



**CERTIFICATE OF ANALYSIS FOR  
NICKEL SULPHIDE ORE REFERENCE  
MATERIAL OREAS 75a**

**SUMMARY STATISTICS**

Constituent	Recommended value	95% Confidence Interval		Tolerance limits 1- $\alpha$ =0.99, $\rho$ =0.95	
		Low	High	Low	High
<b><u>Lead fire assay</u></b>					
Gold, Au (ppb)	34	29	39	30	38
Palladium, Pd (ppb)	280	272	288	266	293
Platinum, Pt (ppb)	353	338	368	337	369
<b><u>4 Acid digest</u></b>					
Aluminium oxide, Al <sub>2</sub> O <sub>3</sub> (wt.%)	1.98	1.91	2.06	1.93	2.04
Arsenic, As (ppm)	78	75	80	73	83
Chromium, Cr (ppm)	1122	959	1285	1043	1201
Cobalt, Co (ppm)	855	831	879	839	871
Copper, Cu (ppm)	1930	1895	1964	1901	1958
Iron, Fe (wt.%)	19.0	18.6	19.5	18.7	19.3
Magnesium oxide, MgO (wt.%)	22.6	22.0	23.2	22.3	22.9
Nickel, Ni (wt.%)	5.11	5.00	5.22	5.03	5.19
Sulphur, S (wt.%)	12.6	12.0	13.1	12.2	12.9
<b><u>Fusion</u></b>					
Aluminium oxide, Al <sub>2</sub> O <sub>3</sub> (wt.%)	1.99	1.95	2.04	1.95	2.03
Arsenic, As (ppm)	80	67	93	72	88
Chromium, Cr (ppm)	1552	1526	1577	1518	1585
Cobalt, Co (ppm)	894	888	900	868	920
Copper, Cu (ppm)	2005	1943	2067	1961	2049
Iron, Fe (wt.%)	19.1	18.7	19.5	18.8	19.4
Magnesium oxide, MgO (wt.%)	22.3	22.1	22.5	22.0	22.6
Nickel, Ni (wt.%)	5.25	5.09	5.40	5.13	5.36
Silicon dioxide, SiO <sub>2</sub> (wt.%)	27.3	27.0	27.7	26.9	27.8
Sulphur, S (wt.%)	12.8	11.2	14.4	12.5	13.1
<b><u>IR Combustion</u></b>					
Sulphur, S (wt.%)	12.5	12.3	12.8	12.4	12.7

\*IND = Indeterminate; values may appear asymmetric due to rounding

Prepared by:  
Ore Research & Exploration Pty Ltd  
November 2006

## INTRODUCTION

OREAS certified reference materials (CRMs) are intended to provide a low cost method of evaluating and improving the quality of precious and base metal analysis of geological samples. To the analyst they provide an effective means of calibrating analytical equipment, assessing new techniques and routinely monitoring in-house procedures. To the geologist they provide a means of implementing quality control in analytical data sets generated in exploration, from the grass roots level through to prospect evaluation, and in grade control at mining operations.

## SOURCE MATERIAL

Reference material OREAS 75a is one of a suite of six nickel sulphide CRMs (OREAS 72a to OREAS 77a) prepared from high grade massive nickel sulphide ore and barren ultramafic material from the Cosmos Nickel mine located in the Kathleen Valley area approximately 30km north of Leinster in Western Australia. Cosmos is situated within the Agnew-Wiluna portion of the Norseman-Wiluna greenstone belt. This portion of the belt is strongly attenuated and characterised by large scale faults, complex folding and typically steep dips. It is a typical Kambalda-style, komatiite associated, massive sulphide deposit representing an essentially in-situ accumulation of primary magmatic Ni-Fe sulphides with minor by-products including Cu, Co and platinum group elements (PGE's). The Cosmos deposit comprises one discrete zone of massive and semi-massive sulphides extending over a strike length of 240m. Mineralisation is strata bound between the overlying ultramafic unit and the underlying dolerite and felsic volcanic rocks. Continuity of grade and width of mineralisation are strong both along strike and down dip.

## COMMUNITION AND HOMOGENISATION PROCEDURES

The material constituting OREAS 75a was prepared in the following manner:

- a) *drying to constant mass at 65 C (Ni ore) and 105<sup>0</sup>C (barren ultramafic);*
- b) *crushing;*
- c) *milling of the nickel ore to 100% minus 25 microns;*
- d) *milling of the barren ultramafic to 98% minus 75 microns;*
- e) *combining in appropriate proportions to achieve the desired grade;*
- f) *homogenisation;*
- g) *packaging into 10g units in laminated foil pouches.*

## ANALYTICAL PROGRAM FOR OREAS 75a

Fifteen commercial laboratories participated in the analytical program to certify Au, Pt, Pd, Al<sub>2</sub>O<sub>3</sub>, As, Cr, Co, Cu, Fe, MgO, Ni, SiO<sub>2</sub> and S by both total and partial methods. Their results together with uncorrected means, medians, one sigma standard deviations, relative standard deviations and percent deviation of lab means from the corrected mean of means (PDM<sup>3</sup>) are presented in an appendix (Tables A2 – A24). The analytical methods employed by each laboratory are indicated as codes at the head of each laboratory data set and explained in Table A1 of the appendix.

Table 1. Approximate major and trace element composition of nickel sulphide reference material OREAS 75a; wt.% - weight percent; ppm - parts per million.

Constituent	wt. %	Constituent	ppm	Constituent	ppm	Constituent	ppm
TiO <sub>2</sub>	0.11	Ag	1	Ho	0.12	Sm	0.55
MnO	0.14	Ba	29	In	0.04	Sn	<1
CaO	1.76	Be	0.35	La	3.75	Sr	16
K <sub>2</sub> O	0.14	Bi	0.85	Li	10	Ta	<1
P <sub>2</sub> O <sub>5</sub>	0.05	Cd	<1	Lu	0.06	Tb	0.1
Na <sub>2</sub> O	0.16	Ce	6.9	Mo	1.8	Te	0.4
C	0.15	Cs	1.8	Nb	1	Th	1.4
		Dy	0.48	Nd	2.0	U	0.4
		Er	0.3	Pb	8.5	W	3.5
		Eu	0.15	Pr	0.6	Y	3.0
		Ga	1.7	Rb	9	Yb	0.33
		Gd	0.6	Sb	1.2	Zn	78
		Hf	0.4	Sc	6	Zr	16

The intent of the certification program was to characterise the analytes by a) fire assay ICP-MS, b) total acid digest methods (mainly HF-HCl-HNO<sub>3</sub>-HClO<sub>4</sub>) with ICP-OES, ICP-MS and AAS finish, and b) sodium peroxide or lithium borate fusion with ICP-OES, ICP-MS, AAS or XRF finish. S was also analysed by Leco IR combustion furnace. A batch of five dried and vacuum-packed samples were submitted to each of the participating laboratories for analysis. Each batch was composed of two 110g sub-samples scoop-split from each of two separate 1kg test units taken during the bagging stage and immediately following homogenisation. This two-stage nested design for the interlaboratory programme was amenable to analysis of variance (ANOVA) treatment and enables a comparative assessment of within- and between-unit homogeneity. A fifth randomly chosen sample was included from a third 1kg test unit to make up batches of five samples.

## STATISTICAL EVALUATION OF OREAS 75a

### Recommended Value and Confidence Limits

The certified value is the mean of means of accepted replicate values of accepted participating laboratories 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 limits were obtained by calculation of the variance of the consensus value (mean of means) and reference to Student's- $t$  distribution with degrees of freedom  $(p-1)$ .

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

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

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

The distributions of the values are assumed to be symmetrical about the mean in the calculation of the confidence limits.

The test for rejection of individual outliers from each laboratory data set was 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

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

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

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.

Individual outliers and, more rarely, laboratory means deemed to be outlying are shown in bold in the tabulated results (Appendix) and have been omitted in the determination of recommended 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 recommended value, i.e. the narrower the confidence interval the greater the certainty in the recommended value.

Table 2. Recommended values and 95% confidence intervals for OREAS 75a

Constituent	Recommended value	95% Confidence Interval	
		Low	High
<b><u>Lead fire assay</u></b>			
Gold, Au (ppb)	34	29	39
Palladium, Pd (ppb)	280	272	288
Platinum, Pt (ppb)	353	338	368
<b><u>4 Acid digest</u></b>			
Aluminium oxide, Al <sub>2</sub> O <sub>3</sub> (wt.%)	1.98	1.91	2.06
Arsenic, As (ppm)	78	75	80
Chromium, Cr (ppm)	1122	959	1285
Cobalt, Co (ppm)	855	831	879
Copper, Cu (ppm)	1930	1895	1964
Iron, Fe (wt.%)	19.0	18.6	19.5
Magnesium oxide, MgO (wt.%)	22.6	22.0	23.2
Nickel, Ni (wt.%)	5.11	5.00	5.22
Sulphur, S (wt.%)	12.6	12.0	13.1
<b><u>Fusion</u></b>			
Aluminium oxide, Al <sub>2</sub> O <sub>3</sub> (wt.%)	1.99	1.95	2.04
Arsenic, As (ppm)	80	67	93
Chromium, Cr (ppm)	1552	1526	1577
Cobalt, Co (ppm)	894	888	900
Copper, Cu (ppm)	2005	1943	2067
Iron, Fe (wt.%)	19.1	18.7	19.5
Magnesium oxide, MgO (wt.%)	22.3	22.1	22.5
Nickel, Ni (wt.%)	5.25	5.09	5.40
Silicon dioxide, SiO <sub>2</sub> (wt.%)	27.3	27.0	27.7
Sulphur, S (wt.%)	12.8	11.2	14.4
<b><u>IR Combustion</u></b>			
Sulphur, S (wt.%)	12.5	12.28	12.8

\*IND - indeterminate; values 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 the 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

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

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

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 4 acid digest, where 99% of the time at least 95% of subsamples will have concentrations lying between 5.03 and 5.19 percent (see Table 3). 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

$$1 - (\frac{s_i}{s'_g}) \text{ is the weighting factor for laboratory } i;$$

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

according to the formula:

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

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. A weighting factor of zero was applied to those data sets where  $s_i / 2s_g' > 1$  (i.e. where the weighting factor  $1 - s_i / 2s_g' < 0$ ). 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. Outliers 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  $1 - s_i / 2s_g' < 0$ ).

Table 3. Recommended values and tolerance limits for OREAS 75a

Constituent	Recommended value	Tolerance limits 1- $\alpha$ =0.99, $\rho$ =0.95	
		Low	High
<b><u>Lead fire assay</u></b>			
Gold, Au (ppb)	34	30	38
Palladium, Pd (ppb)	280	266	293
Platinum, Pt (ppb)	353	337	369
<b><u>4 Acid digest</u></b>			
Aluminium oxide, Al <sub>2</sub> O <sub>3</sub> (wt.%)	1.98	1.93	2.04
Arsenic, As (ppm)	78	73	83
Chromium, Cr (ppm)	1122	1043	1201
Cobalt, Co (ppm)	855	839	871
Copper, Cu (ppm)	1930	1901	1958
Iron, Fe (wt.%)	19.0	18.7	19.3
Magnesium oxide, MgO (wt.%)	22.6	22.3	22.9
Nickel, Ni (wt.%)	5.11	5.03	5.19
Sulphur, S (wt.%)	12.6	12.2	12.9
<b><u>Fusion</u></b>			
Aluminium oxide, Al <sub>2</sub> O <sub>3</sub> (wt.%)	1.99	1.95	2.03
Arsenic, As (ppm)	80	72	88
Chromium, Cr (ppm)	1552	1518	1585
Cobalt, Co (ppm)	894	868	920
Copper, Cu (ppm)	2005	1961	2049
Iron, Fe (wt.%)	19.1	18.8	19.4
Magnesium oxide, MgO (wt.%)	22.3	22.0	22.6
Nickel, Ni (wt.%)	5.25	5.13	5.36
Silicon dioxide, SiO <sub>2</sub> (wt.%)	27.3	26.9	27.8
Sulphur, S (wt.%)	12.8	12.5	13.1
<b><u>IR Combustion</u></b>			
Sulphur, S (wt.%)	12.5	12.4	12.7

\*IND - indeterminate; intervals may appear asymmetric due to rounding

## Performance Gates

Performance gates provide an indication of a level of performance that might reasonably be expected for a particular analyte from a laboratory being monitored by this standard in a QA/QC program. They incorporate errors attributable to measurement (analytical bias and precision) and standard variability. For an effective standard the contribution of the latter

should be negligible in comparison to measurement errors. Two methods have been employed to calculate performance gates.

The first method uses the standard deviation of the pooled individual analyses generated from the certification program. All individual and lab dataset (batch) outliers are removed prior to determination of the standard deviation. These outliers can only be removed if they can be confidently deemed to be analytical rather than arising from inhomogeneity of the CRM. Performance gates have been calculated for one, two and three standard deviations (SDs) of the accepted pool of certification data and are presented in Table 4. As a guide these intervals may be regarded as informational (1SD), warning or rejection for multiple outliers (2SD), or rejection for individual outliers (3SD) in QC monitoring although their precise application should be at the discretion of the QC manager concerned.

Table 4. Proposed performance gates for OREAS 75a

Constituent	Recommended value	Performance Gates							
		1SD		2SD		3SD		5%	
		Low	High	Low	High	Low	High	Low	High
<b>Lead fire assay</b>									
Gold, Au (ppb)	34	25	43	16	52	7	61	32	36
Palladium, Pd (ppb)	280	265	294	251	308	237	322	266	294
Platinum, Pt (ppb)	353	328	378	303	403	278	428	335	371
<b>4 Acid digest</b>									
Aluminium oxide, Al <sub>2</sub> O <sub>3</sub> (wt.%)	1.98	1.87	2.09	1.76	2.20	1.65	2.32	1.88	2.08
Arsenic, As (ppm)	78	74	81	70	85	67	89	74	82
Chromium, Cr (ppm)	1122	885	1358	649	1594	413	1830	1066	1178
Cobalt, Co (ppm)	855	811	899	767	943	723	987	812	898
Copper, Cu (ppm)	1930	1864	1995	1799	2060	1733	2126	1833	2026
Iron, Fe (wt.%)	19.0	18.3	19.7	17.6	20.4	16.9	21.2	18.1	20.0
Magnesium oxide, MgO (wt.%)	22.6	21.6	23.6	20.7	24.5	19.7	25.5	21.5	23.7
Nickel, Ni (wt.%)	5.11	4.90	5.32	4.70	5.52	4.49	5.73	4.85	5.36
Sulphur, S (wt.%)	12.6	11.8	13.3	11.0	14.1	10.3	14.9	11.9	13.2
<b>Fusion</b>									
Aluminium oxide, Al <sub>2</sub> O <sub>3</sub> (wt.%)	1.99	1.90	2.08	1.81	2.17	1.72	2.26	1.89	2.09
Arsenic, As (ppm)	80	61	98	43	117	24	135	76	84
Chromium, Cr (ppm)	1552	1496	1607	1441	1662	1386	1717	1474	1629
Cobalt, Co (ppm)	894	879	909	864	924	849	939	849	939
Copper, Cu (ppm)	2005	1916	2095	1827	2184	1738	2273	1905	2106
Iron, Fe (wt.%)	19.1	18.3	19.9	17.5	20.7	16.8	21.4	18.1	20.1
Magnesium oxide, MgO (wt.%)	22.3	21.9	22.7	21.4	23.1	21.0	23.6	21.2	23.4
Nickel, Ni (wt.%)	5.25	5.03	5.46	4.82	5.67	4.61	5.88	4.98	5.51
Silicon dioxide, SiO <sub>2</sub> (wt.%)	27.3	26.5	28.1	25.7	28.9	24.9	29.7	26.0	28.7
Sulphur, S (wt.%)	12.8	11.9	13.7	10.9	14.7	10.0	15.6	12.2	13.4
<b>IR Combustion</b>									
Sulphur, S (wt.%)	12.5	12.1	13.0	11.7	13.4	11.2	13.9	11.9	13.2

\*IND - indeterminate; intervals may appear asymmetric due to rounding

For the second method a  $\pm 5\%$  error bar on the recommended value is used as the window of acceptability (refer Table 4).

Both methods should be used with caution when concentration levels approach lower limits of detection of the analytical methods employed, as performance gates calculated from standard deviations tend to be excessively wide whereas those determined by the 5% method are too narrow.

## PARTICIPATING LABORATORIES

Acme Analytical Laboratories, Vancouver, BC, Canada  
Activation Laboratories, Ancaster, ON, Canada



Actlabs Pacific, Redcliffe, WA, Australia  
 ALS Chemex, Malaga, WA, Australia  
 ALS Chemex, Stafford, QLD, Australia  
 ALS Chemex, North Vancouver, BC, Canada  
 Amdel Laboratories, Thebarton, SA, Australia  
 Amdel Laboratories, Wangara, WA, Australia  
 Genalysis Laboratory Services, Maddington, WA, Australia  
 Intertek Testing Services, Jakarta, Indonesia  
 Kalgoorlie Assay Laboratories, Kalgoorlie WA, Australia  
 McPhar Geoservices (Phil.) Inc., Makati, Philippines  
 SGS, Welshpool, WA, Australia  
 SGS Geosol, Brazil, Sth America  
 Ultra Trace Laboratories, Canning Vale, WA, Australia

## **PREPARER AND SUPPLIER OF THE REFERENCE MATERIAL**

The siltstone reference material OREAS 75a has been prepared and certified and is supplied by:

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

Telephone	(03) 9729 0333	International	+613-9729 0333
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Email	info @ore.com.au	Web	www.ore.com.au

It is available in unit sizes of 10g in laminated foil packets.

## **INTENDED USE**

OREAS 75a is a reference material intended for the following:

- i) for the calibration of instruments used in the determination of the concentration of Ni, Au, Pt, Pd, Fe, Cu, Cr, Co, MgO, Al<sub>2</sub>O<sub>3</sub>, As, SiO<sub>2</sub> and S;
- ii) for the verification of analytical methods for Ni, Au, Pt, Pd, Fe, Cu, Cr, Co, MgO, Al<sub>2</sub>O<sub>3</sub>, As, SiO<sub>2</sub> and S;
- iii) for the preparation of secondary reference materials of similar composition;

## **STABILITY AND STORAGE INSTRUCTIONS**

OREAS 75a has been prepared from high grade nickel sulphide ore and barren ultramafic. Packaging under nitrogen in robust foil laminate it is considered to provide long-term stability for this CRM under normal storage conditions.

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

The recommended values for OREAS 75a refer to the concentration levels of Ni, Au, Pt, Pd, Fe, Cu, Cr, Co, MgO, Al<sub>2</sub>O<sub>3</sub>, As, SiO<sub>2</sub> and S after removal of hygroscopic moisture (~0.67

wt.%) by drying in air to constant mass at 65<sup>0</sup> C. If the reference material is not dried prior to analysis, the recommended value should be corrected to the moisture-bearing basis.

## **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**

Dr Paul Hamlyn

## **CERTIFICATION DATE**

November 29, 2006

## **REFERENCES**

ISO Guide 35 (1985), Certification of reference materials - General and statistical principals.  
ISO Guide 3207 (1975), Statistical interpretation of data - Determination of a statistical tolerance interval.  
Kleeman, A. W. (1967), *J. Geol. Soc. Australia*,

## **APPENDIX**

### **Analytical Results for OREAS 75a**

Table A1. Explanation of abbreviations used in Tables A2 – A24.

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
4A	four acid (HF-HNO <sub>3</sub> -HClO <sub>4</sub> -HCl) digestion
AAS	atomic absorption spectrometry
OES	inductively coupled plasma optical emission spectrometry
MS	inductively coupled plasma mass spectrometry
PPP	inductively coupled plasma optical emission spectrometry
XRF	x-ray fluorescence
BF	lithium metaborate fusion
PF	sodium peroxide fusion
LECO	Leco infrared furnace
HG	hydride generation

Table A2. Analytical results for gold in OREAS 75a (abbreviations as in Table A1; values in ppb).

Replicate No.	Lab A FA*MS	Lab B FA*MS	Lab C FA*MS	Lab D -	Lab E FA*MS	Lab F FA*MS	Lab G FA*MS	Lab H FA*MS	Lab I -	Lab J FA*MS	Lab K FA*MS	Lab L FA*OES	Lab M FA*MS	Lab N FA*MS	Lab O FA*MS
1	44	41	31	NR	34	25	50	32	NR	50	27	27	36	24	40
2	50	35	30	NR	34	24	30	28	NR	49	18	29	32	24	40
3	45	35	31	NR	33	26	31	28	NR	46	37	29	30	23	37
4	48	32	31	NR	36	23	58	29	NR	54	20	29	32	24	40
5	48	30	28	NR	38	27	48	30	NR	55	29	27	29	23	43
Mean	47	35	30		35	25	43	29		51	26	28	32	24	40
Median	48	35	31		34	25	48	29		50	27	29	32	24	40
Std.Dev.	2	4	1		2	2	12	2		4	8	1	3	1	2
Rel.Std.Dev.	5.21%	12.0%	4.32%		5.71%	6.32%	28.5%	5.69%		7.29%	29.0%	3.38%	8.44%	2.32%	5.30%
PDM <sup>3</sup>	38.6%	2.05%	-10.9%		3.23%	-26.3%	28.0%	-13.3%		49.8%	-22.7%	-16.9%	-6.21%	-30.4%	18.0%

Table A3. Analytical results for palladium in OREAS 75a (abbreviations as in Table A1; values in ppb).

Replicate No.	Lab A FA*MS	Lab B FA*MS	Lab C FA*MS	Lab D -	Lab E FA*MS	Lab F FA*MS	Lab G FA*MS	Lab H FA*MS	Lab I -	Lab J FA*MS	Lab K FA*MS	Lab L FA*OES	Lab M FA*MS	Lab N FA*MS	Lab O FA*MS
1	287	266	295	NR	288	268	289	273	NR	268	226	280	270	290	<b>263</b>
2	285	270	293	NR	301	271	279	254	NR	256	155	285	276	299	293
3	276	282	298	NR	294	275	284	255	NR	250	236	276	275	290	300
4	280	246	291	NR	299	274	290	267	NR	266	183	266	283	279	293
5	274	277	289	NR	303	<b>285</b>	281	260	NR	279	256	254	<b>251</b>	287	303
Mean	280	268	293		297	274	285	262		264	<b>211</b>	272	271	289	290
Median	280	270	293		299	274	284	260		266	226	276	275	290	293
Std.Dev.	6	14	3		6	6	5	8		11	41	12	12	7	16
Rel.Std.Dev.	2.00%	5.17%	1.19%		2.03%	2.34%	1.70%	3.10%		4.26%	19.51%	4.53%	4.47%	2.48%	5.49%
PDM <sup>3</sup>	0.28%	-4.08%	4.86%		6.22%	-1.84%	1.78%	-6.37%		-5.66%	-24.5%	-2.65%	-3.08%	3.36%	3.86%

Table A4. Analytical results for platinum in OREAS 75a (abbreviations as in Table A1; values in ppb).

Replicate No.	Lab A FA*MS	Lab B FA*MS	Lab C FA*MS	Lab D -	Lab E FA*MS	Lab F FA*MS	Lab G FA*MS	Lab H FA*MS	Lab I -	Lab J FA*MS	Lab K FA*MS	Lab L FA*OES	Lab M FA*MS	Lab N FA*MS	Lab O FA*MS
1	381	349	408	NR	372	354	339	338	NR	333	299	349	347	349	340
2	<b>390</b>	350	402	NR	381	358	<b>332</b>	322	NR	314	194	359	358	349	330
3	378	370	412	NR	366	353	338	317	NR	318	334	347	361	352	300
4	375	373	393	NR	374	367	<b>347</b>	335	NR	335	230	336	372	352	310
5	376	356	392	NR	383	<b>389</b>	338	322	NR	364	314	321	337	338	330
Mean	380	360	401		375	364	339	327		333	<b>274</b>	342	355	348	322
Median	378	356	402		374	358	338	322		333	299	347	358	349	330
Std.Dev.	6	11	9		7	15	5	9		20	59	14	13	6	16
Rel.Std.Dev.	1.59%	3.13%	2.21%		1.84%	4.14%	1.58%	2.80%		5.92%	21.7%	4.23%	3.78%	1.66%	5.10%
PDM <sup>3</sup>	7.63%	1.85%	13.7%		6.27%	3.11%	-4.04%	-7.44%		-5.74%	-22.3%	-3.02%	0.55%	-1.44%	-8.80%

Table A5. Analytical results for 4 acid aluminium oxide in OREAS 75a (abbreviations as in Table A1; values in wt %).

Replicate No.	Lab A 4A*OES	Lab B 4A*OES	Lab C 4A*OES	Lab D 4A*MS	Lab E 4A*AAS	Lab F 4A*OES	Lab G 4A*OES	Lab H 4A*OES	Lab I 4A*OES	Lab J -	Lab K -	Lab L -	Lab M 4A*OES	Lab N 4A*OES	Lab O 4A*OES
1	2.06	1.94	1.93	2.00	2.03	1.85	2.00	<b>0.96</b>	1.92	NR	NR	NR	1.79	2.19	2.14
2	2.08	1.92	1.93	1.98	2.03	1.85	2.03	0.93	1.93	NR	NR	NR	1.83	2.19	2.08
3	1.97	1.96	1.91	2.04	2.09	1.85	<b>2.04</b>	0.91	1.95	NR	NR	NR	1.82	2.17	2.10
4	2.00	1.99	1.93	2.00	2.10	1.87	1.99	0.89	1.91	NR	NR	NR	1.78	2.24	2.12
5	1.97	1.90	1.97	<b>1.92</b>	2.02	1.83	1.99	0.92	1.89	NR	NR	NR	1.81	2.16	2.06
Mean	2.02	1.94	1.93	1.99	2.05	1.85	2.01	<b>0.92</b>	1.92				1.81	2.19	2.10
Median	2.00	1.94	1.93	2.00	2.03	1.85	2.00	0.92	1.92				1.81	2.19	2.10
Std.Dev.	0.05	0.04	0.02	0.04	0.04	0.01	0.02	0.03	0.02				0.02	0.03	0.03
Rel.Std.Dev.	2.54%	1.84%	1.07%	2.20%	1.84%	0.72%	1.17%	2.81%	1.16%				1.17%	1.41%	1.42%
PDM <sup>3</sup>	1.65%	-2.06%	-2.63%	0.24%	3.57%	-6.63%	1.35%	-53.5%	-3.19%				-8.96%	10.4%	5.75%

Table A6. Analytical results for 4 acid arsenic in OREAS 75a (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A 4A*OES	Lab B 4A*OES	Lab C 4A*OES	Lab D 4A*MS	Lab E 4A*AAS	Lab F 4A*OES	Lab G 4A*OES	Lab H 4A*OES	Lab I 4A*OES	Lab J HG*AAS	Lab K -	Lab L -	Lab M 4A*OES	Lab N 4A*OES	Lab O 4A*OES
1	75	73	90	80	70	<200	80	80.8	75	73	NR	NR	80	76	76
2	<b>105</b>	71	120	60	50	<200	82	80.6	80	75	NR	NR	80	79	79
3	80	72	90	70	80	<200	79	81.0	80	68	NR	NR	80	78	77
4	80	78	100	50	50	<200	82	81.0	75	69	NR	NR	80	76	74
5	80	80	110	60	60	<200	82	<b>79.8</b>	80	70	NR	NR	80	78	78
Mean	84	74.8	<b>102</b>	<b>64</b>	<b>62</b>	<200	81	80.6	78	71			80	77	77
Median	80	73	100	60	60	<200	82	80.8	80	70			80	78	77
Std.Dev.	12	4	13	11	13	-	1	0	3	3			0	1	2
Rel.Std.Dev.	14.2%	5.30%	12.8%	17.8%	21.0%	-	1.75%	0.62%	3.51%	4.11%			0.00%	1.73%	2.50%
PDM <sup>3</sup>	8.22%	-3.64%	31.4%	-17.5%	-20.1%	-	4.35%	3.89%	0.49%	-8.53%			3.06%	-0.29%	-1.06%

Table A7. Analytical results for 4 acid chromium in OREAS 75a (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A 4A*OES	Lab B 4A*OES	Lab C 4A*OES	Lab D 4A*MS	Lab E 4A*AAS	Lab F 4A*OES	Lab G 4A*OES	Lab H -	Lab I 4A*OES	Lab J -	Lab K -	Lab L -	Lab M 4A*OES	Lab N 4A*OES	Lab O -
1	900	1011	850	880	1150	730	1220	NR	1020	NR	NR	NR	1450	1564	NR
2	915	1381	960	850	1140	760	1250	NR	990	NR	NR	NR	1340	1500	NR
3	1000	1420	1000	1110	1230	760	1280	NR	990	NR	NR	NR	1340	1471	NR
4	920	1440	1000	1200	1260	760	1170	NR	1010	NR	NR	NR	1310	1520	NR
5	1150	1034	1050	1100	1070	760	1120	NR	980	NR	NR	NR	1380	1565	NR
Mean	977	1257	972	1028	1170	754	1208		998				1364	1524	
Median	920	1381	1000	1100	1150	760	1220		990				1340	1520	
Std.Dev.	104	215	75	154	76	13	64		16				54	41	
Rel.Std.Dev.	10.7%	17.1%	7.75%	15.0%	6.48%	1.78%	5.28%		1.65%				3.97%	2.68%	
PDM <sup>3</sup>	-12.9%	12.1%	-13.3%	-8.36%	4.30%	-32.8%	7.69%		-11.0%				21.6%	35.9%	

Table A8. Analytical results for 4 acid cobalt in OREAS 75a (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A 4A*OES	Lab B 4A*OES	Lab C 4A*OES	Lab D 4A*MS	Lab E 4A*AAS	Lab F 4A*OES	Lab G 4A*OES	Lab H 4A*OES	Lab I 4A*OES	Lab J 4A*AAS	Lab K -	Lab L AR*OES	Lab M 4A*OES	Lab N 4A*OES	Lab O 4A*OES
1	840	830	860	810	820	870	823	867	890	797	NR	885	840	891	930
2	830	830	870	810	830	890	829	865	905	820	NR	912	820	892	930
3	825	845	890	830	790	890	844	860	880	771	NR	916	820	853	920
4	815	866	900	800	790	900	830	873	910	751	NR	926	800	857	930
5	775	827	910	790	840	890	823	860	890	828	NR	902	840	889	930
Mean	817	839.6	886	808	814	888	829.8	865	895	793		908.2	824	876.4	928
Median	825	830	890	810	820	890	829	865	890	797		912	820	889	930
Std.Dev.	25	16	21	15	23	11	9	5	12	32		16	17	20	4
Rel.Std.Dev.	3.08%	1.95%	2.34%	1.84%	2.83%	1.23%	1.03%	0.63%	1.37%	4.09%		1.71%	2.03%	2.24%	0.48%
PDM <sup>3</sup>	-4.46%	-1.82%	3.61%	-5.52%	-4.81%	3.84%	-2.97%	1.15%	4.66%	-7.22%		6.20%	-3.64%	2.48%	8.52%

Table A9. Analytical results for 4 acid copper in OREAS 75a (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A 4A*OES	Lab B 4A*OES	Lab C 4A*OES	Lab D 4A*MS	Lab E 4A*AAS	Lab F 4A*OES	Lab G 4A*OES	Lab H 4A*OES	Lab I 4A*OES	Lab J 4A*AAS	Lab K -	Lab L AR*OES	Lab M 4A*OES	Lab N 4A*OES	Lab O 4A*OES
1	1960	1926	1920	1900	1930	1900	<b>1780</b>	1320	2060	1886	NR	<b>1922</b>	1960	2026	1880
2	1990	1921	1930	1900	1930	1950	1840	1310	2070	1887	NR	1961	1970	2018	1890
3	1960	1932	1950	<b>1950</b>	1840	1910	1840	1310	2030	1766	NR	1966	1990	1891	1880
4	1940	<b>1963</b>	1960	1890	1810	1950	1830	1320	2050	<b>1749</b>	NR	1991	1920	1877	1890
5	<b>1880</b>	1909	2000	<b>1860</b>	1930	1920	1830	1320	2080	1921	NR	1973	1940	2018	1880
Mean	1946	1930	1952	1900	1888	1926	1824	<b>1316</b>	2058	1842		1963	1956	1966	1884
Median	1960	1926	1950	1900	1930	1920	1830	1320	2060	1886		1966	1960	2018	1880
Std.Dev.	41	20	31	32	58	23	25	5	19	78		25	27	75	5
Rel.Std.Dev.	2.11%	1.05%	1.60%	1.71%	3.10%	1.20%	1.38%	0.42%	0.93%	4.26%		1.29%	1.38%	3.82%	0.29%
PDM <sup>3</sup>	0.85%	0.03%	1.16%	-1.53%	-2.15%	-0.18%	-5.47%	-31.8%	6.66%	-4.55%		1.71%	1.37%	1.89%	-2.36%

Table A10. Analytical results for 4 acid iron in OREAS 75a (abbreviations as in Table A1; values in wt %).

Replicate No.	Lab A 4A*OES	Lab B 4A*OES	Lab C 4A*OES	Lab D 4A*MS	Lab E 4A*AAS	Lab F 4A*OES	Lab G 4A*OES	Lab H 4A*OES	Lab I 4A*OES	Lab J -	Lab K -	Lab L -	Lab M 4A*OES	Lab N 4A*OES	Lab O 4A*OES
1	19.2	19.6	17.8	18.4	18.7	19.5	19.0	18.0	19.9	NR	NR	NR	18.4	20.3	19.5
2	19.5	19.5	18.0	18.4	18.9	19.9	19.3	18.2	19.8	NR	NR	NR	18.4	20.3	18.9
3	18.4	19.6	18.2	<b>18.8</b>	18.6	19.6	19.3	18.1	20.0	NR	NR	NR	18.3	19.4	19.2
4	19.0	<b>20.1</b>	18.2	18.3	18.5	19.8	19.0	17.9	19.8	NR	NR	NR	18.2	19.6	19.8
5	19.0	19.5	18.7	<b>17.9</b>	19.1	19.5	18.9	17.9	19.8	NR	NR	NR	18.2	20.5	19.7
Mean	19.0	19.6	18.2	18.3	18.7	19.7	19.1	18.0	19.9				18.3	20.0	19.4
Median	19.0	19.6	18.2	18.4	18.7	19.6	19.0	18.0	19.8				18.3	20.3	19.5
Std.Dev.	0.4	0.2	0.3	0.3	0.2	0.2	0.2	0.1	0.1				0.1	0.5	0.4
Rel.Std.Dev.	2.12%	1.18%	1.73%	1.76%	1.27%	0.80%	0.98%	0.72%	0.45%				0.49%	2.37%	1.91%
PDM <sup>3</sup>	0.03%	3.30%	-4.49%	-3.65%	-1.44%	3.39%	0.45%	-5.23%	4.45%				-3.80%	5.31%	2.14%



Table A11. Analytical results for 4 acid magnesium oxide in OREAS 75a (abbreviations as in Table A1; values in wt %).

Replicate No.	Lab A 4A*OES	Lab B 4A*OES	Lab C 4A*OES	Lab D 4A*MS	Lab E 4A*AAS	Lab F 4A*OES	Lab G 4A*OES	Lab H 4A*OES	Lab I 4A*OES	Lab J -	Lab K -	Lab L -	Lab M 4A*OES	Lab N 4A*OES	Lab O 4A*OES
1	23.0	21.9	21.1	21.7	21.7	23.2	24.1	24.0	22.6	NR	NR	NR	24.0	22.3	22.4
2	23.4	21.7	21.1	21.6	21.7	22.9	24.5	24.6	22.8	NR	NR	NR	23.4	22.4	21.9
3	22.2	21.9	21.1	<b>22.4</b>	21.9	23.6	24.6	24.1	22.9	NR	NR	NR	22.7	22.5	22.1
4	22.7	<b>22.7</b>	21.3	21.7	22.0	23.4	23.9	23.8	22.6	NR	NR	NR	22.7	22.3	21.9
5	22.7	22.1	<b>21.7</b>	<b>21.1</b>	21.5	23.2	24.1	23.9	<b>21.8</b>	NR	NR	NR	23.5	22.3	22.1
Mean	22.8	22.0	21.3	21.7	21.8	23.3	24.2	24.1	22.5				23.3	22.3	22.1
Median	22.7	21.9	21.1	21.7	21.7	23.2	24.1	24.0	22.6				23.4	22.3	22.1
Std.Dev.	0.4	0.4	0.3	0.5	0.2	0.3	0.3	0.3	0.4				0.5	0.1	0.2
Rel.Std.Dev.	1.94%	1.71%	1.31%	2.14%	0.90%	1.10%	1.22%	1.25%	1.92%				2.34%	0.43%	0.92%
PDM <sup>3</sup>	0.87%	-2.47%	-5.95%	-3.99%	-3.73%	2.97%	7.25%	6.52%	-0.28%				2.90%	-1.13%	-2.43%

Table A12. Analytical results for 4 acid nickel in OREAS 75a (abbreviations as in Table A1; values in wt %).

Replicate No.	Lab A 4A*OES	Lab B 4A*OES	Lab C 4A*OES	Lab D 4A*MS	Lab E 4A*AAS	Lab F 4A*OES	Lab G 4A*OES	Lab H 4A*OES	Lab I 4A*OES	Lab J 4A*AAS	Lab K -	Lab L AR*OES	Lab M 4A*OES	Lab N 4A*OES	Lab O 4A*OES
1	5.07	4.97	5.04	4.77	4.91	5.01	4.98	5.38	5.32	5.24	NR	<b>5.09</b>	4.68	5.33	5.38
2	5.12	5.12	5.10	4.76	5.00	5.10	<b>5.16</b>	5.37	5.28	5.39	NR	5.17	4.61	5.38	5.35
3	4.89	5.08	5.21	4.83	4.84	5.06	4.94	5.38	5.29	4.77	NR	5.22	4.52	4.92	5.37
4	4.99	5.05	5.21	4.64	4.93	5.13	4.93	<b>5.30</b>	<b>5.38</b>	4.82	NR	5.24	4.51	4.94	5.34
5	<b>4.48</b>	4.99	5.31	4.62	5.01	5.04	4.96	<b>5.50</b>	5.28	5.28	NR	5.19	4.67	5.22	5.41
Mean	4.91	5.04	5.17	4.72	4.94	5.07	4.99	5.39	5.31	5.10		5.18	<b>4.60</b>	5.16	5.37
Median	4.99	5.05	5.21	4.76	4.93	5.06	4.96	5.38	5.29	5.24		5.19	4.61	5.22	5.37
Std.Dev.	0.26	0.06	0.11	0.09	0.07	0.05	0.09	0.07	0.04	0.28		0.06	0.08	0.22	0.03
Rel.Std.Dev.	5.21%	1.26%	2.04%	1.91%	1.41%	0.96%	1.90%	1.34%	0.80%	5.52%		1.14%	1.75%	4.19%	0.51%
PDM <sup>3</sup>	-3.90%	-1.30%	1.27%	-7.54%	-3.35%	-0.83%	-2.25%	5.42%	3.93%	-0.18%		1.45%	-10.0%	0.96%	5.10%

Table A13. Analytical results for 4 acid sulphur in OREAS 75a (abbreviations as in Table A1; values in wt %).

Replicate No.	Lab A 4A*OES	Lab B 4A*OES	Lab C 4A*OES	Lab D 4A*MS	Lab E 4A*AAS	Lab F 4A*OES	Lab G -	Lab H 4A*OES	Lab I 4A*OES	Lab J -	Lab K -	Lab L AR*OES	Lab M 4A*OES	Lab N -	Lab O -
1	12.7	12.1	12.4	11.7	13.0	11.5	NR	10.1	12.8	NR	NR	12.9	14.1	NR	NR
2	12.5	<b>11.6</b>	12.6	11.6	13.1	11.8	NR	10.1	12.9	NR	NR	13.4	13.7	NR	NR
3	12.3	12.1	12.7	11.9	12.4	11.6	NR	10.4	12.8	NR	NR	13.3	14.7	NR	NR
4	12.9	<b>12.6</b>	12.6	11.7	12.4	12.0	NR	10.6	12.6	NR	NR	13.3	12.8	NR	NR
5	<b>11.6</b>	12.0	<b>13.1</b>	11.4	13.1	11.3	NR	10.5	12.9	NR	NR	13.0	14.2	NR	NR
Mean	12.4	12.1	12.7	11.7	12.8	11.6		<b>10.3</b>	12.8			13.2	13.9		
Median	12.5	12.1	12.6	11.7	13.0	11.6		10.4	12.8			13.3	14.1		
Std.Dev.	0.50	0.33	0.26	0.19	0.37	0.29		0.23	0.12			0.19	0.71		
Rel.Std.Dev.	4.03%	2.76%	2.04%	1.61%	2.91%	2.45%		2.23%	0.96%			1.45%	5.11%		
PDM <sup>3</sup>	-1.38%	-4.08%	0.85%	-7.34%	1.65%	-7.36%		-17.8%	1.81%			4.73%	10.6%		

Table A14. Analytical results for fusion aluminium oxide in OREAS 75a (abbreviations as in Table A1; values in wt %).

Replicate No.	Lab A BF*XRF	Lab B PF*OES	Lab C BF*OES	Lab D BF*OES	Lab E BF*XRF	Lab F BF*OES	Lab G BF*OES	Lab H BF*OES	Lab I BF*OES	Lab J BF*XRF	Lab K BF*OES	Lab L PF*OES	Lab M BF*OES	Lab N BF*OES	Lab O BF*OES
1	2.04	2.02	1.98	2.00	1.90	2.02	2.20	1.97	1.93	1.90	1.76	1.99	2.00	2.11	2.24
2	2.04	1.97	1.96	2.12	1.88	2.01	2.00	1.95	1.93	2.00	2.02	1.98	2.10	2.08	2.18
3	2.04	1.97	1.96	2.16	1.89	2.01	2.10	1.94	1.96	2.00	1.93	1.98	2.06	2.12	2.10
4	2.04	2.00	1.92	2.09	1.87	2.04	1.90	1.94	1.91	2.00	1.81	1.99	2.10	2.15	2.35
5	2.06	1.98	2.00	2.22	1.89	<b>2.07</b>	1.90	1.95	1.93	2.00	1.78	1.98	1.99	2.12	2.15
Mean	2.04	1.99	1.96	2.12	1.89	2.03	2.02	1.95	1.93	1.98	1.86	1.98	2.05	2.12	<b>2.20</b>
Median	2.04	1.98	1.96	2.12	1.89	2.02	2.00	1.95	1.93	2.00	1.81	1.98	2.06	2.12	2.18
Std.Dev.	0.01	0.02	0.03	0.08	0.01	0.03	0.13	0.01	0.02	0.04	0.11	0.01	0.05	0.03	0.10
Rel.Std.Dev.	0.44%	1.24%	1.51%	3.87%	0.60%	1.26%	6.45%	0.63%	0.93%	2.26%	6.04%	0.26%	2.58%	1.19%	4.36%
PDM <sup>3</sup>	2.53%	-0.29%	-1.48%	6.24%	-5.39%	1.83%	1.33%	-2.18%	-3.09%	-0.68%	-6.73%	-0.56%	2.83%	6.14%	10.6%

Table A15. Analytical results for fusion arsenic in OREAS 75a (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A BF*XRF	Lab B PF*OES	Lab C BF*OES	Lab D BF*OES	Lab E BF*XRF	Lab F BF*OES	Lab G BF*OES	Lab H BF*OES	Lab I -	Lab J -	Lab K BF*OES	Lab L PF*MS	Lab M BF*OES	Lab N BF*OES	Lab O BF*OES
1	90	<100	100	100	90	63	110	NR	NR	NR	75	70	NR	72	<b>62</b>
2	90	<100	200	100	90	30	120	NR	NR	NR	77	73	NR	72	<b>59</b>
3	90	<b>100</b>	100	100	80	33	100	NR	NR	NR	77	72	NR	72	78
4	90	<100	200	100	80	31	80	NR	NR	NR	78	71	NR	72	79
5	70	<100	<b>&lt;100</b>	<b>300</b>	90	65	100	NR	NR	NR	74	73	NR	72	82
Mean	86	<100	<b>150</b>	140	86	44	102				76	72		72	72
Median	90	<100	150	100	90	33	100				77	72		72	78
Std.Dev.	9	-	58	89	5	18	15				2	1		0	11
Rel.Std.Dev.	10.4%	-	38.5%	63.9%	6.37%	40.4%	14.5%				2.16%	1.67%		0.00%	14.8%
PDM <sup>3</sup>	7.82%	-	88.1%	75.5%	7.82%	-44.3%	27.9%				-4.47%	-10.2%		-9.74%	-9.74%

Table A16. Analytical results for fusion chromium in OREAS 75a (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A BF*XRF	Lab B PF*OES	Lab C BF*OES	Lab D BF*OES	Lab E BF*XRF	Lab F BF*OES	Lab G BF*OES	Lab H BF*OES	Lab I BF*OES	Lab J -	Lab K BF*OES	Lab L PF*OES	Lab M BF*OES	Lab N BF*OES	Lab O BF*OES
1	1570	1627	1600	1600	1590	1526	1810	1500	1550	NR	1400	1527	1490	1565	1700
2	1560	1593	1500	1600	1565	1519	1780	1500	1530	NR	1300	1528	1560	<b>1463</b>	<b>1900</b>
3	1580	1578	1600	1600	1620	<b>1478</b>	1830	1500	1550	NR	1400	1526	1450	1516	1500
4	1560	1616	1500	1500	1605	1533	1740	1500	1520	NR	1400	1528	1420	1580	1700
5	<b>1660</b>	1584	1600	1600	1560	1519	1670	1500	1560	NR	1400	<b>1510</b>	1440	1574	1500
Mean	1586	1600	1560	1580	1588	1515	<b>1766</b>	1500	1542		<b>1380</b>	1524	1472	1540	1660
Median	1570	1593	1600	1600	1590	1519	1780	1500	1550		1400	1527	1450	1565	1700
Std.Dev.	42	21	55	45	26	21	63	0	16		45	8	55	50	167
Rel.Std.Dev.	2.66%	1.32%	3.51%	2.83%	1.61%	1.41%	3.59%	0.00%	1.07%		3.24%	0.51%	3.76%	3.23%	10.1%
PDM <sup>3</sup>	2.22%	3.09%	0.54%	1.83%	2.35%	-2.37%	13.8%	-3.33%	-0.62%		-11.1%	-1.79%	-5.13%	-0.77%	6.99%

Table A17. Analytical results for fusion cobalt in OREAS 75a (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A BF*XRF	Lab B PF*OES	Lab C BF*OES	Lab D BF*OES	Lab E BF*XRF	Lab F BF*OES	Lab G BF*OES	Lab H BF*OES	Lab I -	Lab J -	Lab K BF*OES	Lab L -	Lab M BF*OES	Lab N BF*OES	Lab O BF*OES
1	910	909	880	900	790	886	1010	900	NR	NR	882	NR	980	891	<b>1000</b>
2	900	900	880	900	780	925	950	900	NR	NR	859	NR	970	906	900
3	890	902	870	900	750	855	1000	900	NR	NR	923	NR	960	876	900
4	890	904	880	900	740	877	940	900	NR	NR	891	NR	960	879	900
5	<b>830</b>	901	890	900	770	917	810	900	NR	NR	893	NR	930	868	900
Mean	884	903	880	900	<b>766</b>	892	<b>942</b>	900			890		960	<b>884</b>	920
Median	890	902	880	900	770	886	950	900			891		960	879	900
Std.Dev.	31	4	7	0	21	29	80	0			23		19	15	45
Rel.Std.Dev.	3.54%	0.39%	0.80%	0.00%	2.71%	3.24%	8.47%	0.00%			2.59%		1.95%	1.68%	4.86%
PDM <sup>3</sup>	-1.12%	1.03%	-1.57%	0.67%	-14.3%	-0.23%	5.37%	0.67%			-0.50%		7.38%	-1.12%	2.90%

Table A18. Analytical results for fusion copper in OREAS 75a (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A BF*XRF	Lab B PF*OES	Lab C BF*OES	Lab D BF*OES	Lab E BF*XRF	Lab F BF*OES	Lab G BF*OES	Lab H BF*OES	Lab I -	Lab J -	Lab K BF*OES	Lab L -	Lab M BF*OES	Lab N BF*OES	Lab O -
1	2030	2006	1960	2200	1960	1361	<b>2380</b>	2000	NR	NR	2117	NR	1840	2042	NR
2	2040	1987	1980	2200	1940	1451	2130	2000	NR	NR	2051	NR	1830	2012	NR
3	2020	1997	1960	2300	<b>1840</b>	<b>751</b>	2240	2000	NR	NR	2233	NR	1890	1975	NR
4	2020	1975	1940	2200	<b>1810</b>	<b>838</b>	2020	2000	NR	NR	2150	NR	1900	1957	NR
5	<b>1890</b>	1985	2020	2300	1960	1475	1990	2000	NR	NR	2150	NR	1840	2061	NR
Mean	2000	1990	1972	<b>2240</b>	1902	<b>1175</b>	2152	2000			2140		1860	2009	
Median	2020	1987	1960	2200	1940	1361	2130	2000			2150		1840	2012	
Std.Dev.	62	12	30	55	72	351	161	0			66		32	44	
Rel.Std.Dev.	3.10%	0.60%	1.54%	2.45%	3.76%	29.9%	7.49%	0.00%			3.07%		1.74%	2.18%	
PDM <sup>3</sup>	-0.26%	-0.76%	-1.66%	11.7%	-5.15%	-41.4%	7.32%	-0.26%			6.73%		-7.24%	0.21%	

Table A19. Analytical results for fusion iron in OREAS 75a (abbreviations as in Table A1; values in wt %).

Replicate No.	Lab A BF*XRF	Lab B BF*XRF	Lab C BF*OES	Lab D BF*OES	Lab E BF*XRF	Lab F BF*OES	Lab G BF*OES	Lab H BF*OES	Lab I BF*OES	Lab J BF*XRF	Lab K BF*OES	Lab L PF*OES	Lab M BF*OES	Lab N BF*OES	Lab O BF*OES
1	18.8	19.6	18.5	20.1	18.3	18.9	18.4	19.3	20.3	18.8	18.0	18.8	18.7	20.1	20.1
2	18.8	19.4	18.5	20.5	18.3	18.8	18.0	19.2	20.4	19.1	19.7	18.6	18.6	19.9	20.2
3	18.7	19.4	18.5	20.9	17.8	20.0	18.9	19.4	20.4	18.3	19.7	18.8	18.9	19.4	19.7
4	18.8	19.3	18.3	20.6	17.9	18.9	17.7	19.3	19.9	18.1	19.0	18.7	18.7	19.9	21.9
5	17.9	19.2	18.9	22.0	18.2	19.0	17.4	19.4	20.2	19.0	18.3	18.8	18.5	19.7	19.8
Mean	18.6	19.4	18.5	20.8	18.1	19.1	18.1	19.3	20.2	18.6	18.9	18.7	18.7	19.8	20.3
Median	18.8	19.4	18.5	20.6	18.2	18.9	18.0	19.3	20.3	18.8	19.0	18.8	18.7	19.9	20.1
Std.Dev.	0.4	0.1	0.2	0.7	0.2	0.5	0.6	0.1	0.2	0.4	0.8	0.1	0.1	0.2	0.9
Rel.Std.Dev.	2.12%	0.77%	1.17%	3.45%	1.36%	2.63%	3.26%	0.43%	1.02%	2.34%	4.19%	0.48%	0.79%	1.24%	4.41%
PDM <sup>3</sup>	-2.60%	1.49%	-3.07%	9.02%	-5.27%	0.13%	-5.32%	1.17%	5.99%	-2.35%	-0.89%	-1.94%	-2.18%	3.69%	6.51%

Table A20. Analytical results for fusion magnesium oxide in OREAS 75a (abbreviations as in Table A1; values wt %).

Replicate No.	Lab A BF*XRF	Lab B PF*OES	Lab C BF*OES	Lab D BF*OES	Lab E BF*XRF	Lab F BF*OES	Lab G BF*OES	Lab H BF*OES	Lab I BF*OES	Lab J BF*XRF	Lab K BF*OES	Lab L PF*OES	Lab M BF*OES	Lab N BF*OES	Lab O BF*OES
1	22.4	22.9	21.2	23.1	22.0	22.4	25.2	22.1	21.6	23.0	21.7	22.4	22.6	22.5	24.6
2	22.3	22.5	20.9	23.8	21.7	22.4	22.6	22.4	21.9	23.1	30.3	22.3	22.8	22.4	24.6
3	22.5	22.6	20.9	24.1	21.8	22.0	23.8	22.2	21.8	24.1	26.0	22.3	22.7	22.7	24.0
4	22.3	22.5	20.7	23.7	21.6	22.5	21.8	22.1	21.8	23.9	22.7	22.4	22.7	22.9	26.6
5	23.2	22.5	21.6	25.6	21.6	22.3	21.3	22.3	22.1	23.2	22.0	22.3	22.4	22.5	24.2
Mean	22.5	22.6	21.1	24.1	21.7	22.3	22.9	22.2	21.8	23.5	24.5	22.3	22.6	22.6	24.8
Median	22.4	22.5	20.9	23.8	21.7	22.4	22.6	22.2	21.8	23.2	22.7	22.3	22.7	22.5	24.6
Std.Dev.	0.4	0.2	0.4	0.9	0.2	0.2	1.6	0.1	0.2	0.5	3.6	0.1	0.1	0.2	1.0
Rel.Std.Dev.	1.68%	0.79%	1.67%	3.88%	0.77%	0.98%	6.88%	0.44%	0.83%	2.14%	14.8%	0.30%	0.66%	0.89%	4.19%
PDM <sup>3</sup>	1.13%	1.28%	-5.51%	7.95%	-2.46%	0.19%	2.92%	-0.37%	-2.01%	5.26%	10.1%	0.16%	1.47%	1.33%	11.3%

Table A21. Analytical results for fusion nickel in OREAS 75a (abbreviations as in Table A1; values in wt %).

Replicate No.	Lab A BF*XRF	Lab B PF*OES	Lab C BF*OES	Lab D BF*OES	Lab E BF*XRF	Lab F BF*OES	Lab G BF*OES	Lab H BF*OES	Lab I -	Lab J -	Lab K BF*OES	Lab L -	Lab M BF*OES	Lab N BF*OES	Lab O BF*OES
1	5.27	5.36	5.18	4.77	5.12	5.44	NR	5.46	NR	NR	4.77	NR	5.79	5.42	5.48
2	5.25	5.32	5.22	4.76	5.13	5.34	NR	5.34	NR	NR	4.68	NR	5.70	5.32	5.53
3	5.22	5.34	5.19	4.83	4.81	5.59	NR	5.43	NR	NR	5.02	NR	5.84	5.37	5.36
4	5.24	5.26	5.13	4.64	4.91	5.42	NR	5.31	NR	NR	5.08	NR	<b>5.15</b>	5.27	5.41
5	<b>4.86</b>	5.28	<b>5.31</b>	4.62	4.88	5.30	NR	5.48	NR	NR	4.89	NR	<b>4.88</b>	5.41	5.39
Mean	5.17	5.31	5.21	<b>4.72</b>	4.97	5.42		5.40			4.89		<b>5.47</b>	5.36	5.43
Median	5.24	5.32	5.19	4.76	4.91	5.42		5.43			4.89		5.70	5.37	5.41
Std.Dev.	0.17	0.04	0.07	0.09	0.15	0.11		0.08			0.17		0.43	0.06	0.07
Rel.Std.Dev.	3.35%	0.73%	1.28%	1.91%	2.94%	2.04%		1.39%			3.42%		7.87%	1.18%	1.28%
PDM <sup>3</sup>	-1.47%	1.27%	-0.75%	-9.94%	-5.25%	3.26%		3.03%			-6.81%		4.32%	2.15%	3.60%

Table A22. Analytical results for silicon dioxide in OREAS 75a (abbreviations as in Table A1; values in wt %).

Replicate No.	Lab A BF*XRF	Lab B PF*OES	Lab C BF*OES	Lab D BF*OES	Lab E BF*XRF	Lab F BF*OES	Lab G BF*OES	Lab H BF*OES	Lab I BF*OES	Lab J BF*XRF	Lab K -	Lab L PF*OES	Lab M BF*OES	Lab N BF*OES	Lab O BF*OES
1	27.1	28.0	27.4	27.4	<b>27.3</b>	27.0	29.7	27.1	26.6	27.6	NR	27.3	26.9	26.4	29.0
2	27.1	27.6	27.8	29.0	27.0	27.4	26.3	27.4	26.8	27.9	NR	27.2	27.5	<b>23.7</b>	29.2
3	27.2	27.8	27.8	29.1	26.8	26.0	27.7	27.2	27.0	28.4	NR	27.2	27.7	26.7	28.6
4	27.1	27.6	27.2	27.8	26.9	26.9	25.1	27.2	26.6	28.4	NR	27.4	27.7	27.0	<b>30.6</b>
5	<b>27.9</b>	27.4	28.2	30.1	26.8	27.3	<b>24.4</b>	27.3	27.1	27.9	NR	27.1	26.7	26.5	29.0
Mean	27.3	27.7	27.7	28.7	27.0	26.9	26.6	27.3	26.8	28.0		27.2	27.3	26.0	<b>29.3</b>
Median	27.1	27.6	27.8	29.0	26.9	27.0	26.3	27.2	26.8	27.9		27.2	27.5	26.5	29.0
Std.Dev.	0.3	0.2	0.4	1.1	0.2	0.6	2.1	0.1	0.2	0.4		0.1	0.5	1.3	0.8
Rel.Std.Dev.	1.28%	0.88%	1.41%	3.78%	0.77%	2.12%	7.96%	0.49%	0.85%	1.25%		0.32%	1.77%	5.18%	2.63%
PDM <sup>3</sup>	-0.23%	1.25%	1.24%	4.90%	-1.40%	-1.60%	-2.57%	-0.33%	-1.91%	2.55%		-0.35%	-0.12%	-4.78%	7.09%

Table A23. Analytical results for fusion sulphur in OREAS 75a (abbreviations as in Table A1; values in wt %).

Replicate No.	Lab A BF*XRF	Lab B PF*OES	Lab C BF*OES	Lab D BF*OES	Lab E BF*XRF	Lab F -	Lab G -	Lab H -	Lab I -	Lab J -	Lab K -	Lab L -	Lab M -	Lab N -	Lab O -
1	12.6	12.8	11.8	13.4	>6.0	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2	12.6	12.7	11.8	14.1	>6.0	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
3	12.5	12.8	11.8	14.5	>6.0	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
4	12.5	12.9	11.7	14.2	>6.0	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
5	<b>11.6</b>	12.6	<b>12.1</b>	14.6	>6.0	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Mean	12.4	12.8	11.8	14.1	>6.0										
Median	12.5	12.8	11.8	14.2	>6.0										
Std.Dev.	0.4	0.1	0.2	0.5	-										
Rel.Std.Dev.	3.46%	0.98%	1.45%	3.29%	-										
PDM <sup>3</sup>	-3.44%	-0.22%	-7.73%	10.5%	-										

Table A24. Analytical results for sulphur by LECO in OREAS 75a (abbreviations as in Table A1; values in wt %).

Replicate No.	Lab A LECO	Lab B LECO	Lab C LECO	Lab D LECO	Lab E LECO	Lab F LECO	Lab G LECO	Lab H LECO	Lab I LECO	Lab J LECO	Lab K LECO	Lab L LECO	Lab M LECO	Lab N LECO	Lab O LECO
1	12.6	13.3	12.6	12.7	<b>13.0</b>	<b>12.6</b>	11.9	13.4	NR	10.9	12.8	12.2	12.6	11.6	12.5
2	12.8	13.2	12.8	12.6	12.8	12.5	12.2	14.2	NR	11.4	13.0	12.1	12.5	11.7	12.5
3	12.2	13.4	13.4	12.8	12.8	<b>12.2</b>	12.2	13.8	NR	10.7	12.5	12.2	12.5	11.7	12.5
4	12.5	13.3	12.4	12.7	12.8	12.4	12.5	13.3	NR	11.1	12.8	12.4	<b>14.6</b>	<b>11.5</b>	12.5
5	<b>11.4</b>	13.5	12.9	12.8	12.9	12.4	12.4	13.7	NR	11.8	13.0	11.9	<b>15.9</b>	11.7	12.6
Mean	12.3	13.3	12.8	12.7	12.8	12.4	12.2	<b>13.7</b>		<b>11.2</b>	12.8	12.1	13.6	11.6	12.5
Median	12.5	13.3	12.8	12.7	12.8	12.4	12.2	13.7		11.1	12.8	12.2	12.6	11.7	12.5
Std.Dev.	0.5	0.1	0.4	0.1	0.1	0.2	0.2	0.4		0.4	0.2	0.2	1.5	0.1	0.0
Rel.Std.Dev.	4.45%	0.85%	3.04%	0.62%	0.84%	1.21%	1.88%	2.61%		3.87%	1.40%	1.37%	11.4%	0.84%	0.36%
PDM <sup>3</sup>	-1.93%	6.36%	2.05%	1.26%	2.37%	-0.93%	-2.41%	9.07%		-10.9%	2.18%	-3.16%	8.62%	-7.36%	-0.18%