



**CERTIFICATE OF ANALYSIS FOR  
NICKEL LATERITE ORE REFERENCE MATERIAL  
OREAS 182**

Constituent	Certified Value	1SD
<b>Fusion XRF</b>		
Nickel, Ni (wt.%)	0.707	0.006
Cobalt, Co (ppm)	728	7
Aluminium oxide, Al <sub>2</sub> O <sub>3</sub> (wt.%)	4.07	0.02
Calcium oxide, CaO (wt.%)	0.251	0.004
<i>Chlorine, Cl (ppm)</i>	<50	IND
Copper, Cu (ppm)	52	6
Chromium oxide, Cr <sub>2</sub> O <sub>3</sub> (wt.%)	1.29	0.011
Iron oxide, Fe <sub>2</sub> O <sub>3</sub> (wt.%)	29.40	0.13
<i>Potassium oxide, K<sub>2</sub>O (wt.%)</i>	<0.01	IND
Magnesium oxide, MgO (wt.%)	9.16	0.03
Manganese oxide, MnO (wt.%)	0.580	0.004
Sodium oxide, Na <sub>2</sub> O (wt.%)	0.019	0.006
Phosphorus oxide, P <sub>2</sub> O <sub>5</sub> (wt.%)	0.010	0.001
Silicon dioxide, SiO <sub>2</sub> (wt.%)	46.77	0.17
Sulphur oxide, SO <sub>3</sub> (wt.%)	0.006	IND
Titanium oxide, TiO <sub>2</sub> (wt.%)	0.053	0.003
Zinc, Zn (ppm)	181	6
Loss on ignition, LOI (wt.%)	7.14	0.05
<b>Fusion ICP</b>		
Nickel, Ni (wt.%)	0.706	0.023
Cobalt, Co (ppm)	723	31
Aluminium oxide, Al <sub>2</sub> O <sub>3</sub> (wt.%)	4.02	0.09
Calcium oxide, CaO (wt.%)	0.253	0.033
<i>Copper, Cu (ppm)</i>	49	7
Chromium oxide, Cr <sub>2</sub> O <sub>3</sub> (wt.%)	1.28	0.05
Iron oxide, Fe <sub>2</sub> O <sub>3</sub> (wt.%)	29.62	0.69
<i>Potassium oxide, K<sub>2</sub>O (wt.%)</i>	<0.1	IND
Magnesium oxide, MgO (wt.%)	9.12	0.25
Manganese oxide, MnO (wt.%)	0.587	0.013
Sodium oxide, Na <sub>2</sub> O (wt.%)	0.014	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.%)	46.54	0.83
<i>Sulphur oxide, SO<sub>3</sub> (wt.%)</i>	<0.05	IND
Titanium oxide, TiO <sub>2</sub> (wt.%)	0.051	0.004
Zinc, Zn (ppm)	189	18
<b>IR Combustion Furnace</b>		
Carbon, C (wt.%)	0.09	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 182 is one of a suite of thirteen nickel laterite CRMs (OREAS 182 to OREAS 195) prepared from transitional 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 182 was prepared in the following manner:

- a) *drying to constant mass at 105°C;*
- b) *crushing;*
- c) *milling to 98.5% 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 182

OREAS 182 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 182

### 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 182.

Constituent	Certified Value	95% Confidence Interval	
		Low	High
<b>Fusion XRF</b>			
Nickel, Ni (wt.%)	0.707	0.702	0.713
Cobalt, Co (ppm)	728	714	743
Aluminium oxide, Al <sub>2</sub> O <sub>3</sub> (wt.%)	4.07	4.05	4.08
Calcium oxide, CaO (wt.%)	0.251	0.246	0.255
<i>Chlorine, Cl (ppm)</i>	<50	IND	IND
Copper, Cu (ppm)	52	45	59
Chromium oxide, Cr <sub>2</sub> O <sub>3</sub> (wt.%)	1.29	1.28	1.29
Iron oxide, Fe <sub>2</sub> O <sub>3</sub> (wt.%)	29.40	29.27	29.54
<i>Potassium oxide, K<sub>2</sub>O (wt.%)</i>	<0.01	IND	IND
Magnesium oxide, MgO (wt.%)	9.16	9.11	9.21
Manganese oxide, MnO (wt.%)	0.580	0.576	0.583
Sodium oxide, Na <sub>2</sub> O (wt.%)	0.019	0.016	0.021
Phosphorus oxide, P <sub>2</sub> O <sub>5</sub> (wt.%)	0.010	0.010	0.011
Silicon dioxide, SiO <sub>2</sub> (wt.%)	46.77	46.63	46.91
Sulphur oxide, SO <sub>3</sub> (wt.%)	0.006	0.004	0.008
Titanium oxide, TiO <sub>2</sub> (wt.%)	0.053	0.051	0.055
Zinc, Zn (ppm)	181	172	189
Loss on ignition, LOI (wt.%)	7.14	7.04	7.24
<b>Fusion ICP</b>			
Nickel, Ni (wt.%)	0.706	0.696	0.716
Cobalt, Co (ppm)	723	713	733
Aluminium oxide, Al <sub>2</sub> O <sub>3</sub> (wt.%)	4.02	3.98	4.06
Calcium oxide, CaO (wt.%)	0.253	0.234	0.273
<i>Copper, Cu (ppm)</i>	49	46	53
Chromium oxide, Cr <sub>2</sub> O <sub>3</sub> (wt.%)	1.28	1.26	1.30
Iron oxide, Fe <sub>2</sub> O <sub>3</sub> (wt.%)	29.62	29.36	29.88
<i>Potassium oxide, K<sub>2</sub>O (wt.%)</i>	<0.1	IND	IND
Magnesium oxide, MgO (wt.%)	9.12	8.98	9.26
Manganese oxide, MnO (wt.%)	0.587	0.582	0.592
Sodium oxide, Na <sub>2</sub> O (wt.%)	0.014	0.011	0.018
<i>Phosphorus oxide, P<sub>2</sub>O<sub>5</sub> (wt.%)</i>	<0.02	IND	IND
Silica dioxide, SiO <sub>2</sub> (wt.%)	46.54	46.16	46.92
<i>Sulphur oxide, SO<sub>3</sub> (wt.%)</i>	<0.05	IND	IND
Titanium oxide, TiO <sub>2</sub> (wt.%)	0.051	0.049	0.053
Zinc, Zn (ppm)	189	176	202
<b>IR Combustion Furnace</b>			
Carbon, C (wt.%)	0.09	0.08	0.10
<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  $\ddot{x} - k'_2(n, p, 1 - \alpha) s''_g$

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

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 0.704 and 0.711 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 182.

Constituent	Certified Value	Tolerance limits 1- $\alpha$ =0.99, $\rho$ =0.95	
		Low	High
<b>Fusion XRF</b>			
Nickel, Ni (wt.%)	0.707	0.704	0.711
Cobalt, Co (ppm)	728	718	739
Aluminium oxide, Al <sub>2</sub> O <sub>3</sub> (wt.%)	4.07	4.04	4.09
Calcium oxide, CaO (wt.%)	0.251	0.250	0.251
<i>Chlorine, Cl (ppm)</i>	<50	IND	IND
Copper, Cu (ppm)	52	IND	IND
Chromium oxide, Cr <sub>2</sub> O <sub>3</sub> (wt.%)	1.29	1.28	1.30
Iron oxide, Fe <sub>2</sub> O <sub>3</sub> (wt.%)	29.40	29.30	29.51
<i>Potassium oxide, K<sub>2</sub>O (wt.%)</i>	<0.01	IND	IND
Magnesium oxide, MgO (wt.%)	9.16	9.12	9.20
Manganese oxide, MnO (wt.%)	0.580	0.577	0.582
Sodium oxide, Na <sub>2</sub> O (wt.%)	0.019	IND	IND
Phosphorus oxide, P <sub>2</sub> O <sub>5</sub> (wt.%)	0.010	IND	IND
Silicon dioxide, SiO <sub>2</sub> (wt.%)	46.77	46.64	46.90
Sulphur oxide, SO <sub>3</sub> (wt.%)	0.006	IND	IND
Titanium oxide, TiO <sub>2</sub> (wt.%)	0.053	0.049	0.057
Zinc, Zn (ppm)	181	178	184
Loss on ignition, LOI (wt.%)	7.14	7.10	7.18
<b>Fusion ICP</b>			
Nickel, Ni (wt.%)	0.706	0.695	0.717
Cobalt, Co (ppm)	723	714	732
Aluminium oxide, Al <sub>2</sub> O <sub>3</sub> (wt.%)	4.02	3.97	4.08
Calcium oxide, CaO (wt.%)	0.253	0.242	0.265
<i>Copper, Cu (ppm)</i>	49	45	54
Chromium oxide, Cr <sub>2</sub> O <sub>3</sub> (wt.%)	1.28	1.26	1.30
Iron oxide, Fe <sub>2</sub> O <sub>3</sub> (wt.%)	29.62	29.28	29.96
<i>Potassium oxide, K<sub>2</sub>O (wt.%)</i>	<0.1	IND	IND
Magnesium oxide, MgO (wt.%)	9.12	9.01	9.23
Manganese oxide, MnO (wt.%)	0.587	0.578	0.596
Sodium oxide, Na <sub>2</sub> O (wt.%)	0.014	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.%)	46.54	46.10	46.98
<i>Sulphur oxide, SO<sub>3</sub> (wt.%)</i>	<0.05	IND	IND
Titanium oxide, TiO <sub>2</sub> (wt.%)	0.051	0.049	0.053
Zinc, Zn (ppm)	189	164	214
<b>IR Combustion Furnace</b>			
Carbon, C (wt.%)	0.09	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 182 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 182. 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 182. 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 0.999 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 182 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 182

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.%)	0.707	0.006	0.696	0.719	0.690	0.725	0.84%	1.68%	2.52%
Co (ppm)	728	7	715	742	708	749	0.94%	1.88%	2.82%
Al <sub>2</sub> O <sub>3</sub> (wt.%)	4.07	0.02	4.02	4.11	4.00	4.13	0.53%	1.07%	1.60%
CaO (wt.%)	0.251	0.004	0.242	0.259	0.238	0.263	1.66%	3.32%	4.97%
Cl (ppm)	<50	IND	IND	IND	IND	IND	IND	IND	IND
Cu (ppm)	52	6	40	64	34	70	11.42%	22.84%	34.26%
Cr <sub>2</sub> O <sub>3</sub> (wt.%)	1.29	0.011	1.264	1.307	1.253	1.318	0.83%	1.67%	2.50%
Fe <sub>2</sub> O <sub>3</sub> (wt.%)	29.40	0.13	29.15	29.66	29.02	29.79	0.44%	0.87%	1.31%
K <sub>2</sub> O (wt.%)	<0.01	IND	IND	IND	IND	IND	IND	IND	IND
MgO (wt.%)	9.16	0.03	9.10	9.22	9.07	9.25	0.34%	0.68%	1.03%
MnO (wt.%)	0.580	0.004	0.571	0.588	0.566	0.593	0.76%	1.53%	2.29%
Na <sub>2</sub> O (wt.%)	0.019	0.006	0.007	0.030	0.001	0.036	31.40%	62.79%	94.19%
P <sub>2</sub> O <sub>5</sub> (wt.%)	0.010	0.001	0.009	0.012	0.008	0.013	6.72%	13.44%	20.16%
SiO <sub>2</sub> (wt.%)	46.77	0.17	46.43	47.11	46.26	47.28	0.37%	0.73%	1.10%
SO <sub>3</sub> (wt.%)	0.006	IND	IND	IND	IND	IND	IND	IND	IND
TiO <sub>2</sub> (wt.%)	0.053	0.003	0.046	0.060	0.043	0.063	6.54%	13.07%	19.61%
Zn (ppm)	181	6	169	193	162	199	3.38%	6.75%	10.13%
LOI (wt.%)	7.14	0.05	7.03	7.25	6.98	7.31	0.77%	1.53%	2.30%
<b>Fusion ICP</b>									
Ni (wt.%)	0.706	0.023	0.661	0.751	0.638	0.774	3.21%	6.41%	9.62%
Co (ppm)	723	31	662	785	631	815	4.24%	8.49%	12.73%
Al <sub>2</sub> O <sub>3</sub> (wt.%)	4.02	0.09	3.84	4.20	3.75	4.29	2.26%	4.52%	6.78%
CaO (wt.%)	0.253	0.033	0.187	0.319	0.154	0.352	13.01%	26.02%	39.03%
Cu (ppm)	49	7	36	63	29	69	13.45%	26.90%	40.34%
Cr <sub>2</sub> O <sub>3</sub> (wt.%)	1.28	0.05	1.18	1.38	1.13	1.43	3.96%	7.93%	11.89%
Fe <sub>2</sub> O <sub>3</sub> (wt.%)	29.62	0.69	28.25	30.99	27.56	31.68	2.32%	4.63%	6.95%
K <sub>2</sub> O (wt.%)	<0.1	IND	IND	IND	IND	IND	IND	IND	IND
MgO (wt.%)	9.12	0.25	8.63	9.61	8.39	9.86	2.69%	5.38%	8.07%
MnO (wt.%)	0.587	0.013	0.560	0.614	0.547	0.627	2.28%	4.57%	6.85%
Na <sub>2</sub> O (wt.%)	0.014	0.004	0.006	0.023	0.002	0.027	29.74%	59.48%	89.22%
P <sub>2</sub> O <sub>5</sub> (wt.%)	<0.02	IND	IND	IND	IND	IND	IND	IND	IND
SiO <sub>2</sub> (wt.%)	46.54	0.83	44.87	48.21	44.04	49.04	1.79%	3.58%	5.38%
SO <sub>3</sub> (wt.%)	<0.05	IND	IND	IND	IND	IND	IND	IND	IND
TiO <sub>2</sub> (wt.%)	0.051	0.004	0.044	0.058	0.040	0.061	6.88%	13.76%	20.64%
Zn (ppm)	189	18	153	225	135	242	9.45%	18.90%	28.35%
<b>IR Combustion Furnace</b>									
C (wt.%)	0.09	0.02	0.05	0.13	0.03	0.15	23.59%	47.17%	70.76%
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

## PARTICIPATING LABORATORIES

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  
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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 182 has been prepared and certified and is supplied by:

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6-8 Gatwick Road  
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AUSTRALIA*

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OREAS 182 is packaged in unit sizes of 10g (single-use laminated foil pouches) and 1kg (wide mouthed plastic jars).

## INTENDED USE

OREAS 182 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 182 has been sourced from a sample of transitional 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 182**

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 182 (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	0.695	0.725	0.696	0.699	0.736	0.703	0.710	0.726	0.710	0.731	0.702	0.700	0.686	0.716	0.720	0.715	0.700
2	0.703	0.720	0.693	0.700	0.726	0.702	0.700	0.714	0.709	0.739	0.691	0.710	<b>0.717</b>	0.717	0.710	0.713	0.690
3	0.698	0.725	0.701	0.704	0.729	0.712	0.710	0.724	0.711	0.734	0.695	0.710	0.688	0.718	0.710	0.712	0.690
4	0.700	0.720	0.699	0.702	0.732	0.708	0.720	0.716	0.705	0.730	0.694	0.710	0.679	0.721	0.720	0.715	0.690
5	0.706	0.720	0.698	0.697	0.733	0.710	0.700	0.699	0.704	0.728	0.696	0.700	0.686	0.725	NR	NR	NR
6	0.706	0.720	0.703	0.703	0.733	0.705	0.700	0.714	0.701	0.726	0.693	0.700	0.686	0.718	NR	NR	NR
7	0.700	0.715	0.699	0.700	0.731	0.706	0.700	0.717	0.711	0.724	0.701	0.700	<b>0.668</b>	0.717	NR	NR	NR
8	0.703	0.715	0.697	0.699	0.723	0.706	0.700	0.708	0.704	0.724	0.700	0.700	0.669	0.718	NR	NR	NR
9	0.701	0.720	0.702	0.695	0.694	0.703	0.690	0.718	0.702	0.735	0.690	0.700	0.704	0.700	NR	NR	NR
10	0.707	0.720	0.704	0.697	<b>0.733</b>	0.700	<b>0.840</b>	0.728	0.706	0.728	0.692	0.710	0.686	0.696	NR	NR	NR
11	0.710	0.720	<b>0.718</b>	0.697	0.691	0.702	0.720	0.730	0.708	0.747	0.689	0.720	0.696	0.695	NR	NR	NR
12	0.704	0.720	0.704	0.695	0.697	0.703	0.700	0.715	0.708	0.739	0.692	0.720	0.698	0.696	NR	NR	NR
Mean	0.703	0.720	0.701	0.699	0.722	0.705	0.716	0.717	0.707	0.732	0.695	0.707	0.689	0.711	0.715	0.714	0.693
Median	0.703	0.720	0.700	0.699	0.730	0.704	0.700	0.717	0.707	0.731	0.694	0.705	0.686	0.717	0.715	0.714	0.690
Std.Dev.	0.004	0.003	0.006	0.003	0.017	0.004	0.040	0.009	0.003	0.007	0.004	0.008	0.014	0.011	0.006	0.002	0.005
Rel.Std.Dev.	0.60%	0.42%	0.90%	0.42%	2.35%	0.51%	5.60%	1.22%	0.48%	0.95%	0.63%	1.10%	2.01%	1.57%	0.81%	0.24%	0.72%
PDM <sup>3</sup>	-0.66%	1.77%	-0.89%	-1.19%	1.99%	-0.35%	1.18%	1.41%	-0.12%	3.48%	-1.82%	-0.11%	-2.67%	0.56%	1.07%	0.90%	-2.11%

Table A3. Fusion XRF results for Co in OREAS 182 (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	720	800	710	730	760	710	NR	<b>860</b>	750	760	720	800	710	750	700	704	700
2	720	800	700	730	750	720	NR	<b>860</b>	750	700	710	800	<b>760</b>	730	700	699	700
3	720	800	710	740	750	730	NR	<b>870</b>	760	<b>840</b>	710	800	730	740	700	698	700
4	720	800	700	740	750	720	NR	<b>860</b>	760	810	710	800	710	730	700	700	<b>600</b>
5	720	750	700	720	750	720	NR	<b>840</b>	760	710	720	700	<b>730</b>	740	NR	NR	NR
6	730	800	710	730	750	720	NR	<b>850</b>	760	800	710	700	710	730	NR	NR	NR
7	720	800	710	730	760	720	NR	<b>860</b>	760	750	730	700	700	750	NR	NR	NR
8	720	800	700	730	740	720	NR	<b>860</b>	760	720	730	700	700	750	NR	NR	NR
9	720	800	700	710	750	720	NR	<b>870</b>	760	750	710	700	740	740	NR	NR	NR
10	720	800	700	720	770	710	NR	<b>870</b>	750	740	710	700	720	720	NR	NR	NR
11	720	800	710	720	750	710	NR	<b>880</b>	750	750	710	700	730	720	NR	NR	NR
12	720	800	700	720	770	720	NR	<b>850</b>	740	<b>790</b>	720	700	730	720	NR	NR	NR
Mean	721	796	704	727	754	718		<b>861</b>	755	760	716	733	723	735	700	700	675
Median	720	800	700	730	750	720		860	760	750	710	700	725	735	700	700	700
Std.Dev.	3	14	5	9	9	6		11	7	42	8	49	18	12	0	3	50
Rel.Std.Dev.	0.40%	1.81%	0.73%	1.22%	1.19%	0.80%		1.26%	0.89%	5.58%	1.11%	6.71%	2.44%	1.59%	0.00%	0.38%	7.41%
PDM <sup>3</sup>	-1.04%	9.25%	-3.33%	-0.24%	3.53%	-1.39%		18.18%	3.65%	4.33%	-1.73%	0.67%	-0.81%	0.90%	-3.90%	-3.87%	-7.33%

Table A4. Fusion XRF results for Al<sub>2</sub>O<sub>3</sub> in OREAS 182 (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	4.02	<b>3.91</b>	4.02	4.07	4.09	4.04	4.01	4.10	4.06	<b>3.95</b>	4.06	4.09	4.09	<b>4.16</b>	4.10	4.09	4.05
2	4.04	<b>3.91</b>	4.02	4.07	4.12	4.06	4.02	4.09	4.02	4.13	4.07	4.08	4.17	<b>4.15</b>	4.11	4.10	4.04
3	4.02	<b>3.94</b>	4.03	4.07	4.12	4.10	3.99	4.07	4.08	4.13	4.07	4.06	4.04	<b>4.13</b>	4.10	4.09	4.02
4	4.03	<b>3.92</b>	4.05	4.07	4.11	4.07	4.03	4.05	4.08	3.96	4.07	4.08	4.04	<b>4.13</b>	4.09	4.10	4.02
5	4.07	<b>3.92</b>	4.05	4.04	4.03	4.07	<b>3.95</b>	4.04	4.12	4.10	4.05	4.07	4.07	<b>4.17</b>	NR	NR	NR
6	4.11	<b>3.96</b>	4.07	4.07	4.05	4.05	<b>3.96</b>	4.14	4.11	4.06	4.06	4.06	4.05	<b>4.16</b>	NR	NR	NR
7	4.08	<b>3.92</b>	4.04	4.04	4.05	4.07	<b>3.95</b>	4.01	4.13	3.99	4.05	4.03	4.04	<b>4.17</b>	NR	NR	NR
8	4.09	<b>3.93</b>	4.06	4.05	4.08	4.06	<b>3.94</b>	4.08	4.15	4.17	4.05	4.07	4.05	<b>4.13</b>	NR	NR	NR
9	4.06	<b>3.92</b>	4.00	4.07	<b>4.20</b>	4.03	<b>3.89</b>	4.16	4.10	4.11	4.06	4.05	4.06	4.10	NR	NR	NR
10	4.06	<b>3.91</b>	4.05	4.07	<b>4.16</b>	4.04	<b>3.90</b>	4.14	4.10	4.09	4.04	4.06	4.07	4.11	NR	NR	NR
11	4.07	<b>3.92</b>	4.06	4.06	<b>4.22</b>	4.05	<b>3.92</b>	4.05	4.11	<b>3.94</b>	4.06	4.08	4.12	4.12	NR	NR	NR
12	4.05	<b>3.91</b>	4.05	4.06	<b>4.25</b>	4.04	<b>3.97</b>	4.03	4.10	4.02	4.06	4.07	4.07	4.08	NR	NR	NR
Mean	4.06	<b>3.92</b>	4.04	4.06	4.12	4.06	3.96	4.08	4.10	4.05	4.06	4.07	4.07	4.13	4.10	4.09	4.03
Median	4.06	3.92	4.05	4.07	4.12	4.06	3.96	4.08	4.10	4.07	4.06	4.07	4.07	4.13	4.10	4.09	4.03
Std.Dev.	0.03	0.01	0.02	0.01	0.07	0.02	0.05	0.05	0.03	0.08	0.01	0.02	0.04	0.03	0.01	0.01	0.02
Rel.Std.Dev.	0.69%	0.37%	0.50%	0.29%	1.72%	0.47%	1.15%	1.17%	0.83%	1.93%	0.23%	0.40%	0.95%	0.70%	0.20%	0.20%	0.37%
PDM <sup>3</sup>	-0.24%	-3.64%	-0.65%	-0.16%	1.36%	-0.26%	-2.64%	0.29%	0.70%	-0.38%	-0.24%	-0.04%	0.09%	1.62%	0.78%	0.65%	-0.88%



Table A5. Fusion XRF results for CaO in OREAS 182 (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	0.260	0.240	0.250	0.260	0.240	0.252	0.250	<b>0.270</b>	0.270	0.267	0.260	0.250	0.251	0.260	0.250	0.224	0.250
2	0.260	0.240	0.250	0.260	0.240	0.253	0.240	0.250	0.270	0.270	0.250	0.250	0.259	0.260	0.250	<b>0.208</b>	0.250
3	0.260	0.240	0.250	0.260	0.240	0.252	0.250	0.240	0.270	0.261	0.250	0.240	0.255	0.260	0.250	0.241	0.240
4	0.260	0.240	0.240	0.260	0.250	0.252	0.250	0.250	0.270	0.263	0.250	0.250	0.250	0.260	0.250	0.235	0.240
5	0.260	0.240	0.250	0.260	0.250	0.250	0.240	0.240	0.270	0.252	0.250	0.260	0.252	0.260	NR	NR	NR
6	0.260	0.240	0.250	0.260	0.250	0.252	0.240	0.250	0.270	0.264	0.250	0.250	0.254	0.250	NR	NR	NR
7	0.250	0.240	0.250	0.260	0.260	0.250	0.240	0.240	<b>0.280</b>	0.237	0.250	0.260	0.251	0.260	NR	NR	NR
8	0.260	0.245	0.240	0.250	0.240	0.250	0.240	0.240	0.270	0.248	0.250	0.250	0.249	0.250	NR	NR	NR
9	0.250	0.240	0.250	0.260	0.240	0.249	0.240	0.240	0.270	0.242	0.250	0.260	0.258	0.260	NR	NR	NR
10	0.250	0.240	0.250	0.260	0.240	<b>0.254</b>	0.240	0.250	0.270	0.259	0.250	0.260	0.257	0.260	NR	NR	NR
11	0.260	0.240	0.250	0.260	0.240	0.249	0.240	0.240	0.270	0.255	0.250	0.260	0.260	0.260	NR	NR	NR
12	0.260	0.240	0.250	0.270	0.250	0.251	0.240	0.240	0.260	0.250	0.250	0.260	0.259	0.260	NR	NR	NR
Mean	0.258	0.240	0.248	0.260	0.245	0.251	0.243	0.246	0.270	0.256	0.251	0.254	0.255	0.258	0.250	0.227	0.245
Median	0.260	0.240	0.250	0.260	0.240	0.252	0.240	0.240	0.270	0.257	0.250	0.255	0.255	0.260	0.250	0.230	0.245
Std.Dev.	0.005	0.001	0.004	0.004	0.007	0.002	0.005	0.009	0.004	0.010	0.003	0.007	0.004	0.004	0.000	0.014	0.006
Rel.Std.Dev.	1.76%	0.60%	1.57%	1.64%	2.75%	0.63%	1.87%	3.66%	1.58%	3.98%	1.15%	2.63%	1.55%	1.51%	0.00%	6.37%	2.36%
PDM <sup>3</sup>	2.77%	-4.05%	-0.89%	3.77%	-2.22%	0.24%	-3.22%	-1.89%	7.76%	2.04%	0.11%	1.44%	1.61%	3.10%	-0.22%	-9.33%	-2.22%

Table A6. Fusion XRF results for Cl in OREAS 182 (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	80	NR	NR	<50	10	NR	NR	NR	NR	NR	<50	<50	NR	NR	<50	<50	NR
2	<50	NR	NR	<50	10	NR	NR	NR	NR	NR	<50	<50	NR	NR	<50	<50	NR
3	<50	NR	NR	<50	<10	NR	NR	NR	NR	NR	<50	<50	NR	NR	<50	<50	NR
4	<50	NR	NR	<50	<10	NR	NR	NR	NR	NR	<50	<50	NR	NR	<50	<50	NR
5	<50	NR	NR	50	110	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	50	140	NR	NR	NR	NR	NR	<50	NR	NR	NR	NR	NR	NR
8	<50	NR	NR	50	120	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	20	NR	NR	NR	NR	NR	<50	NR	NR	NR	NR	NR	NR
11	<50	NR	NR	50	10	NR	NR	NR	NR	NR	<50	NR	NR	NR	NR	NR	NR
12	<50	NR	NR	50	70	NR	NR	NR	NR	NR	<50	NR	NR	NR	NR	NR	NR
Mean	80			50	63												
Median	80			50	45												
Std.Dev.				0	55												
Rel.Std.Dev.				0.00%	86.63%												
PDM <sup>3</sup>	24.35%			-22.28%	-2.07%												

Table A7. Fusion XRF results for Cu in OREAS 182 (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	60	44	<50	50	<b>90</b>	48	50	60	70	<100	40	<b>100</b>	NR	50	<100	40	NR
2	60	41	<50	55	60	48	40	60	70	<100	30	<b>100</b>	NR	50	<100	53	NR
3	60	41	<50	55	70	<b>52</b>	40	50	70	<100	30	<b>100</b>	NR	50	<100	31	NR
4	60	47	<50	60	70	49	50	60	60	<100	30	<b>100</b>	NR	40	<100	42	NR
5	50	39	<50	50	80	50	40	40	60	<100	40	<b>90</b>	NR	50	NR	NR	NR
6	60	38	<50	55	80	49	40	40	70	<100	20	<b>80</b>	NR	50	NR	NR	NR
7	50	42	<50	55	<b>90</b>	49	40	50	70	<100	30	<b>100</b>	NR	60	NR	NR	NR
8	60	<b>49</b>	<50	50	60	50	40	40	60	<100	50	<b>90</b>	NR	40	NR	NR	NR
9	50	51	<50	50	<b>80</b>	46	30	70	<50	<100	40	70	NR	50	NR	NR	NR
10	60	44	<50	55	<b>90</b>	47	<b>140</b>	60	<50	<100	40	70	NR	50	NR	NR	NR
11	60	44	<50	55	<b>100</b>	49	50	<b>170</b>	<50	<100	30	60	NR	50	NR	NR	NR
12	60	37	<50	55	<b>90</b>	48	40	60	<50	<100	40	60	NR	50	NR	NR	NR
Mean	58	43		54	80	49	50	63	66		35	85		49		42	
Median	60	43		55	80	49	40	60	70		35	90		50		41	
Std.Dev.	5	4		3	13	1	29	35	5		8	16		5		9	
Rel.Std.Dev.	7.87%	10.37%		5.78%	15.99%	3.01%	57.84%	55.25%	7.81%		22.79%	19.10%		10.47%		21.78%	
PDM <sup>3</sup>	10.51%	-17.51%		3.31%	53.76%	-6.47%	-3.90%	21.73%	27.33%		-32.73%	63.37%		-5.50%		-20.24%	

Table A8. Fusion XRF results for Cr<sub>2</sub>O<sub>3</sub> in OREAS 182 (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	1.30	1.26	1.27	1.29	1.27	1.29	<b>1.87</b>	1.32	1.25	<b>1.37</b>	1.26	1.31	1.30	1.29	1.28	1.29	1.31
2	1.31	1.27	1.27	1.30	1.27	1.30	<b>1.89</b>	1.32	1.25	<b>1.39</b>	1.28	1.30	<b>1.36</b>	1.30	1.28	1.29	1.29
3	1.30	1.27	1.28	1.29	1.26	1.31	<b>1.87</b>	1.33	1.26	<b>1.38</b>	1.27	1.28	1.29	1.29	1.27	1.30	1.28
4	1.33	1.25	1.28	1.29	1.26	1.30	<b>1.90</b>	1.33	1.27	<b>1.38</b>	1.29	1.29	1.30	1.29	1.27	1.29	1.30
5	1.29	1.27	1.28	1.28	1.30	1.31	1.27	1.30	1.25	<b>1.35</b>	<b>1.26</b>	1.32	1.31	1.30	NR	NR	NR
6	1.30	1.27	1.27	1.29	1.27	1.31	1.27	1.31	1.26	<b>1.38</b>	1.29	1.30	1.30	1.29	NR	NR	NR
7	1.28	1.28	1.28	1.29	1.30	1.30	1.27	1.31	1.27	<b>1.34</b>	1.29	<b>1.25</b>	1.29	1.29	NR	NR	NR
8	1.29	1.27	1.26	1.29	1.28	1.31	1.27	1.32	1.25	<b>1.36</b>	1.30	1.32	1.27	1.30	NR	NR	NR
9	1.29	1.27	1.28	1.28	1.29	1.29	1.25	1.31	1.25	<b>1.38</b>	<b>1.23</b>	1.25	1.33	1.28	NR	NR	NR
10	1.29	1.27	1.27	1.29	1.24	1.29	1.26	1.34	1.26	<b>1.39</b>	1.27	1.28	1.30	1.28	NR	NR	NR
11	1.32	1.27	1.30	1.28	1.29	1.29	1.26	1.33	1.25	<b>1.44</b>	1.26	1.29	1.31	1.27	NR	NR	NR
12	1.30	1.27	1.28	1.29	1.29	1.30	1.28	1.30	1.24	<b>1.42</b>	1.27	1.30	1.32	1.27	NR	NR	NR
Mean	1.30	1.27	1.28	1.29	1.28	1.30	1.47	1.32	1.26	<b>1.38</b>	1.27	1.29	1.31	1.29	1.28	1.29	1.30
Median	1.30	1.27	1.28	1.29	1.27	1.30	1.27	1.32	1.25	1.38	1.27	1.30	1.30	1.29	1.28	1.29	1.30
Std.Dev.	0.01	0.01	0.01	0.01	0.02	0.01	0.30	0.01	0.01	0.03	0.02	0.02	0.02	0.01	0.01	0.00	0.01
Rel.Std.Dev.	1.08%	0.51%	0.70%	0.40%	1.40%	0.66%	20.62%	0.96%	0.72%	2.01%	1.43%	1.79%	1.64%	0.81%	0.45%	0.24%	1.00%
PDM <sup>3</sup>	1.01%	-1.49%	-0.65%	0.13%	-0.77%	1.18%	14.46%	2.56%	-2.36%	7.40%	-1.33%	0.42%	1.62%	0.18%	-0.81%	0.73%	0.75%

Table A9. Fusion XRF results for Fe<sub>2</sub>O<sub>3</sub> in OREAS 182 (abbreviations as in Table A1; values in wt.%).

Replicate No.	Lab A	Lab B	Lab C	Lab D	Lab E	Lab F	Lab G	Lab H	Lab I	Lab J	Lab K	Lab L	Lab N	Lab O	Lab P	Lab Q	Lab R
	BF*XRF	BF*XRF	BF*XRF	BF*XRF	BF*XRF	BF*XRF	BF*XRF	BF*XRF	BF*XRF	BF*XRF	BF*XRF	BF*XRF	BF*XRF	BF*XRF	BF*XRF	BF*XRF	BF*XRF
1	28.70	29.53	29.62	29.60	29.20	29.37	29.45	29.37	29.26	29.06	29.20	29.42	29.28	29.40	30.10	29.57	29.80
2	29.00	29.55	29.74	29.58	29.00	29.38	29.42	29.33	29.37	29.11	29.10	29.42	<b>30.10</b>	29.50	30.00	29.68	29.60
3	28.80	29.49	29.74	29.56	29.10	29.67	29.47	29.43	29.38	29.06	29.20	29.24	29.38	29.40	30.00	29.51	29.50
4	28.80	29.54	29.79	29.71	29.30	29.60	29.74	29.41	29.30	29.19	29.20	29.48	29.03	29.40	30.10	29.52	29.60
5	29.10	29.33	29.63	29.66	29.10	29.54	29.10	<b>28.52</b>	28.97	28.75	29.40	29.54	29.28	29.40	NR	NR	NR
6	29.40	29.37	29.62	29.67	29.10	29.50	29.16	29.06	28.95	28.95	29.40	29.39	29.30	29.50	NR	NR	NR
7	29.10	29.35	29.67	29.73	29.10	29.46	29.19	29.16	29.34	28.83	29.40	29.30	28.88	29.50	NR	NR	NR
8	29.20	29.38	29.61	29.74	28.80	29.55	29.16	29.01	29.04	28.62	29.50	29.45	28.74	29.40	NR	NR	NR
9	29.00	29.60	29.69	29.69	29.40	29.39	28.81	29.48	29.08	29.14	29.30	29.27	29.80	29.30	NR	NR	NR
10	29.10	29.64	29.75	29.67	29.30	29.29	29.05	29.59	29.09	29.01	29.30	29.37	29.30	29.20	NR	NR	NR
11	29.20	29.56	29.72	29.62	29.20	29.36	29.07	29.62	29.18	29.14	29.20	29.46	29.63	29.30	NR	NR	NR
12	29.00	29.57	29.72	29.68	29.30	29.34	29.41	29.16	29.27	29.18	29.30	29.40	29.66	29.30	NR	NR	NR
Mean	29.03	29.49	29.69	29.66	29.16	29.45	29.25	29.26	29.19	29.01	29.29	29.40	29.36	29.38	30.05	29.57	29.63
Median	29.05	29.54	29.71	29.67	29.15	29.42	29.18	29.35	29.22	29.06	29.30	29.41	29.30	29.40	30.05	29.54	29.60
Std.Dev.	0.20	0.11	0.06	0.06	0.16	0.12	0.25	0.31	0.16	0.18	0.12	0.09	0.39	0.09	0.06	0.08	0.13
Rel.Std.Dev.	0.68%	0.36%	0.20%	0.20%	0.56%	0.41%	0.86%	1.04%	0.53%	0.63%	0.40%	0.30%	1.32%	0.32%	0.19%	0.26%	0.42%
PDM <sup>3</sup>	-1.26%	0.30%	0.98%	0.87%	-0.84%	0.17%	-0.52%	-0.48%	-0.74%	-1.36%	-0.38%	-0.03%	-0.14%	-0.07%	2.20%	0.56%	0.75%

Table A10. Fusion XRF results for K<sub>2</sub>O in OREAS 182 (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	0.004	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	0.010	0.005	0.001	NR	<0.001	<0.01	0.010	<0.01	<0.01	<0.01	NR	0.010	<0.01	0.008	<0.01
3	<0.01	<0.01	<0.01	0.005	0.001	NR	<0.001	0.010	0.010	<0.01	<0.01	<0.01	NR	0.010	<0.01	0.006	<0.01
4	<0.01	<0.01	<0.01	0.005	0.002	NR	<0.001	0.010	0.010	0.014	<0.01	<0.01	NR	0.010	<0.01	0.009	<0.01
5	<0.01	<0.01	<0.05	0.003	0.007	NR	<0.001	<0.01	0.010	<0.01	<0.01	<0.01	NR	0.010	NR	NR	NR
6	<0.01	<0.01	<0.05	0.004	0.007	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	0.004	0.006	NR	<0.001	<0.01	0.020	<0.01	<0.01	<0.01	NR	0.010	NR	NR	NR
8	<0.01	<0.01	<0.05	0.003	0.005	NR	<0.001	<0.01	0.020	<0.01	<0.01	<0.01	NR	0.010	NR	NR	NR
9	<0.01	<0.01	<0.01	0.004	<0.001	NR	<0.001	0.010	0.010	<0.01	<0.01	<0.01	NR	0.010	NR	NR	NR
10	<0.01	<0.01	<0.01	0.006	<0.001	NR	<0.001	0.010	0.010	<0.01	<0.01	<0.01	NR	0.010	NR	NR	NR
11	<0.01	<0.01	<0.01	0.005	<0.001	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	<0.001	NR	<0.001	<0.01	0.010	<0.01	<0.01	<0.01	NR	0.010	NR	NR	NR
Mean			0.010	0.004	0.004			0.010	0.013	0.014				0.010		0.007	
Median			0.010	0.005	0.004			0.010	0.010	0.014				0.010		0.007	
Std.Dev.				0.001	0.003			0.000	0.005					0.000		0.001	
Rel.Std.Dev.				20.38%	68.19%			0.00%	36.18%					0.00%		20.86%	
PDM <sup>3</sup>			11.28%	-50.85%	-56.88%			11.28%	39.10%	55.79%				11.28%		-20.99%	

Table A11. Fusion XRF results for MgO in OREAS 182 (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	9.03	9.22	9.15	9.16	8.98	8.99	<b>8.75</b>	9.33	9.17	<b>9.08</b>	9.13	9.21	9.26	9.34	9.12	9.10	9.12
2	9.11	9.13	9.11	9.13	9.05	8.99	<b>8.75</b>	9.37	9.18	9.44	9.13	9.17	9.48	9.34	9.12	9.09	9.09
3	9.07	9.22	9.15	9.16	9.05	8.99	<b>8.78</b>	9.37	9.23	9.33	9.13	9.17	9.15	9.36	9.11	9.13	9.03
4	9.07	9.20	9.16	9.14	9.08	9.00	<b>8.82</b>	9.28	9.19	9.34	9.14	9.19	9.11	9.37	9.12	9.11	9.09
5	9.06	9.28	9.13	9.16	8.99	8.98	9.00	9.26	9.21	9.08	9.15	9.23	9.24	9.35	NR	NR	NR
6	9.13	9.23	9.13	9.18	9.00	8.95	9.01	9.30	9.22	9.22	9.15	9.16	9.21	9.36	NR	NR	NR
7	9.06	9.20	9.17	9.16	8.95	8.96	9.03	9.23	9.30	9.13	9.12	9.10	9.12	9.37	NR	NR	NR
8	9.10	9.32	9.14	9.16	9.06	8.95	9.02	9.33	9.23	9.28	9.16	9.20	9.08	9.33	NR	NR	NR
9	9.11	9.24	9.16	9.18	9.36	8.90	8.95	9.40	9.23	9.40	9.14	9.09	9.31	9.34	NR	NR	NR
10	9.13	9.27	9.18	9.17	9.44	8.92	8.97	9.36	9.29	<b>9.20</b>	9.12	9.16	9.16	9.31	NR	NR	NR
11	9.15	9.31	9.11	9.19	9.41	8.91	9.01	9.31	9.14	9.37	9.13	9.16	9.26	9.30	NR	NR	NR
12	9.11	9.29	9.15	9.20	9.38	8.91	<b>9.13</b>	9.28	9.18	9.42	9.10	9.10	9.23	9.28	NR	NR	NR
Mean	9.09	9.24	9.15	9.17	9.15	8.95	8.94	9.32	9.21	9.27	9.13	9.16	9.22	9.34	9.12	9.11	9.08
Median	9.11	9.24	9.15	9.16	9.06	8.95	8.99	9.32	9.22	9.31	9.13	9.17	9.22	9.34	9.12	9.11	9.09
Std.Dev.	0.04	0.05	0.02	0.02	0.19	0.04	0.13	0.05	0.05	0.13	0.02	0.04	0.11	0.03	0.00	0.01	0.04
Rel.Std.Dev.	0.39%	0.57%	0.24%	0.22%	2.08%	0.40%	1.42%	0.55%	0.51%	1.41%	0.18%	0.49%	1.18%	0.30%	0.05%	0.15%	0.42%
PDM <sup>3</sup>	-0.73%	0.86%	-0.17%	0.05%	-0.16%	-2.26%	-2.47%	1.72%	0.58%	1.22%	-0.30%	0.01%	0.61%	1.93%	-0.47%	-0.56%	-0.86%

Table A12. Fusion XRF results for MnO in OREAS 182 (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>0.557</b>	0.560	0.570	0.580	0.587	0.575	0.590	0.570	0.573	<b>0.600</b>	0.583	0.590	0.581	<b>0.607</b>	0.580	0.582	0.580
2	<b>0.561</b>	0.570	0.570	0.570	0.581	0.577	0.590	0.580	0.577	<b>0.602</b>	0.578	0.580	<b>0.603</b>	<b>0.609</b>	0.580	0.580	0.590
3	<b>0.559</b>	0.575	0.570	0.580	0.583	0.582	0.590	0.580	0.575	<b>0.597</b>	0.576	0.580	0.582	<b>0.607</b>	0.580	0.583	0.580
4	<b>0.559</b>	0.565	0.570	0.570	0.589	0.579	0.600	0.580	0.579	<b>0.596</b>	0.579	0.580	0.576	<b>0.608</b>	0.580	0.582	0.580
5	0.570	0.575	0.570	0.580	0.585	0.580	0.580	0.560	0.577	0.592	0.580	0.580	0.582	<b>0.615</b>	NR	NR	NR
6	0.577	0.565	0.570	0.580	0.586	0.579	0.590	0.570	0.575	<b>0.610</b>	0.577	0.580	0.577	<b>0.609</b>	NR	NR	NR
7	0.575	0.565	0.570	0.580	0.587	0.575	0.590	0.570	0.582	0.585	0.578	0.580	0.569	<b>0.608</b>	NR	NR	NR
8	0.574	0.565	0.570	0.580	0.577	0.580	0.590	0.570	0.582	0.597	0.582	0.580	0.569	<b>0.609</b>	NR	NR	NR
9	0.562	0.565	0.570	0.570	0.571	0.574	0.580	0.570	0.570	<b>0.600</b>	0.585	0.580	0.598	0.599	NR	NR	NR
10	0.562	0.570	0.580	0.580	<b>0.592</b>	0.574	0.580	0.580	0.574	<b>0.599</b>	0.581	0.580	0.587	0.594	NR	NR	NR
11	0.566	<b>0.555</b>	0.570	0.570	0.571	0.575	0.580	0.580	0.569	<b>0.605</b>	0.582	0.580	0.591	0.594	NR	NR	NR
12	0.563	0.565	0.570	0.570	0.577	0.574	0.590	0.570	0.570	<b>0.592</b>	0.581	0.580	0.594	0.598	NR	NR	NR
Mean	0.565	0.566	0.571	0.576	0.582	0.577	0.588	0.573	0.575	0.598	0.580	0.581	0.584	0.605	0.580	0.581	0.583
Median	0.563	0.565	0.570	0.580	0.584	0.576	0.590	0.570	0.575	0.598	0.581	0.580	0.582	0.608	0.580	0.582	0.580
Std.Dev.	0.007	0.006	0.003	0.005	0.007	0.003	0.006	0.007	0.004	0.007	0.003	0.003	0.011	0.007	0.000	0.001	0.005
Rel.Std.Dev.	1.22%	1.01%	0.51%	0.89%	1.18%	0.50%	1.06%	1.14%	0.76%	1.09%	0.46%	0.50%	1.84%	1.12%	0.00%	0.23%	0.86%
PDM <sup>3</sup>	-2.44%	-2.29%	-1.50%	-0.64%	0.46%	-0.44%	1.38%	-1.07%	-0.74%	3.17%	0.11%	0.22%	0.82%	4.36%	0.08%	0.34%	0.51%



Table A13. Fusion XRF results for Na<sub>2</sub>O in OREAS 182 (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>0.043</b>	0.015	0.010	NR	<b>0.065</b>	NR	<0.01	<b>0.470</b>	0.020	<0.1	0.019	0.020	NR	0.020	<0.01	0.026	<0.01
2	<b>0.047</b>	0.020	0.020	NR	<b>0.063</b>	NR	<0.01	0.020	<0.01	<0.1	0.019	<0.01	NR	0.020	0.020	<0.01	<0.01
3	<b>0.053</b>	0.015	0.020	NR	<b>0.061</b>	NR	<0.01	0.030	0.010	<0.1	0.012	0.030	NR	0.020	0.020	0.015	<0.01
4	<b>0.054</b>	0.020	0.020	NR	<b>0.058</b>	NR	<0.01	0.020	0.020	<0.1	0.016	<0.01	NR	0.020	0.010	0.031	<0.01
5	<0.005	0.020	0.020	NR	<b>0.069</b>	NR	<0.01	0.010	0.040	<0.1	0.015	0.020	NR	0.020	NR	NR	NR
6	0.005	0.010	0.020	NR	<b>0.077</b>	NR	<0.01	0.010	0.010	<0.1	0.015	0.030	NR	0.020	NR	NR	NR
7	0.005	0.010	0.020	NR	<b>0.074</b>	NR	<0.01	0.010	0.040	<0.1	0.012	<0.01	NR	0.020	NR	NR	NR
8	0.012	0.010	0.030	NR	<b>0.066</b>	NR	<0.01	0.010	0.030	<0.1	0.013	0.020	NR	0.020	NR	NR	NR
9	0.015	0.015	0.030	NR	<b>0.104</b>	NR	<0.01	0.030	0.020	<0.1	0.019	<0.01	NR	0.030	NR	NR	NR
10	0.018	0.010	0.020	NR	<b>0.084</b>	NR	<0.01	0.030	<0.01	<0.1	0.020	0.010	NR	0.030	NR	NR	NR
11	0.014	0.010	0.010	NR	<b>0.108</b>	NR	<0.01	0.010	0.020	<0.1	0.016	0.020	NR	0.030	NR	NR	NR
12	0.014	0.010	0.020	NR	<b>0.116</b>	NR	<0.01	0.010	0.010	<0.1	0.015	<0.01	NR	0.020	NR	NR	NR
Mean	0.025	0.014	0.020		<b>0.079</b>			0.055	0.022		0.016	0.021		0.023	0.017	0.024	
Median	0.015	0.013	0.020		0.072			0.015	0.020		0.016	0.020		0.020	0.020	0.026	
Std.Dev.	0.019	0.004	0.006		0.020			0.131	0.011		0.003	0.007		0.005	0.006	0.008	
Rel.Std.Dev.	76.49%	31.49%	30.15%		25.32%			238.14%	51.60%		17.66%	32.20%		20.10%	34.64%	33.16%	
PDM <sup>3</sup>	37.33%	-25.82%	7.90%		324.85%			196.72%	18.69%		-14.13%	15.61%		21.39%	-10.08%	29.30%	

Table A14. Fusion XRF results for P<sub>2</sub>O<sub>5</sub> in OREAS 182 (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	0.011	0.010	0.013	0.012	0.009	NR	0.010	0.010	<b>0.010</b>	<b>0.023</b>	0.009	0.010	NR	0.010	0.010	0.008	<0.01
2	0.012	0.010	0.013	0.011	0.008	NR	0.010	<0.01	<b>0.020</b>	<b>&lt;0.01</b>	0.009	0.010	NR	0.010	0.010	0.009	<0.01
3	0.012	0.010	0.013	0.012	0.008	NR	0.010	0.010	<b>0.020</b>	<b>&lt;0.01</b>	0.009	0.010	NR	0.010	0.010	0.008	<0.01
4	0.012	0.010	0.012	0.010	0.008	NR	0.010	<0.01	<b>0.020</b>	<b>0.024</b>	0.010	0.010	NR	0.010	0.010	0.008	0.010
5	0.014	0.010	0.012	0.012	0.011	NR	0.010	0.010	<b>0.020</b>	0.012	0.012	0.010	NR	0.010	NR	NR	NR
6	0.014	0.010	0.011	0.013	0.012	NR	0.010	<0.01	<b>0.020</b>	<b>0.018</b>	0.012	0.010	NR	0.010	NR	NR	NR
7	0.014	0.010	0.013	0.012	0.012	NR	0.010	0.010	<b>0.020</b>	0.012	0.012	0.010	NR	0.010	NR	NR	NR
8	0.014	0.010	0.012	0.012	0.011	NR	0.010	0.010	<b>0.020</b>	0.015	0.011	0.010	NR	0.010	NR	NR	NR
9	0.014	0.005	0.012	0.012	0.009	NR	0.010	0.010	<b>0.010</b>	<0.01	0.010	<0.01	NR	0.010	NR	NR	NR
10	0.014	0.010	0.013	0.012	0.010	NR	0.010	0.010	<b>0.020</b>	0.010	0.010	0.010	NR	0.010	NR	NR	NR
11	0.014	0.010	0.012	0.010	0.010	NR	0.010	0.010	<b>0.010</b>	0.010	0.010	<0.01	NR	0.010	NR	NR	NR
12	0.014	0.010	0.013	0.010	0.010	NR	0.010	0.010	<b>0.020</b>	0.010	0.010	0.010	NR	0.010	NR	NR	NR
Mean	0.013	0.010	0.012	0.012	0.010		0.010	0.010	<b>0.018</b>	0.015	0.010	0.010		0.010	0.010	0.008	0.010
Median	0.014	0.010	0.013	0.012	0.010		0.010	0.010	0.020	0.012	0.010	0.010		0.010	0.010	0.008	0.010
Std.Dev.	0.001	0.001	0.001	0.001	0.001		0.000	0.000	0.005	0.006	0.001	0.000		0.000	0.000	0.000	
Rel.Std.Dev.	8.59%	15.06%	5.38%	8.70%	14.92%		0.00%	0.00%	25.84%	37.31%	11.17%	0.00%		0.00%	0.00%	3.68%	
PDM <sup>3</sup>	26.56%	-8.46%	18.60%	9.85%	-6.07%		-4.48%	-4.48%	67.16%	42.22%	-1.30%	-4.48%		-4.48%	-4.48%	-22.15%	-4.48%

Table A15. Fusion XRF results for SiO<sub>2</sub> in OREAS 182 (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	46.50	47.17	46.88	46.87	<b>45.80</b>	46.80	47.46	46.80	46.55	46.02	47.10	46.89	46.43	47.40	46.60	46.89	46.80
2	46.90	46.98	46.90	46.82	<b>46.10</b>	46.75	47.47	46.90	46.52	46.70	47.20	46.84	47.24	47.40	46.70	46.77	46.50
3	46.70	47.03	46.95	46.87	<b>46.00</b>	47.14	47.54	46.80	46.69	46.46	47.10	46.58	46.06	47.50	46.70	46.87	46.30
4	46.90	47.09	47.07	46.84	<b>45.80</b>	47.05	47.55	46.30	46.59	46.74	47.20	46.85	45.85	47.60	46.60	46.72	46.50
5	46.70	47.17	46.79	46.91	46.00	47.00	46.25	46.40	46.35	46.14	46.90	46.91	<b>46.25</b>	47.50	NR	NR	NR
6	46.90	47.16	47.02	46.94	46.00	46.87	46.24	46.40	46.41	46.15	46.90	46.62	<b>46.22</b>	47.50	NR	NR	NR
7	46.80	47.14	46.98	46.90	45.90	46.93	46.21	46.40	46.93	46.14	46.70	46.90	<b>45.78</b>	47.50	NR	NR	NR
8	46.70	47.08	46.92	46.88	46.40	46.99	46.24	46.60	46.59	46.12	46.70	46.83	<b>45.61</b>	47.40	NR	NR	NR
9	46.90	47.13	46.76	46.94	46.70	46.65	47.12	47.30	46.24	46.68	47.00	46.61	46.55	47.40	NR	NR	NR
10	47.10	47.09	46.81	46.92	46.60	46.66	<b>46.47</b>	47.20	46.52	46.44	47.00	46.89	46.16	47.20	NR	NR	NR
11	47.20	47.02	46.59	46.96	46.80	46.73	47.37	46.70	46.38	46.34	47.00	46.96	46.56	47.30	NR	NR	NR
12	46.80	47.40	46.74	46.99	46.50	46.64	47.27	46.50	46.37	46.85	47.00	46.70	46.53	47.20	NR	NR	NR
Mean	46.84	47.12	46.87	46.90	46.22	46.85	46.93	46.69	46.51	46.40	46.98	46.80	46.27	47.41	46.65	46.81	46.53
Median	46.85	47.11	46.89	46.91	46.05	46.83	47.20	46.65	46.52	46.39	47.00	46.85	46.23	47.40	46.65	46.82	46.50
Std.Dev.	0.19	0.11	0.14	0.05	0.36	0.17	0.59	0.32	0.18	0.29	0.16	0.13	0.44	0.12	0.06	0.08	0.21
Rel.Std.Dev.	0.40%	0.23%	0.29%	0.11%	0.78%	0.36%	1.26%	0.69%	0.39%	0.62%	0.35%	0.29%	0.94%	0.26%	0.12%	0.17%	0.44%
PDM <sup>3</sup>	0.15%	0.74%	0.20%	0.28%	-1.19%	0.17%	0.34%	-0.17%	-0.56%	-0.80%	0.45%	0.06%	-1.07%	1.36%	-0.26%	0.08%	-0.53%

Table A16. Fusion XRF results for SO<sub>3</sub> in OREAS 182 (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	0.011	<0.01	0.006	0.008	0.001	NR	0.005	0.004	NR	NR	0.012	NR	NR	NR	<0.01	0.002	NR
2	0.007	<0.01	0.007	0.007	0.001	NR	0.006	0.003	NR	NR	0.011	NR	NR	NR	<0.01	<0.002	NR
3	0.008	<0.01	0.004	0.008	0.002	NR	0.004	0.002	NR	NR	0.008	NR	NR	NR	0.010	<0.002	NR
4	0.011	<0.01	0.006	0.008	0.001	NR	0.005	<0.002	NR	NR	0.011	NR	NR	NR	<0.01	<0.002	NR
5	0.003	<0.01	0.007	0.010	<0.001	NR	0.002	<b>&lt;0.002</b>	NR	NR	0.010	NR	NR	NR	NR	NR	NR
6	0.003	<0.01	0.008	0.009	<0.001	NR	0.002	<b>0.091</b>	NR	NR	0.010	NR	NR	NR	NR	NR	NR
7	0.003	<0.01	0.009	0.008	<0.001	NR	0.003	<b>&lt;0.002</b>	NR	NR	0.011	NR	NR	NR	NR	NR	NR
8	0.004	<0.01	0.007	0.010	<0.001	NR	0.002	<b>&lt;0.002</b>	NR	NR	0.009	NR	NR	NR	NR	NR	NR
9	0.011	<0.01	0.008	0.008	<b>0.017</b>	NR	0.006	<0.002	NR	NR	0.008	NR	NR	NR	NR	NR	NR
10	0.012	<0.01	0.007	0.009	<b>0.033</b>	NR	<b>0.012</b>	<0.002	NR	NR	0.012	NR	NR	NR	NR	NR	NR
11	0.011	<0.01	0.008	0.008	<b>0.017</b>	NR	0.005	<0.002	NR	NR	0.012	NR	NR	NR	NR	NR	NR
12	0.012	0.005	0.009	0.007	<b>0.018</b>	NR	0.005	<0.002	NR	NR	0.011	NR	NR	NR	NR	NR	NR
Mean	0.008	0.005	0.007	0.008	0.011		0.005	0.025			0.010				0.010	0.002	
Median	0.010	0.005	0.007	0.008	0.010		0.005	0.004			0.011				0.010	0.002	
Std.Dev.	0.004		0.001	0.001	0.012		0.003	0.044			0.001						
Rel.Std.Dev.	47.67%		19.58%	11.82%	105.47%		57.57%	176.03%			13.86%						
PDM <sup>3</sup>	35.00%	-15.62%	20.94%	40.63%	89.85%		-19.84%	321.89%			75.79%				68.75%	-66.25%	

Table A17. Fusion XRF results for TiO<sub>2</sub> in OREAS 182 (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	0.060	0.055	0.050	0.051	0.050	NR	0.050	0.060	0.060	0.051	<b>0.070</b>	0.060	NR	0.050	0.060	0.043	0.050
2	0.060	0.050	0.050	0.053	0.050	NR	0.050	0.070	0.050	0.047	<b>0.070</b>	0.050	NR	0.050	0.060	0.045	0.050
3	0.060	0.060	0.050	0.051	0.050	NR	0.050	0.050	0.060	0.046	<b>0.060</b>	0.060	NR	0.050	0.060	<b>0.050</b>	0.050
4	0.060	0.055	0.050	0.052	0.060	NR	0.050	0.040	0.050	0.049	<b>0.080</b>	0.060	NR	0.050	0.050	0.043	0.050
5	0.060	0.050	0.050	0.052	0.050	NR	0.050	<b>0.120</b>	0.050	0.057	0.050	0.060	NR	0.050	NR	NR	NR
6	0.060	0.050	0.050	0.054	0.060	NR	0.050	<b>0.080</b>	0.050	0.051	0.050	0.060	NR	0.050	NR	NR	NR
7	0.060	0.060	0.050	0.052	0.050	NR	0.050	<b>0.070</b>	0.060	0.054	0.060	0.060	NR	0.040	NR	NR	NR
8	0.060	0.060	0.050	0.051	0.040	NR	0.050	<b>0.090</b>	0.050	0.057	0.060	0.060	NR	0.050	NR	NR	NR
9	0.060	0.060	0.050	0.053	0.050	NR	0.050	0.070	0.060	0.054	0.060	0.060	NR	0.050	NR	NR	NR
10	0.060	0.060	0.050	0.052	0.060	NR	0.050	0.050	0.050	<b>0.047</b>	0.060	0.050	NR	0.050	NR	NR	NR
11	0.060	0.055	0.050	0.051	0.060	NR	0.050	<b>0.030</b>	0.050	0.054	0.060	0.050	NR	0.050	NR	NR	NR
12	0.060	0.050	0.050	0.053	0.060	NR	0.050	0.060	0.050	0.052	0.050	0.050	NR	0.040	NR	NR	NR
Mean	0.060	0.055	0.050	0.052	0.053		0.050	0.066	0.053	0.052	0.061	0.057		0.048	0.058	0.045	0.050
Median	0.060	0.055	0.050	0.052	0.050		0.050	0.065	0.050	0.052	0.060	0.060		0.050	0.060	0.044	0.050
Std.Dev.	0.000	0.005	0.000	0.001	0.007		0.000	0.024	0.005	0.004	0.009	0.005		0.004	0.005	0.003	0.000
Rel.Std.Dev.	0.00%	8.12%	0.00%	1.91%	12.21%		0.00%	36.33%	9.23%	7.32%	14.80%	8.69%		8.05%	8.70%	7.51%	0.00%
PDM <sup>3</sup>	13.11%	4.47%	-5.74%	-1.82%	0.54%		-5.74%	24.11%	0.54%	-2.76%	14.68%	6.83%		-8.88%	8.40%	-14.70%	-5.74%

Table A18. Fusion XRF results for Zn in OREAS 182 (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	150	172	180	180	220	190	210	210	190	180	170	<b>240</b>	NR	200	<b>100</b>	170	NR
2	160	178	180	180	210	192	190	200	180	180	160	<b>240</b>	NR	200	<b>100</b>	174	NR
3	160	164	180	185	210	198	210	190	180	170	160	<b>240</b>	NR	200	<b>100</b>	162	NR
4	160	166	180	185	210	197	210	180	200	180	160	<b>240</b>	NR	200	<b>&lt;100</b>	177	NR
5	160	180	190	185	220	197	170	<b>170</b>	180	170	160	160	NR	190	NR	NR	NR
6	170	182	180	180	210	195	170	200	190	180	160	150	NR	190	NR	NR	NR
7	170	175	180	185	220	194	180	190	200	170	170	150	NR	190	NR	NR	NR
8	170	173	180	185	<b>190</b>	194	<b>200</b>	190	<b>320</b>	180	160	160	NR	190	NR	NR	NR
9	170	171	180	180	200	194	160	200	190	160	170	150	NR	200	NR	NR	NR
10	170	172	180	175	<b>230</b>	193	170	190	190	180	180	150	NR	190	NR	NR	NR
11	170	169	190	185	200	193	160	200	190	190	170	150	NR	190	NR	NR	NR
12	170	169	180	180	210	194	170	180	200	170	180	150	NR	180	NR	NR	NR
Mean	165	172	182	182	211	194	183	192	201	176	167	182		193	100	171	
Median	170	172	180	183	210	194	175	190	190	180	165	155		190	100	172	
Std.Dev.	7	5	4	3	11	2	20	11	38	8	8	43		7	0	7	
Rel.Std.Dev.	4.09%	3.13%	2.14%	1.84%	5.14%	1.17%	10.74%	5.82%	19.04%	4.51%	4.67%	23.80%		3.37%	0.00%	3.81%	
PDM <sup>3</sup>	-8.73%	-4.63%	0.49%	0.72%	16.62%	7.43%	1.41%	6.02%	11.09%	-2.74%	-7.81%	0.49%		6.94%	-44.68%	-5.55%	

Table A19. Results for LOI at 1000°C in OREAS 182 (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	6.92	7.14	7.03	7.04	7.00	7.42	NR	7.19	6.74	7.61	7.21	7.00	<b>8.28</b>	6.92	7.05	7.29	7.04
2	6.83	7.14	7.03	7.08	6.91	7.43	NR	7.18	6.81	7.46	7.20	7.00	<b>8.44</b>	6.97	7.06	7.31	6.89
3	6.91	7.14	7.04	7.07	6.95	7.35	NR	7.09	6.75	7.49	7.20	7.00	<b>8.30</b>	6.89	7.05	7.30	6.98
4	6.93	7.14	7.02	7.06	6.82	7.36	NR	7.06	6.76	7.48	7.20	7.10	<b>8.36</b>	6.95	7.11	7.30	7.04
5	7.03	7.23	7.04	7.09	6.92	<b>7.75</b>	7.21	7.06	6.98	7.57	7.34	6.90	7.33	6.78	NR	NR	NR
6	7.09	7.22	7.09	7.08	6.92	<b>7.71</b>	7.10	7.14	7.18	7.56	7.31	7.00	7.47	6.77	NR	NR	NR
7	7.06	7.23	7.08	7.07	7.00	<b>7.78</b>	7.29	7.05	7.06	7.51	7.42	7.00	7.42	6.82	NR	NR	NR
8	7.03	7.23	7.10	7.11	6.91	<b>7.80</b>	7.21	<b>7.33</b>	7.04	7.47	7.30	6.90	7.59	6.81	NR	NR	NR
9	7.17	7.21	7.14	7.03	6.82	<b>7.96</b>	7.27	7.15	7.03	<b>7.73</b>	7.32	<b>7.40</b>	<b>8.38</b>	6.77	NR	NR	NR
10	7.19	7.21	7.13	7.04	6.88	<b>7.92</b>	7.15	7.06	7.05	<b>7.88</b>	7.33	6.90	<b>8.40</b>	6.82	NR	NR	NR
11	7.23	7.21	7.13	7.02	6.76	<b>7.66</b>	7.17	7.17	7.08	<b>7.80</b>	7.32	7.00	<b>8.39</b>	6.81	NR	NR	NR
12	7.22	7.23	7.12	7.00	6.88	<b>7.65</b>	7.24	7.14	7.11	<b>7.96</b>	7.35	7.00	<b>8.46</b>	6.81	NR	NR	NR
Mean	7.05	7.19	7.08	7.06	6.90	7.65	7.21	7.14	6.97	7.63	7.29	7.02	8.07	6.84	7.07	7.30	6.99
Median	7.05	7.21	7.09	7.07	6.91	7.69	7.21	7.14	7.04	7.56	7.32	7.00	8.33	6.82	7.06	7.30	7.01
Std.Dev.	0.13	0.04	0.05	0.03	0.07	0.21	0.06	0.08	0.16	0.17	0.07	0.13	0.46	0.07	0.03	0.01	0.07
Rel.Std.Dev.	1.90%	0.55%	0.64%	0.45%	1.04%	2.79%	0.88%	1.12%	2.25%	2.26%	0.99%	1.91%	5.71%	1.03%	0.41%	0.13%	1.01%
PDM <sup>3</sup>	-1.26%	0.71%	-0.87%	-1.17%	-3.41%	7.14%	0.89%	-0.09%	-2.45%	6.82%	2.11%	-1.74%	12.98%	-4.17%	-1.03%	2.21%	-2.15%

Table A20. Fusion ICP results for Ni in OREAS 182 (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	0.728	0.721	0.715	<b>0.751</b>	0.717	0.684	0.712	0.713	0.731	0.680	0.730	0.689
2	0.723	0.733	0.710	0.708	0.713	0.688	0.720	0.703	0.719	0.689	0.712	0.680
3	0.715	0.717	0.715	0.712	0.705	0.686	0.703	<b>0.780</b>	0.707	0.696	0.680	0.685
4	0.721	0.719	0.720	0.712	0.721	0.686	0.711	0.695	0.720	0.688	0.701	0.679
5	0.699	0.722	0.715	0.713	0.699	0.689	0.745	0.651	0.748	0.739	NR	NR
6	0.708	0.753	0.690	0.718	0.685	0.692	0.739	<b>0.623</b>	0.743	0.729	NR	NR
7	0.698	0.772	0.705	0.714	0.697	0.699	0.745	0.743	0.729	0.705	NR	NR
8	0.693	0.758	0.700	0.703	0.699	0.692	0.746	0.726	0.762	0.716	NR	NR
9	0.727	0.672	0.690	0.695	0.711	<b>0.688</b>	0.719	0.682	<b>0.708</b>	0.681	NR	NR
10	0.721	0.672	0.705	0.701	0.711	0.668	0.712	0.711	0.748	0.688	NR	NR
11	0.721	<b>0.653</b>	0.695	0.684	0.697	0.670	0.709	0.683	0.734	0.688	NR	NR
12	0.722	0.673	0.695	0.682	0.706	0.669	0.709	0.652	0.743	0.687	NR	NR
Mean	0.715	0.714	0.705	0.708	0.705	0.684	0.723	0.697	0.733	0.699	0.706	0.683
Median	0.721	0.720	0.705	0.710	0.705	0.687	0.716	0.699	0.732	0.689	0.706	0.682
Std.Dev.	0.012	0.039	0.011	0.018	0.010	0.010	0.016	0.043	0.017	0.019	0.021	0.005
Rel.Std.Dev.	1.69%	5.41%	1.50%	2.53%	1.45%	1.48%	2.27%	6.18%	2.32%	2.77%	2.99%	0.67%
PDM <sup>3</sup>	1.23%	1.07%	-0.20%	0.25%	-0.15%	-3.07%	2.34%	-1.30%	3.76%	-1.01%	-0.05%	-3.23%



Table A21. Fusion ICP results for Co in OREAS 182 (abbreviations as in Table A1; values in ppm).

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	700	703	760	740	732	710	730	760	699	690	720	724
2	700	705	740	740	731	700	730	773	693	720	711	720
3	720	696	740	730	722	730	720	793	691	720	<b>680</b>	727
4	700	703	740	<b>690</b>	723	690	730	772	703	700	727	722
5	730	769	740	740	732	710	740	749	729	750	NR	NR
6	740	805	700	700	703	740	740	760	723	760	NR	NR
7	730	796	740	710	723	710	740	762	728	730	NR	NR
8	730	778	720	710	722	680	740	754	730	740	NR	NR
9	730	722	800	680	760	690	680	666	<b>674</b>	710	NR	NR
10	720	763	780	670	758	690	670	700	701	710	NR	NR
11	730	754	780	650	739	700	660	670	702	710	NR	NR
12	730	740	760	640	758	710	670	692	707	710	NR	NR
Mean	722	745	750	700	734	705	713	738	707	721	710	723
Median	730	747	740	705	732	705	730	757	703	715	716	723
Std.Dev.	14	39	28	35	17	17	32	43	18	21	21	3
Rel.Std.Dev.	1.94%	5.18%	3.68%	4.99%	2.38%	2.46%	4.52%	5.88%	2.48%	2.87%	2.92%	0.41%
PDM <sup>3</sup>	-0.22%	2.94%	3.70%	-3.21%	1.43%	-2.52%	-1.49%	1.98%	-2.28%	-0.33%	-1.90%	0.01%

Table A22. Fusion ICP results for Al<sub>2</sub>O<sub>3</sub> in OREAS 182 (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	4.07	4.02	4.02	<b>4.35</b>	4.02	4.06	3.96	3.95	<b>4.21</b>	3.85	3.96	4.01
2	4.09	4.05	3.99	4.17	4.14	4.05	4.06	3.95	<b>4.45</b>	3.94	3.84	4.02
3	4.04	4.01	3.99	4.01	4.04	4.03	4.08	4.06	<b>4.55</b>	3.94	3.91	4.01
4	4.09	4.02	4.02	3.81	4.06	4.06	4.06	3.89	<b>4.44</b>	3.91	4.01	4.01
5	4.03	4.03	4.10	4.12	4.19	4.06	4.03	3.91	4.02	<b>4.23</b>	NR	NR
6	4.08	4.18	4.06	4.12	4.17	4.02	3.99	3.98	4.04	3.99	NR	NR
7	4.02	4.28	3.99	4.20	<b>4.01</b>	4.07	4.09	3.97	4.02	3.88	NR	NR
8	3.97	4.19	4.12	4.03	4.15	4.06	4.06	3.99	4.04	3.96	NR	NR
9	4.20	<b>3.79</b>	3.87	4.09	4.17	4.06	4.12	3.82	3.93	3.96	NR	NR
10	4.14	<b>3.81</b>	3.93	4.14	4.14	4.00	4.11	3.97	3.93	3.95	NR	NR
11	4.12	<b>3.71</b>	3.82	3.97	4.06	3.95	<b>3.82</b>	3.87	3.99	3.94	NR	NR
12	4.18	<b>3.84</b>	4.10	4.02	4.11	3.96	4.08	3.90	3.99	3.91	NR	NR
Mean	4.09	3.99	4.00	4.09	4.11	4.03	4.04	3.94	4.13	3.96	3.93	4.01
Median	4.09	4.02	4.01	4.11	4.13	4.06	4.06	3.95	4.03	3.94	3.94	4.01
Std.Dev.	0.07	0.18	0.09	0.13	0.06	0.04	0.08	0.06	0.22	0.09	0.07	0.01
Rel.Std.Dev.	1.64%	4.41%	2.30%	3.28%	1.55%	1.02%	2.05%	1.62%	5.34%	2.39%	1.85%	0.17%
PDM <sup>3</sup>	1.61%	-0.67%	-0.51%	1.61%	2.08%	0.26%	0.42%	-2.10%	2.80%	-1.65%	-2.27%	-0.19%

Table A23. Fusion ICP results for CaO in OREAS 182 (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>0.340</b>	0.270	0.300	0.240	0.240	0.250	0.260	0.278	0.210	0.220	<0.3	<b>0.339</b>
2	<b>0.400</b>	0.280	0.300	0.230	0.250	0.250	0.280	0.275	0.208	0.230	<0.3	<b>0.349</b>
3	<b>0.390</b>	0.280	0.300	0.220	0.250	0.250	0.250	0.276	0.217	0.210	<0.3	<b>0.345</b>
4	<b>0.380</b>	0.280	0.300	0.270	0.250	0.250	0.260	0.262	0.208	0.220	<0.3	<b>0.341</b>
5	<b>0.420</b>	0.260	0.300	0.180	0.260	0.240	0.270	0.258	0.267	<b>0.770</b>	NR	NR
6	<b>0.390</b>	0.270	0.300	0.210	0.260	0.240	0.260	0.267	0.246	<b>0.240</b>	NR	NR
7	<b>0.370</b>	0.290	0.300	0.200	0.250	0.240	0.270	0.262	0.246	<b>0.100</b>	NR	NR
8	<b>0.300</b>	0.290	0.300	0.190	0.250	0.240	0.260	0.259	0.246	<b>0.190</b>	NR	NR
9	<b>0.440</b>	0.190	0.300	0.210	0.240	0.260	0.270	0.263	0.213	0.330	NR	NR
10	<b>0.370</b>	0.190	0.300	0.220	0.240	0.240	0.280	0.275	0.213	<b>0.360</b>	NR	NR
11	<b>0.340</b>	0.200	0.300	0.180	0.250	0.250	0.260	0.271	0.213	0.340	NR	NR
12	<b>0.410</b>	0.250	0.300	0.190	0.250	0.250	0.270	0.266	0.213	0.270	NR	NR
Mean	<b>0.379</b>	0.254	0.300	0.212	0.249	0.247	0.266	0.268	0.225	0.290		0.343
Median	0.385	0.270	0.300	0.210	0.250	0.250	0.265	0.267	0.213	0.235		0.343
Std.Dev.	0.039	0.038	0.000	0.027	0.007	0.007	0.009	0.007	0.020	0.167		0.004
Rel.Std.Dev.	10.21%	15.14%	0.00%	12.55%	2.68%	2.64%	3.39%	2.65%	8.94%	57.72%		1.27%
PDM <sup>3</sup>	49.65%	0.31%	18.40%	-16.46%	-1.66%	-2.65%	4.92%	5.64%	-11.14%	14.46%		35.52%

Table A24. Fusion ICP results for Cu in OREAS 182 (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	54	<50	50	<50	50	<50	<b>15</b>	61	50	45	64
2	<50	55	50	50	<50	50	<50	<b>20</b>	62	<50	47	49
3	<50	55	50	50	<50	60	<50	<b>18</b>	59	<50	33	50
4	<50	54	<50	<50	<50	50	<50	<b>20</b>	65	50	30	52
5	<50	38	50	50	<50	50	<50	<b>25</b>	42	50	NR	NR
6	<50	42	50	50	<50	70	<50	<b>22</b>	42	50	NR	NR
7	<50	39	50	60	<50	50	<50	<b>17</b>	40	50	NR	NR
8	<50	39	<50	50	<50	50	<50	<b>18</b>	44	50	NR	NR
9	<50	46	<50	50	50	50	<50	<b>16</b>	46	60	NR	NR
10	<50	45	<50	50	<b>80</b>	50	<50	<b>14</b>	46	50	NR	NR
11	<50	46	50	50	50	50	<50	<b>16</b>	46	60	NR	NR
12	<50	45	<b>100</b>	50	50	50	<50	<b>17</b>	53	50	NR	NR
Mean		47	57	51	58	53		<b>18</b>	50	52	39	54
Median		46	50	50	50	50		18	46	50	39	51
Std.Dev.		7	19	3	15	6		3	9	4	9	7
Rel.Std.Dev.		14.01%	33.07%	5.92%	26.09%	11.84%		16.56%	17.79%	8.11%	21.94%	12.96%
PDM <sup>3</sup>		-5.91%	15.62%	3.01%	16.34%	6.23%		-62.94%	2.07%	5.21%	-21.60%	8.66%

Table A25. Fusion ICP results for Cr<sub>2</sub>O<sub>3</sub> in OREAS 182 (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	1.27	1.34	1.36	1.29	1.20	1.26	1.24	1.32	1.20	1.26	1.32	1.32
2	1.29	1.36	1.35	1.24	1.22	1.26	1.26	1.31	1.15	1.26	1.29	1.29
3	1.26	1.35	1.32	1.24	1.17	1.25	1.24	<b>1.43</b>	1.13	1.29	1.29	1.29
4	1.29	1.34	1.36	1.15	1.22	1.26	1.24	1.32	1.19	1.26	1.28	1.31
5	1.23	1.27	1.30	1.22	1.30	1.24	<b>1.41</b>	<b>1.27</b>	1.30	1.36	NR	NR
6	1.24	1.32	1.43	1.18	1.28	1.25	<b>1.44</b>	1.31	1.30	1.33	NR	NR
7	1.23	1.35	1.30	1.19	<b>1.23</b>	1.24	<b>1.42</b>	1.31	1.31	1.29	NR	NR
8	1.23	1.30	1.30	1.17	1.31	1.24	<b>1.43</b>	1.31	1.28	1.33	NR	NR
9	1.36	1.26	1.29	1.26	1.27	1.23	1.32	1.26	1.32	1.27	NR	NR
10	1.34	1.23	1.27	1.27	1.27	1.28	1.35	1.33	1.31	1.26	NR	NR
11	1.33	1.23	1.27	1.21	1.27	1.25	1.32	1.31	1.30	1.27	NR	NR
12	1.34	1.24	1.29	1.21	1.29	1.26	1.34	1.28	1.29	1.29	NR	NR
Mean	1.28	1.30	1.32	1.22	1.25	1.25	1.33	1.31	1.26	1.29	1.30	1.30
Median	1.28	1.31	1.30	1.22	1.27	1.25	1.33	1.31	1.30	1.28	1.29	1.30
Std.Dev.	0.05	0.05	0.05	0.04	0.04	0.01	0.08	0.04	0.07	0.03	0.02	0.01
Rel.Std.Dev.	3.76%	3.89%	3.55%	3.49%	3.52%	1.00%	5.82%	3.30%	5.48%	2.67%	1.34%	1.00%
PDM <sup>3</sup>	0.29%	1.47%	3.08%	-4.79%	-2.27%	-2.19%	4.19%	2.57%	-1.81%	0.54%	1.13%	1.80%

Table A26. Fusion ICP results for Fe<sub>2</sub>O<sub>3</sub> in OREAS 182 (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	29.70	30.58	30.00	31.50	28.97	29.92	30.35	30.45	28.78	28.90	28.90	30.58
2	29.50	30.96	29.70	30.30	28.90	29.88	<b>28.97</b>	30.17	28.89	29.50	28.00	30.25
3	29.30	30.62	29.70	30.40	29.47	29.81	30.15	31.04	28.64	29.70	28.40	30.41
4	29.60	30.57	30.20	<b>28.00</b>	28.91	29.88	30.53	30.18	28.60	29.30	30.20	30.40
5	29.50	<b>29.30</b>	30.00	<b>27.80</b>	30.40	29.59	28.23	29.24	30.58	30.60	NR	NR
6	29.80	30.64	29.70	<b>26.80</b>	30.08	29.44	29.84	29.82	30.25	30.10	NR	NR
7	29.40	31.09	30.00	<b>26.80</b>	30.58	29.65	28.02	29.57	30.28	29.20	NR	NR
8	29.30	30.84	30.00	<b>26.60</b>	29.70	29.43	30.11	29.95	30.08	29.70	NR	NR
9	29.00	29.42	29.60	29.00	29.13	29.73	29.82	28.99	29.10	29.00	NR	NR
10	28.90	29.08	29.60	29.10	29.26	29.63	29.43	30.04	29.15	29.40	NR	NR
11	28.90	29.16	29.00	28.10	29.02	29.82	29.02	29.04	28.91	29.30	NR	NR
12	29.00	29.44	29.70	28.00	28.99	29.64	29.28	29.41	28.94	29.50	NR	NR
Mean	29.33	30.14	29.77	28.53	29.45	29.70	29.48	29.82	29.35	29.52	28.88	30.41
Median	29.35	30.58	29.70	28.05	29.20	29.69	29.63	29.88	29.02	29.45	28.65	30.40
Std.Dev.	0.31	0.78	0.31	1.57	0.60	0.17	0.81	0.61	0.73	0.47	0.96	0.13
Rel.Std.Dev.	1.07%	2.59%	1.05%	5.49%	2.05%	0.56%	2.74%	2.04%	2.47%	1.59%	3.31%	0.44%
PDM <sup>3</sup>	-1.00%	1.76%	0.49%	-3.67%	-0.57%	0.27%	-0.48%	0.69%	-0.91%	-0.35%	-2.52%	2.66%

Table A27. Fusion ICP results for K<sub>2</sub>O in OREAS 182 (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	<0.1	<0.1	<0.02	<0.1	0.010	<0.01	<0.01	<0.1	0.036	0.120	<0.2	0.078
2	<0.1	<0.1	<0.02	<0.1	<0.01	<0.01	0.010	<0.1	0.025	0.120	<0.2	0.094
3	<0.1	<0.1	<0.02	<0.1	0.010	<0.01	<0.01	<0.1	0.031	0.120	<0.2	0.080
4	<0.1	<0.1	<0.02	<0.1	0.010	<0.01	<0.01	<0.1	0.032	<0.1	<0.2	0.087
5	0.100	0.100	<0.1	<0.1	0.020	<0.01	0.010	0.158	0.007	<b>0.361</b>	NR	NR
6	0.100	0.100	<0.1	<0.1	0.010	<0.01	<0.01	0.129	0.007	0.120	NR	NR
7	0.100	0.100	0.100	<0.1	0.020	<0.01	<0.01	0.106	0.007	<0.1	NR	NR
8	<0.1	0.100	0.100	<0.1	0.010	<0.01	<0.01	<0.1	0.007	<0.1	NR	NR
9	0.100	0.181	<0.1	<0.1	0.020	<0.01	<0.01	0.103	0.007	0.120	NR	NR
10	0.100	0.169	<0.1	<0.1	0.010	<0.01	<0.01	<0.1	0.007	0.120	NR	NR
11	0.100	0.181	<0.1	<0.1	0.010	<0.01	<0.01	0.154	0.008	0.120	NR	NR
12	0.100	0.193	<0.1	<0.1	0.010	<0.01	<0.01	0.151	0.007	0.120	NR	NR
Mean	0.100	0.140	0.100		0.013		0.010	0.134	0.015	0.147		0.085
Median	0.100	0.134	0.100		0.010		0.010	0.140	0.007	0.120		0.084
Std.Dev.	0.000	0.044	0.000		0.005		0.000	0.025	0.012	0.080		0.007
Rel.Std.Dev.	0.00%	31.07%	0.00%		36.70%		0.00%	18.45%	79.91%	54.55%		8.35%
PDM <sup>3</sup>	25.57%	76.23%	25.57%		-84.02%		-87.44%	67.64%	-81.24%	84.88%		6.43%

Table A28. Fusion ICP results for MgO in OREAS 182 (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	8.88	9.03	9.09	<b>9.92</b>	9.02	9.40	8.77	<b>9.92</b>	9.19	8.77	8.64	9.17
2	8.86	9.09	9.04	9.50	9.37	9.41	9.15	<b>9.76</b>	9.59	8.92	8.42	9.13
3	8.75	8.93	9.12	9.44	9.20	9.40	8.96	<b>9.94</b>	9.72	8.97	8.73	9.19
4	8.83	8.99	9.24	8.94	9.26	9.40	8.99	<b>9.60</b>	9.45	8.89	8.61	9.19
5	9.06	<b>9.55</b>	8.95	<b>8.83</b>	9.42	9.15	9.21	<b>9.88</b>	8.97	9.48	NR	NR
6	9.18	<b>10.07</b>	9.04	<b>8.48</b>	9.30	9.13	8.80	<b>9.94</b>	9.04	9.48	NR	NR
7	9.00	<b>10.14</b>	8.97	<b>8.49</b>	<b>8.97</b>	9.19	9.19	<b>9.85</b>	9.14	9.26	NR	NR
8	8.94	<b>10.09</b>	<b>9.37</b>	<b>8.37</b>	9.28	9.14	8.95	<b>9.90</b>	9.13	9.39	NR	NR
9	9.54	9.01	9.27	9.28	9.12	9.21	9.20	9.44	9.09	8.81	NR	NR
10	9.49	8.87	9.17	9.31	9.18	9.09	9.25	9.77	9.16	8.81	NR	NR
11	9.42	8.88	8.82	9.04	9.09	9.07	<b>8.41</b>	9.50	9.18	8.77	NR	NR
12	9.51	8.97	9.04	8.99	9.09	9.09	9.09	9.59	9.10	8.76	NR	NR
Mean	9.12	9.30	9.09	9.05	9.19	9.22	9.00	9.76	9.23	9.03	8.60	9.17
Median	9.03	9.02	9.07	9.02	9.19	9.17	9.04	9.81	9.15	8.91	8.63	9.18
Std.Dev.	0.29	0.51	0.15	0.47	0.14	0.14	0.24	0.18	0.23	0.29	0.13	0.03
Rel.Std.Dev.	3.23%	5.51%	1.67%	5.16%	1.51%	1.50%	2.72%	1.86%	2.49%	3.22%	1.52%	0.31%
PDM <sup>3</sup>	0.00%	1.98%	-0.31%	-0.79%	0.77%	1.12%	-1.36%	6.97%	1.17%	-1.05%	-5.72%	0.53%



Table A29. Fusion ICP results for MnO in OREAS 182 (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	0.570	0.589	0.584	0.610	<b>0.550</b>	0.570	0.594	0.585	<b>0.548</b>	0.570	0.573	0.596
2	0.570	0.591	0.580	0.580	<b>0.570</b>	0.570	0.578	0.589	<b>0.546</b>	0.580	0.567	0.590
3	0.560	0.577	0.578	0.590	<b>0.550</b>	0.570	0.588	0.607	<b>0.536</b>	0.590	0.567	0.595
4	0.570	0.583	0.588	0.570	<b>0.560</b>	0.570	0.600	0.569	<b>0.537</b>	0.580	0.583	0.591
5	0.590	<b>0.584</b>	0.596	<b>0.550</b>	0.610	0.570	0.591	0.582	0.611	0.620	NR	NR
6	0.600	0.608	0.596	<b>0.530</b>	0.600	0.580	0.592	0.589	0.607	0.620	NR	NR
7	0.590	0.615	0.594	<b>0.530</b>	0.580	0.570	0.587	0.586	0.602	0.600	NR	NR
8	0.590	0.610	0.586	<b>0.520</b>	0.600	0.570	0.603	0.584	0.610	0.610	NR	NR
9	0.590	0.576	0.576	<b>0.560</b>	0.590	0.580	0.603	0.577	<b>0.611</b>	0.580	NR	NR
10	0.580	0.572	0.584	<b>0.570</b>	0.590	0.560	0.601	0.606	0.590	0.590	NR	NR
11	0.590	0.569	0.576	<b>0.540</b>	0.580	0.570	<b>0.562</b>	0.585	0.590	0.590	NR	NR
12	0.580	0.573	0.586	<b>0.540</b>	0.590	0.570	0.597	0.599	0.579	0.590	NR	NR
Mean	0.582	0.587	0.585	0.558	0.581	0.571	0.591	0.588	0.581	0.593	0.573	0.593
Median	0.585	0.584	0.585	0.555	0.585	0.570	0.593	0.586	0.590	0.590	0.570	0.593
Std.Dev.	0.012	0.016	0.007	0.027	0.020	0.005	0.012	0.011	0.030	0.016	0.008	0.003
Rel.Std.Dev.	2.05%	2.69%	1.23%	4.90%	3.40%	0.90%	2.01%	1.89%	5.23%	2.72%	1.32%	0.48%
PDM <sup>3</sup>	-0.92%	0.02%	-0.29%	-5.03%	-1.06%	-2.76%	0.73%	0.19%	-1.11%	1.07%	-2.48%	1.02%

Table A30. Fusion ICP results for Na<sub>2</sub>O in OREAS 182 (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	0.010	0.010	<0.01	0.014	NR	NR	NR
2	NR	NR	NR	NR	0.020	0.010	0.020	<0.01	0.014	NR	NR	NR
3	NR	NR	NR	NR	0.020	<0.01	0.020	<0.01	0.014	NR	NR	NR
4	NR	NR	NR	NR	0.020	0.010	0.010	<0.01	0.014	NR	NR	NR
5	NR	NR	NR	NR	0.020	0.010	0.020	<0.01	0.015	NR	NR	NR
6	NR	NR	NR	NR	0.020	0.010	0.010	<0.01	0.014	NR	NR	NR
7	NR	NR	NR	NR	0.020	0.010	0.020	<0.01	0.014	NR	NR	NR
8	NR	NR	NR	NR	0.020	0.010	0.010	<0.01	0.014	NR	NR	NR
9	NR	NR	NR	NR	0.020	<0.01	0.020	0.011	0.015	NR	NR	NR
10	NR	NR	NR	NR	0.010	0.010	0.010	0.020	0.015	NR	NR	NR
11	NR	NR	NR	NR	0.010	0.010	0.010	0.012	0.015	NR	NR	NR
12	NR	NR	NR	NR	0.010	0.010	0.020	0.016	0.016	NR	NR	NR
Mean					0.018	0.010	0.015	0.015	0.015			
Median					0.020	0.010	0.015	0.014	0.014			
Std.Dev.					0.005	0.000	0.005	0.004	0.001			
Rel.Std.Dev.					25.84%	0.00%	34.82%	27.88%	5.37%			
PDM <sup>3</sup>					21.67%	-30.48%	4.29%	2.55%	1.97%			

Table A31. Fusion ICP results for P<sub>2</sub>O<sub>5</sub> in OREAS 182 (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	0.010	0.030	<b>0.090</b>	<0.01	0.023	NR	NR	0.025
2	NR	<0.03	<0.02	<0.02	0.010	<0.01	<b>0.020</b>	<0.01	0.036	NR	NR	0.010
3	NR	<0.03	<0.02	<0.02	0.020	0.030	<b>&lt;0.01</b>	<0.01	0.025	NR	NR	0.017
4	NR	<0.03	<0.02	<0.02	0.020	0.020	<b>0.020</b>	<0.01	0.018	NR	NR	0.006
5	NR	<0.03	<0.02	0.020	0.020	<0.01	0.020	<0.01	0.007	NR	NR	NR
6	NR	<0.03	<0.02	0.020	0.010	<0.01	<0.01	<0.01	0.009	NR	NR	NR
7	NR	<0.03	0.020	0.020	0.010	0.010	0.010	<0.01	0.007	NR	NR	NR
8	NR	<0.03	0.020	0.020	0.020	<0.01	<0.01	<0.01	0.009	NR	NR	NR
9	NR	<0.03	<b>0.040</b>	0.020	0.020	<0.01	0.020	<0.01	0.014	NR	NR	NR
10	NR	<0.03	0.020	<0.02	0.020	<0.01	0.010	<0.01	0.012	NR	NR	NR
11	NR	<0.03	0.020	<0.02	0.020	0.010	0.020	<0.01	<b>0.007</b>	NR	NR	NR
12	NR	<0.03	0.020	0.020	0.020	0.020	0.010	<0.01	0.012	NR	NR	NR
Mean			0.023	0.020	0.017	0.020	0.024		0.015			0.015
Median			0.020	0.020	0.020	0.020	0.020		0.012			0.014
Std.Dev.			0.008	0.000	0.005	0.009	0.025		0.009			0.008
Rel.Std.Dev.			34.99%	0.00%	29.54%	44.72%	102.50%		62.22%			57.56%
PDM <sup>3</sup>			34.28%	15.10%	-4.08%	15.10%	40.68%		-15.06%			-16.55%

Table A32. Fusion ICP results for SiO<sub>2</sub> in OREAS 182 (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	47.80	47.00	47.10	<b>48.10</b>	46.68	45.95	46.32	47.04	46.53	45.80	46.10	<b>48.48</b>
2	45.40	47.10	47.10	46.20	46.70	46.02	47.83	46.30	45.81	47.30	45.60	<b>48.41</b>
3	46.20	46.90	46.80	45.30	47.13	46.18	46.90	47.35	46.00	47.00	46.10	<b>48.67</b>
4	46.30	46.70	46.80	45.40	46.90	46.15	47.11	45.22	46.24	46.60	46.70	<b>48.64</b>
5	47.40	<b>47.90</b>	46.20	46.10	46.94	46.77	47.80	47.76	46.41	<b>51.50</b>	NR	NR
6	47.30	<b>49.80</b>	47.10	45.00	46.87	46.87	46.72	48.64	46.66	47.30	NR	NR
7	47.60	<b>50.40</b>	45.10	44.80	46.64	46.65	47.86	48.21	46.66	45.40	NR	NR
8	47.00	<b>49.80</b>	47.30	<b>43.60</b>	46.59	46.62	46.78	48.32	46.58	46.70	NR	NR
9	45.30	<b>50.60</b>	46.80	<b>44.50</b>	46.67	46.46	48.21	<b>39.31</b>	46.52	45.20	NR	NR
10	44.80	<b>50.40</b>	46.20	<b>44.70</b>	47.04	46.77	48.58	<b>40.70</b>	46.52	45.50	NR	NR
11	45.60	<b>49.50</b>	44.50	<b>43.30</b>	46.48	46.59	<b>45.32</b>	<b>38.93</b>	46.44	45.70	NR	NR
12	45.60	<b>50.50</b>	45.80	<b>43.20</b>	47.04	46.73	47.74	<b>39.62</b>	46.38	45.30	NR	NR
Mean	46.36	48.88	46.40	45.02	46.81	46.48	47.26	44.78	46.40	46.61	46.13	48.55
Median	46.25	49.65	46.80	44.90	46.79	46.61	47.43	46.67	46.48	46.20	46.10	48.56
Std.Dev.	1.03	1.61	0.88	1.38	0.21	0.32	0.91	3.93	0.26	1.73	0.45	0.12
Rel.Std.Dev.	2.22%	3.30%	1.89%	3.07%	0.44%	0.69%	1.93%	8.77%	0.57%	3.71%	0.98%	0.25%
PDM <sup>3</sup>	-0.39%	5.04%	-0.30%	-3.27%	0.58%	-0.12%	1.56%	-3.77%	-0.31%	0.15%	-0.89%	4.32%

Table A33. Fusion ICP results for SO<sub>3</sub> in OREAS 182 (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	0.050	<0.01	NR
2	<0.02	<0.05	<0.1	<0.02	<0.01	NR	NR	NR	NR	0.050	<0.01	NR
3	<0.02	<0.05	<0.1	<0.02	0.010	NR	NR	NR	NR	0.075	<0.01	NR
4	<0.02	<0.05	<0.1	<0.02	<0.01	NR	NR	NR	NR	0.050	<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	<0.02	NR	NR	NR	NR	NR	<0.01	NR	NR
7	0.020	<0.05	<0.02	<0.02	NR	NR	NR	NR	NR	<0.01	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	0.080	0.020	0.025	NR	NR	NR	NR	0.050	NR	NR
10	<0.02	<0.05	0.040	0.020	0.025	NR	NR	NR	NR	0.100	NR	NR
11	0.040	<0.05	0.040	0.020	<0.02	NR	NR	NR	NR	<0.01	NR	NR
12	0.020	<0.05	0.040	0.020	<0.02	NR	NR	NR	NR	<0.01	NR	NR
Mean	0.025		0.050	0.020	0.020					0.062		
Median	0.020		0.040	0.020	0.025					0.050		
Std.Dev.	0.010		0.020	0.000	0.009					0.021		
Rel.Std.Dev.	40.00%		40.00%	0.00%	43.26%					33.47%		
PDM <sup>3</sup>	-29.54%		40.92%	-43.63%	-43.69%					75.94%		

Table A34. Fusion ICP results for TiO<sub>2</sub> in OREAS 182 (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	0.050	0.050	0.050	0.051	0.050	0.052	0.043	0.048	0.050	0.050	0.058
2	<0.01	0.050	0.050	0.050	0.053	0.050	0.053	0.045	0.047	0.050	0.040	0.056
3	<0.01	0.050	0.050	0.050	0.053	0.050	0.053	0.047	0.045	0.050	0.040	0.057
4	<0.01	0.050	0.050	0.040	0.054	0.050	0.053	0.043	0.047	0.050	0.050	0.057
5	<b>&lt;0.01</b>	0.050	0.050	0.050	0.055	0.050	0.051	0.055	0.052	0.060	NR	NR
6	<b>&lt;0.01</b>	0.060	0.050	0.050	0.054	0.050	0.052	0.053	0.052	0.050	NR	NR
7	<b>&lt;0.01</b>	0.060	0.050	0.050	0.054	0.050	0.051	<b>0.063</b>	0.051	0.050	NR	NR
8	<b>0.020</b>	0.060	<b>0.070</b>	0.050	0.055	0.050	0.052	0.054	0.054	0.050	NR	NR
9	<0.01	0.050	0.050	0.050	0.056	0.050	0.054	0.050	0.050	0.050	NR	NR
10	<0.01	0.050	0.050	0.050	0.054	0.050	0.052	<b>0.059</b>	0.053	0.050	NR	NR
11	<0.01	0.050	0.050	0.050	0.056	0.050	0.050	0.050	0.051	0.050	NR	NR
12	<0.01	0.050	0.050	0.050	0.055	0.050	0.053	0.052	0.055	0.050	NR	NR
Mean	0.020	0.053	0.052	0.049	0.054	0.050	0.052	0.051	0.051	0.051	0.045	0.057
Median	0.020	0.050	0.050	0.050	0.054	0.050	0.052	0.051	0.051	0.050	0.045	0.057
Std.Dev.		0.005	0.006	0.003	0.001	0.000	0.001	0.006	0.003	0.003	0.006	0.001
Rel.Std.Dev.		8.61%	11.17%	5.87%	2.59%	0.00%	2.14%	12.07%	6.08%	5.68%	12.83%	1.27%
PDM <sup>3</sup>	-60.75%	3.03%	1.40%	-3.51%	6.31%	-1.87%	2.38%	0.42%	-0.88%	-0.24%	-11.68%	11.77%

Table A35. Fusion ICP results for Zn in OREAS 182 (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	200	184	200	200	<b>90</b>	NR	<b>100</b>	181	151	200	<b>65</b>	NR
2	200	193	150	200	<b>90</b>	NR	200	178	154	200	<b>65</b>	NR
3	200	<b>248</b>	150	200	<b>90</b>	NR	200	192	157	200	<b>33</b>	NR
4	200	168	200	200	<b>100</b>	NR	200	176	140	200	<b>59</b>	NR
5	200	206	200	200	<b>100</b>	NR	200	171	<b>92</b>	200	NR	NR
6	200	188	200	200	<b>100</b>	NR	200	182	<b>72</b>	200	NR	NR
7	200	194	250	200	<b>100</b>	NR	<b>100</b>	183	<b>82</b>	200	NR	NR
8	200	183	200	200	<b>100</b>	NR	200	183	<b>87</b>	200	NR	NR
9	200	157	<b>250</b>	200	<b>80</b>	NR	200	174	164	200	NR	NR
10	200	164	<b>250</b>	200	<b>110</b>	NR	200	191	175	200	NR	NR
11	200	150	<b>250</b>	200	<b>80</b>	NR	200	177	161	200	NR	NR
12	200	177	<b>250</b>	200	<b>80</b>	NR	200	184	161	200	NR	NR
Mean	200	184	213	200	93		183	181	133	200	56	
Median	200	184	200	200	95		200	182	153	200	62	
Std.Dev.	0	26	38	0	10		39	7	38	0	15	
Rel.Std.Dev.	0.00%	14.04%	17.74%	0.00%	10.55%		21.23%	3.63%	28.45%	0.00%	27.50%	
PDM <sup>3</sup>	5.88%	-2.41%	12.50%	5.88%	-50.59%		-2.94%	-4.15%	-29.62%	5.88%	-70.62%	

Table A36. Results for C in OREAS 182 (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	0.080	0.090	0.080	0.060	<b>0.160</b>	0.110	0.103	0.070	0.110	0.084	0.120
2	0.080	0.140	0.070	0.070	0.100	0.080	0.094	0.060	0.100	0.088	0.080
3	0.090	0.130	0.070	0.060	0.130	0.060	0.102	0.060	0.110	0.084	0.080
4	0.080	<b>0.240</b>	0.060	0.050	0.100	0.080	0.094	0.070	0.100	0.089	0.080
5	0.080	0.090	0.080	0.060	0.100	0.080	0.104	0.070	0.130	0.089	0.080
6	0.070	0.100	0.080	0.060	0.100	0.100	0.113	0.070	0.130	0.093	0.080
7	0.080	0.100	0.080	0.060	0.110	0.090	0.117	0.070	0.130	0.090	0.080
8	0.070	0.090	0.080	0.060	0.110	0.090	0.091	0.070	0.120	0.097	0.080
9	<b>0.240</b>	0.080	0.060	0.070	0.110	0.070	0.134	0.060	0.110	0.087	0.090
10	0.070	0.100	0.060	0.070	0.110	0.090	0.125	0.070	0.130	<b>0.122</b>	0.060
11	0.090	0.130	0.060	0.080	0.110	0.080	0.114	0.070	0.110	0.093	0.070
12	0.080	0.080	0.060	0.080	0.110	0.090	0.107	0.070	0.130	0.084	0.060
Mean	0.093	0.114	0.070	0.065	0.113	0.085	0.108	0.068	0.118	0.092	0.080
Median	0.080	0.100	0.070	0.060	0.110	0.085	0.106	0.070	0.115	0.089	0.080
Std.Dev.	0.047	0.044	0.010	0.009	0.017	0.013	0.013	0.005	0.012	0.010	0.015
Rel.Std.Dev.	50.73%	38.90%	13.62%	13.92%	15.22%	15.46%	12.04%	6.70%	10.34%	11.22%	19.22%
PDM <sup>3</sup>	4.66%	29.17%	-20.80%	-26.46%	27.28%	-3.83%	22.38%	-23.63%	32.94%	3.88%	-9.49%



Table A37. Results for S in OREAS 182 (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	0.005	<0.01
2	0.010	<0.005	<0.01	<0.01	<0.02	<0.01	0.030	<0.01	<0.01	<0.003	<0.01
3	0.010	<0.005	<0.01	<0.01	<0.02	<0.01	0.010	<0.01	<0.01	0.003	<0.01
4	0.010	<0.005	<0.01	<0.01	<0.02	<0.01	0.030	<0.01	<0.01	0.008	<0.01
5	0.010	<0.005	<0.01	0.020	<0.02	<0.01	0.020	<0.01	<0.01	0.016	<0.01
6	<0.01	0.019	<0.01	0.010	<0.02	<0.01	0.020	<0.01	<0.01	0.017	<0.01
7	0.010	0.019	<0.01	<0.01	<0.02	<0.01	0.020	<0.01	<0.01	0.018	<0.01
8	0.010	<0.005	<0.01	<0.01	<0.02	<0.01	0.020	0.010	<0.01	0.017	<0.01
9	<0.01	<0.005	<0.01	0.010	<0.02	<0.01	<0.01	<0.01	<0.01	0.013	<0.01
10	0.010	<0.005	<0.01	0.010	<0.02	<0.01	0.010	<0.01	<0.01	0.014	<0.01
11	0.010	<0.005	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	0.014	<0.01
12	<0.01	<0.005	<0.01	<0.01	<0.02	<0.01	<0.01	<0.01	<0.01	0.012	<0.01
Mean	0.010	0.019		0.013			0.020	0.010		0.013	
Median	0.010	0.019		0.010			0.020	0.010		0.014	
Std.Dev.	0.000	0.000		0.005			0.007			0.005	
Rel.Std.Dev.	0.00%	0.00%		40.00%			35.36%			41.12%	
PDM <sup>3</sup>	-28.73%	35.41%		-10.92%			42.53%	-28.73%		-9.55%	