81	18.60	<b>16.85</b>	18.73	18.51	18.47	19.17	17.71	18.45	18.00	18.83
5	18.50	18.48	18.20	17.35	18.47	18.53	17.39	17.42	18.79	17.75	NR	NR
6	18.40	18.32	17.90	17.85	18.37	18.46	17.61	17.76	18.88	17.95	NR	NR
7	18.45	<b>18.94</b>	18.00	17.75	18.25	18.45	18.59	17.38	<b>19.61</b>	18.00	NR	NR
8	18.55	18.25	18.00	17.30	18.55	18.50	18.05	17.98	18.61	18.10	NR	NR
9	18.00	17.90	18.30	16.80	18.41	19.12	17.90	18.30	18.45	18.50	NR	NR
10	18.00	18.06	18.00	18.45	18.50	18.81	18.16	18.26	18.03	18.70	NR	NR
11	18.40	18.06	17.60	17.80	18.59	18.58	<b>15.93</b>	18.48	17.78	18.55	NR	NR
12	18.50	17.99	17.70	<b>16.70</b>	18.41	18.49	18.01	18.01	17.84	18.50	NR	NR
Mean	18.36	18.39	18.10	17.32	18.55	18.64	17.87	18.41	18.41	18.33	17.65	18.93
Median	18.40	18.32	18.10	17.33	18.53	18.56	18.03	18.28	18.24	18.50	17.65	18.94
Std.Dev.	0.18	0.36	0.29	0.61	0.18	0.20	0.71	0.76	0.64	0.30	0.31	0.08
Rel.Std.Dev.	1.00%	1.94%	1.60%	3.50%	0.96%	1.09%	3.97%	4.13%	3.50%	1.63%	1.76%	0.40%
PDM <sup>3</sup>	0.52%	0.66%	-0.91%	-5.18%	1.53%	2.07%	-2.18%	0.78%	0.78%	0.36%	-3.38%	3.63%

Table A27. Fusion ICP results for K<sub>2</sub>O in OREAS 185 (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	0.020	<0.01	<0.01	<0.1	<0.01	0.120	<0.2	0.064
2	<0.1	<0.1	<0.02	<0.1	0.020	<0.01	<0.01	<0.1	0.033	0.120	<0.2	0.063
3	<0.1	<0.1	<0.02	<0.1	0.010	<0.01	<0.01	<0.1	<0.01	0.120	<0.2	0.081
4	<0.1	<0.1	<0.02	<0.1	<0.01	<0.01	<0.01	<0.1	0.021	<0.1	<0.2	0.078
5	0.300	<0.1	0.100	<0.1	0.010	<0.01	0.020	<0.1	0.006	<0.1	NR	NR
6	0.300	<0.1	<0.1	<0.1	0.010	<0.01	0.020	0.143	0.005	0.120	NR	NR
7	0.300	<0.1	0.100	<0.1	0.010	<0.01	<0.01	0.124	0.006	0.120	NR	NR
8	0.200	<0.1	<0.1	<0.1	0.020	<0.01	0.020	0.115	0.006	0.120	NR	NR
9	0.300	<0.1	0.100	<0.1	0.010	<0.01	0.020	<0.1	0.006	<0.1	NR	NR
10	0.300	<0.1	<0.1	<0.1	0.010	<0.01	0.020	0.143	0.005	0.120	NR	NR
11	0.300	<0.1	0.100	<0.1	0.010	<0.01	<0.01	0.124	0.006	0.120	NR	NR
12	0.200	<0.1	<0.1	<0.1	0.020	<0.01	0.020	0.115	0.006	0.120	NR	NR
Mean	0.256		0.100		0.014		0.020	0.127	0.010	0.120		0.072
Median	0.300		0.100		0.010		0.020	0.124	0.006	0.120		0.071
Std.Dev.	0.073		0.000		0.005		0.000	0.013	0.009	0.000		0.009
Rel.Std.Dev.	28.43%		0.00%		37.00%		0.00%	10.04%	94.71%	0.00%		13.12%
PDM <sup>3</sup>	184.53%		11.34%		-84.82%		-77.73%	41.77%	-88.91%	34.12%		-20.30%

Table A28. Fusion ICP results for MgO in OREAS 185 (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	20.00	19.89	19.10	<b>19.15</b>	20.81	20.43	20.25	<b>21.70</b>	<b>18.89</b>	20.00	<b>18.60</b>	20.30
2	19.80	19.45	19.20	<b>17.85</b>	20.47	20.48	20.34	<b>21.52</b>	20.18	20.20	<b>18.20</b>	20.53
3	20.00	19.92	19.40	<b>18.60</b>	20.48	20.51	20.03	<b>21.99</b>	20.82	20.10	<b>18.50</b>	20.50
4	19.95	19.99	19.60	<b>18.30</b>	20.45	20.25	20.29	<b>21.40</b>	20.77	20.00	<b>18.60</b>	20.30
5	20.40	<b>21.58</b>	19.70	19.40	20.20	19.89	19.42	20.81	20.11	20.40	NR	NR
6	20.20	<b>21.41</b>	19.60	20.60	20.02	19.89	20.44	21.00	20.22	20.50	NR	NR
7	20.30	<b>22.28</b>	19.70	20.70	20.11	19.98	19.86	20.50	21.34	20.50	NR	NR
8	20.40	<b>21.58</b>	19.70	20.00	20.08	19.84	20.33	21.22	20.70	20.50	NR	NR
9	20.20	19.86	19.60	19.55	20.33	21.24	19.47	20.98	18.99	19.95	NR	NR
10	20.20	20.08	19.20	20.90	20.43	21.00	19.58	21.02	19.44	19.95	NR	NR
11	19.95	20.00	18.70	20.90	20.48	19.66	19.81	21.53	20.01	19.90	NR	NR
12	19.95	20.15	18.90	19.45	20.17	19.69	20.18	21.12	19.40	19.85	NR	NR
Mean	20.11	20.52	19.37	19.62	20.34	20.24	20.00	21.23	20.07	20.15	18.48	20.41
Median	20.10	20.04	19.50	19.50	20.38	20.12	20.11	21.17	20.14	20.05	18.55	20.40
Std.Dev.	0.20	0.92	0.34	1.03	0.23	0.51	0.36	0.41	0.77	0.25	0.19	0.12
Rel.Std.Dev.	0.98%	4.50%	1.77%	5.27%	1.12%	2.52%	1.81%	1.95%	3.84%	1.26%	1.02%	0.61%
PDM <sup>3</sup>	-0.31%	1.69%	-4.01%	-2.77%	0.80%	0.32%	-0.87%	5.24%	-0.51%	-0.10%	-8.43%	1.16%



Table A29. Fusion ICP results for MnO in OREAS 185 (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	0.290	0.299	0.290	<b>0.260</b>	0.300	0.290	0.294	0.291	<b>0.301</b>	0.300	<b>0.303</b>	0.305
2	0.290	0.292	0.290	<b>0.240</b>	0.300	0.290	0.300	0.287	<b>0.272</b>	0.300	0.279	0.304
3	0.290	0.299	0.290	<b>0.270</b>	0.300	0.290	0.299	0.293	<b>0.275</b>	0.300	0.286	0.304
4	0.290	0.300	0.292	<b>0.260</b>	0.300	0.290	0.300	0.285	<b>0.270</b>	0.300	0.281	0.301
5	0.300	0.299	0.296	<b>0.280</b>	0.290	0.290	0.294	0.296	0.312	0.300	NR	NR
6	0.300	0.297	0.294	<b>0.260</b>	0.290	0.300	0.307	0.302	0.308	0.300	NR	NR
7	0.300	0.306	0.296	<b>0.280</b>	0.290	0.300	0.306	0.295	<b>0.322</b>	0.300	NR	NR
8	0.300	0.295	0.294	<b>0.280</b>	0.290	0.300	0.305	0.304	0.312	0.300	NR	NR
9	0.290	0.288	0.294	<b>0.270</b>	0.300	0.290	0.292	0.293	0.308	0.300	NR	NR
10	0.300	0.287	0.292	0.300	0.300	0.290	0.292	0.294	0.299	0.300	NR	NR
11	0.300	0.289	0.278	0.280	0.290	0.300	0.291	0.301	0.304	0.300	NR	NR
12	0.300	0.288	0.282	<b>0.270</b>	0.290	0.300	0.296	0.292	0.299	0.300	NR	NR
Mean	0.296	0.295	0.291	0.271	0.295	0.294	0.298	0.294	0.299	0.300	0.287	0.303
Median	0.300	0.296	0.292	0.270	0.295	0.290	0.298	0.294	0.303	0.300	0.284	0.304
Std.Dev.	0.005	0.006	0.005	0.015	0.005	0.005	0.006	0.006	0.017	0.000	0.011	0.002
Rel.Std.Dev.	1.74%	2.05%	1.89%	5.56%	1.77%	1.75%	1.92%	1.95%	5.71%	0.00%	3.80%	0.59%
PDM <sup>3</sup>	0.16%	-0.15%	-1.59%	-8.31%	-0.13%	-0.41%	0.89%	-0.32%	1.08%	1.57%	-2.75%	2.72%

Table A30. Fusion ICP results for Na<sub>2</sub>O in OREAS 185 (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	0.020	0.020	0.020	0.014	0.027	NR	NR	NR
2	NR	NR	NR	NR	0.020	0.020	0.020	<0.01	0.026	NR	NR	NR
3	NR	NR	NR	NR	0.020	0.020	0.020	<0.01	0.026	NR	NR	NR
4	NR	NR	NR	NR	0.020	0.020	0.020	<0.01	0.025	NR	NR	NR
5	NR	NR	NR	NR	0.030	0.020	0.030	0.024	0.027	NR	NR	NR
6	NR	NR	NR	NR	0.030	0.020	0.030	0.028	0.027	NR	NR	NR
7	NR	NR	NR	NR	0.030	0.020	0.020	0.026	0.027	NR	NR	NR
8	NR	NR	NR	NR	0.030	0.020	0.030	0.030	0.029	NR	NR	NR
9	NR	NR	NR	NR	0.030	0.020	0.030	0.026	<b>0.036</b>	NR	NR	NR
10	NR	NR	NR	NR	0.020	0.020	0.020	0.025	<b>0.037</b>	NR	NR	NR
11	NR	NR	NR	NR	0.020	0.020	0.020	0.022	<b>0.036</b>	NR	NR	NR
12	NR	NR	NR	NR	0.020	0.020	0.020	0.021	<b>0.036</b>	NR	NR	NR
Mean					0.024	0.020	0.023	0.024	0.030			
Median					0.020	0.020	0.020	0.025	0.027			
Std.Dev.					0.005	0.000	0.005	0.005	0.005			
Rel.Std.Dev.					21.31%	0.00%	21.10%	19.43%	15.66%			
PDM <sup>3</sup>					2.18%	-15.44%	-1.34%	1.47%	26.14%			

Table A31. Fusion ICP results for P<sub>2</sub>O<sub>5</sub> in OREAS 185 (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	0.010	<0.01	<0.01	NR	NR	0.013
2	NR	<0.03	<0.02	<0.02	<0.01	<0.01	0.010	<0.01	0.018	NR	NR	0.006
3	NR	<0.03	<0.02	<0.02	<0.01	<0.01	0.010	<0.01	0.009	NR	NR	0.024
4	NR	<0.03	<0.02	<0.02	<0.01	<0.01	0.020	<0.01	0.013	NR	NR	<0.002
5	NR	<0.03	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	NR	NR	NR
6	NR	<0.03	<0.02	<0.02	0.010	<0.01	0.010	<0.01	<0.01	NR	NR	NR
7	NR	<0.03	0.020	0.020	<0.01	0.020	<0.01	<0.01	<0.01	NR	NR	NR
8	NR	<0.03	<0.02	<0.02	0.010	<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	<b>0.040</b>	0.020	0.010	<0.01	<0.01	<0.01	<0.01	NR	NR	NR
11	NR	<0.03	<b>0.060</b>	<0.02	0.010	<0.01	<0.01	<0.01	0.007	NR	NR	NR
12	NR	<0.03	<b>0.040</b>	0.020	0.010	<0.01	<0.01	<0.01	<0.01	NR	NR	NR
Mean			0.040	0.020	0.010	0.020	0.012		0.012			0.014
Median			0.040	0.020	0.010	0.020	0.010		0.011			0.013
Std.Dev.			0.014	0.000	0.000		0.004		0.005			0.009
Rel.Std.Dev.			35.36%	0.00%	0.00%		37.27%		42.23%			63.31%
PDM <sup>3</sup>			158.43%	29.21%	-35.39%	29.21%	-22.47%		-22.38%			-7.40%

Table A32. Fusion ICP results for SiO<sub>2</sub> in OREAS 185 (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	47.30	44.90	44.90	<b>44.30</b>	45.86	45.11	45.46	45.04	45.66	46.40	<b>47.10</b>	47.13
2	45.80	44.80	45.10	<b>40.60</b>	45.87	44.96	46.16	45.36	46.15	47.00	43.50	47.43
3	47.00	46.00	45.10	<b>41.90</b>	46.67	44.91	45.92	45.55	45.51	47.00	44.60	47.74
4	46.00	46.20	45.30	<b>41.50</b>	45.95	45.33	46.30	44.42	46.10	46.40	43.40	46.95
5	<b>44.90</b>	47.80	44.90	<b>41.90</b>	45.84	45.90	45.64	46.88	45.92	44.60	NR	NR
6	46.60	46.20	44.30	45.80	45.31	45.81	46.25	47.04	45.73	45.20	NR	NR
7	47.20	47.30	44.70	44.20	45.22	45.96	46.18	45.73	44.95	46.00	NR	NR
8	47.40	46.10	44.70	42.90	46.31	45.82	46.27	48.83	45.92	45.90	NR	NR
9	44.00	<b>48.20</b>	<b>43.80</b>	42.20	46.56	43.98	46.28	<b>36.89</b>	45.35	44.90	NR	NR
10	44.90	<b>49.40</b>	<b>43.20</b>	45.60	46.36	44.55	44.95	<b>37.96</b>	44.92	45.00	NR	NR
11	44.80	<b>49.40</b>	<b>41.90</b>	45.30	46.04	46.12	45.28	<b>37.59</b>	45.33	44.80	NR	NR
12	43.80	<b>48.50</b>	<b>42.60</b>	<b>42.00</b>	45.69	46.29	46.38	<b>37.67</b>	45.25	44.30	NR	NR
Mean	45.81	47.07	44.21	43.18	45.97	45.40	45.92	43.25	45.57	45.63	44.65	47.31
Median	45.90	46.75	44.70	42.55	45.91	45.57	46.17	45.20	45.59	45.55	44.05	47.28
Std.Dev.	1.31	1.60	1.10	1.78	0.45	0.71	0.48	4.38	0.42	0.94	1.72	0.34
Rel.Std.Dev.	2.85%	3.40%	2.49%	4.11%	0.98%	1.55%	1.03%	10.12%	0.92%	2.07%	3.86%	0.73%
PDM <sup>3</sup>	0.49%	3.25%	-3.02%	-5.26%	0.86%	-0.41%	0.74%	-5.13%	-0.04%	0.09%	-2.05%	3.80%

Table A33. Fusion ICP results for SO<sub>3</sub> in OREAS 185 (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	<0.02	<0.05	<0.1	<0.02	<0.01	NR	NR	NR	NR	0.025	<0.01	NR
2	0.020	<0.05	<0.1	<0.02	<0.01	NR	NR	NR	NR	0.025	<0.01	NR
3	<0.02	<0.05	<0.1	0.020	<0.01	NR	NR	NR	NR	0.050	<0.01	NR
4	0.020	<0.05	<0.1	<0.02	<0.01	NR	NR	NR	NR	0.025	<0.01	NR
5	0.040	<0.05	<0.02	<0.02	NR	NR	NR	NR	NR	0.025	NR	NR
6	<0.02	<0.05	<0.02	<0.02	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	0.070	<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	<0.01	NR	NR
11	0.050	<0.05	0.080	<0.02	<0.02	NR	NR	NR	NR	<0.01	NR	NR
12	<0.02	<0.05	0.040	<0.02	<0.02	NR	NR	NR	NR	0.025	NR	NR
Mean	0.037		0.050	0.020						0.034		
Median	0.030		0.040	0.020						0.025		
Std.Dev.	0.021		0.020							0.019		
Rel.Std.Dev.	56.33%		40.00%							54.11%		
PDM <sup>3</sup>	4.02%		41.84%	-43.26%						-2.60%		

Table A34. Fusion ICP results for TiO<sub>2</sub> in OREAS 185 (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	0.030	0.030	0.030	0.032	0.030	0.031	<b>0.022</b>	0.030	0.030	0.030	<b>0.036</b>
2	<0.01	0.030	0.030	0.030	0.033	0.030	0.032	<b>0.023</b>	0.032	0.030	0.030	<b>0.036</b>
3	<0.01	0.030	0.030	0.030	0.033	0.030	0.031	<b>0.025</b>	0.028	0.030	0.030	<b>0.036</b>
4	<0.01	0.030	0.030	0.030	0.032	0.030	0.032	<b>0.020</b>	0.027	0.030	0.030	<b>0.037</b>
5	<0.01	0.030	0.030	0.030	<b>0.034</b>	0.030	0.030	0.032	<b>0.032</b>	0.030	NR	NR
6	<0.01	0.030	0.030	<b>0.020</b>	<b>0.033</b>	0.030	0.033	0.032	<b>0.037</b>	0.030	NR	NR
7	<0.01	0.030	0.030	0.030	<b>0.033</b>	0.030	0.032	0.032	<b>0.032</b>	0.030	NR	NR
8	<b>0.020</b>	0.030	0.030	0.030	<b>0.033</b>	0.030	0.033	0.033	<b>0.032</b>	0.030	NR	NR
9	<0.01	0.030	0.030	<b>0.020</b>	<b>0.033</b>	0.030	0.031	<b>0.026</b>	<b>0.034</b>	0.030	NR	NR
10	<0.01	0.030	0.030	0.030	<b>0.034</b>	0.030	0.031	<b>0.025</b>	<b>0.040</b>	0.030	NR	NR
11	<0.01	0.030	0.030	0.030	<b>0.034</b>	0.030	0.031	<b>0.027</b>	<b>0.040</b>	0.030	NR	NR
12	<0.01	0.030	0.030	0.030	<b>0.034</b>	0.030	0.031	<b>0.026</b>	<b>0.035</b>	0.030	NR	NR
Mean	<b>0.020</b>	0.030	0.030	0.028	0.033	0.030	0.032	0.027	0.033	0.030	0.030	0.036
Median	0.020	0.030	0.030	0.030	0.033	0.030	0.031	0.026	0.032	0.030	0.030	0.036
Std.Dev.		0.000	0.000	0.004	0.001	0.000	0.001	0.004	0.004	0.000	0.000	0.000
Rel.Std.Dev.		0.00%	0.00%	13.74%	2.16%	0.00%	2.87%	16.27%	12.50%	0.00%	0.00%	1.16%
PDM <sup>3</sup>	-34.54%	-1.80%	-1.80%	-7.26%	8.56%	-1.80%	3.11%	-11.90%	8.85%	-1.80%	-1.80%	17.98%

Table A35. Fusion ICP results for Zn in OREAS 185 (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	100	146	150	100	80	NR	100	144	113	<b>200</b>	<b>52</b>	NR
2	200	136	150	100	70	NR	100	147	119	<b>200</b>	<b>40</b>	NR
3	100	146	150	200	70	NR	200	144	127	<b>200</b>	<b>37</b>	NR
4	100	148	100	100	80	NR	100	136	135	<b>200</b>	<b>36</b>	NR
5	<b>200</b>	139	<b>200</b>	200	100	NR	200	138	93	100	NR	NR
6	<b>200</b>	141	<b>200</b>	100	100	NR	100	146	93	100	NR	NR
7	<b>200</b>	147	<b>150</b>	200	90	NR	100	135	93	200	NR	NR
8	<b>200</b>	136	<b>200</b>	200	90	NR	100	159	99	200	NR	NR
9	<b>200</b>	122	<b>200</b>	100	80	NR	100	131	135	<b>200</b>	NR	NR
10	<b>200</b>	116	<b>200</b>	200	80	NR	200	130	120	<b>200</b>	NR	NR
11	<b>200</b>	114	<b>200</b>	100	70	NR	100	136	114	<b>200</b>	NR	NR
12	<b>200</b>	122	<b>200</b>	100	70	NR	100	134	121	<b>200</b>	NR	NR
Mean	175	134	175	142	82		125	140	114	183	41	
Median	200	138	200	100	80		100	137	117	200	39	
Std.Dev.	45	13	34	51	11		45	8	16	39	7	
Rel.Std.Dev.	25.84%	9.37%	19.26%	36.35%	13.65%		36.18%	5.94%	13.65%	21.23%	17.86%	
PDM <sup>3</sup>	37.08%	5.29%	37.08%	10.97%	-36.03%		-2.08%	9.72%	-10.99%	43.61%	-67.69%	

Table A36. Results for C in OREAS 185 (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	0.110	0.130	0.100	0.070	0.120	0.110	0.119	0.070	0.130	0.103	0.110
2	0.100	0.110	0.090	0.080	0.170	0.090	0.157	0.070	0.130	0.113	0.090
3	0.110	0.120	0.090	0.070	0.120	0.080	0.161	0.080	0.140	0.099	0.100
4	0.100	0.110	0.100	0.090	<b>0.180</b>	0.110	0.150	0.080	0.140	0.113	0.100
5	0.070	0.110	0.090	0.080	0.130	0.070	0.116	0.090	0.120	0.135	0.100
6	0.090	0.130	0.080	0.070	0.130	0.100	0.147	0.080	0.130	0.104	0.100
7	0.090	<b>0.310</b>	0.080	0.070	0.130	0.090	0.137	0.080	0.130	0.114	0.100
8	0.100	0.100	0.080	0.070	0.130	0.080	0.134	0.080	0.140	0.104	0.100
9	0.110	0.090	0.070	0.100	0.120	0.090	0.128	0.080	0.130	0.112	0.080
10	0.120	0.090	0.070	0.100	0.120	0.110	0.140	0.080	0.120	0.112	0.080
11	0.110	0.080	0.070	0.100	0.150	0.080	0.121	0.100	0.130	0.102	0.080
12	0.120	<b>0.210</b>	0.070	0.090	0.150	0.090	0.121	0.090	0.130	0.112	0.080
Mean	0.103	0.133	0.083	0.083	0.138	0.092	0.136	0.082	0.131	0.110	0.093
Median	0.105	0.110	0.080	0.080	0.130	0.090	0.136	0.080	0.130	0.112	0.100
Std.Dev.	0.014	0.065	0.011	0.013	0.021	0.013	0.015	0.008	0.007	0.009	0.011
Rel.Std.Dev.	13.88%	49.14%	13.80%	15.61%	14.91%	14.59%	11.33%	10.22%	5.11%	8.61%	11.50%
PDM <sup>3</sup>	-2.12%	26.53%	-21.22%	-21.22%	31.31%	-12.46%	29.79%	-22.01%	24.94%	5.36%	-10.87%



Table A37. Results for S in OREAS 185 (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	<0.01	<0.005	<0.01	<0.01	<0.02	<0.01	0.010	<0.01	<0.01	0.004	<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	<0.01	<0.005	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	0.006	<0.01
4	<0.01	<0.005	<0.01	<0.01	<0.02	<0.01	0.010	<0.01	<0.01	0.004	<0.01
5	<0.01	0.012	<0.01	0.010	<0.02	<0.01	0.020	0.010	<0.01	0.061	<0.01
6	<0.01	0.014	<0.01	0.030	<0.02	<0.01	<0.01	<0.01	<0.01	0.056	<0.01
7	<0.01	0.015	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	0.061	<0.01
8	<0.01	<0.005	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	0.059	<0.01
9	<0.01	<0.005	<0.01	<0.01	<0.02	<0.01	0.010	<0.01	<0.01	0.018	<0.01
10	0.010	<0.005	<0.01	0.010	<0.02	<0.01	0.010	<0.01	<0.01	0.026	<0.01
11	0.010	<0.005	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	0.025	<0.01
12	<0.01	<0.005	<0.01	<0.01	<0.02	<0.01	0.010	<0.01	<0.01	0.019	<0.01
Mean	0.010	0.014		0.017			0.013	0.010		0.031	
Median	0.010	0.014		0.010			0.010	0.010		0.025	
Std.Dev.	0.000	0.002		0.012			0.005			0.024	
Rel.Std.Dev.	0.00%	11.18%		69.28%			37.95%			77.37%	
PDM <sup>3</sup>	-9.64%	23.49%		50.60%			16.18%	-9.64%		178.99%	