



**CERTIFICATE OF ANALYSIS FOR**  
**NICKEL LATERITE ORE REFERENCE MATERIAL**  
**OREAS 192**

Constituent	Certified Value	1SD
<b>Fusion XRF</b>		
Nickel, Ni (wt.%)	1.77	0.03
Cobalt, Co (ppm)	404	12
Aluminium oxide, Al <sub>2</sub> O <sub>3</sub> (wt.%)	2.76	0.05
Calcium oxide, CaO (wt.%)	0.313	0.009
<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.%)	0.913	0.016
Iron oxide, Fe <sub>2</sub> O <sub>3</sub> (wt.%)	18.10	0.15
<i>Potassium oxide, K<sub>2</sub>O (wt.%)</i>	<0.01	IND
Magnesium oxide, MgO (wt.%)	21.32	0.24
Manganese oxide, MnO (wt.%)	0.277	0.006
Sodium oxide, Na <sub>2</sub> O (wt.%)	0.028	0.014
<i>Phosphorus oxide, P<sub>2</sub>O<sub>5</sub> (wt.%)</i>	<0.01	IND
Silicon dioxide, SiO <sub>2</sub> (wt.%)	43.58	0.32
<i>Sulphur oxide, SO<sub>3</sub> (wt.%)</i>	~0.004	IND
Titanium oxide, TiO <sub>2</sub> (wt.%)	0.036	0.007
Zinc, Zn (ppm)	176	14
Loss on ignition, LOI (wt.%)	10.17	0.25
<b>Fusion ICP</b>		
Nickel, Ni (wt.%)	1.75	0.05
Cobalt, Co (ppm)	398	17
Aluminium oxide, Al <sub>2</sub> O <sub>3</sub> (wt.%)	2.75	0.08
Calcium oxide, CaO (wt.%)	0.316	0.029
<i>Copper, Cu (ppm)</i>	~38	IND
Chromium oxide, Cr <sub>2</sub> O <sub>3</sub> (wt.%)	0.910	0.022
Iron oxide, Fe <sub>2</sub> O <sub>3</sub> (wt.%)	18.14	0.54
<i>Potassium oxide, K<sub>2</sub>O (wt.%)</i>	<0.1	IND
Magnesium oxide, MgO (wt.%)	21.26	0.65
Manganese oxide, MnO (wt.%)	0.278	0.008
Sodium oxide, Na <sub>2</sub> O (wt.%)	0.022	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.%)	43.45	0.93
<i>Sulphur oxide, SO<sub>3</sub> (wt.%)</i>	<0.02	IND
Titanium oxide, TiO <sub>2</sub> (wt.%)	0.033	0.004
Zinc, Zn (ppm)	193	25
<b>IR Combustion Furnace</b>		
Carbon, C (wt.%)	0.07	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 192 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 Barro Alto Nickel Mine located in the state of Goiás and ~300 kms from the port of Santos, Brazil.

## COMMINUTION AND HOMOGENISATION PROCEDURES

The material constituting OREAS 192 was prepared in the following manner:

- a) *drying to constant mass at 105°C;*
- b) *crushing;*
- c) *milling to 99.7% 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 192

OREAS 192 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 192

### Certified Value and Confidence Interval

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

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

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

where

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

$p$  is the number of participating laboratories;

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

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

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

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

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

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

where

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

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

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

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

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

where

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

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

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

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

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

Table 1. Certified Values and 95% Confidence Intervals for OREAS 192.

Constituent	Certified Value	95% Confidence Interval	
		Low	High
Fusion XRF			
Nickel, Ni (wt.%)	1.77	1.76	1.79
Cobalt, Co (ppm)	404	399	410
Aluminium oxide, Al <sub>2</sub> O <sub>3</sub> (wt.%)	2.76	2.74	2.78
Calcium oxide, CaO (wt.%)	0.313	0.309	0.317
Chlorine, Cl (ppm)	<50	IND	IND
Copper, Cu (ppm)	<50	IND	IND
Chromium oxide, Cr <sub>2</sub> O <sub>3</sub> (wt.%)	0.913	0.907	0.919
Iron oxide, Fe <sub>2</sub> O <sub>3</sub> (wt.%)	18.10	18.02	18.17
Potassium oxide, K <sub>2</sub> O (wt.%)	<0.01	IND	IND
Magnesium oxide, MgO (wt.%)	21.32	21.22	21.43
Manganese oxide, MnO (wt.%)	0.277	0.275	0.280
Sodium oxide, Na <sub>2</sub> O (wt.%)	~0.03	IND	IND
Phosphorus oxide, P <sub>2</sub> O <sub>5</sub> (wt.%)	<0.01	IND	IND
Silicon dioxide, SiO <sub>2</sub> (wt.%)	43.58	43.42	43.74
Sulphur oxide, SO <sub>3</sub> (wt.%)	~0.004	IND	IND
Titanium oxide, TiO <sub>2</sub> (wt.%)	0.036	0.033	0.040
Zinc, Zn (ppm)	176	168	184
Loss on ignition, LOI (wt.%)	10.17	10.02	10.32
Fusion ICP			
Nickel, Ni (wt.%)	1.75	1.73	1.77
Cobalt, Co (ppm)	398	394	403
Aluminium oxide, Al <sub>2</sub> O <sub>3</sub> (wt.%)	2.75	2.71	2.79
Calcium oxide, CaO (wt.%)	0.316	0.302	0.331
Copper, Cu (ppm)	~38	IND	IND
Chromium oxide, Cr <sub>2</sub> O <sub>3</sub> (wt.%)	0.910	0.905	0.916
Iron oxide, Fe <sub>2</sub> O <sub>3</sub> (wt.%)	18.14	17.89	18.40
Potassium oxide, K <sub>2</sub> O (wt.%)	<0.1	IND	IND
Magnesium oxide, MgO (wt.%)	21.26	20.90	21.62
Manganese oxide, MnO (wt.%)	0.278	0.275	0.281
Sodium oxide, Na <sub>2</sub> O (wt.%)	0.022	0.020	0.024
Phosphorus oxide, P <sub>2</sub> O <sub>5</sub> (wt.%)	<0.02	IND	IND
Silica dioxide, SiO <sub>2</sub> (wt.%)	43.45	42.96	43.94
Sulphur oxide, SO <sub>3</sub> (wt.%)	<0.02	IND	IND
Titanium oxide, TiO <sub>2</sub> (wt.%)	0.033	0.030	0.035
Zinc, Zn (ppm)	193	173	212
IR Combustion Furnace			
Carbon, C (wt.%)	0.07	0.06	0.08
Sulphur, S (wt.%)	<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 1.76 and 1.78 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 192.

Constituent	Certified Value	Tolerance limits 1-α=0.99, ρ=0.95	
		Low	High
Fusion XRF			
Nickel, Ni (wt.%)	1.77	1.76	1.78
Cobalt, Co (ppm)	404	396	412
Aluminium oxide, Al <sub>2</sub> O <sub>3</sub> (wt.%)	2.76	2.74	2.78
Calcium oxide, CaO (wt.%)	0.313	0.309	0.316
Chlorine, Cl (ppm)	<50	IND	IND
Copper, Cu (ppm)	<50	IND	IND
Chromium oxide, Cr <sub>2</sub> O <sub>3</sub> (wt.%)	0.913	0.906	0.920
Iron oxide, Fe <sub>2</sub> O <sub>3</sub> (wt.%)	18.10	18.03	18.16
Potassium oxide, K <sub>2</sub> O (wt.%)	<0.01	IND	IND
Magnesium oxide, MgO (wt.%)	21.32	21.27	21.38
Manganese oxide, MnO (wt.%)	0.277	0.276	0.279
Sodium oxide, Na <sub>2</sub> O (wt.%)	~0.03	IND	IND
Phosphorus oxide, P <sub>2</sub> O <sub>5</sub> (wt.%)	<0.01	IND	IND
Silicon dioxide, SiO <sub>2</sub> (wt.%)	43.58	43.42	43.74
Sulphur oxide, SO <sub>3</sub> (wt.%)	~0.004	IND	IND
Titanium oxide, TiO <sub>2</sub> (wt.%)	0.036	0.033	0.040
Zinc, Zn (ppm)	176	169	183
Loss on ignition, LOI (wt.%)	10.17	10.12	10.22
Fusion ICP			
Nickel, Ni (wt.%)	1.75	1.72	1.78
Cobalt, Co (ppm)	398	392	405
Aluminium oxide, Al <sub>2</sub> O <sub>3</sub> (wt.%)	2.75	2.71	2.79
Calcium oxide, CaO (wt.%)	0.316	0.302	0.331
Copper, Cu (ppm)	~38	IND	IND
Chromium oxide, Cr <sub>2</sub> O <sub>3</sub> (wt.%)	0.910	0.896	0.925
Iron oxide, Fe <sub>2</sub> O <sub>3</sub> (wt.%)	18.14	17.94	18.35
Potassium oxide, K <sub>2</sub> O (wt.%)	<0.1	IND	IND
Magnesium oxide, MgO (wt.%)	21.26	21.03	21.49
Manganese oxide, MnO (wt.%)	0.278	0.275	0.281
Sodium oxide, Na <sub>2</sub> O (wt.%)	0.022	IND	IND
Phosphorus oxide, P <sub>2</sub> O <sub>5</sub> (wt.%)	<0.02	IND	IND
Silica dioxide, SiO <sub>2</sub> (wt.%)	43.45	43.05	43.84
Sulphur oxide, SO <sub>3</sub> (wt.%)	<0.02	IND	IND
Titanium oxide, TiO <sub>2</sub> (wt.%)	0.033	0.031	0.034
Zinc, Zn (ppm)	193	173	213
IR Combustion Furnace			
Carbon, C (wt.%)	0.07	IND	IND
Sulphur, S (wt.%)	<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 192 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 192. 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 192. 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 0.926 for nickel, 0.874 for cobalt, 0.999 for iron oxide and 1.00 for magnesium oxide and indicates no evidence that between-unit variance is greater than within-unit variance. Conclusion: do not reject  $H_0$ .

Note that ANOVA is not an absolute measure of homogeneity. Rather, it establishes that the metals are distributed in a similar manner throughout OREAS 192 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 192

Constituent	Certified Value	Absolute Standard Deviations					Relative Standard Deviations		
		1SD	2SD Low	2SD High	3SD Low	3SD High	1RSD	2RSD	3RSD
Fusion XRF									
Ni (wt.%)	1.77	0.03	1.71	1.83	1.68	1.86	1.71%	3.42%	5.13%
Co (ppm)	404	12	380	429	368	441	3.03%	6.05%	9.08%
Al <sub>2</sub> O <sub>3</sub> (wt.%)	2.76	0.05	2.67	2.86	2.62	2.90	1.71%	3.43%	5.14%
CaO (wt.%)	0.313	0.009	0.295	0.331	0.286	0.340	2.86%	5.71%	8.57%
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.%)	0.913	0.016	0.882	0.944	0.866	0.960	1.72%	3.44%	5.16%
Fe <sub>2</sub> O <sub>3</sub> (wt.%)	18.10	0.15	17.79	18.40	17.64	18.55	0.84%	1.67%	2.51%
K <sub>2</sub> O (wt.%)	<0.01	IND	IND	IND	IND	IND	IND	IND	IND
MgO (wt.%)	21.32	0.24	20.84	21.81	20.60	22.05	1.13%	2.26%	3.39%
MnO (wt.%)	0.277	0.006	0.266	0.289	0.260	0.294	2.06%	4.13%	6.19%
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.%)	43.58	0.32	42.95	44.21	42.63	44.53	0.72%	1.45%	2.17%
SO <sub>3</sub> (wt.%)	~0.004	IND	IND	IND	IND	IND	IND	IND	IND
TiO <sub>2</sub> (wt.%)	0.036	0.007	0.022	0.050	0.015	0.057	19.36%	38.73%	58.09%
Zn (ppm)	176	14	147	205	133	219	8.22%	16.43%	24.65%
LOI (wt.%)	10.17	0.25	9.67	10.67	9.42	10.92	2.46%	4.91%	7.37%
Fusion ICP									
Ni (wt.%)	1.75	0.05	1.65	1.85	1.60	1.90	2.80%	5.61%	8.41%
Co (ppm)	398	17	364	433	347	450	4.32%	8.64%	12.95%
Al <sub>2</sub> O <sub>3</sub> (wt.%)	2.75	0.08	2.58	2.92	2.50	3.01	3.07%	6.14%	9.22%
CaO (wt.%)	0.316	0.029	0.257	0.375	0.228	0.405	9.32%	18.63%	27.95%
Cu (ppm)	~38	IND	IND	IND	IND	IND	IND	IND	IND
Cr <sub>2</sub> O <sub>3</sub> (wt.%)	0.910	0.022	0.866	0.955	0.844	0.977	2.43%	4.87%	7.30%
Fe <sub>2</sub> O <sub>3</sub> (wt.%)	18.14	0.54	17.07	19.22	16.53	19.76	2.97%	5.93%	8.90%
K <sub>2</sub> O (wt.%)	<0.1	IND	IND	IND	IND	IND	IND	IND	IND
MgO (wt.%)	21.26	0.65	19.97	22.55	19.33	23.20	3.03%	6.07%	9.10%
MnO (wt.%)	0.278	0.008	0.263	0.293	0.255	0.300	2.70%	5.40%	8.11%
Na <sub>2</sub> O (wt.%)	0.022	0.004	0.014	0.030	0.010	0.034	18.63%	37.25%	55.88%
P <sub>2</sub> O <sub>5</sub> (wt.%)	<0.02	IND	IND	IND	IND	IND	IND	IND	IND
SiO <sub>2</sub> (wt.%)	43.45	0.93	41.59	45.30	40.67	46.22	2.13%	4.26%	6.39%
SO <sub>3</sub> (wt.%)	<0.02	IND	IND	IND	IND	IND	IND	IND	IND
TiO <sub>2</sub> (wt.%)	0.033	0.004	0.025	0.041	0.021	0.045	12.40%	24.81%	37.21%
Zn (ppm)	193	25	143	242	119	267	12.79%	25.58%	38.37%
IR Combustion Furnace									
C (wt.%)	0.07	0.02	0.04	0.11	0.02	0.13	25.16%	50.33%	75.49%
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  
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BV Amdel, Cardiff, NSW, Australia  
BV Amdel, Stirling, SA, Australia  
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UIS Analytical Services, Centurion, South Africa

## PREPARER AND SUPPLIER OF THE REFERENCE MATERIAL

Nickel laterite ore reference material OREAS 192 has been prepared and certified and is supplied by:

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OREAS 192 is packaged in unit sizes of 10g (single-use laminated foil pouches) and 1kg (wide mouthed plastic jars).

## INTENDED USE

OREAS 192 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 192 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 192**

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 192 (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	1.72	1.80	1.75	1.74	1.81	1.77	1.75	1.82	1.79	1.80	1.76	1.74	1.74	1.77	1.80	1.77	1.73
2	1.71	1.80	1.75	1.75	1.82	1.77	1.78	1.83	1.78	1.81	1.74	1.76	1.76	1.78	1.80	1.78	1.73
3	1.72	1.80	1.74	1.74	1.82	1.76	1.78	1.82	1.77	1.82	1.73	1.75	1.74	1.77	1.80	1.77	1.73
4	1.72	1.80	1.74	1.74	1.81	1.75	1.78	1.82	1.79	1.82	1.73	1.75	1.74	1.77	1.80	1.78	1.74
5	<b>1.82</b>	1.82	1.75	1.75	1.82	1.75	1.78	1.81	1.78	1.80	1.74	1.76	1.75	1.77	NR	NR	NR
6	1.77	1.82	1.75	1.76	1.82	1.77	<b>1.85</b>	1.78	1.78	1.81	1.74	1.77	1.76	1.76	NR	NR	NR
7	1.77	1.82	1.76	1.75	1.80	1.77	1.77	1.80	1.78	1.79	1.74	1.76	1.75	1.78	NR	NR	NR
8	1.78	1.82	1.74	1.75	1.82	1.76	1.79	1.79	1.78	1.80	1.74	1.75	1.74	1.77	NR	NR	NR
9	1.78	1.82	1.75	1.75	1.84	1.74	1.80	1.81	1.78	1.81	1.74	1.80	1.74	1.76	NR	NR	NR
10	1.76	1.83	1.74	1.75	1.71	1.76	1.78	1.83	1.80	1.82	1.74	1.77	1.74	1.75	NR	NR	NR
11	1.76	1.82	1.75	1.75	1.81	1.75	1.75	1.84	1.81	1.80	1.73	1.76	1.75	1.77	NR	NR	NR
12	1.77	1.83	1.76	1.75	1.78	1.74	1.77	1.81	1.79	1.81	1.73	1.81	<b>1.79</b>	1.76	NR	NR	NR
Mean	1.75	1.81	1.75	1.75	1.80	1.76	1.78	1.81	1.79	1.81	1.74	1.77	1.75	1.77	1.80	1.78	1.73
Median	1.76	1.82	1.75	1.75	1.81	1.76	1.78	1.81	1.78	1.81	1.74	1.76	1.74	1.77	1.80	1.78	1.73
Std.Dev.	0.03	0.01	0.01	0.01	0.03	0.01	0.03	0.02	0.01	0.01	0.01	0.02	0.01	0.01	0.00	0.00	0.01
Rel.Std.Dev.	1.85%	0.60%	0.42%	0.33%	1.82%	0.66%	1.45%	0.94%	0.61%	0.52%	0.42%	1.17%	0.82%	0.45%	0.00%	0.24%	0.29%
PDM <sup>3</sup>	-1.00%	2.37%	-1.36%	-1.33%	1.80%	-0.80%	0.55%	2.27%	0.79%	1.96%	-1.96%	-0.39%	-1.28%	-0.32%	1.59%	0.20%	-2.22%

Table A3. Fusion XRF results for Co in OREAS 192 (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	390	400	400	400	410	400	NR	490	420	480	390	400	420	410	400	393	400
2	380	400	390	410	430	400	NR	490	410	520	390	400	420	420	400	390	400
3	390	400	390	400	420	400	NR	500	410	560	400	400	420	410	400	391	400
4	380	400	400	400	410	400	NR	500	410	440	390	400	420	420	400	392	400
5	410	400	400	400	410	400	NR	490	410	340	400	400	410	410	NR	NR	NR
6	400	400	390	400	420	400	NR	490	410	490	400	400	420	420	NR	NR	NR
7	410	400	390	400	400	400	NR	490	400	440	410	400	410	410	NR	NR	NR
8	410	400	390	400	410	400	NR	490	430	370	400	400	410	420	NR	NR	NR
9	410	400	390	410	440	390	NR	500	400	580	400	400	420	430	NR	NR	NR
10	400	400	380	410	420	390	NR	500	410	440	400	400	410	430	NR	NR	NR
11	400	400	400	400	420	390	NR	500	410	410	400	400	420	420	NR	NR	NR
12	410	400	390	410	400	390	NR	500	410	440	390	400	420	430	NR	NR	NR
Mean	399	400	393	403	416	397		495	411	459	398	400	417	419	400	392	400
Median	400	400	390	400	415	400		495	410	440	400	400	420	420	400	392	400
Std.Dev.	12	0	6	5	12	5		5	8	71	6	0	5	8	0	1	0
Rel.Std.Dev.	2.92%	0.00%	1.58%	1.22%	2.80%	1.24%		1.06%	1.93%	15.52%	1.56%	0.00%	1.18%	1.89%	0.00%	0.33%	0.00%
PDM <sup>3</sup>	-1.25%	-1.04%	-2.90%	-0.22%	2.88%	-1.87%		22.46%	1.64%	13.60%	-1.66%	-1.04%	3.08%	3.70%	-1.04%	-3.14%	-1.04%

Table A4. Fusion XRF results for Al<sub>2</sub>O<sub>3</sub> in OREAS 192 (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	2.74	2.65	2.75	2.79	2.79	2.74	2.69	2.78	2.82	2.75	2.76	2.79	2.76	2.83	2.76	2.80	2.77
2	2.73	2.69	2.77	2.78	2.79	2.75	2.69	2.77	2.81	2.66	2.76	2.78	2.73	2.84	2.77	2.77	2.76
3	2.75	2.67	2.76	2.77	2.80	2.75	2.72	2.80	2.84	2.70	2.76	2.78	2.71	2.82	2.75	<b>2.72</b>	2.79
4	2.74	2.65	2.77	2.79	2.79	2.73	2.68	2.81	2.81	2.77	2.76	2.79	2.67	2.83	2.76	2.78	2.75
5	2.81	2.68	2.76	2.74	2.73	2.74	2.74	2.78	<b>2.92</b>	2.75	2.73	2.75	2.78	2.85	NR	NR	NR
6	2.81	2.66	2.74	2.77	2.77	2.75	<b>2.83</b>	2.76	<b>2.90</b>	<b>2.99</b>	2.74	2.76	2.79	2.82	NR	NR	NR
7	2.80	2.64	2.74	2.75	2.74	2.74	2.72	2.76	<b>2.80</b>	2.78	2.73	2.77	2.79	2.81	NR	NR	NR
8	2.81	2.68	2.76	2.76	2.76	2.75	2.72	2.75	<b>2.85</b>	2.76	2.75	2.77	2.74	2.84	NR	NR	NR
9	2.76	<b>2.68</b>	2.75	2.75	2.77	2.70	2.69	2.80	2.85	2.66	2.73	2.80	2.79	2.80	NR	NR	NR
10	2.75	<b>2.64</b>	2.73	2.79	2.85	2.72	2.69	2.77	2.83	2.64	2.76	<b>2.93</b>	2.71	2.80	NR	NR	NR
11	2.75	<b>2.63</b>	2.74	2.76	2.79	2.73	2.67	2.81	2.85	2.77	2.74	2.79	2.79	2.83	NR	NR	NR
12	2.79	<b>2.66</b>	2.77	2.76	2.80	2.72	2.68	2.80	2.89	2.72	2.75	2.78	2.89	2.82	NR	NR	NR
Mean	2.77	2.66	2.75	2.77	2.78	2.73	2.71	2.78	2.85	2.75	2.75	2.79	2.76	2.82	2.76	2.77	2.77
Median	2.76	2.66	2.76	2.77	2.79	2.74	2.69	2.78	2.85	2.75	2.75	2.78	2.77	2.83	2.76	2.78	2.77
Std.Dev.	0.03	0.02	0.01	0.02	0.03	0.02	0.04	0.02	0.04	0.09	0.01	0.05	0.06	0.02	0.01	0.03	0.02
Rel.Std.Dev.	1.13%	0.68%	0.50%	0.62%	1.12%	0.56%	1.60%	0.75%	1.34%	3.32%	0.47%	1.65%	2.02%	0.55%	0.30%	1.16%	0.62%
PDM <sup>3</sup>	0.33%	-3.73%	-0.27%	0.24%	0.75%	-0.99%	-1.84%	0.78%	3.14%	-0.53%	-0.49%	1.08%	0.05%	2.29%	-0.03%	0.29%	0.24%



Table A5. Fusion XRF results for CaO in OREAS 192 (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	0.300	<b>0.285</b>	0.310	0.320	0.300	0.312	0.310	0.300	<b>0.330</b>	0.300	0.320	0.310	0.314	0.300	0.310	<b>0.284</b>	0.300
2	0.300	<b>0.290</b>	0.310	0.330	0.300	0.313	0.310	0.300	<b>0.330</b>	0.307	0.310	0.310	0.314	0.320	0.310	<b>0.287</b>	0.310
3	<b>0.370</b>	<b>0.290</b>	0.300	0.320	0.300	0.310	0.310	0.310	<b>0.340</b>	0.310	0.320	0.310	0.312	0.320	0.320	<b>0.293</b>	0.310
4	0.300	<b>0.290</b>	0.310	0.320	0.300	0.313	0.310	0.310	<b>0.340</b>	0.327	0.320	0.310	0.318	0.320	0.310	<b>0.286</b>	0.300
5	0.330	<b>0.290</b>	0.310	0.310	0.300	0.310	0.310	0.300	0.340	0.305	0.310	0.320	0.320	0.320	NR	NR	NR
6	0.320	<b>0.290</b>	0.310	0.310	0.310	0.312	0.320	0.300	0.320	0.311	0.310	0.320	0.319	0.320	NR	NR	NR
7	0.330	<b>0.285</b>	0.310	0.320	0.310	0.310	0.310	0.300	0.330	0.306	0.310	0.320	0.314	0.320	NR	NR	NR
8	0.320	<b>0.290</b>	0.310	0.320	0.300	0.315	0.310	0.290	0.330	0.309	0.310	0.320	0.317	0.320	NR	NR	NR
9	0.320	<b>0.290</b>	0.310	0.320	0.300	0.307	0.310	0.310	0.330	0.316	0.310	0.310	0.318	0.310	NR	NR	NR
10	0.320	<b>0.285</b>	0.310	0.330	0.300	0.310	0.300	0.310	0.330	0.309	0.310	0.330	0.316	0.310	NR	NR	NR
11	0.320	<b>0.285</b>	0.310	0.330	0.290	0.312	0.310	0.310	0.340	0.316	0.310	0.310	0.317	0.320	NR	NR	NR
12	0.320	<b>0.290</b>	0.310	0.320	0.300	0.310	0.310	0.300	0.330	0.308	0.310	0.320	<b>0.329</b>	0.320	NR	NR	NR
Mean	0.321	<b>0.288</b>	0.309	0.321	0.301	0.311	0.310	0.303	0.333	0.310	0.313	0.316	0.317	0.317	0.313	0.287	0.305
Median	0.320	0.290	0.310	0.320	0.300	0.311	0.310	0.300	0.330	0.309	0.310	0.315	0.317	0.320	0.310	0.286	0.305
Std.Dev.	0.019	0.002	0.003	0.007	0.005	0.002	0.004	0.007	0.006	0.007	0.005	0.007	0.004	0.007	0.005	0.004	0.006
Rel.Std.Dev.	5.86%	0.85%	0.93%	2.08%	1.71%	0.67%	1.38%	2.15%	1.87%	2.21%	1.45%	2.12%	1.38%	2.06%	1.60%	1.43%	1.89%
PDM <sup>3</sup>	2.57%	-7.82%	-1.16%	2.57%	-3.83%	-0.52%	-0.90%	-3.03%	6.30%	-0.79%	-0.10%	0.97%	1.45%	1.24%	-0.10%	-8.15%	-2.49%

Table A6. Fusion XRF results for Cl in OREAS 192 (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A BF*XRF	Lab B BF*XRF	Lab C BF*XRF	Lab D BF*XRF	Lab E BF*XRF	Lab F BF*XRF	Lab G BF*XRF	Lab H BF*XRF	Lab I BF*XRF	Lab J BF*XRF	Lab K BF*XRF	Lab L BF*XRF	Lab N BF*XRF	Lab O BF*XRF	Lab P BF*XRF	Lab Q BF*XRF	Lab R BF*XRF
1	<50	NR	NR	50	<10	NR	NR	NR	NR	NR	<50	<50	NR	NR	<50	<50	NR
2	<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	100	NR	NR	50	<b>110</b>	NR	NR	NR	NR	NR	<50	NR	NR	NR	NR	NR	NR
6	70	NR	NR	50	<b>110</b>	NR	NR	NR	NR	NR	<50	NR	NR	NR	NR	NR	NR
7	<50	NR	NR	50	<b>100</b>	NR	NR	NR	NR	NR	<50	NR	NR	NR	NR	NR	NR
8	<50	NR	NR	<50	<b>100</b>	NR	NR	NR	NR	NR	<50	NR	NR	NR	NR	NR	NR
9	<50	NR	NR	<50	50	NR	NR	NR	NR	NR	<50	NR	NR	NR	NR	NR	NR
10	<50	NR	NR	<50	<b>240</b>	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	10	NR	NR	NR	NR	NR	<50	NR	NR	NR	NR	NR	NR
Mean	68			50	69												
Median	60			50	50												
Std.Dev.	24			0	72												
Rel.Std.Dev.	35.01%			0.00%	104%												
PDM <sup>3</sup>	50.93%			11.80%	54.49%												

Table A7. Fusion XRF results for Cu in OREAS 192 (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	25	10	31	20	<10	80	<100	10	80	NR	40	<100	<20	NR
2	50	<30	<50	30	30	32	20	30	80	<100	10	90	NR	50	<100	<20	NR
3	<50	<30	<50	25	20	30	20	<10	70	<100	10	70	NR	50	<100	<20	NR
4	<50	<30	<50	30	20	30	20	<10	90	<100	20	60	NR	50	<100	23	NR
5	50	<30	<50	20	30	30	20	<10	70	<100	<10	50	NR	50	NR	NR	NR
6	<50	<30	<50	25	50	33	20	<10	80	<100	<10	60	NR	50	NR	NR	NR
7	<50	<30	<50	20	20	30	20	<10	80	<100	10	40	NR	50	NR	NR	NR
8	<50	<30	<50	20	30	30	10	<10	70	<100	10	40	NR	50	NR	NR	NR
9	<50	<30	<50	35	60	30	60	10	<50	<100	20	20	NR	60	NR	NR	NR
10	<50	<30	<50	30	30	30	40	<10	<50	<100	10	30	NR	50	NR	NR	NR
11	<50	<30	<50	25	40	30	20	30	<50	<100	10	40	NR	60	NR	NR	NR
12	<50	<30	<50	25	20	30	20	<10	<50	<100	20	30	NR	60	NR	NR	NR
Mean	50			26	30	30	24	23	78		13	51		52		23	
Median	50			25	30	30	20	30	80		10	45		50		23	
Std.Dev.	0			5	14	1	13	12	7		5	22		6			
Rel.Std.Dev.	0.00%			18.14%	47.14%	3.32%	54.26%	49.49%	9.12%		37.16%	42.32%		11.17%			
PDM <sup>3</sup>	61.17%			-16.73%	-3.30%	-1.72%	-22.10%	-24.79%	149%		-58.10%	63.85%		66.54%		-25.86%	

Table A8. Fusion XRF results for Cr<sub>2</sub>O<sub>3</sub> in OREAS 192 (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	0.909	0.895	0.908	0.917	0.885	0.921	<b>1.345</b>	0.950	0.900	<b>0.960</b>	0.916	0.910	0.926	0.911	0.910	0.922	0.920
2	0.912	0.895	0.905	0.920	0.907	0.930	<b>1.330</b>	0.940	0.900	<b>1.025</b>	0.912	0.960	0.937	0.911	0.900	0.902	0.920
3	0.922	0.895	0.902	0.917	0.908	0.922	<b>1.359</b>	0.930	0.920	<b>0.978</b>	0.893	0.940	0.908	0.909	0.900	0.912	0.920
4	0.896	0.895	0.906	0.916	0.893	0.917	<b>1.330</b>	0.930	0.900	<b>0.984</b>	0.902	0.930	0.939	0.912	0.900	0.924	0.920
5	0.923	0.895	0.908	0.921	0.886	0.919	0.927	0.930	0.910	<b>0.972</b>	0.898	0.920	0.948	0.908	NR	NR	NR
6	0.917	0.895	0.906	0.919	0.948	0.926	<b>0.971</b>	0.930	0.900	<b>0.945</b>	0.904	0.920	0.928	0.902	NR	NR	NR
7	0.917	0.895	0.907	0.923	0.892	0.940	0.924	0.930	0.910	<b>0.949</b>	0.901	0.930	0.933	0.911	NR	NR	NR
8	<b>0.947</b>	0.895	0.905	0.923	0.916	0.928	0.941	0.930	0.900	<b>0.962</b>	0.905	0.910	0.915	0.912	NR	NR	NR
9	0.921	0.895	0.899	0.910	0.892	0.906	0.916	0.940	0.900	<b>0.978</b>	0.888	0.940	0.912	0.903	NR	NR	NR
10	0.915	0.895	0.907	0.919	0.916	0.920	0.906	0.950	0.890	<b>0.975</b>	0.896	0.890	0.910	0.902	NR	NR	NR
11	0.912	0.890	0.919	0.912	0.866	0.922	0.902	0.950	0.910	<b>0.976</b>	0.900	0.890	0.916	0.906	NR	NR	NR
12	0.916	0.885	0.908	0.914	<b>0.846</b>	0.909	0.914	0.950	0.900	<b>0.982</b>	0.895	<b>0.980</b>	<b>0.984</b>	0.903	NR	NR	NR
Mean	0.917	0.894	0.907	0.918	0.896	0.922	1.064	0.938	0.903	<b>0.974</b>	0.901	0.927	0.930	0.907	0.903	0.915	0.920
Median	0.917	0.895	0.907	0.918	0.893	0.922	0.934	0.935	0.900	0.976	0.901	0.925	0.927	0.908	0.900	0.917	0.920
Std.Dev.	0.012	0.003	0.005	0.004	0.026	0.009	0.206	0.009	0.008	0.020	0.008	0.026	0.021	0.004	0.005	0.010	0.000
Rel.Std.Dev.	1.29%	0.35%	0.52%	0.45%	2.90%	0.98%	19.34%	1.00%	0.86%	2.10%	0.87%	2.85%	2.30%	0.44%	0.55%	1.09%	0.00%
PDM <sup>3</sup>	0.47%	-2.10%	-0.69%	0.51%	-1.83%	0.95%	16.51%	2.78%	-1.05%	6.67%	-1.33%	1.50%	1.83%	-0.61%	-1.14%	0.20%	0.77%

Table A9. Fusion XRF results for Fe<sub>2</sub>O<sub>3</sub> in OREAS 192 (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>17.65</b>	18.18	18.32	18.22	<b>17.70</b>	18.13	18.01	18.08	18.16	<b>17.49</b>	17.95	18.03	17.89	18.05	<b>18.50</b>	18.18	18.20
2	<b>17.50</b>	18.16	18.38	18.29	<b>17.70</b>	18.17	18.23	18.15	18.07	17.90	17.95	18.09	18.08	18.10	<b>18.60</b>	18.15	18.20
3	<b>17.65</b>	18.12	18.32	18.25	<b>17.70</b>	18.04	18.26	18.02	18.07	17.87	18.00	18.08	17.91	18.05	<b>18.60</b>	18.13	18.10
4	<b>17.65</b>	18.15	18.28	18.24	<b>17.65</b>	17.94	18.26	18.10	18.30	17.89	18.00	18.04	18.11	18.10	<b>18.60</b>	18.16	18.20
5	<b>18.35</b>	18.18	18.38	18.27	<b>17.65</b>	17.92	18.53	18.01	18.09	<b>17.60</b>	17.95	18.07	18.03	18.10	NR	NR	NR
6	18.00	18.19	18.33	18.33	<b>17.65</b>	18.08	<b>19.07</b>	17.76	18.17	<b>17.59</b>	17.95	18.11	18.12	18.10	NR	NR	NR
7	18.05	18.21	18.41	18.31	<b>17.55</b>	17.94	18.33	17.86	18.14	<b>17.53</b>	18.00	18.14	17.91	18.10	NR	NR	NR
8	18.05	18.13	18.30	18.29	<b>17.65</b>	18.01	18.35	17.85	18.15	<b>17.61</b>	18.00	18.08	17.93	18.05	NR	NR	NR
9	18.00	18.11	18.33	18.25	<b>17.85</b>	17.85	18.23	18.06	18.06	17.80	18.00	18.11	17.89	18.15	NR	NR	NR
10	17.85	18.15	18.29	18.18	<b>17.70</b>	17.92	18.18	18.18	18.24	17.79	17.95	18.17	17.78	18.15	NR	NR	NR
11	17.85	18.12	18.38	18.21	<b>17.60</b>	17.91	18.07	18.23	18.30	17.80	17.95	18.18	17.91	18.15	NR	NR	NR
12	17.95	18.16	18.36	18.20	<b>17.50</b>	17.87	18.22	18.11	18.17	17.90	17.95	18.23	<b>18.52</b>	18.20	NR	NR	NR
Mean	17.88	18.15	18.34	18.25	<b>17.66</b>	17.98	18.31	18.03	18.16	17.73	17.97	18.11	18.01	18.11	18.58	18.16	18.18
Median	17.90	18.15	18.33	18.25	17.65	17.94	18.25	18.07	18.16	17.80	17.95	18.10	17.92	18.10	18.60	18.16	18.20
Std.Dev.	0.24	0.03	0.04	0.05	0.09	0.10	0.27	0.14	0.08	0.15	0.03	0.06	0.19	0.05	0.05	0.02	0.05
Rel.Std.Dev.	1.32%	0.17%	0.23%	0.25%	0.50%	0.58%	1.49%	0.79%	0.46%	0.87%	0.14%	0.33%	1.06%	0.26%	0.27%	0.10%	0.28%
PDM <sup>3</sup>	-1.20%	0.30%	1.34%	0.86%	-2.42%	-0.65%	1.19%	-0.35%	0.35%	-2.03%	-0.70%	0.08%	-0.51%	0.06%	2.64%	0.33%	0.43%

Table A10. Fusion XRF results for K<sub>2</sub>O in OREAS 192 (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	<0.001	NR	<0.001	0.010	0.010	<0.01	<0.01	<0.01	NR	0.010	<0.01	0.005	<0.01
2	<0.01	<0.01	<0.01	0.005	0.001	NR	<0.001	<0.01	0.010	0.010	<0.01	<0.01	NR	0.010	<0.01	0.006	<0.01
3	<0.01	<0.01	<0.01	0.005	0.001	NR	<0.001	0.010	0.010	0.010	<0.01	<0.01	NR	0.010	<0.01	0.006	<0.01
4	<0.01	<0.01	<0.01	0.005	0.001	NR	<0.001	0.010	<0.01	<0.01	<0.01	<0.01	NR	0.010	<0.01	0.007	<0.01
5	<0.01	<0.01	<0.05	0.004	0.007	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	0.020	<0.01	<0.01	<0.01	NR	0.010	NR	NR	NR
7	<0.01	<0.01	<0.05	0.004	0.005	NR	<0.001	<0.01	0.010	<0.01	<0.01	<0.01	NR	0.010	NR	NR	NR
8	<0.01	<0.01	<0.05	0.004	0.006	NR	<0.001	<0.01	0.010	<0.01	<0.01	<0.01	NR	0.010	NR	NR	NR
9	<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
10	<0.01	<0.01	<0.01	0.005	0.003	NR	<0.001	<0.01	0.010	<0.01	<0.01	0.010	NR	0.010	NR	NR	NR
11	<0.01	<0.01	<0.01	0.006	<0.001	NR	<0.001	<0.01	0.010	<0.01	<0.01	<0.01	NR	0.010	NR	NR	NR
12	<0.01	<0.01	<0.01	0.006	<0.001	NR	<0.001	<0.01	0.010	<0.01	<0.01	<0.01	NR	0.010	NR	NR	NR
Mean				0.005	0.004			0.010	0.011	0.010		0.010		0.010		0.006	
Median				0.005	0.003			0.010	0.010	0.010		0.010		0.010		0.006	
Std.Dev.				0.001	0.003			0.000	0.003	0.000				0.000		0.001	
Rel.Std.Dev.				15.87%	75.87%			0.00%	27.64%	0.00%				0.00%		13.28%	
PDM <sup>3</sup>				-44.55%	-58.50%			16.73%	27.34%	16.73%		16.73%		16.73%		-31.42%	

Table A11. Fusion XRF results for MgO in OREAS 192 (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	21.10	21.53	21.25	21.27	21.00	21.11	<b>20.23</b>	21.85	21.43	21.27	21.10	21.29	20.93	21.50	21.30	21.23	21.20
2	20.90	21.49	21.30	21.29	21.00	21.11	<b>20.45</b>	21.66	21.36	21.49	21.20	21.28	21.11	21.50	21.30	21.27	21.30
3	21.10	21.58	21.23	21.27	21.00	21.03	<b>20.50</b>	21.83	21.47	21.66	21.20	21.30	20.88	21.50	21.40	21.28	21.20
4	21.10	21.55	21.25	21.30	21.00	20.99	<b>20.53</b>	21.81	21.47	21.86	21.20	21.27	20.81	21.50	21.30	21.24	21.30
5	21.50	21.55	21.30	21.24	21.00	20.93	21.63	21.70	21.55	21.49	21.20	21.29	21.10	21.50	NR	NR	NR
6	21.30	21.53	21.24	21.27	20.90	21.05	<b>22.36</b>	21.71	21.41	21.56	21.20	21.28	21.20	21.50	NR	NR	NR
7	21.30	21.43	21.31	21.21	21.10	20.93	21.48	21.72	21.40	21.27	21.20	21.33	21.06	21.50	NR	NR	NR
8	21.30	21.57	21.23	21.21	21.00	21.11	21.53	21.65	21.37	21.62	21.20	21.32	20.99	21.50	NR	NR	NR
9	21.40	21.64	21.21	21.38	21.60	20.73	21.42	21.71	21.40	21.21	21.20	21.26	21.07	21.60	NR	NR	NR
10	21.20	21.67	21.17	21.29	21.60	20.83	21.38	21.91	21.55	21.18	21.20	21.24	20.87	21.60	NR	NR	NR
11	21.20	21.70	21.32	21.36	21.60	20.85	21.19	21.80	21.62	21.47	21.20	21.31	21.09	21.70	NR	NR	NR
12	21.30	21.67	21.27	21.33	21.70	20.91	21.36	21.70	21.52	21.63	21.10	21.56	<b>21.78</b>	21.50	NR	NR	NR
Mean	21.23	21.57	21.26	21.29	21.21	20.96	21.17	21.75	21.46	21.48	21.18	21.31	21.07	21.53	21.33	21.25	21.25
Median	21.25	21.56	21.25	21.28	21.00	20.96	21.37	21.72	21.45	21.49	21.20	21.29	21.06	21.50	21.30	21.25	21.25
Std.Dev.	0.16	0.08	0.04	0.05	0.31	0.12	0.62	0.08	0.08	0.21	0.04	0.08	0.25	0.07	0.05	0.02	0.06
Rel.Std.Dev.	0.76%	0.38%	0.21%	0.25%	1.47%	0.59%	2.94%	0.38%	0.38%	0.96%	0.18%	0.39%	1.19%	0.30%	0.23%	0.10%	0.27%
PDM <sup>3</sup>	-0.46%	1.17%	-0.31%	-0.18%	-0.54%	-1.69%	-0.71%	2.02%	0.65%	0.72%	-0.66%	-0.06%	-1.17%	0.99%	0.01%	-0.33%	-0.34%

Table A12. Fusion XRF results for MnO in OREAS 192 (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	0.270	0.275	0.280	0.280	0.271	0.275	0.280	0.280	0.280	0.284	0.277	0.280	0.278	<b>0.294</b>	0.280	0.276	0.280
2	0.267	0.270	0.280	0.280	0.277	0.275	0.280	0.280	0.276	0.289	0.274	0.290	0.280	<b>0.296</b>	0.280	0.272	0.280
3	0.270	0.265	0.270	0.280	0.275	0.274	0.290	0.270	0.283	0.289	0.276	0.290	0.279	<b>0.294</b>	0.280	0.274	0.270
4	0.268	0.265	0.280	0.280	0.272	0.272	0.290	0.280	0.281	0.287	0.275	0.290	0.280	<b>0.296</b>	0.280	0.269	0.280
5	0.281	0.270	0.280	0.280	0.275	0.271	0.290	0.280	0.279	0.287	0.271	0.280	0.274	<b>0.294</b>	NR	NR	NR
6	0.277	0.270	0.270	0.280	0.277	0.272	<b>0.300</b>	0.270	0.279	0.286	0.274	0.280	0.279	<b>0.293</b>	NR	NR	NR
7	0.277	0.270	0.280	0.280	0.271	0.273	0.290	0.270	0.278	<b>0.279</b>	0.272	0.280	0.274	<b>0.293</b>	NR	NR	NR
8	0.277	0.270	0.280	0.270	0.277	0.273	0.280	0.270	0.275	0.286	0.273	0.280	0.276	<b>0.296</b>	NR	NR	NR
9	0.271	0.265	0.280	0.280	<b>0.282</b>	0.269	0.280	0.280	0.279	<b>0.289</b>	0.275	0.280	0.278	<b>0.291</b>	NR	NR	NR
10	0.268	0.265	0.270	0.280	0.270	0.270	0.280	0.280	0.282	<b>0.287</b>	0.270	0.280	0.276	<b>0.291</b>	NR	NR	NR
11	0.270	0.270	0.280	0.280	0.274	0.271	0.280	0.280	0.287	<b>0.298</b>	0.273	0.280	0.276	<b>0.293</b>	NR	NR	NR
12	0.273	0.270	0.280	0.280	0.271	0.271	0.280	0.280	0.278	<b>0.296</b>	0.275	0.280	0.280	<b>0.293</b>	NR	NR	NR
Mean	0.272	0.269	0.278	0.279	0.274	0.272	0.285	0.277	0.280	0.288	0.274	0.283	0.278	<b>0.294</b>	0.280	0.273	0.278
Median	0.271	0.270	0.280	0.280	0.275	0.272	0.280	0.280	0.279	0.287	0.274	0.280	0.278	0.294	0.280	0.273	0.280
Std.Dev.	0.005	0.003	0.005	0.003	0.004	0.002	0.007	0.005	0.003	0.005	0.002	0.005	0.002	0.002	0.000	0.003	0.005
Rel.Std.Dev.	1.66%	1.16%	1.63%	1.03%	1.29%	0.70%	2.37%	1.78%	1.15%	1.74%	0.75%	1.60%	0.83%	0.61%	0.00%	1.04%	1.80%
PDM <sup>3</sup>	-1.71%	-3.03%	0.12%	0.72%	-1.02%	-1.80%	2.83%	-0.18%	0.93%	3.94%	-1.23%	1.93%	0.12%	5.95%	1.02%	-1.58%	0.12%



Table A13. Fusion XRF results for Na<sub>2</sub>O in OREAS 192 (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	0.046	0.010	0.030	NR	<b>0.118</b>	NR	<0.01	0.030	0.020	<0.1	0.019	0.020	NR	0.030	0.030	0.032	0.010
2	<b>0.036</b>	0.010	0.040	NR	<b>0.130</b>	NR	<0.01	0.020	0.020	<0.1	0.015	0.040	NR	0.030	0.030	0.024	0.020
3	0.048	0.010	0.030	NR	<b>0.128</b>	NR	<0.01	0.050	0.020	<0.1	0.014	0.020	NR	0.040	0.040	0.036	0.010
4	0.051	0.010	0.040	NR	<b>0.120</b>	NR	<0.01	0.050	0.030	<0.1	0.015	0.020	NR	0.030	0.040	0.045	0.020
5	0.059	0.010	0.020	NR	<b>0.141</b>	NR	<0.01	0.020	0.030	<0.1	0.006	0.030	NR	0.030	NR	NR	NR
6	0.056	0.010	0.030	NR	<b>0.140</b>	NR	<0.01	0.020	0.040	<0.1	0.010	0.040	NR	0.030	NR	NR	NR
7	0.052	0.010	0.020	NR	<b>0.131</b>	NR	<0.01	0.010	0.030	<0.1	0.014	0.020	NR	0.030	NR	NR	NR
8	0.046	0.010	0.030	NR	<b>0.136</b>	NR	<0.01	0.020	0.030	<0.1	0.011	0.020	NR	0.030	NR	NR	NR
9	0.055	0.010	0.030	NR	<b>0.160</b>	NR	<0.01	0.020	0.020	<0.1	0.019	<0.01	NR	0.050	NR	NR	NR
10	0.056	0.010	0.030	NR	<b>0.201</b>	NR	<0.01	0.010	0.020	<0.1	0.019	<0.01	NR	0.040	NR	NR	NR
11	0.059	0.010	0.030	NR	<b>0.144</b>	NR	<0.01	0.030	0.030	<0.1	0.014	<0.01	NR	0.050	NR	NR	NR
12	0.063	0.010	0.030	NR	<b>0.137</b>	NR	<0.01	0.020	0.030	<0.1	0.022	0.040	NR	0.050	NR	NR	NR
Mean	0.052	0.010	0.030		<b>0.141</b>			0.025	0.027		0.015	0.028		0.037	0.035	0.034	0.015
Median	0.054	0.010	0.030		0.137			0.020	0.030		0.015	0.020		0.030	0.035	0.034	0.015
Std.Dev.	0.007	0.000	0.006		0.022			0.013	0.007		0.004	0.010		0.009	0.006	0.009	0.006
Rel.Std.Dev.	14.18%	0.00%	20.10%		15.72%			52.57%	24.43%		30.26%	34.99%		24.21%	16.50%	25.63%	38.49%
PDM <sup>3</sup>	86.22%	-64.36%	6.92%		400%			-10.90%	-4.96%		-47.13%	-1.00%		30.68%	24.74%	21.09%	-46.54%

Table A14. Fusion XRF results for P<sub>2</sub>O<sub>5</sub> in OREAS 192 (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	0.005	0.006	<0.001	NR	<0.01	<0.01	0.010	<b>&lt;0.01</b>	0.001	<0.01	NR	<0.01	<0.01	<0.002	<0.01
2	0.004	<0.01	0.004	0.006	0.001	NR	<0.01	<0.01	0.010	<b>0.017</b>	<0.001	<0.01	NR	<0.01	<0.01	<0.002	<0.01
3	0.004	<0.01	0.004	0.006	<0.001	NR	<0.01	<0.01	0.010	<b>0.018</b>	0.001	<0.01	NR	<0.01	<0.01	<0.002	<0.01
4	0.004	0.005	0.004	0.005	<0.001	NR	<0.01	<0.01	0.010	<b>0.019</b>	<0.001	<0.01	NR	<0.01	<0.01	<0.002	<0.01
5	0.006	0.005	0.004	0.007	0.001	NR	<0.01	<0.01	0.010	0.010	0.003	<0.01	NR	<0.01	NR	NR	NR
6	0.006	0.010	0.005	0.006	0.002	NR	<0.01	<0.01	0.010	<0.01	0.003	<0.01	NR	<0.01	NR	NR	NR
7	0.006	<0.01	0.005	0.008	0.001	NR	<0.01	<0.01	0.010	<0.01	0.003	<0.01	NR	<0.01	NR	NR	NR
8	0.006	<0.01	0.004	0.006	0.001	NR	<0.01	<0.01	0.010	<0.01	0.003	<0.01	NR	<0.01	NR	NR	NR
9	0.006	<0.01	0.004	0.007	0.001	NR	<0.01	<0.01	0.010	<0.01	0.001	<0.01	NR	<0.01	NR	NR	NR
10	0.006	0.005	0.005	0.006	0.001	NR	<0.01	<0.01	0.010	<0.01	0.001	<0.01	NR	<0.01	NR	NR	NR
11	0.006	<0.01	0.005	0.007	0.001	NR	<0.01	<0.01	0.010	<0.01	0.001	<0.01	NR	<0.01	NR	NR	NR
12	0.006	<0.01	0.003	0.006	<0.001	NR	<0.01	<0.01	0.010	<0.01	0.001	<0.01	NR	<0.01	NR	NR	NR
Mean	0.005	0.006	0.004	0.006	0.001				0.010	0.016	0.002						
Median	0.006	0.005	0.004	0.006	0.001				0.010	0.018	0.001						
Std.Dev.	0.001	0.003	0.001	0.001	0.000				0.000	0.004	0.001						
Rel.Std.Dev.	18.46%	40.00%	15.03%	12.29%	31.43%				0.00%	25.52%	57.38%						
PDM <sup>3</sup>	-5.55%	10.68%	-23.26%	12.16%	-80.08%				77.09%	183%	-68.12%						

Table A15. Fusion XRF results for SiO<sub>2</sub> in OREAS 192 (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	43.70	43.85	43.70	43.66	<b>42.90</b>	43.62	<b>43.98</b>	43.80	43.42	<b>42.55</b>	44.00	43.54	<b>42.70</b>	44.10	43.70	43.69	43.30
2	43.40	43.89	43.67	43.81	<b>42.70</b>	43.71	<b>44.46</b>	43.60	43.19	42.86	43.90	43.55	<b>42.88</b>	44.30	43.70	43.60	43.30
3	43.60	43.71	43.71	43.85	<b>42.90</b>	43.48	<b>44.59</b>	43.80	43.48	43.26	43.90	43.54	<b>42.40</b>	44.20	43.60	43.69	43.30
4	43.50	43.83	43.69	43.73	<b>42.70</b>	43.39	<b>44.49</b>	43.80	43.42	43.31	43.90	43.54	<b>42.86</b>	44.20	43.70	43.72	43.50
5	44.20	43.86	43.80	43.64	43.00	43.31	43.90	43.50	43.74	<b>42.79</b>	43.50	43.42	43.17	44.30	NR	NR	NR
6	43.80	43.85	43.58	43.75	42.90	43.62	<b>41.84</b>	43.50	43.34	<b>42.57</b>	43.50	43.42	43.39	44.10	NR	NR	NR
7	43.80	43.89	43.84	43.66	43.20	43.26	43.57	43.50	43.40	<b>41.97</b>	43.50	43.66	42.96	44.30	NR	NR	NR
8	43.80	43.87	43.74	43.61	42.90	43.60	43.71	43.30	43.55	<b>42.93</b>	43.60	43.48	42.92	44.20	NR	NR	NR
9	43.90	43.90	43.55	43.64	43.00	43.04	44.31	43.70	43.18	42.86	43.70	43.42	<b>42.81</b>	44.00	NR	NR	NR
10	43.70	43.85	43.56	43.76	43.20	43.20	44.11	43.80	43.68	42.92	43.90	43.66	<b>41.54</b>	43.80	NR	NR	NR
11	43.60	43.84	43.65	43.75	43.20	43.24	44.14	43.90	43.72	43.16	43.80	43.46	<b>42.85</b>	43.90	NR	NR	NR
12	43.90	43.93	43.70	43.78	43.40	43.30	44.27	43.70	43.41	43.22	43.60	43.34	<b>43.65</b>	44.10	NR	NR	NR
Mean	43.74	43.85	43.68	43.72	43.00	43.40	43.95	43.66	43.46	42.86	43.73	43.50	42.84	44.13	43.68	43.67	43.35
Median	43.75	43.86	43.70	43.74	42.95	43.35	44.13	43.70	43.42	42.89	43.75	43.51	42.87	44.15	43.70	43.69	43.30
Std.Dev.	0.21	0.05	0.09	0.08	0.21	0.21	0.73	0.18	0.19	0.38	0.19	0.10	0.52	0.16	0.05	0.05	0.10
Rel.Std.Dev.	0.48%	0.12%	0.20%	0.17%	0.50%	0.47%	1.67%	0.41%	0.43%	0.88%	0.43%	0.22%	1.21%	0.36%	0.11%	0.11%	0.23%
PDM <sup>3</sup>	0.37%	0.63%	0.23%	0.32%	-1.33%	-0.42%	0.84%	0.18%	-0.27%	-1.64%	0.35%	-0.18%	-1.69%	1.25%	0.22%	0.21%	-0.53%

Table A16. Fusion XRF results for SO<sub>3</sub> in OREAS 192 (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	0.002	0.003	<0.001	NR	<0.001	<0.002	NR	NR	0.007	NR	NR	NR	<0.01	0.002	NR
2	0.006	<0.01	0.003	0.002	<0.001	NR	<0.001	<0.002	NR	NR	0.005	NR	NR	NR	<0.01	<0.002	NR
3	0.008	<0.01	0.003	0.002	<0.001	NR	<0.001	<0.002	NR	NR	<b>0.011</b>	NR	NR	NR	<0.01	<0.002	NR
4	0.006	<0.01	0.003	0.002	<0.001	NR	<0.001	<0.002	NR	NR	<b>0.012</b>	NR	NR	NR	<0.01	<0.002	NR
5	0.004	<0.01	<0.002	0.003	<0.001	NR	<0.001	<0.002	NR	NR	0.006	NR	NR	NR	NR	NR	NR
6	0.004	<0.01	0.002	0.003	<0.001	NR	<0.001	<0.002	NR	NR	0.006	NR	NR	NR	NR	NR	NR
7	0.005	<0.01	0.002	0.003	<0.001	NR	<0.001	<0.002	NR	NR	0.006	NR	NR	NR	NR	NR	NR
8	<b>0.001</b>	<0.01	<0.002	0.002	<0.001	NR	<0.001	<0.002	NR	NR	0.006	NR	NR	NR	NR	NR	NR
9	<b>0.015</b>	<0.01	0.003	0.003	<b>0.028</b>	NR	0.004	<0.002	NR	NR	0.003	NR	NR	NR	NR	NR	NR
10	<b>0.016</b>	0.005	0.003	0.002	<b>0.012</b>	NR	0.003	0.005	NR	NR	0.003	NR	NR	NR	NR	NR	NR
11	<b>0.016</b>	<0.01	0.004	0.002	<b>0.026</b>	NR	0.002	<0.002	NR	NR	0.004	NR	NR	NR	NR	NR	NR
12	<b>0.016</b>	<0.01	0.004	0.001	<b>0.026</b>	NR	0.001	<0.002	NR	NR	0.004	NR	NR	NR	NR	NR	NR
Mean	0.009	0.005	0.003	0.002	0.023		0.003	0.005			0.006					0.002	
Median	0.006	0.005	0.003	0.002	0.026		0.003	0.005			0.006					0.002	
Std.Dev.	0.006		0.001	0.001	0.007		0.001				0.003						
Rel.Std.Dev.	64.67%		25.44%	27.91%	32.15%		51.64%				46.74%						
PDM <sup>3</sup>	126%	31.99%	-23.44%	-38.40%	507%		-34.00%	31.99%			60.59%					-47.20%	

Table A17. Fusion XRF results for TiO<sub>2</sub> in OREAS 192 (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	0.050	0.040	0.030	0.033	0.030	NR	0.030	<b>0.060</b>	0.040	0.036	0.050	0.050	NR	0.030	0.040	0.023	0.040
2	0.050	0.035	0.030	0.034	<b>0.060</b>	NR	0.030	<b>0.040</b>	0.040	0.043	0.030	0.050	NR	0.030	0.040	0.032	0.040
3	0.050	0.040	0.030	0.033	0.040	NR	0.030	<b>0.070</b>	0.040	0.035	0.030	0.040	NR	0.030	0.040	0.027	0.030
4	0.050	0.035	0.030	0.032	0.040	NR	0.030	<b>0.060</b>	0.030	0.028	0.030	0.040	NR	0.030	0.040	0.030	0.030
5	0.050	0.040	0.030	0.034	0.040	NR	0.030	<b>0.060</b>	0.040	0.026	0.030	0.050	NR	0.030	NR	NR	NR
6	0.050	0.040	0.030	0.034	0.040	NR	0.040	<b>0.100</b>	0.040	0.037	0.030	0.050	NR	0.030	NR	NR	NR
7	0.050	0.030	0.030	0.035	0.030	NR	0.030	<b>0.080</b>	0.040	0.038	0.030	0.040	NR	0.020	NR	NR	NR
8	0.050	0.040	0.030	0.035	0.040	NR	0.030	<b>0.090</b>	0.040	0.042	0.030	0.040	NR	0.030	NR	NR	NR
9	0.050	0.040	0.030	0.034	0.040	NR	0.030	0.050	0.040	0.034	0.030	0.040	NR	0.030	NR	NR	NR
10	0.040	0.040	0.030	0.035	0.030	NR	0.030	0.040	0.040	0.034	0.030	0.040	NR	0.030	NR	NR	NR
11	0.050	0.035	0.030	0.032	0.050	NR	0.030	0.040	0.040	0.033	0.030	0.040	NR	0.030	NR	NR	NR
12	0.050	0.030	0.030	0.033	0.040	NR	0.030	<b>0.060</b>	0.040	0.036	0.050	0.040	NR	0.030	NR	NR	NR
Mean	0.049	0.037	0.030	0.034	0.040		0.031	0.063	0.039	0.035	0.033	0.043		0.029	0.040	0.028	0.035
Median	0.050	0.040	0.030	0.034	0.040		0.030	0.060	0.040	0.036	0.030	0.040		0.030	0.040	0.028	0.035
Std.Dev.	0.003	0.004	0.000	0.001	0.009		0.003	0.020	0.003	0.005	0.008	0.005		0.003	0.000	0.004	0.006
Rel.Std.Dev.	5.87%	10.69%	0.00%	3.19%	21.32%		9.36%	31.36%	7.37%	13.92%	23.35%	11.36%		9.90%	0.00%	13.37%	16.50%
PDM <sup>3</sup>	35.23%	2.00%	-17.49%	-7.40%	10.02%		-15.19%	71.91%	7.73%	-3.27%	-8.32%	19.19%		-19.78%	10.02%	-23.19%	-3.73%

Table A18. Fusion XRF results for Zn in OREAS 192 (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	160	169	170	180	170	175	100	190	180	180	150	240	NR	200	<100	153	NR
2	160	175	180	180	190	176	100	200	180	180	150	240	NR	200	<100	160	NR
3	160	175	170	175	190	173	100	180	190	190	170	240	NR	200	<100	174	NR
4	160	167	180	175	180	170	100	190	180	200	150	230	NR	210	<100	177	NR
5	180	180	180	170	170	174	110	190	190	200	160	150	NR	200	NR	NR	NR
6	160	178	180	175	190	175	100	180	190	180	150	160	NR	200	NR	NR	NR
7	160	177	180	170	170	173	100	180	180	200	160	150	NR	200	NR	NR	NR
8	160	168	170	170	180	174	100	190	280	200	160	160	NR	210	NR	NR	NR
9	170	168	180	175	230	171	40	180	190	190	170	150	NR	200	NR	NR	NR
10	160	155	170	175	180	173	40	200	190	190	170	160	NR	200	NR	NR	NR
11	160	166	180	180	200	172	50	190	190	180	170	150	NR	210	NR	NR	NR
12	170	173	180	170	180	170	70	190	180	180	160	160	NR	210	NR	NR	NR
Mean	163	171	177	175	186	173	84	188	193	189	160	183		203		166	
Median	160	171	180	175	180	173	100	190	190	190	160	160		200		167	
Std.Dev.	7	7	5	4	17	2	26	7	28	9	9	41		5		11	
Rel.Std.Dev.	3.99%	4.05%	2.79%	2.27%	9.02%	1.14%	31.42%	3.81%	14.35%	4.76%	5.33%	22.43%		2.42%		6.87%	
PDM <sup>3</sup>	-7.17%	-3.03%	0.40%	-0.78%	5.61%	-1.76%	-52.17%	7.04%	9.88%	7.51%	-9.07%	3.72%		15.56%		-5.66%	

Table A19. Results for LOI at 1000°C in OREAS 192 (abbreviations as in Table A1; values in wt.%).

Replicate No.	Lab A LOI	Lab B LOI	Lab C LOI	Lab D LOI	Lab E LOI	Lab F LOI	Lab G LOI	Lab H LOI	Lab I LOI	Lab J LOI	Lab K LOI	Lab L LOI	Lab M LOI	Lab O LOI	Lab P LOI	Lab Q LOI	Lab R LOI
1	10.15	10.29	10.11	10.10	10.10	10.86	NR	10.06	9.78	<b>11.62</b>	10.29	10.40	<b>11.47</b>	9.70	10.30	10.34	9.84
2	10.05	10.29	10.13	10.08	10.10	10.86	NR	10.20	9.78	<b>11.59</b>	10.27	10.30	<b>11.35</b>	9.61	10.20	10.40	9.73
3	9.99	10.29	10.16	10.04	9.95	10.77	NR	10.22	9.78	<b>11.49</b>	10.30	10.30	<b>11.48</b>	9.68	10.30	10.31	9.90
4	10.05	10.30	10.10	10.04	10.20	10.68	NR	10.23	9.85	<b>11.43</b>	10.29	10.30	<b>11.43</b>	9.54	10.20	10.34	9.84
5	10.05	10.37	10.10	10.16	9.96	<b>10.92</b>	10.31	10.19	9.93	<b>11.33</b>	10.82	10.20	9.82	<b>9.59</b>	NR	NR	NR
6	10.05	10.38	10.09	10.12	9.97	<b>11.24</b>	10.31	10.20	9.90	<b>11.26</b>	10.74	10.10	10.02	<b>9.56</b>	NR	NR	NR
7	10.00	10.37	10.12	10.14	9.96	<b>10.98</b>	<b>10.56</b>	10.15	9.94	<b>11.34</b>	10.74	10.10	10.19	<b>9.49</b>	NR	NR	NR
8	10.00	10.37	10.11	10.12	9.95	<b>11.03</b>	10.35	10.10	9.90	<b>11.27</b>	10.63	10.20	10.03	<b>9.54</b>	NR	NR	NR
9	10.20	10.42	10.20	10.18	10.20	<b>11.26</b>	10.36	10.26	9.78	<b>11.44</b>	10.49	10.00	<b>11.56</b>	<b>9.52</b>	NR	NR	NR
10	10.25	10.43	10.22	10.14	10.35	<b>11.16</b>	10.34	10.42	9.77	<b>11.43</b>	10.40	10.00	<b>11.60</b>	<b>9.52</b>	NR	NR	NR
11	10.20	10.42	10.18	10.16	10.40	<b>11.28</b>	10.10	10.41	9.74	<b>11.47</b>	10.51	10.10	<b>11.67</b>	<b>9.46</b>	NR	NR	NR
12	10.15	10.44	10.21	10.10	10.40	<b>11.33</b>	10.49	10.35	9.81	<b>11.49</b>	10.70	10.00	<b>11.55</b>	<b>9.54</b>	NR	NR	NR
Mean	10.10	10.36	10.14	10.12	10.13	11.03	10.35	10.23	9.83	<b>11.43</b>	10.52	10.17	11.01	9.56	10.25	10.34	9.83
Median	10.05	10.37	10.13	10.12	10.10	11.00	10.35	10.21	9.80	11.44	10.50	10.15	11.45	9.54	10.25	10.34	9.84
Std.Dev.	0.09	0.06	0.05	0.05	0.18	0.22	0.14	0.11	0.07	0.11	0.21	0.14	0.75	0.07	0.06	0.04	0.07
Rel.Std.Dev.	0.89%	0.55%	0.47%	0.45%	1.77%	2.00%	1.31%	1.10%	0.72%	0.99%	1.95%	1.35%	6.78%	0.75%	0.56%	0.38%	0.72%
PDM <sup>3</sup>	-0.77%	1.86%	-0.29%	-0.57%	-0.44%	8.43%	1.76%	0.58%	-3.37%	12.35%	3.36%	-0.06%	8.27%	-6.00%	0.75%	1.67%	-3.40%

Table A20. Fusion ICP results for Ni in OREAS 192 (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	1.78	1.80	1.74	1.80	1.74	1.73	1.78	<b>1.59</b>	1.75	1.73	1.83	1.75
2	1.76	1.77	1.77	1.84	1.78	1.72	1.76	<b>1.61</b>	1.84	1.73	1.74	1.71
3	1.75	<b>1.85</b>	1.73	1.83	1.73	1.72	1.77	<b>1.65</b>	1.83	1.74	1.71	1.68
4	1.78	1.77	1.75	1.87	1.69	1.73	1.78	<b>1.80</b>	1.78	1.75	1.85	1.74
5	1.73	1.78	1.72	<b>1.79</b>	1.70	1.74	1.85	<b>1.54</b>	1.84	1.74	NR	NR
6	1.72	1.76	1.70	1.83	1.75	1.74	1.85	<b>1.73</b>	1.87	1.76	NR	NR
7	1.70	1.71	1.73	1.86	1.71	1.74	1.84	<b>1.61</b>	1.77	1.74	NR	NR
8	1.75	1.83	1.67	1.85	1.70	1.74	1.82	<b>1.49</b>	1.79	1.78	NR	NR
9	1.75	1.72	1.69	1.81	1.78	1.69	1.76	<b>1.60</b>	1.75	1.76	NR	NR
10	1.75	1.69	1.76	1.83	1.76	1.69	1.76	1.83	<b>1.86</b>	1.75	NR	NR
11	1.74	1.69	1.73	1.73	1.75	1.69	1.75	1.60	1.78	1.73	NR	NR
12	1.76	1.71	1.68	1.77	1.73	1.69	1.73	1.71	1.76	1.75	NR	NR
Mean	1.74	1.76	1.72	1.81	1.74	1.72	1.79	1.65	1.80	1.74	1.78	1.72
Median	1.75	1.76	1.73	1.83	1.74	1.73	1.78	1.61	1.79	1.74	1.79	1.72
Std.Dev.	0.02	0.05	0.03	0.04	0.03	0.02	0.04	0.10	0.04	0.02	0.07	0.03
Rel.Std.Dev.	1.30%	3.03%	1.84%	2.16%	1.72%	1.37%	2.33%	6.17%	2.44%	0.88%	3.82%	1.74%
PDM <sup>3</sup>	-0.45%	0.21%	-1.69%	3.57%	-0.97%	-1.91%	2.02%	-5.98%	2.82%	-0.50%	1.74%	-1.90%



Table A21. Fusion ICP results for Co in OREAS 192 (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	380	378	420	420	406	380	420	473	380	400	395	396
2	360	380	400	410	422	390	410	497	388	400	384	389
3	350	387	420	400	399	390	460	493	393	400	383	386
4	380	377	400	370	385	400	410	499	400	400	405	416
5	390	423	380	410	393	410	420	486	408	400	NR	NR
6	420	412	380	450	400	400	420	512	406	410	NR	NR
7	400	400	400	440	396	390	420	505	411	410	NR	NR
8	420	413	400	430	394	370	420	480	396	410	NR	NR
9	350	423	420	390	382	390	380	474	382	400	NR	NR
10	370	440	460	390	380	380	380	482	403	400	NR	NR
11	350	421	440	340	394	390	380	472	392	400	NR	NR
12	350	419	420	380	411	390	380	486	378	400	NR	NR
Mean	377	406	412	403	397	390	408	488	395	403	392	397
Median	375	413	410	405	395	390	415	486	394	400	390	392
Std.Dev.	26	21	23	31	12	10	24	13	11	5	10	13
Rel.Std.Dev.	7.01%	5.20%	5.66%	7.72%	3.05%	2.68%	5.98%	2.68%	2.80%	1.12%	2.65%	3.36%
PDM <sup>3</sup>	-5.45%	1.94%	3.34%	1.04%	-0.38%	-2.10%	2.50%	22.56%	-0.93%	1.04%	-1.66%	-0.44%

Table A22. Fusion ICP results for Al<sub>2</sub>O<sub>3</sub> in OREAS 192 (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	2.72	2.76	2.74	2.86	2.83	2.78	2.86	2.64	2.86	2.69	2.72	2.71
2	2.73	2.73	2.72	2.82	2.85	2.80	2.86	2.73	2.67	2.65	<b>2.89</b>	2.66
3	2.72	2.83	2.76	2.89	2.87	2.81	2.92	2.65	2.55	2.67	2.72	2.71
4	2.72	2.76	2.70	<b>3.08</b>	2.86	2.80	2.80	2.74	2.69	2.68	2.75	<b>2.87</b>
5	2.75	2.71	2.74	2.88	2.76	2.81	2.88	2.61	2.84	2.82	NR	NR
6	2.76	2.68	2.74	2.86	2.78	2.82	2.82	2.74	2.81	2.73	NR	NR
7	2.74	<b>2.56</b>	2.63	2.89	2.85	2.83	2.79	2.66	2.84	2.70	NR	NR
8	2.70	2.74	2.59	2.89	2.78	2.83	2.88	2.64	2.85	2.74	NR	NR
9	2.76	2.62	2.57	2.81	2.86	2.74	2.85	2.73	2.79	2.69	NR	NR
10	2.76	2.61	2.63	2.96	2.91	2.81	2.77	2.76	2.77	2.68	NR	NR
11	2.77	2.63	2.65	2.68	2.82	2.73	2.80	2.79	2.79	2.67	NR	NR
12	2.72	2.63	2.59	2.89	2.90	2.76	<b>2.61</b>	2.78	2.74	2.69	NR	NR
Mean	2.74	2.69	2.67	2.88	2.84	2.79	2.82	2.71	2.77	2.70	2.77	2.74
Median	2.74	2.70	2.68	2.89	2.85	2.81	2.84	2.73	2.79	2.69	2.74	2.71
Std.Dev.	0.02	0.08	0.07	0.09	0.05	0.03	0.08	0.06	0.09	0.05	0.08	0.09
Rel.Std.Dev.	0.81%	2.95%	2.59%	3.25%	1.66%	1.21%	2.82%	2.24%	3.38%	1.67%	2.93%	3.28%
PDM <sup>3</sup>	-0.56%	-2.34%	-2.95%	4.47%	3.14%	1.47%	2.44%	-1.69%	0.49%	-1.89%	0.62%	-0.61%

Table A23. Fusion ICP results for CaO in OREAS 192 (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>0.390</b>	0.330	0.300	0.290	0.310	0.310	0.330	0.342	0.288	0.330	0.300	<b>0.382</b>
2	<b>0.430</b>	0.330	0.400	0.290	0.310	0.310	0.330	<b>0.376</b>	0.283	0.230	0.300	<b>0.388</b>
3	<b>0.430</b>	0.340	0.400	0.320	0.310	0.310	0.310	0.335	0.297	0.290	<0.3	<b>0.406</b>
4	<b>0.440</b>	0.340	0.300	<b>0.230</b>	0.310	0.300	0.320	0.332	0.295	0.360	0.300	<b>0.436</b>
5	0.340	0.310	0.300	0.280	0.310	0.310	0.320	0.319	0.316	0.400	NR	NR
6	0.340	0.300	0.300	0.290	0.330	0.300	0.330	0.347	0.337	0.360	NR	NR
7	0.400	0.310	0.300	0.280	0.320	0.310	0.330	0.329	0.316	0.330	NR	NR
8	0.380	0.330	0.300	0.280	0.310	0.310	0.330	<b>0.503</b>	0.308	0.280	NR	NR
9	<b>0.400</b>	0.260	0.300	0.280	0.300	0.310	0.310	0.336	0.280	0.390	NR	NR
10	<b>0.400</b>	0.280	0.300	0.300	0.310	0.310	0.330	0.342	0.280	0.320	NR	NR
11	<b>0.390</b>	0.260	0.300	0.280	0.300	0.300	0.330	0.343	0.290	0.350	NR	NR
12	<b>0.350</b>	0.270	0.300	0.280	0.310	0.300	0.310	0.348	0.269	0.330	NR	NR
Mean	0.391	0.305	0.317	0.283	0.311	0.307	0.323	0.354	0.297	0.331	0.300	0.403
Median	0.395	0.310	0.300	0.280	0.310	0.310	0.330	0.342	0.293	0.330	0.300	0.397
Std.Dev.	0.034	0.031	0.039	0.021	0.008	0.005	0.009	0.049	0.019	0.048	0.000	0.024
Rel.Std.Dev.	8.69%	10.03%	12.29%	7.27%	2.55%	1.61%	2.75%	13.77%	6.52%	14.38%	0.00%	6.00%
PDM <sup>3</sup>	23.52%	-3.60%	0.08%	-10.45%	-1.76%	-3.08%	2.19%	11.99%	-6.25%	4.56%	-5.18%	27.37%

Table A24. Fusion ICP results for Cu in OREAS 192 (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	36	50	<50	<50	40	<50	36	29	<50	24	51
2	<50	37	50	<50	<50	50	<50	33	30	<50	15	28
3	<50	37	50	<50	<50	40	<50	40	31	<50	32	37
4	<50	37	50	<50	<50	40	<50	46	28	<50	23	42
5	<50	<20	100	<50	<50	60	<50	<10	30	<50	NR	NR
6	<50	<20	100	<50	<50	50	<50	<10	29	<50	NR	NR
7	<50	<20	50	<50	<50	50	<50	<10	29	<50	NR	NR
8	<50	<20	100	<50	<50	40	<50	<10	25	<50	NR	NR
9	<50	24	<50	<50	<50	30	<50	<10	36	<50	NR	NR
10	<50	23	<50	<50	<50	30	<50	<10	36	<50	NR	NR
11	<50	25	<50	<50	<50	30	<50	<10	30	50	NR	NR
12	<50	20	<50	<50	<50	30	<50	<10	35	80	NR	NR
Mean		30	69			41		39	31	65	24	40
Median		31	50			40		38	30	65	24	40
Std.Dev.		7	26			10		5	3	21	7	10
Rel.Std.Dev.		25.08%	37.64%			24.40%		14.15%	11.18%	32.64%	29.58%	24.19%
PDM <sup>3</sup>		-21.16%	81.43%			7.76%		1.72%	-18.77%	71.54%	-37.98%	4.53%

Table A25. Fusion ICP results for Cr<sub>2</sub>O<sub>3</sub> in OREAS 192 (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	0.910	<b>0.957</b>	0.935	0.890	0.915	0.894	0.900	0.875	<b>0.871</b>	0.906	0.941	<b>1.008</b>
2	0.910	<b>0.944</b>	0.920	0.910	0.878	0.905	0.870	0.958	0.942	0.906	0.896	<b>0.985</b>
3	0.890	<b>0.976</b>	0.945	0.910	0.902	0.904	0.880	0.899	0.944	0.921	0.870	<b>0.982</b>
4	0.880	<b>0.943</b>	0.945	<b>1.010</b>	0.887	0.896	0.870	0.933	0.935	0.906	0.955	<b>0.923</b>
5	0.920	0.896	0.865	0.890	0.887	0.895	<b>1.010</b>	<b>0.908</b>	0.915	0.906	NR	NR
6	0.940	0.889	0.890	0.900	0.893	0.911	<b>1.010</b>	0.943	0.919	0.906	NR	NR
7	0.910	0.874	0.885	0.910	0.893	0.902	<b>1.020</b>	0.942	0.911	0.892	NR	NR
8	0.880	0.927	0.870	0.900	0.886	0.891	<b>1.000</b>	0.933	0.901	0.921	NR	NR
9	0.920	0.909	<b>0.840</b>	0.940	0.908	0.923	0.960	0.918	0.906	0.921	NR	NR
10	0.920	0.908	<b>0.855</b>	0.950	0.910	0.897	0.940	0.938	0.911	0.906	NR	NR
11	0.920	0.898	<b>0.865</b>	<b>0.820</b>	0.903	0.902	0.960	0.912	0.901	0.906	NR	NR
12	0.920	0.894	<b>0.840</b>	0.910	0.926	0.922	0.950	0.949	0.901	0.906	NR	NR
Mean	0.910	0.918	0.888	0.912	0.899	0.904	0.948	0.926	0.913	0.909	0.916	0.974
Median	0.915	0.908	0.878	0.910	0.897	0.902	0.955	0.933	0.911	0.906	0.919	0.983
Std.Dev.	0.018	0.031	0.039	0.044	0.014	0.010	0.056	0.024	0.020	0.008	0.039	0.036
Rel.Std.Dev.	1.99%	3.39%	4.40%	4.86%	1.57%	1.16%	5.96%	2.58%	2.24%	0.93%	4.31%	3.69%
PDM <sup>3</sup>	-0.04%	0.82%	-2.47%	0.14%	-1.26%	-0.75%	4.08%	1.68%	0.29%	-0.19%	0.56%	7.02%

Table A26. Fusion ICP results for Fe<sub>2</sub>O<sub>3</sub> in OREAS 192 (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	17.85	18.52	18.00	18.50	18.29	18.28	17.26	18.68	18.47	18.05	17.40	19.48
2	17.85	18.27	18.30	18.90	18.28	18.19	17.50	18.60	19.17	17.95	18.40	19.02
3	17.80	<b>19.03</b>	18.20	18.90	18.40	18.33	18.01	18.79	19.59	18.10	17.90	19.16
4	17.80	18.21	18.00	19.30	18.51	18.28	17.69	<b>19.25</b>	19.19	18.10	17.90	18.51
5	17.75	17.54	17.30	<b>17.15</b>	17.86	18.30	17.44	19.03	18.40	18.05	NR	NR
6	17.70	17.39	17.60	17.80	17.75	18.37	17.67	19.35	18.69	18.25	NR	NR
7	17.60	16.93	17.40	18.00	18.06	18.44	17.49	19.04	18.26	18.05	NR	NR
8	18.20	17.97	17.20	17.80	17.82	18.42	17.29	18.87	18.68	18.55	NR	NR
9	17.25	18.38	17.70	18.40	18.01	18.47	17.51	17.36	17.59	18.15	NR	NR
10	17.25	18.21	17.90	18.50	18.15	18.48	17.59	17.55	17.72	18.25	NR	NR
11	17.30	18.12	17.90	17.15	17.95	18.48	18.04	17.94	17.72	17.95	NR	NR
12	17.30	18.44	17.90	17.85	18.22	18.52	17.61	17.67	17.52	18.30	NR	NR
Mean	17.64	18.08	17.78	18.19	18.11	18.38	17.59	18.51	18.42	18.15	17.90	19.04
Median	17.73	18.21	17.90	18.20	18.11	18.40	17.55	18.74	18.44	18.10	17.90	19.09
Std.Dev.	0.30	0.56	0.35	0.68	0.24	0.10	0.24	0.70	0.68	0.17	0.41	0.41
Rel.Std.Dev.	1.71%	3.11%	1.96%	3.74%	1.33%	0.56%	1.37%	3.77%	3.71%	0.94%	2.28%	2.13%
PDM <sup>3</sup>	-2.79%	-0.33%	-1.99%	0.24%	-0.20%	1.30%	-3.04%	2.01%	1.50%	0.01%	-1.34%	4.95%

Table A27. Fusion ICP results for K<sub>2</sub>O in OREAS 192 (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	<0.01	0.120	<0.2	0.072
2	0.100	<0.1	<0.02	<0.1	0.010	<0.01	<0.01	<0.1	<0.01	<0.1	<0.2	0.073
3	<0.1	<0.1	<0.02	<0.1	<0.01	<0.01	0.020	<0.1	<0.01	0.120	<0.2	0.093
4	<0.1	<0.1	<0.02	<0.1	<0.01	<0.01	<0.01	<0.1	<0.01	0.120	<0.2	0.103
5	<0.1	0.100	0.100	<0.1	0.010	<0.01	0.010	0.138	0.006	0.120	NR	NR
6	<0.1	0.100	0.100	<0.1	0.010	<0.01	0.020	<0.1	0.009	0.120	NR	NR
7	<0.1	0.100	<0.1	<0.1	0.010	<0.01	0.010	<0.1	0.007	0.120	NR	NR
8	<0.1	0.100	<0.1	<0.1	0.010	<0.01	<0.01	<0.1	0.006	0.120	NR	NR
9	0.100	0.181	<0.1	<0.1	<0.01	<0.01	<0.01	<0.1	0.006	0.120	NR	NR
10	0.100	0.241	<0.1	<0.1	0.010	<0.01	0.010	0.103	0.006	0.120	NR	NR
11	0.100	0.205	<0.1	<0.1	0.010	<0.01	<0.01	<0.1	0.005	0.120	NR	NR
12	0.100	0.229	<0.1	<0.1	0.010	<0.01	<0.01	<0.1	0.006	0.120	NR	NR
Mean	0.100	0.157	0.100		0.010		0.014	0.121	0.006	0.120		0.085
Median	0.100	0.140	0.100		0.010		0.010	0.121	0.006	0.120		0.083
Std.Dev.	0.000	0.063	0.000		0.000		0.005	0.025	0.001	0.000		0.015
Rel.Std.Dev.	0.00%	40.34%	0.00%		0.00%		39.12%	20.54%	20.61%	0.00%		17.88%
PDM <sup>3</sup>	26.08%	97.84%	26.08%		-87.39%		-82.35%	51.93%	-91.81%	51.88%		7.73%

Table A28. Fusion ICP results for MgO in OREAS 192 (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	20.30	21.12	21.10	22.60	21.15	21.47	21.28	<b>22.77</b>	<b>20.45</b>	20.90	<b>19.00</b>	21.49
2	20.30	20.83	21.20	22.80	21.30	21.40	21.40	<b>23.00</b>	<b>19.29</b>	20.80	<b>19.70</b>	21.15
3	20.20	<b>21.79</b>	21.10	22.90	21.33	21.39	21.50	<b>22.91</b>	<b>19.44</b>	21.00	<b>18.80</b>	21.30
4	20.30	20.99	21.10	22.70	21.37	21.38	20.97	<b>23.02</b>	<b>19.21</b>	20.90	<b>19.10</b>	21.60
5	21.90	22.33	20.60	<b>20.90</b>	21.22	21.08	21.73	<b>22.78</b>	21.22	21.30	NR	NR
6	21.70	22.00	20.90	21.60	21.41	21.05	<b>20.92</b>	<b>23.03</b>	20.56	21.30	NR	NR
7	21.60	21.42	20.70	22.00	21.81	20.98	21.61	<b>22.89</b>	21.24	21.10	NR	NR
8	21.00	22.81	20.60	21.80	21.52	21.03	21.70	<b>23.04</b>	20.42	21.50	NR	NR
9	21.60	21.70	19.90	22.30	21.52	20.90	21.62	<b>22.69</b>	20.60	20.90	NR	NR
10	21.60	21.35	20.20	22.90	21.77	20.51	20.95	<b>22.88</b>	20.69	21.00	NR	NR
11	21.70	21.28	20.10	<b>20.80</b>	21.37	20.81	21.12	<b>23.17</b>	20.00	20.80	NR	NR
12	21.50	21.69	19.90	22.30	21.75	20.86	19.82	<b>23.04</b>	20.57	21.10	NR	NR
Mean	21.14	21.61	20.62	22.13	21.46	21.07	21.22	<b>22.93</b>	20.31	21.05	19.15	21.38
Median	21.55	21.56	20.65	22.30	21.39	21.04	21.34	22.95	20.51	21.00	19.05	21.39
Std.Dev.	0.67	0.57	0.49	0.73	0.22	0.29	0.53	0.14	0.69	0.22	0.39	0.20
Rel.Std.Dev.	3.19%	2.65%	2.36%	3.32%	1.02%	1.38%	2.51%	0.61%	3.38%	1.04%	2.02%	0.92%
PDM <sup>3</sup>	-0.56%	1.64%	-3.03%	4.10%	0.93%	-0.89%	-0.20%	7.87%	-4.49%	-0.99%	-9.93%	0.57%



Table A29. Fusion ICP results for MnO in OREAS 192 (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	0.270	0.282	0.274	0.280	0.270	0.280	0.278	0.273	0.270	0.280	0.272	<b>0.293</b>
2	0.270	0.280	0.276	0.290	0.270	0.270	0.279	0.281	0.287	0.280	0.267	0.284
3	0.270	0.290	0.276	0.290	0.270	0.270	<b>0.292</b>	0.276	0.293	0.270	0.263	0.286
4	0.270	0.275	0.274	<b>0.310</b>	0.270	0.270	0.283	0.276	0.284	0.270	0.282	0.285
5	0.280	0.275	0.264	0.260	0.270	0.280	0.287	0.265	0.290	0.280	NR	NR
6	0.280	0.268	0.274	0.280	0.280	0.270	0.281	0.270	0.289	0.280	NR	NR
7	0.280	0.263	0.272	0.280	0.280	0.280	0.278	0.270	0.282	0.280	NR	NR
8	0.290	0.279	0.268	0.270	0.280	0.280	0.287	0.272	0.290	0.280	NR	NR
9	0.270	0.282	0.266	0.280	0.280	0.270	0.278	0.291	0.281	0.280	NR	NR
10	0.270	0.275	0.272	0.290	0.290	0.280	0.281	0.294	0.284	0.280	NR	NR
11	0.270	0.278	0.268	<b>0.250</b>	0.280	0.280	0.286	0.296	0.280	0.280	NR	NR
12	0.270	0.283	0.272	0.270	0.280	0.280	0.278	0.296	0.280	0.280	NR	NR
Mean	0.274	0.278	0.271	0.279	0.277	0.276	0.282	0.280	0.284	0.278	0.271	0.287
Median	0.270	0.278	0.272	0.280	0.280	0.280	0.281	0.276	0.284	0.280	0.270	0.286
Std.Dev.	0.007	0.007	0.004	0.016	0.007	0.005	0.005	0.011	0.006	0.004	0.008	0.004
Rel.Std.Dev.	2.44%	2.53%	1.45%	5.60%	2.35%	1.87%	1.66%	4.03%	2.12%	1.40%	3.03%	1.37%
PDM <sup>3</sup>	-1.34%	-0.14%	-2.36%	0.46%	-0.44%	-0.74%	1.60%	0.76%	2.24%	0.16%	-2.48%	3.35%

Table A30. Fusion ICP results for Na<sub>2</sub>O in OREAS 192 (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	0.030	0.019	0.024	NR	NR	NR
2	NR	NR	NR	NR	0.020	0.020	0.020	0.018	0.021	NR	NR	NR
3	NR	NR	NR	NR	0.030	0.020	0.030	0.011	0.021	NR	NR	NR
4	NR	NR	NR	NR	0.020	0.020	0.020	0.013	0.022	NR	NR	NR
5	NR	NR	NR	NR	0.020	0.020	0.020	<0.01	0.022	NR	NR	NR
6	NR	NR	NR	NR	0.030	0.020	0.030	<0.01	0.023	NR	NR	NR
7	NR	NR	NR	NR	0.030	0.020	0.020	<0.01	0.023	NR	NR	NR
8	NR	NR	NR	NR	0.020	0.020	0.020	<0.01	0.024	NR	NR	NR
9	NR	NR	NR	NR	0.020	0.020	0.020	0.024	0.024	NR	NR	NR
10	NR	NR	NR	NR	0.020	0.020	0.030	0.027	0.023	NR	NR	NR
11	NR	NR	NR	NR	0.020	0.020	0.020	0.028	0.023	NR	NR	NR
12	NR	NR	NR	NR	0.020	0.020	0.020	<b>0.035</b>	0.026	NR	NR	NR
Mean					0.023	0.020	0.023	0.022	0.023			
Median					0.020	0.020	0.020	0.022	0.023			
Std.Dev.					0.005	0.000	0.005	0.008	0.001			
Rel.Std.Dev.					20.10%	0.00%	21.10%	37.09%	5.86%			
PDM <sup>3</sup>					3.37%	-8.12%	7.20%	0.50%	5.67%			

Table A31. Fusion ICP results for P<sub>2</sub>O<sub>5</sub> in OREAS 192 (abbreviations as in Table A1; values in wt.%).

Replicate No.	Lab A PF*OES	Lab C PF*OES	Lab D PF*OES	Lab E PF*OES	Lab G MAR*OES	Lab H BF*OES	Lab I PF*ICP	Lab J BF*OES	Lab M PF*OES	Lab O PF*OES	Lab P PF*OES	Lab S PF*OES
1	NR	<0.03	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	0.014	NR	NR	0.005
2	NR	<0.03	<0.02	<0.02	<0.01	0.010	0.010	<0.01	0.022	NR	NR	<0.004
3	NR	<0.03	<0.02	<0.02	<0.01	<0.01	0.010	<0.01	0.027	NR	NR	<0.003
4	NR	<0.03	<0.02	<0.02	<0.01	0.010	<0.01	<0.01	0.014	NR	NR	0.001
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	<0.01	<0.01	0.010	<0.01	0.007	NR	NR	NR
7	NR	<0.03	<0.02	0.020	<0.01	<0.01	<0.01	<0.01	<0.01	NR	NR	NR
8	NR	<0.03	<0.02	0.050	<0.01	<0.01	<0.01	<0.01	<0.01	NR	NR	NR
9	NR	<0.03	0.020	<0.02	0.010	0.010	<0.01	<0.01	<0.01	NR	NR	NR
10	NR	<0.03	0.020	<0.02	0.010	<0.01	0.020	<0.01	<0.01	NR	NR	NR
11	NR	<0.03	<0.02	<0.02	0.010	<0.01	0.010	<0.01	0.007	NR	NR	NR
12	NR	<0.03	0.020	<0.02	0.010	0.020	<0.01	<0.01	<0.01	NR	NR	NR
Mean			0.020	0.035	0.010	0.013	0.012		0.015			0.003
Median			0.020	0.035	0.010	0.010	0.010		0.014			0.003
Std.Dev.			0.000	0.021	0.000	0.005	0.004		0.008			0.003
Rel.Std.Dev.			0.00%	60.61%	0.00%	40.00%	37.27%		52.22%			94.28%
PDM <sup>3</sup>			65.20%	189%	-17.40%	3.25%	-0.88%		25.05%			-75.22%

Table A32. Fusion ICP results for SiO<sub>2</sub> in OREAS 192 (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	42.30	44.10	42.80	43.50	43.87	43.14	43.98	43.70	42.98	43.80	42.60	44.99
2	42.00	43.60	43.20	43.50	44.44	43.16	44.23	44.23	43.26	43.20	41.60	44.32
3	42.10	<b>45.30</b>	42.80	44.20	44.83	42.97	44.26	43.87	42.49	43.60	41.50	44.53
4	42.30	43.50	42.80	<b>47.50</b>	43.86	43.06	43.92	44.47	43.28	43.90	43.90	45.77
5	<b>39.10</b>	44.20	41.70	<b>43.80</b>	43.23	43.39	44.11	42.22	43.86	45.20	NR	NR
6	43.80	44.00	41.70	45.00	43.16	43.31	43.32	42.90	43.77	44.70	NR	NR
7	42.80	42.70	42.10	45.50	43.85	43.33	44.00	42.88	43.82	44.10	NR	NR
8	43.70	44.80	41.70	45.40	43.11	43.36	44.28	43.02	43.93	44.80	NR	NR
9	41.90	<b>48.50</b>	<b>40.20</b>	42.30	43.29	43.40	44.09	<b>45.46</b>	43.65	42.70	NR	NR
10	41.90	<b>47.90</b>	<b>40.90</b>	43.90	44.06	43.62	44.09	<b>46.94</b>	43.66	42.50	NR	NR
11	41.40	<b>48.20</b>	<b>40.90</b>	<b>39.80</b>	42.98	43.39	44.03	<b>46.49</b>	43.79	42.20	NR	NR
12	41.50	<b>48.80</b>	<b>41.10</b>	42.60	43.44	43.27	<b>41.98</b>	<b>46.03</b>	43.63	42.70	NR	NR
Mean	42.07	45.47	41.83	43.92	43.68	43.28	43.86	44.35	43.51	43.62	42.40	44.90
Median	42.05	44.50	41.70	43.85	43.65	43.32	44.06	44.05	43.66	43.70	42.10	44.76
Std.Dev.	1.20	2.23	0.94	1.92	0.58	0.18	0.64	1.55	0.43	0.98	1.12	0.64
Rel.Std.Dev.	2.86%	4.91%	2.25%	4.37%	1.32%	0.41%	1.46%	3.51%	0.99%	2.24%	2.63%	1.44%
PDM <sup>3</sup>	-3.17%	4.65%	-3.73%	1.08%	0.53%	-0.37%	0.95%	2.08%	0.15%	0.39%	-2.41%	3.35%

Table A33. Fusion ICP results for SO<sub>3</sub> in OREAS 192 (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>0.070</b>	<0.05	<0.1	<0.02	<0.01	NR	NR	NR	NR	0.075	<b>0.100</b>	NR
2	<0.02	<0.05	<0.1	<0.02	<0.01	NR	NR	NR	NR	0.050	<b>&lt;0.01</b>	NR
3	<0.02	<0.05	<0.1	<0.02	<0.01	NR	NR	NR	NR	0.050	<b>0.125</b>	NR
4	<0.02	<0.05	<0.1	<0.02	<0.01	NR	NR	NR	NR	0.025	<b>0.050</b>	NR
5	<0.02	<0.05	<0.02	<0.02	NR	NR	NR	NR	NR	0.050	NR	NR
6	<0.02	<0.05	<0.02	<0.02	NR	NR	NR	NR	NR	0.025	NR	NR
7	<0.02	<0.05	<0.02	<0.02	NR	NR	NR	NR	NR	0.050	NR	NR
8	0.050	<0.05	0.020	<0.02	NR	NR	NR	NR	NR	0.050	NR	NR
9	0.020	<0.05	0.040	<0.02	<0.02	NR	NR	NR	NR	0.050	NR	NR
10	<0.02	<0.05	0.040	0.020	<0.02	NR	NR	NR	NR	0.050	NR	NR
11	0.050	<0.05	0.040	0.020	<0.02	NR	NR	NR	NR	<0.01	NR	NR
12	<0.02	<0.05	0.040	0.020	<0.02	NR	NR	NR	NR	0.025	NR	NR
Mean	0.048		0.036	0.020						0.045	<b>0.092</b>	
Median	0.050		0.040	0.020						0.050	0.100	
Std.Dev.	0.021		0.009	0.000						0.015	0.038	
Rel.Std.Dev.	43.40%		24.85%	0.00%						33.17%	41.66%	
PDM <sup>3</sup>	34.37%		1.84%	-43.42%						28.43%	159%	

Table A34. Fusion ICP results for TiO<sub>2</sub> in OREAS 192 (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	0.035	0.030	0.034	0.024	0.031	0.030	0.030	0.043
2	<0.01	0.030	0.030	0.030	0.035	0.030	0.035	0.025	0.033	0.030	0.030	0.042
3	<0.01	0.030	0.030	0.030	0.035	0.030	0.038	0.025	0.034	0.030	0.030	0.041
4	<0.01	0.030	0.030	0.030	0.036	0.030	0.034	0.023	0.033	0.030	0.030	<b>0.038</b>
5	0.010	0.040	0.030	0.030	0.035	0.030	0.035	0.025	0.035	0.030	NR	NR
6	<0.01	0.030	0.030	0.030	0.034	0.030	0.034	0.024	0.035	0.040	NR	NR
7	<0.01	0.030	0.030	0.030	0.035	0.030	0.034	0.025	0.035	0.030	NR	NR
8	0.010	0.040	0.030	0.030	0.035	0.030	0.036	0.025	0.033	0.030	NR	NR
9	<0.01	0.030	0.030	0.030	0.035	0.030	0.035	0.036	0.033	0.030	NR	NR
10	<0.01	0.030	0.030	0.030	0.037	0.030	0.035	0.044	0.034	0.030	NR	NR
11	<0.01	0.030	0.030	0.030	0.035	0.030	0.034	0.035	0.033	0.040	NR	NR
12	<0.01	0.030	0.030	0.030	0.036	0.030	0.033	0.042	0.036	0.040	NR	NR
Mean	0.010	0.032	0.030	0.030	0.035	0.030	0.035	0.029	0.034	0.033	0.030	0.041
Median	0.010	0.030	0.030	0.030	0.035	0.030	0.035	0.025	0.034	0.030	0.030	0.042
Std.Dev.	0.000	0.004	0.000	0.000	0.001	0.000	0.001	0.008	0.001	0.005	0.000	0.002
Rel.Std.Dev.	0.00%	12.29%	0.00%	0.00%	2.14%	0.00%	3.71%	25.99%	3.94%	13.92%	0.00%	4.70%
PDM <sup>3</sup>	-69.37%	-3.02%	-8.12%	-8.12%	7.95%	-8.12%	6.42%	-9.91%	3.03%	-0.47%	-8.12%	25.71%

Table A35. Fusion ICP results for Zn in OREAS 192 (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 -
1	200	165	200	200	<b>110</b>	NR	200	174	155	200	<b>59</b>	NR
2	200	163	250	200	<b>100</b>	NR	200	188	157	200	<b>71</b>	NR
3	200	170	200	200	<b>100</b>	NR	<b>100</b>	171	199	200	<b>77</b>	NR
4	200	172	200	200	<b>100</b>	NR	200	177	<b>102</b>	200	<b>108</b>	NR
5	200	196	250	200	<b>120</b>	NR	200	172	<b>105</b>	200	NR	NR
6	200	172	250	200	<b>120</b>	NR	200	187	<b>116</b>	200	NR	NR
7	200	207	250	200	<b>120</b>	NR	200	186	<b>116</b>	200	NR	NR
8	200	220	250	200	<b>130</b>	NR	200	186	<b>121</b>	200	NR	NR
9	200	158	250	200	<b>120</b>	NR	200	174	134	200	NR	NR
10	200	154	250	200	<b>110</b>	NR	200	178	145	200	NR	NR
11	200	150	250	200	<b>110</b>	NR	200	185	141	200	NR	NR
12	200	160	200	200	<b>110</b>	NR	200	190	144	200	NR	NR
Mean	200	174	233	200	<b>113</b>		192	181	136	200	79	
Median	200	168	250	200	110		200	181	137	200	74	
Std.Dev.	0	22	25	0	10		29	7	27	0	21	
Rel.Std.Dev.	0.00%	12.67%	10.55%	0.00%	8.58%		15.06%	3.83%	19.79%	0.00%	26.52%	
PDM <sup>3</sup>	3.81%	-9.73%	21.11%	3.81%	-41.61%		-0.52%	-6.19%	-29.34%	3.81%	-59.13%	

Table A36. Results for C in OREAS 192 (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	0.070	0.080	0.060	<b>0.020</b>	0.080	<b>&lt;0.01</b>	<b>0.110</b>	0.050	0.100	0.062	0.070
2	0.070	0.100	0.060	<b>0.010</b>	0.080	<b>0.030</b>	<b>0.119</b>	0.050	0.100	0.071	0.080
3	0.080	0.130	0.070	<b>0.030</b>	0.070	<b>0.040</b>	<b>0.136</b>	<b>0.150</b>	0.110	0.068	0.070
4	0.070	0.090	0.050	<b>0.020</b>	0.080	<b>0.020</b>	<b>0.106</b>	0.050	0.100	0.074	0.060
5	0.060	0.080	0.060	0.060	0.090	0.080	<b>0.111</b>	0.060	0.090	0.066	0.060
6	0.050	0.110	0.060	0.050	0.100	0.070	<b>0.093</b>	0.070	0.070	0.063	0.070
7	0.070	0.100	0.060	0.040	0.110	0.070	<b>0.112</b>	0.060	0.080	0.067	0.070
8	0.060	0.070	0.060	0.060	0.090	0.070	<b>0.126</b>	0.060	0.070	0.075	0.070
9	0.060	0.070	0.050	0.060	0.090	0.080	0.099	0.050	0.090	0.067	0.050
10	0.060	<b>0.110</b>	0.040	0.070	0.090	0.070	0.097	0.060	0.090	0.067	0.050
11	0.070	0.060	0.040	0.060	0.100	0.060	0.109	0.050	0.090	0.067	0.050
12	0.070	0.070	0.040	0.060	0.120	0.090	0.094	0.050	0.090	0.094	0.040
Mean	0.066	0.089	0.054	0.045	0.092	0.062	0.109	0.063	0.090	0.070	0.062
Median	0.070	0.085	0.060	0.055	0.090	0.070	0.110	0.055	0.090	0.067	0.065
Std.Dev.	0.008	0.021	0.010	0.020	0.014	0.022	0.013	0.028	0.012	0.008	0.012
Rel.Std.Dev.	12.04%	23.65%	18.39%	44.95%	15.31%	36.04%	11.91%	44.32%	13.40%	12.06%	19.35%
PDM <sup>3</sup>	-10.30%	21.49%	-26.20%	-38.69%	24.89%	-15.77%	48.97%	-13.71%	22.62%	-4.24%	-15.98%



Table A37. Results for S in OREAS 192 (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	0.030	<0.01	<0.01	0.003	<0.01
2	<0.01	<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	0.030	<0.01	<0.01	0.005	<0.01
4	0.010	<0.005	<0.01	<0.01	<0.02	<0.01	0.030	<0.01	<0.01	0.004	<0.01
5	0.010	<0.005	<0.01	0.010	<0.02	<0.01	0.020	<0.01	<0.01	<0.003	<0.01
6	<0.01	0.015	<0.01	0.010	<0.02	<0.01	0.010	<0.01	<0.01	<0.003	<0.01
7	<0.01	0.015	<0.01	<0.01	<0.02	<0.01	0.020	<0.01	<0.01	<0.003	<0.01
8	<0.01	<0.005	<0.01	<0.01	<0.02	<0.01	0.020	<0.01	<0.01	0.006	<0.01
9	<0.01	<0.005	<0.01	<0.01	<0.02	<0.01	0.020	<0.01	<0.01	0.005	0.010
10	<0.01	<0.005	<0.01	<0.01	<0.02	<0.01	0.020	<0.01	<0.01	0.005	<0.01
11	0.010	<0.005	<0.01	<0.01	<0.02	<0.01	0.010	<0.01	<0.01	0.006	<0.01
12	<0.01	<0.005	<0.01	<0.01	<0.02	<0.01	0.020	<0.01	<0.01	0.010	<0.01
Mean	0.010	0.015		0.010			0.022			0.006	0.010
Median	0.010	0.015		0.010			0.020			0.005	0.010
Std.Dev.	0.000	0.000		0.000			0.007			0.002	
Rel.Std.Dev.	0.00%	0.00%		0.00%			33.13%			38.72%	
PDM <sup>3</sup>	-11.97%	32.05%		-11.97%			90.73%			-50.19%	-11.97%