

**CERTIFICATE OF ANALYSIS FOR  
 NICKEL SULPHIDE ORE REFERENCE  
 MATERIAL OREAS 76a**

**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)	41	38	44	40	43
Palladium, Pd (ppb)	403	392	414	396	410
Platinum, Pt (ppb)	701	674	727	683	719
<b><u>4 Acid digest</u></b>					
Aluminium oxide, Al <sub>2</sub> O <sub>3</sub> (wt.%)	1.71	1.64	1.79	1.69	1.7
Arsenic, As (ppm)	107	101	112	102	111
Chromium, Cr (ppm)	872	730	1014	803	940
Cobalt, Co (ppm)	1191	1164	1218	1164	1218
Copper, Cu (ppm)	2848	2811	2885	2801	2896
Iron, Fe (wt.%)	25.0	24.3	25.8	24.8	25.3
Magnesium oxide, MgO (wt.%)	16.6	16.1	17.1	16.3	16.9
Nickel, Ni (wt.%)	7.29	7.17	7.41	7.19	7.38
Sulphur, S (wt.%)	17.2	15.6	18.8	16.8	17.6
<b><u>Fusion</u></b>					
Aluminium oxide, Al <sub>2</sub> O <sub>3</sub> (wt.%)	1.78	1.73	1.83	1.75	1.81
Arsenic, As (ppm)	117	102	132	106	128
Chromium, Cr (ppm)	1283	1267	1299	1242	1324
Cobalt, Co (ppm)	1215	1206	1225	1189	1241
Copper, Cu (ppm)	2974	2881	3067	2902	3046
Iron, Fe (wt.%)	24.6	24.2	25.0	24.2	25.0
Magnesium oxide, MgO (wt.%)	16.5	16.3	16.7	16.2	16.8
Nickel, Ni (wt.%)	7.40	7.23	7.58	7.29	7.52
Silicon dioxide, SiO <sub>2</sub> (wt.%)	21.7	21.5	22.0	21.3	22.2
Sulphur, S (wt.%)	17.7	16.3	19.0	17.3	18.0
<b><u>IR Combustion</u></b>					
Sulphur, S (wt.%)	18.0	17.6	18.3	17.6	18.3

\*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 76a 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°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 in 10g units sealed under nitrogen, in laminated foil pouches.*

## ANALYTICAL PROGRAM FOR OREAS 76a

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 76a; wt.% - weight percent; ppm - parts per million.

Constituent	wt.%	Constituent	ppm	Constituent	ppm	Constituent	ppm
TiO <sub>2</sub>	0.09	Ag	1.5	Ho	0.12	Sm	0.48
MnO	0.14	Ba	36	In	0.08	Sn	0.5
CaO	1.53	Be	0.35	La	4.1	Sr	14
K <sub>2</sub> O	0.15	Bi	0.85	Li	11	Ta	<1
P <sub>2</sub> O <sub>5</sub>	0.05	Cd	0.5	Lu	0.06	Tb	0.1
Na <sub>2</sub> O	0.16	Ce	7.6	Mo	2.3	Te	0.7
C	0.16	Cs	1.8	Nb	1.5	Th	1.4
		Dy	0.48	Nd	1.9	U	0.4
		Er	0.33	Pb	12	W	3
		Eu	0.15	Pr	0.7	Y	2.9
		Ga	1.8	Rb	9	Yb	0.33
		Gd	0.6	Sb	1.5	Zn	78
		Hf	0.4	Sc	4	Zr	15

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 76a

### 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.

Table 2. Recommended values and 95% confidence intervals for OREAS 76a

Constituent	Recommended value	95% Confidence Interval	
		Low	High
<b>Lead fire assay</b>			
Gold, Au (ppb)	41	38	44
Palladium, Pd (ppb)	403	392	414
Platinum, Pt (ppb)	701	674	727
<b>4 Acid digest</b>			
Aluminium oxide, Al <sub>2</sub> O <sub>3</sub> (wt.%)	1.71	1.64	1.79
Arsenic, As (ppm)	107	101	112
Chromium, Cr (ppm)	872	730	1014
Cobalt, Co (ppm)	1191	1164	1218
Copper, Cu (ppm)	2848	2811	2885
Iron, Fe (wt.%)	25.0	24.3	25.8
Magnesium oxide, MgO (wt.%)	16.6	16.1	17.1
Nickel, Ni (wt.%)	7.29	7.17	7.41
Sulphur, S (wt.%)	17.2	15.6	18.8
<b>Fusion</b>			
Aluminium oxide, Al <sub>2</sub> O <sub>3</sub> (wt.%)	1.78	1.73	1.83
Arsenic, As (ppm)	117	102	132
Chromium, Cr (ppm)	1283	1267	1299
Cobalt, Co (ppm)	1215	1206	1225
Copper, Cu (ppm)	2974	2881	3067
Iron, Fe (wt.%)	24.6	24.2	25.0
Magnesium oxide, MgO (wt.%)	16.5	16.3	16.7
Nickel, Ni (wt.%)	7.40	7.23	7.58
Silicon dioxide, SiO <sub>2</sub> (wt.%)	21.7	21.5	22.0
Sulphur, S (wt.%)	17.7	16.3	19.0
<b>IR Combustion</b>			
Sulphur, S (wt.%)	18.0	17.6	18.3

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

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

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

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

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.*

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.

### **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 7.19 and 7.38 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

$1 - (\frac{s_i}{s'_g})$  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 76a

Constituent	Recommended value	Tolerance limits 1- $\alpha$ =0.99, $\rho$ =0.95	
		Low	High
<b>Lead fire assay</b>			
Gold, Au (ppb)	41	40	43
Palladium, Pd (ppb)	403	396	410
Platinum, Pt (ppb)	701	683	719
<b>4 Acid digest</b>			
Aluminium oxide, Al <sub>2</sub> O <sub>3</sub> (wt.%)	1.71	1.69	1.7
Arsenic, As (ppm)	107	102	111
Chromium, Cr (ppm)	872	803	940
Cobalt, Co (ppm)	1191	1164	1218
Copper, Cu (ppm)	2848	2801	2896
Iron, Fe (wt.%)	25.0	24.8	25.3
Magnesium oxide, MgO (wt.%)	16.6	16.3	16.9
Nickel, Ni (wt.%)	7.29	7.19	7.38
Sulphur, S (wt.%)	17.2	16.8	17.6
<b>Fusion</b>			
Aluminium oxide, Al <sub>2</sub> O <sub>3</sub> (wt.%)	1.78	1.75	1.81
Arsenic, As (ppm)	117	106	128
Chromium, Cr (ppm)	1283	1242	1324
Cobalt, Co (ppm)	1215	1189	1241
Copper, Cu (ppm)	2974	2902	3046
Iron, Fe (wt.%)	24.6	24.2	25.0
Magnesium oxide, MgO (wt.%)	16.5	16.2	16.8
Nickel, Ni (wt.%)	7.40	7.29	7.52
Silicon dioxide, SiO <sub>2</sub> (wt.%)	21.7	21.3	22.2
Sulphur, S (wt.%)	17.7	17.3	18.0
<b>IR Combustion</b>			
Sulphur, S (wt.%)	18.0	17.6	18.3

\*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 of the accepted pool of certification data and are presented in Table 4. As a guide these intervals may be regarded as informational ( $1\sigma$ ), warning or rejection for multiple outliers ( $2\sigma$ ), or rejection for individual outliers ( $3\sigma$ ) in QC monitoring although their precise application should be at the discretion of the QC manager concerned.

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.

Table 4. Proposed performance gates for OREAS 76a

Constituent	Recommended value	Performance Gates							
		$1\sigma$		$2\sigma$		$3\sigma$		5%	
		Low	High	Low	High	Low	High	Low	High
<b>Lead fire assay</b>									
Gold, Au (ppb)	41	37	46	32	50	27	55	39	43
Palladium, Pd (ppb)	403	386	420	368	438	351	455	383	423
Platinum, Pt (ppb)	701	653	749	605	796	557	844	666	736
<b>4 Acid digest</b>									
Aluminium oxide, Al <sub>2</sub> O <sub>3</sub> (wt.%)	1.71	1.61	1.82	1.50	1.93	1.39	2.04	1.63	1.80
Arsenic, As (ppm)	107	97	116	88	126	78	135	101	112
Chromium, Cr (ppm)	872	681	1063	490	1254	299	1445	828	915
Cobalt, Co (ppm)	1191	1143	1239	1094	1288	1046	1336	1132	1251
Copper, Cu (ppm)	2848	2775	2921	2703	2994	2630	3067	2706	2991
Iron, Fe (wt.%)	25.0	23.9	26.2	22.7	27.4	21.6	28.5	23.8	26.3
Magnesium oxide, MgO (wt.%)	16.6	15.8	17.4	15.0	18.2	14.2	19.0	15.8	17.4
Nickel, Ni (wt.%)	7.29	7.06	7.52	6.83	7.75	6.60	7.97	6.92	7.65
Sulphur, S (wt.%)	17.2	15.1	19.3	13.0	21.4	10.9	23.4	16.3	18.1
<b>Fusion</b>									
Aluminium oxide, Al <sub>2</sub> O <sub>3</sub> (wt.%)	1.78	1.69	1.87	1.60	1.97	1.50	2.06	1.69	1.87
Arsenic, As (ppm)	117	87	146	58	176	29	205	111	123
Chromium, Cr (ppm)	1283	1241	1324	1200	1366	1158	1407	1219	1347
Cobalt, Co (ppm)	1215	1185	1246	1154	1276	1124	1307	1154	1276
Copper, Cu (ppm)	2974	2847	3100	2721	3227	2594	3353	2825	3123
Iron, Fe (wt.%)	24.6	23.8	25.4	22.9	26.3	22.1	27.1	23.4	25.8
Magnesium oxide, MgO (wt.%)	16.5	16.1	16.9	15.7	17.3	15.3	17.7	15.7	17.3
Nickel, Ni (wt.%)	7.40	7.14	7.66	6.88	7.92	6.63	8.18	7.03	7.77
Silicon dioxide, SiO <sub>2</sub> (wt.%)	21.7	21.3	22.2	20.8	22.7	20.3	23.1	20.7	22.8
Sulphur, S (wt.%)	17.7	17.2	18.2	16.7	18.7	16.1	19.2	16.8	18.6
<b>IR Combustion</b>									
Sulphur, S (wt.%)	18.0	17.4	18.6	16.7	19.2	16.1	19.8	17.1	18.9

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

## 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 nickel sulphide ore reference material OREAS 76a has been prepared and certified and is supplied by:

Ore Research & Exploration Pty Ltd  
37A Hosie Street  
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 76a 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 76a 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 76a 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 (~0.55 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 76a**

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 76a (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	57	46	42	NR	46	42	42	37	NR	68	38	<b>43</b>	43	34	53
2	53	47	<b>49</b>	NR	45	41	44	37	NR	69	40	39	42	35	53
3	57	51	43	NR	45	38	41	37	NR	71	39	39	40	32	56
4	55	51	44	NR	45	38	43	<b>48</b>	NR	70	41	39	39	31	56
5	54	48	43	NR	47	39	41	43	NR	NR	<b>44</b>	<b>36</b>	<b>53</b>	34	53
Mean	<b>55</b>	49	44		46	40	42	40		<b>70</b>	40	39	43	33	<b>54</b>
Median	55	48	43		45	39	42	37		70	40	39	42	34	53
Std.Dev.	2	2	3		1	2	1	5		1	2	3	6	2	2
Rel.Std.Dev.	3.54%	4.74%	6.28%		1.96%	4.59%	3.09%	12.3%		1.86%	5.70%	6.70%	12.9%	4.95%	3.03%
PDM <sup>3</sup>	34.3%	18.5%	7.74%		11.2%	-3.47%	2.87%	-1.52%		69.4%	-1.52%	-4.69%	5.79%	-19.1%	32.1%

Table A3. Analytical results for palladium in OREAS 76a (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	389	413	407	NR	433	388	398	402	NR	405	<b>362</b>	383	387	424	<b>499</b>
2	387	<b>420</b>	420	NR	439	386	404	409	NR	400	346	388	399	421	566
3	393	413	419	NR	<b>429</b>	<b>394</b>	<b>387</b>	410	NR	385	348	380	391	401	566
4	391	412	407	NR	439	385	400	406	NR	382	349	380	366	402	566
5	388	<b>426</b>	428	NR	441	385	398	<b>390</b>	NR	412	353	<b>359</b>	409	419	533
Mean	390	417	416		436	388	397	403		397	<b>352</b>	378	390	413	<b>546</b>
Median	389	413	419		439	386	398	406		400	349	380	391	419	566
Std.Dev.	2	6	9		5	4	6	8		13	6	11	16	11	30
Rel.Std.Dev.	0.62%	1.45%	2.18%		1.15%	1.02%	1.59%	1.98%		3.25%	1.81%	2.94%	4.10%	2.66%	5.48%
PDM <sup>3</sup>	-3.31%	3.44%	3.29%		8.26%	-3.80%	-1.37%	0.08%		-1.52%	-12.7%	-6.19%	-3.11%	2.60%	35.5%

Table A4. Analytical results for platinum in OREAS 76a (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	717	<b>709</b>	774	NR	706	739	654	584	NR	735	<b>571</b>	662	691	672	<b>792</b>
2	701	728	795	NR	701	724	652	601	NR	757	674	673	706	668	759
3	709	729	794	NR	683	778	631	593	NR	688	659	661	702	666	733
4	715	<b>748</b>	776	NR	681	743	647	695	NR	710	664	667	<b>643</b>	<b>651</b>	733
5	701	723	794	NR	691	703	644	697	NR	750	670	<b>627</b>	742	668	733
Mean	709	727	787		692	737	646	634		728	648	658	697	665	750
Median	709	728	794		691	739	647	601		735	664	662	702	668	733
Std.Dev.	8	14	11		11	27	9	57		29	43	18	36	8	26
Rel.Std.Dev.	1.08%	1.93%	1.35%		1.58%	3.73%	1.41%	8.97%		3.94%	6.67%	2.73%	5.12%	1.22%	3.47%
PDM <sup>3</sup>	1.10%	3.80%	12.2%		-1.19%	5.23%	-7.87%	-9.53%		3.89%	-7.59%	-6.10%	-0.57%	-5.10%	7.03%

Table A5. Analytical results for 4 acid aluminium oxide in OREAS 76a (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	1.81	1.70	1.74	1.76	1.83	1.66	1.78	0.82	1.62	NR	NR	NR	1.52	1.88	1.66
2	1.80	1.74	1.70	1.78	1.80	1.66	1.80	0.82	1.63	NR	NR	NR	1.52	1.90	1.71
3	1.80	1.70	1.70	1.72	<b>1.78</b>	1.66	1.77	0.82	1.60	NR	NR	NR	1.43	<b>1.83</b>	1.67
4	1.78	1.66	1.70	1.70	1.84	1.66	1.79	0.84	1.62	NR	NR	NR	1.44	1.88	1.68
5	1.83	1.68	1.68	1.74	1.84	1.66	1.76	0.82	1.60	NR	NR	NR	1.45	1.87	1.68
Mean	1.80	1.70	1.70	1.74	1.82	1.66	1.78	<b>0.82</b>	1.61				1.47	1.87	1.68
Median	1.80	1.70	1.70	1.74	1.83	1.66	1.78	0.82	1.62				1.45	1.88	1.68
Std.Dev.	0.02	0.03	0.02	0.03	0.03	0.00	0.02	0.01	0.01				0.04	0.03	0.02
Rel.Std.Dev.	1.03%	1.78%	1.21%	1.82%	1.48%	0.00%	0.89%	1.09%	0.83%				2.95%	1.38%	1.18%
PDM <sup>3</sup>	5.14%	-1.11%	-0.62%	1.46%	6.01%	-3.04%	3.80%	-52.0%	-5.88%				-14.1%	9.16%	-1.98%

Table A6. Analytical results for 4 acid arsenic in OREAS 76a (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	120	107	110	100	110	<200	112	110	110	98	NR	NR	110	102	103
2	110	109	110	100	90	<200	114	110	105	99	NR	NR	120	102	100
3	110	105	110	90	80	<200	112	110	110	93	NR	NR	120	104	108
4	120	104	120	100	90	<200	110	110	115	88	NR	NR	120	102	101
5	120	106	130	110	90	<200	113	112	105	95	NR	NR	120	102	106
Mean	116	106	116	100	92	<200	112	110	109	95			118	102	104
Median	120	106	110	100	90	<200	112	110	110	95			120	102	103
Std.Dev.	5	2	9	7	11	-	1	1	4	4			4	1	3
Rel.Std.Dev.	4.72%	1.81%	7.71%	7.07%	11.9%	-	1.32%	0.81%	3.84%	4.64%			3.79%	0.87%	3.24%
PDM <sup>3</sup>	8.72%	-0.47%	8.72%	-6.28%	-13.8%	-	5.15%	3.47%	2.16%	-11.3%			10.6%	-4.03%	-2.91%

Table A7. Analytical results for 4 acid chromium in OREAS 76a (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	675	841	750	1000	950	670	1010	NR	770	NR	NR	NR	1180	939	NR
2	708	786	<b>1040</b>	1040	1090	640	1130	NR	780	NR	NR	NR	1220	921	NR
3	655	792	540	900	1160	680	1020	NR	780	NR	NR	NR	<b>620</b>	960	NR
4	630	814	510	880	990	650	1110	NR	750	NR	NR	NR	<b>830</b>	973	NR
5	660	<b>979</b>	620	920	1220	660	920	NR	790	NR	NR	NR	1150	974	NR
Mean	666	842	692	948	1082	660	1038		774				1000	953	
Median	660	814	620	920	1090	660	1020		780				1150	960	
Std.Dev.	29	79	216	69	113	16	85		15				263	23	
Rel.Std.Dev.	4.29%	9.42%	31.2%	7.25%	10.4%	2.40%	8.16%		1.96%				26.3%	2.41%	
PDM <sup>3</sup>	-23.7%	-3.37%	-20.6%	8.75%	24.1%	-24.3%	19.1%		-11.2%				14.7%	9.37%	

Table A8. Analytical results for 4 acid cobalt in OREAS 76a (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	<b>1170</b>	1168	1240	1120	1200	1210	1200	1200	1190	1054	NR	1242	1180	1264	1240
2	1145	<b>1194</b>	1200	1140	1160	1210	1190	1210	1180	1063	NR	1274	1240	1243	1230
3	1150	1161	1220	1080	1070	1220	1150	1210	1180	1048	NR	1245	1220	1239	1230
4	1140	1138	1190	1070	1120	1240	1140	1200	1170	1035	NR	1263	1200	1212	1240
5	1150	1158	1220	1100	1190	1240	1190	1190	1190	<b>1090</b>	NR	1272	1180	1262	1200
Mean	1151	1164	1214	1102	1148	1224	1174	1202	1182	<b>1058</b>		1259	1204	1244	1228
Median	1150	1161	1220	1100	1160	1220	1190	1200	1180	1054		1263	1200	1243	1230
Std.Dev.	11	20	19	29	54	15	27	8	8	21		15	26	21	16
Rel.Std.Dev.	0.99%	1.74%	1.61%	2.60%	4.67%	1.24%	2.30%	0.70%	0.71%	1.95%		1.19%	2.17%	1.69%	1.34%
PDM <sup>3</sup>	-3.36%	-2.29%	1.93%	-7.48%	-3.61%	2.77%	-1.43%	0.92%	-0.76%	-11.2%		5.72%	1.09%	4.45%	3.10%

Table A9. Analytical results for 4 acid copper in OREAS 76a (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	2760	2874	2920	2810	3010	2830	2830	1980	2900	2808	NR	<b>2835</b>	2940	2987	2770
2	2785	2894	2860	2850	2870	2840	2860	1980	<b>2860</b>	2750	NR	2915	2960	2964	2790
3	2810	2845	2880	2710	2720	2850	2830	1990	2900	2711	NR	2900	2940	2857	2800
4	2780	2775	2860	2710	2770	2880	2820	1970	2930	2726	NR	2883	2920	2872	2760
5	<b>2880</b>	2813	2880	2780	2960	2890	2820	1960	2890	2777	NR	2910	<b>2840</b>	2904	2770
Mean	2803	2840	2880	2772	2866	2858	2832	<b>1976</b>	2896	2754		2889	2920	2917	2778
Median	2785	2845	2880	2780	2870	2850	2830	1980	2900	2750		2900	2940	2904	2770
Std.Dev.	47	48	24	62	123	26	16	11	25	39		32	47	57	16
Rel.Std.Dev.	1.66%	1.67%	0.85%	2.23%	4.28%	0.91%	0.58%	0.58%	0.87%	1.42%		1.12%	1.61%	1.95%	0.59%
PDM <sup>3</sup>	-1.59%	-0.29%	1.11%	-2.68%	0.62%	0.34%	-0.57%	-30.6%	1.67%	-3.30%		1.41%	2.52%	2.40%	-2.47%

Table A10. Analytical results for 4 acid iron in OREAS 76a (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	24.4	25.9	<b>24.0</b>	23.9	26.1	25.8	24.8	23.1	26.2	NR	NR	NR	<b>24.1</b>	26.1	26.6
2	24.5	26.0	23.5	24.2	25.0	25.4	24.9	23.4	26.3	NR	NR	NR	25.3	27.0	<b>25.9</b>
3	24.5	25.5	23.6	23.2	24.8	25.8	24.8	23.4	26.2	NR	NR	NR	25.3	26.7	26.5
4	24.3	25.0	23.5	23.1	24.4	25.9	24.7	23.1	26.4	NR	NR	NR	25.4	26.2	26.4
5	<b>23.9</b>	25.4	23.6	23.6	25.6	25.9	24.6	23.0	26.1	NR	NR	NR	<b>24.5</b>	26.6	26.5
Mean	24.3	25.6	23.6	23.6	25.2	25.7	24.8	23.2	26.2				24.9	26.5	26.4
Median	24.4	25.5	23.6	23.6	25.0	25.8	24.8	23.1	26.2				25.3	26.6	26.5
Std.Dev.	0.2	0.4	0.2	0.5	0.7	0.2	0.1	0.2	0.1				0.6	0.4	0.3
Rel.Std.Dev.	0.99%	1.63%	0.88%	1.96%	2.67%	0.77%	0.46%	0.81%	0.43%				2.27%	1.50%	1.05%
PDM <sup>3</sup>	-2.95%	2.02%	-5.62%	-5.78%	0.53%	2.79%	-1.15%	-7.38%	4.76%				-0.47%	5.83%	5.32%



Table A11. Analytical results for 4 acid magnesium oxide in OREAS 76a (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	17.4	16.6	<b>15.9</b>	15.8	16.7	17.4	17.4	18.1	16.8	NR	NR	NR	<b>17.7</b>	16.2	16.0
2	17.2	16.7	15.3	16.0	15.8	17.5	17.6	17.7	16.4	NR	NR	NR	16.3	16.3	16.1
3	16.9	16.5	15.5	15.5	16.0	17.6	17.6	17.7	16.2	NR	NR	NR	16.5	<b>16.5</b>	16.2
4	16.9	16.1	15.6	15.3	16.6	17.6	17.9	17.5	16.2	NR	NR	NR	16.8	16.3	16.2
5	17.6	16.2	15.4	15.7	16.2	17.4	17.4	18.6	16.7	NR	NR	NR	16.0	16.3	16.0
Mean	17.2	16.4	15.5	15.6	16.2	17.5	17.6	17.9	16.5				16.6	16.3	16.1
Median	17.2	16.5	15.5	15.7	16.2	17.5	17.6	17.7	16.4				16.5	16.3	16.1
Std.Dev.	0.31	0.25	0.21	0.28	0.40	0.10	0.20	0.41	0.28				0.65	0.12	0.09
Rel.Std.Dev.	1.79%	1.52%	1.33%	1.77%	2.44%	0.57%	1.17%	2.27%	1.70%				3.93%	0.72%	0.55%
PDM <sup>3</sup>	3.63%	-1.14%	-6.32%	-5.77%	-2.16%	5.47%	5.92%	8.03%	-0.83%				0.30%	-1.75%	-2.98%

Table A12. Analytical results for 4 acid nickel in OREAS 76a (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	7.25	7.18	7.52	6.96	7.19	7.14	7.21	7.61	7.35	7.47	NR	<b>7.24</b>	<b>6.75</b>	7.54	7.67
2	7.23	7.42	7.40	7.04	7.15	7.12	7.22	7.60	7.36	7.21	NR	7.45	7.05	7.54	7.54
3	7.22	7.28	7.44	6.69	6.84	7.30	7.19	7.61	7.40	7.12	NR	7.41	7.03	7.39	7.45
4	7.23	7.19	<b>7.24</b>	6.70	6.87	7.44	7.28	7.50	7.35	7.00	NR	7.39	7.09	7.34	7.64
5	<b>7.14</b>	7.30	7.36	7.03	7.27	7.38	<b>6.98</b>	7.50	7.35	7.30	NR	7.44	6.83	7.70	7.55
Mean	7.21	7.27	7.39	6.88	7.06	7.28	7.18	7.56	7.36	7.22		7.38	6.95	7.50	7.57
Median	7.23	7.28	7.40	6.96	7.15	7.30	7.21	7.60	7.35	7.21		7.41	7.03	7.54	7.55
Std.Dev.	0.04	0.10	0.10	0.18	0.20	0.14	0.11	0.06	0.02	0.18		0.09	0.15	0.14	0.09
Rel.Std.Dev.	0.59%	1.35%	1.40%	2.55%	2.77%	1.97%	1.60%	0.77%	0.29%	2.47%		1.16%	2.16%	1.90%	1.16%
PDM <sup>3</sup>	-1.02%	-0.20%	1.44%	-5.53%	-3.06%	-0.15%	-1.53%	3.80%	1.03%	-0.93%		1.34%	-4.63%	2.95%	3.88%

Table A13. Analytical results for 4 acid sulphur in OREAS 76a (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	17.5	16.6	18.5	15.3	19.6	16.0	NR	13.5	16.8	NR	NR	<b>17.9</b>	20.1	NR	NR
2	17.5	16.7	18.1	15.5	18.7	16.3	NR	13.3	16.7	NR	NR	18.8	21.5	NR	NR
3	18.0	16.0	18.4	14.8	18.4	15.6	NR	13.3	16.9	NR	NR	18.8	21.1	NR	NR
4	17.3	15.6	18.5	14.9	18.2	15.7	NR	<b>13.7</b>	17.0	NR	NR	18.9	21.4	NR	NR
5	17.3	16.2	18.5	15.0	19.2	16.0	NR	13.2	16.6	NR	NR	18.8	21.0	NR	NR
Mean	17.5	16.2	18.4	15.1	18.8	15.9		13.4	16.8			18.6	21.0		
Median	17.5	16.2	18.5	15.0	18.7	16.0		13.3	16.8			18.8	21.1		
Std.Dev.	0.29	0.44	0.17	0.29	0.59	0.27		0.20	0.16			0.43	0.55		
Rel.Std.Dev.	1.63%	2.71%	0.94%	1.94%	3.15%	1.71%		1.49%	0.94%			2.32%	2.64%		
PDM <sup>3</sup>	1.91%	-5.65%	7.03%	-12.3%	9.36%	-7.30%		-22.1%	-2.28%			8.30%	22.3%		

Table A14. Analytical results for fusion aluminium oxide in OREAS 76a (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	1.85	1.78	1.78	<b>1.79</b>	1.64	1.82	1.70	1.70	1.61	1.70	1.57	1.77	1.78	1.81	1.90
2	1.86	1.76	1.72	1.95	1.64	1.81	1.70	1.73	1.59	1.80	1.57	1.77	1.76	1.93	1.88
3	1.84	1.74	1.70	1.94	1.67	1.81	1.90	1.73	1.61	1.70	1.57	1.76	<b>1.82</b>	1.85	<b>2.01</b>
4	1.84	1.78	1.78	1.95	1.68	<b>1.84</b>	1.70	1.72	1.60	1.80	1.57	1.74	1.79	1.87	1.92
5	1.87	1.72	1.75	<b>1.87</b>	1.69	<b>1.79</b>	1.90	1.72	1.62	1.80	1.57	1.75	1.77	<b>1.70</b>	1.94
Mean	1.85	1.75	1.75	1.90	1.66	1.81	1.78	1.72	1.61	1.76	<b>1.57</b>	1.76	1.78	1.83	1.93
Median	1.85	1.76	1.75	1.94	1.67	1.81	1.70	1.72	1.61	1.80	1.57	1.76	1.78	1.85	1.92
Std.Dev.	0.01	0.02	0.04	0.07	0.02	0.02	0.11	0.01	0.01	0.05	0.00	0.01	0.02	0.09	0.05
Rel.Std.Dev.	0.62%	1.41%	2.05%	3.68%	1.38%	0.99%	6.15%	0.71%	0.71%	3.11%	0.00%	0.57%	1.29%	4.67%	2.59%
PDM <sup>3</sup>	3.88%	-1.60%	-2.01%	6.63%	-6.62%	1.75%	-0.11%	-3.47%	-9.87%	-1.23%	-12.0%	-1.36%	0.12%	2.81%	8.31%

Table A15. Analytical results for fusion arsenic in OREAS 76a (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	130	100	200	<b>300</b>	120	44	120	NR	NR	NR	103	101	NR	98	102
2	130	200	200	100	130	26	130	NR	NR	NR	103	100	NR	96	85
3	120	100	200	200	120	42	110	NR	NR	NR	101	100	NR	98	93
4	130	200	200	200	120	63	110	NR	NR	NR	101	102	NR	98	95
5	120	100	200	100	130	20	110	NR	NR	NR	101	103	NR	96	102
Mean	126	140	<b>200</b>	180	124	<b>39</b>	116				102	101		97	95
Median	130	100	200	200	120	42	110				101	101		98	95
Std.Dev.	5	55	0	84	5	17	9				1	1		1	7
Rel.Std.Dev.	4.35%	39.1%	0.00%	46.5%	4.42%	43.3%	7.71%				1.08%	1.13%		1.13%	7.43%
PDM <sup>3</sup>	7.84%	19.8%	71.2%	54.1%	6.13%	-66.7%	-0.72%				-12.9%	-13.4%		-16.8%	-18.3%

Table A16. Analytical results for fusion chromium in OREAS 76a (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	1300	1287	1300	1300	1270	1245	1320	1300	1260	NR	1100	1256	1210	1280	1300
2	1290	1286	1200	1300	1305	1252	1290	1300	<b>1200</b>	NR	1100	1254	1130	1259	1200
3	1280	1322	1300	1300	1325	1266	<b>1470</b>	1300	1230	NR	1200	1247	1160	1278	1200
4	1260	1323	1300	1300	1335	1238	1310	1200	1250	NR	1100	<b>1224</b>	1170	1251	1400
5	1325	1292	1300	1400	1295	1232	1350	1300	1260	NR	1100	1248	<b>1340</b>	1296	<b>1700</b>
Mean	1291	1302	1280	1320	1306	1247	1348	1280	1240		<b>1120</b>	1246	<b>1202</b>	1273	1360
Median	1290	1292	1300	1300	1305	1245	1320	1300	1250		1100	1248	1170	1278	1300
Std.Dev.	24	19	45	45	26	13	72	45	25		45	13	82	18	207
Rel.Std.Dev.	1.87%	1.45%	3.49%	3.39%	1.96%	1.06%	5.31%	3.49%	2.06%		3.99%	1.03%	6.85%	1.41%	15.2%
PDM <sup>3</sup>	0.65%	1.51%	-0.21%	2.91%	1.82%	-2.81%	5.09%	-0.21%	-3.33%		-12.7%	-2.88%	-6.29%	-0.77%	6.03%

Table A17. Analytical results for fusion cobalt in OREAS 76a (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	1200	<b>1231</b>	1210	1200	1050	1214	1200	1300	NR	NR	1211	NR	1310	1274	1200
2	1210	1220	1160	1200	1030	1201	1200	1200	NR	NR	<b>1231</b>	NR	1280	1268	1000
3	1220	1216	1190	1200	990	1236	<b>1360</b>	1200	NR	NR	1206	NR	1270	<b>1286</b>	1100
4	1230	1218	1230	1300	980	1223	1240	1200	NR	NR	1205	NR	1310	1266	1100
5	1185	<b>1188</b>	1230	1300	1030	1177	1220	1200	NR	NR	1201	NR	1300	1264	1100
Mean	1209	1215	1204	1240	<b>1016</b>	1210	1244	1220			1211		<b>1294</b>	<b>1272</b>	<b>1100</b>
Median	1210	1218	1210	1200	1030	1214	1220	1200			1206		1300	1268	1100
Std.Dev.	17	16	30	55	30	23	67	45			12		18	9	71
Rel.Std.Dev.	1.44%	1.31%	2.46%	4.42%	2.92%	1.86%	5.38%	3.67%			0.98%		1.40%	0.70%	6.43%
PDM <sup>3</sup>	-0.51%	-0.05%	-0.93%	2.04%	-16.4%	-0.42%	2.37%	0.39%			-0.37%		6.48%	4.64%	-9.48%

Table A18. Analytical results for fusion copper in OREAS 76a (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	2880	2911	2950	3000	2810	1993	3030	3000	NR	NR	3133	NR	2000	2942	NR
2	2910	2919	2870	3200	2830	1811	2960	3000	NR	NR	<b>3190</b>	NR	2140	2940	NR
3	2930	2886	2830	3300	<b>2710</b>	2013	<b>3350</b>	3000	NR	NR	<b>3102</b>	NR	2320	2864	NR
4	2930	2878	2970	3300	2790	1905	3020	3000	NR	NR	3130	NR	2110	2857	NR
5	<b>2805</b>	2892	2930	3200	2870	1607	<b>3330</b>	2900	NR	NR	3134	NR	2050	2918	NR
Mean	2891	2897	2910	3200	2802	<b>1866</b>	3138	2980			3138		<b>2124</b>	2904	
Median	2910	2892	2930	3200	2810	1905	3030	3000			3133		2110	2918	
Std.Dev.	52	17	58	122	59	165	186	45			32		122	41	
Rel.Std.Dev.	1.81%	0.59%	2.00%	3.83%	2.12%	8.86%	5.94%	1.50%			1.02%		5.75%	1.41%	
PDM <sup>3</sup>	-2.79%	-2.58%	-2.15%	7.60%	-5.78%	-37.3%	5.52%	0.21%			5.51%		-28.6%	-2.34%	

Table A19. Analytical results for fusion iron in OREAS 76a (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	24.1	24.9	24.6	<b>25.9</b>	23.6	24.3	22.7	25.1	25.9	24.2	23.9	<b>24.5</b>	24.3	26.1	26.0
2	24.0	25.1	23.7	27.2	23.7	24.3	23.4	25.1	26.2	24.6	23.9	24.4	24.3	26.8	25.2
3	24.3	25.1	23.9	28.0	23.4	24.6	27.0	25.1	25.8	23.6	24.0	24.3	24.5	26.1	25.8
4	24.3	24.7	24.9	27.7	23.5	24.5	24.1	25.3	26.2	23.9	<b>23.2</b>	24.3	24.5	26.7	26.0
5	23.8	24.9	24.4	27.8	23.8	24.8	25.4	24.6	26.0	24.6	24.0	24.3	24.6	26.3	25.8
Mean	24.1	24.9	24.3	<b>27.3</b>	23.6	24.5	24.5	25.0	26.0	24.2	23.8	24.3	24.4	<b>26.4</b>	25.8
Median	24.1	24.9	24.4	27.7	23.6	24.5	24.1	25.1	26.0	24.2	23.9	24.3	24.5	26.3	25.8
Std.Dev.	0.2	0.2	0.5	0.8	0.2	0.2	1.7	0.3	0.2	0.4	0.3	0.1	0.1	0.3	0.3
Rel.Std.Dev.	0.88%	0.62%	2.04%	3.10%	0.67%	0.79%	6.97%	1.04%	0.69%	1.64%	1.42%	0.29%	0.55%	1.22%	1.28%
PDM <sup>3</sup>	-1.98%	1.47%	-1.17%	11.1%	-4.02%	-0.41%	-0.27%	1.84%	5.83%	-1.69%	-3.26%	-0.99%	-0.60%	7.40%	4.77%

Table A20. Analytical results for fusion magnesium oxide in OREAS 76a (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	16.5	16.4	16.0	<b>17.1</b>	15.8	17.0	16.4	16.3	16.4	16.7	15.9	16.5	16.6	16.1	18.2
2	16.7	16.7	15.4	17.8	15.6	16.9	16.7	16.3	16.3	17.0	16.3	16.5	16.5	16.3	<b>17.8</b>
3	16.3	16.7	15.2	18.2	16.0	16.8	<b>18.0</b>	16.4	16.6	17.7	<b>16.7</b>	16.5	16.6	16.6	18.4
4	16.4	16.4	15.9	18.0	16.2	16.7	16.1	16.1	16.2	17.6	15.9	<b>16.2</b>	16.6	16.7	18.5
5	17.1	16.4	15.7	18.0	15.9	16.7	17.2	16.5	16.3	17.0	15.9	16.4	16.6	16.4	18.4
Mean	16.6	16.5	<b>15.6</b>	<b>17.8</b>	15.9	16.8	16.9	16.3	16.4	17.2	16.1	16.4	16.6	16.4	<b>18.3</b>
Median	16.5	16.4	15.7	18.0	15.9	16.8	16.7	16.3	16.3	17.0	15.9	16.5	16.6	16.4	18.4
Std.Dev.	0.3	0.2	0.3	0.4	0.2	0.1	0.7	0.1	0.2	0.4	0.4	0.1	0.1	0.3	0.3
Rel.Std.Dev.	1.79%	0.95%	2.10%	2.34%	1.30%	0.70%	4.42%	0.82%	0.93%	2.50%	2.18%	0.75%	0.39%	1.59%	1.53%
PDM <sup>3</sup>	0.68%	0.34%	-5.33%	8.08%	-3.57%	1.95%	2.44%	-0.98%	-0.72%	4.38%	-2.05%	-0.38%	0.56%	-0.39%	10.8%

Table A21. Analytical results for fusion nickel in OREAS 76a (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	7.35	7.42	7.52	6.96	7.10	7.53	NR	7.81	NR	NR	6.95	NR	7.01	7.54	7.71
2	7.36	7.44	7.25	7.04	7.14	7.55	NR	7.62	NR	NR	6.96	NR	6.99	7.37	<b>7.44</b>
3	7.46	7.46	7.36	6.69	6.99	7.54	NR	7.64	NR	NR	6.89	NR	7.61	7.40	7.69
4	7.48	7.35	7.62	6.70	<b>6.91</b>	7.55	NR	7.69	NR	NR	6.77	NR	7.38	7.54	7.73
5	7.24	7.36	7.50	7.03	7.14	<b>7.61</b>	NR	<b>7.39</b>	NR	NR	7.12	NR	7.55	7.70	7.71
Mean	7.38	7.41	7.45	<b>6.88</b>	7.06	7.55		7.63			6.94		7.31	7.51	7.66
Median	7.36	7.42	7.50	6.96	7.10	7.55		7.64			6.95		7.38	7.54	7.71
Std.Dev.	0.10	0.05	0.15	0.18	0.10	0.03		0.15			0.13		0.29	0.13	0.12
Rel.Std.Dev.	1.33%	0.67%	1.95%	2.55%	1.45%	0.43%		2.01%			1.83%		4.02%	1.76%	1.59%
PDM <sup>3</sup>	-0.34%	0.04%	0.65%	-7.00%	-4.68%	2.06%		3.08%			-6.27%		-1.27%	1.46%	3.43%

Table A22. Analytical results for silicon dioxide in OREAS 76a (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	21.7	21.6	22.3	22.4	20.4	21.9	19.9	21.8	22.4	21.8	NR	21.8	21.5	20.9	23.0
2	21.7	22.0	21.7	23.1	20.5	22.0	19.7	21.7	21.8	22.2	NR	21.8	21.3	20.9	22.6
3	21.5	22.0	21.5	23.9	21.0	21.8	22.5	21.7	22.4	22.7	NR	21.7	21.8	20.8	23.2
4	21.4	21.8	22.6	23.6	21.0	21.9	20.0	<b>21.4</b>	21.6	22.6	NR	21.4	21.6	20.7	23.2
5	22.1	21.8	22.2	21.9	20.7	<b>21.5</b>	21.7	21.6	21.9	22.2	NR	21.6	21.5	20.5	23.0
Mean	21.7	21.9	22.1	<b>23.0</b>	<b>20.7</b>	21.8	<b>20.8</b>	21.6	22.0	22.3		21.7	21.5	20.8	<b>23.0</b>
Median	21.7	21.8	22.2	23.1	20.7	21.9	20.0	21.7	21.9	22.2		21.7	21.5	20.8	23.0
Std.Dev.	0.3	0.2	0.5	0.8	0.3	0.2	1.3	0.1	0.4	0.4		0.2	0.2	0.2	0.2
Rel.Std.Dev.	1.24%	0.82%	2.04%	3.61%	1.34%	0.88%	6.07%	0.59%	1.65%	1.62%		0.84%	0.85%	0.85%	1.06%
PDM <sup>3</sup>	-0.32%	0.53%	1.43%	5.66%	-4.73%	0.42%	-4.55%	-0.49%	1.24%	2.53%		-0.45%	-1.05%	-4.43%	5.75%

Table A23. Analytical results for fusion sulphur in OREAS 76a (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	17.8	18.2	17.3	<b>19.2</b>	>6.0	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
2	17.8	18.0	16.8	20.8	>6.0	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
3	17.9	18.1	16.8	20.9	>6.0	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
4	18.0	<b>18.6</b>	17.5	21.0	>6.0	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
5	<b>17.4</b>	18.1	17.1	20.3	>6.0	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Mean	17.8	18.2	17.1	<b>20.4</b>	>6.0										
Median	17.8	18.1	17.1	20.8	>6.0										
Std.Dev.	0.2	0.2	0.3	0.7	-										
Rel.Std.Dev.	1.28%	1.29%	1.95%	3.64%	-										
PDM <sup>3</sup>	0.57%	2.93%	-3.45%	15.6%	-										

Table A24. Analytical results for sulphur by LECO in OREAS 76a (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	17.5	19.1	17.8	17.6	18.7	17.4	17.7	19.8	NR	18.8	17.8	18.0	18.7	16.9	18.2
2	17.7	18.7	19.5	17.5	18.4	17.7	17.7	20.0	NR	17.3	<b>17.3</b>	17.6	18.4	16.9	18.1
3	18.4	19.3	19.0	<b>17.9</b>	18.2	17.7	17.5	19.6	NR	17.9	18.3	17.9	18.6	<b>16.7</b>	18.2
4	17.9	18.9	18.5	17.2	18.1	18.0	17.2	<b>20.6</b>	NR	17.5	17.9	17.8	18.3	<b>17.0</b>	18.2
5	17.7	18.9	18.2	17.4	18.8	17.4	17.7	19.5	NR	17.0	18.0	18.3	18.2	16.8	18.0
Mean	17.8	19.0	18.6	17.5	18.4	17.6	17.6	<b>19.9</b>		17.7	17.8	17.9	18.4	16.9	18.1
Median	17.7	18.9	18.5	17.5	18.4	17.7	17.7	19.8		17.5	17.9	17.9	18.4	16.9	18.2
Std.Dev.	0.3	0.2	0.6	0.3	0.3	0.2	0.2	0.4		0.7	0.4	0.3	0.2	0.1	0.1
Rel.Std.Dev.	1.93%	1.20%	3.46%	1.48%	1.73%	1.38%	1.25%	2.19%		3.93%	1.99%	1.60%	1.07%	0.51%	0.49%
PDM <sup>3</sup>	-0.65%	5.70%	3.47%	-2.71%	2.53%	-1.86%	-2.21%	10.83%		-1.43%	-0.62%	-0.15%	2.74%	-6.15%	1.02%