CERTIFICATE OF ANALYSIS FOR

BARREN SILTSTONE REFERENCE
MATERIAL OREAS 90

SUMMARY STATISTICS OREAS 90

Constituent	Recommended value	95% Confidence Interval		Tolerance limits 1-α=0.99, ρ=0.95	
		Low	High	Low	High
4 Acid					
Silver, Ag (ppm)	<0.4	IND	IND	IND	IND
Bismuth, Bi (ppm)	0.87	0.82	0.92	0.80	0.94
Cobalt, Co (ppm)	15.9	15.3	16.5	15.5	16.4
Copper, Cu (ppm)	112	109	115	109	115
Lead, Pb (ppm)	6.59	6.29	6.89	6.03	7.15
Sulphur, S (ppm)	715	673	757	668	761
Antimony, Sb (ppm)	0.86	0.82	0.89	0.79	0.93
Selenium, Se (ppm)	1.32	0.81	1.82	1.19	1.44
Tin, Sn (ppm)	7.83	7.51	8.15	7.51	8.15
Zinc, Zn (ppm)	67.8	63.4	72.3	64.7	71.0
Aqua Regia					
Silver, Ag (ppm)	0.06	0.04	0.07	0.04	0.07
Bismuth, Bi (ppm)	0.92	0.84	1.01	0.86	0.99
Cobalt, Co (ppm)	15.3	14.5	16.1	14.9	15.7
Copper, Cu (ppm)	110	106	114	107	112
Lead, Pb (ppm)	5.50	5.09	5.91	4.58	6.42
Sulphur, S (ppm)	699	667	732	677	722
Antimony, Sb (ppm)	0.45	0.38	0.51	0.41	0.49
Selenium, Se (ppm)	0.83	0.69	0.96	0.75	0.90
Tin, Sn (ppm)	1.50	1.32	1.68	1.47	1.54
Zinc, Zn (ppm)	58.5	56.4	60.6	57.3	59.6

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

Prepared by:
Ore Research & Exploration Pty Ltd
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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 90 is one of a suite of nine copper CRMs (OREAS 90 to OREAS 98) prepared from material from the CSA mine located near the town Cobar in central western New South Wales, Australia. The copper ore body is hosted by the Early Devonian CSA Siltstone, a thinly bedded turbiditic sequence of carbonaceous siltstones and mudstones with minor coarser units. The CSA Siltstone is part of the Cobar Supergroup, consisting of lower syn-rift sediments and upper post-rift sag phase sediments. The mineralisation is structurally controlled and confined to a number of steeply dipping bodies within a major shear zone on the eastern margin of the Early Devonian Cobar Basin. It is characterised by low-grade greenschist alteration and epigenetic low-grade mineralisation enveloping higher-grade shoots of vein complexes or sub-massive to massive sulphides. The sulphides include chalcopyrite, pyrrhotite, pyrite, sphalerite, galena, bornite and cubanite. Iron-rich chlorite and silica are prominent alterations in the siltstone host.

Table 1. Indicative (uncertified) major and trace element composition of OREAS 90 (values are means of duplicate determinations; SiO_2 to C in wt.%, As to Zr in ppm).

Constituent	Mean value	Constituent	Mean value	Constituent	Mean value
SiO_2	65.6	As	7	Ni	92
Al_2O_3	15.7	Ba	459	Pr	10.6
CaO	0.70	Be	2.7	Rb	201
Fe_2O_3	6.6	Cd	<0.5	Re	<0.1
K_2O	3.8	Ce	93	Sb	0.8
MgO	3.0	Cs	6.9	Sc	13
Na_2O	0.68	Dy	5.4	Sm	7.3
P_2O_5	0.16	Er	3.0	Sr	31.3
SO_3	0.19	Eu	1.4	Ta	0.95
TiO_2	0.75	Ga	13.3	Tb	0.91
MnO	0.09	Gd	6	Te	<0.2
LOI	3.1	Hf	3.5	Th	14.4
		Ho	1.1	Tl	1.05
C	0.09	In	0.13	Tm	0.42
		La	45	U	3.2
		Li	23.5	W	2.5
		Lu	0.39	Y	27.1
		Mo	<0.5	Yb	2.9
		Nb	13.5	Zr	117
		Nd	38		

The approximate major and trace element composition of OREAS 90 has been determined by various total methods. These values, presented in Table 1, are based on the means of duplicate determinations at one laboratory and are uncertified. The constituents SiO_2 to MnO (excluding Na_2O) have been determined by borate fusion X-ray fluorescence analysis, LOI by thermo-gravimetric analysis, C by total combustion analysis, Na_2O, Co, Ni and Sc by 4-acid ICPOES and the remaining trace constituents by 4-acid ICP-MS.

COMMINUTION AND HOMOGENISATION PROCEDURES

The material constituting OREAS 90 was prepared in the following manner:

- a) *drying to constant mass at 105⁰ C;*
- b) *crushing;*
- c) *milling to minus 75 microns;*
- d) *homogenisation;*
- e) *packaging into 10g lots in laminated foil pouches.*

ANALYTICAL PROGRAM FOR OREAS 90

Sixteen commercial laboratories participated in the analytical program to certify Ag, Bi, Co, Cu, Pb, S, Sb, Se, Sn and Zn 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[3]) are presented in an appendix (Tables A2 – A21). 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.

The intent of the certification program was to characterise the analytes by a) total methods (mainly HF-HCl-HNO_3-$HClO_4$ digest ICP-OES and ICP-MS), and b) aqua regia digest ICP-OES, ICP-MS or AAS. 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 10g 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 90

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

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

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

where

> x_{ij} *is the jth result reported by laboratory i;*
>
> *p is the number of participating laboratories;*
>
> n_i *is the number of results reported by laboratory i;*
>
> $\overline{x}_i$ *is the mean for laboratory i;*
>
> $\ddot{x}$ *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).

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

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

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

The distribution of the values 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

$$S = 1.483 \underset{j=1.....n}{median} / x_j - \underset{i=1.....n}{median}(x_i) /$$

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

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 90

Constituent	Recommended value	95% Confidence Interval	
		Low	High
4 Acid			
Silver, Ag (ppm)	<0.4	IND	IND
Bismuth, Bi (ppm)	0.87	0.82	0.92
Cobalt, Co (ppm)	15.9	15.3	16.5
Copper, Cu (ppm)	112	109	115
Lead, Pb (ppm)	6.59	6.29	6.89
Sulphur, S (ppm)	715	673	757
Antimony, Sb (ppm)	0.86	0.82	0.89
Selenium, Se (ppm)	1.32	0.81	1.82
Tin, Sn (ppm)	7.83	7.51	8.15
Zinc, Zn (ppm)	67.8	63.4	72.3
Aqua Regia			
Silver, Ag (ppm)	0.06	0.04	0.07
Bismuth, Bi (ppm)	0.92	0.84	1.01
Cobalt, Co (ppm)	15.3	14.5	16.1
Copper, Cu (ppm)	110	106	114
Lead, Pb (ppm)	5.50	5.09	5.91
Sulphur, S (ppm)	699	667	732
Antimony, Sb (ppm)	0.45	0.38	0.51
Selenium, Se (ppm)	0.83	0.69	0.96
Tin, Sn (ppm)	1.50	1.32	1.68
Zinc, Zn (ppm)	58.5	56.4	60.6

*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:

$$x'_{ij} = x_{ij} - \overline{x}_i + \frac{\sum_{i=1}^{p} \sum_{j=1}^{n_i} x_{ij}}{\sum_{i=1}^{p} n_i}$$

where

> x_{ij} *is the jth raw result reported by laboratory i;*
>
> x'_{ij} *is the jth 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

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

where

> *n is the number of results;*
>
> $1 - \alpha$ *is the confidence level;*
>
> *p is the proportion of results* $\exp ected\ within\ the\ tolerance\ \lim its;$
>
> k'_2 *is the factor for two* $- sided\ tolerance\ \lim its\ (m, \alpha\ unknown);$
>
> s''_g *is the corrected grand s* $\tan dard\ deviation.$

The meaning of these tolerance limits may be illustrated for copper by 4 acid digest, where 99% of the time at least 95% of subsamples will have concentrations lying between 109 and 115 ppm (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 (IS0 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:

$$s''_g = \frac{\sum\limits_{i=1}^{p}\left(s_i\left(1 - \dfrac{s_i}{s'_g}\right)\right)}{\sum\limits_{i=1}^{p}\left(1 - \dfrac{s_i}{s'_g}\right)}$$

where

> $1 - \left(\dfrac{s_i}{2s'_g}\right)$ *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:

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

where $\overline{x}'_i$ is the transformed mean for laboratory i

Table 3. Recommended values and tolerance limits for OREAS 90

Constituent	Recommended value	Tolerance limits 1-α=0.99, ρ=0.95	
		Low	High
4 Acid			
Silver, Ag (ppm)	<0.4	IND	IND
Bismuth, Bi (ppm)	0.87	0.80	0.94
Cobalt, Co (ppm)	15.9	15.5	16.4
Copper, Cu (ppm)	112	109	115
Lead, Pb (ppm)	6.59	6.03	7.15
Sulphur, S (ppm)	715	668	761
Antimony, Sb (ppm)	0.86	0.79	0.93
Selenium, Se (ppm)	1.32	1.19	1.44
Tin, Sn (ppm)	7.83	7.51	8.15
Zinc, Zn (ppm)	67.8	64.7	71.0
Aqua Regia			
Silver, Ag (ppm)	0.06	0.04	0.07
Bismuth, Bi (ppm)	0.92	0.86	0.99
Cobalt, Co (ppm)	15.3	14.9	15.7
Copper, Cu (ppm)	110	107	112
Lead, Pb (ppm)	5.50	4.58	6.42
Sulphur, S (ppm)	699	677	722
Antimony, Sb (ppm)	0.45	0.41	0.49
Selenium, Se (ppm)	0.83	0.75	0.90
Tin, Sn (ppm)	1.50	1.47	1.54
Zinc, Zn (ppm)	58.5	57.3	59.6

*IND - indeterminate; values may appear asymmetric due to rounding

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 $s_l / 2s_g' >1$ (i.e. where the weighting factor 1- $s_l / 2s_g' < 0$). 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 $s_l / 2s_g' >1$ (i.e. where the weighting factor 1- $s_l / 2s_g' < 0$).

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.

Table 4. Performance gates for OREAS 90

Constituent	Recommended value	Performance Gates							
		1σ		2σ		3σ		5%	
		Low	High	Low	High	Low	High	Low	High
4 Acid									
Silver, Ag (ppm)	<0.4	IND	IND	IND	IND	IND	IND	IND	IND
Bismuth, Bi (ppm)	0.87	0.75	0.99	0.63	1.11	0.51	1.23	0.83	0.91
Cobalt, Co (ppm)	15.9	14.9	16.9	13.9	17.9	12.9	18.9	15.1	16.7
Copper, Cu (ppm)	112	106	118	100	124	94	130	106	118
Lead, Pb (ppm)	6.59	5.93	7.25	5.26	7.91	4.60	8.58	6.26	6.92
Sulphur, S (ppm)	702	618	787	533	872	448	956	667	737
Antimony, Sb (ppm)	0.86	0.79	0.92	0.73	0.99	0.66	1.05	0.815	0.901
Selenium, Se (ppm)	1.32	0.73	1.90	0.14	2.49	0.00	3.08	1.25	1.38
Tin, Sn (ppm)	7.83	7.32	8.34	6.81	8.85	6.31	9.36	7.44	8.22
Zinc, Zn (ppm)	67.8	60.0	75.6	52.2	83.4	44.4	91.3	64.4	71.2
Aqua Regia									
Silver, Ag (ppm)	0.06	0.03	0.08	IND	IND	IND	IND	0.05	0.06
Bismuth, Bi (ppm)	0.92	0.77	1.08	0.61	1.24	0.45	1.40	0.877	0.969
Cobalt, Co (ppm)	15.3	13.8	16.8	12.3	18.4	10.7	19.9	14.6	16.1
Copper, Cu (ppm)	110	103	117	95	124	88	132	104	115
Lead, Pb (ppm)	5.50	4.71	6.29	3.92	7.08	3.14	7.87	5.23	5.78
Sulphur, S (ppm)	699	641	758	583	816	525	874	665	734
Antimony, Sb (ppm)	0.45	0.34	0.55	0.23	0.66	0.13	0.77	0.43	0.47
Selenium, Se (ppm)	0.83	0.66	0.99	0.50	1.15	0.34	1.31	0.78	0.87
Tin, Sn (ppm)	1.50	1.20	1.81	0.89	2.12	0.58	2.43	1.43	1.58
Zinc, Zn (ppm)	58.5	54.8	62.2	51.1	65.9	47.4	69.6	55.6	61.4

*IND - indeterminate; values may appear asymmetric due to rounding

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 (1σ), warning or rejection for multiple outliers (2σ), or rejection for individual outliers (3σ) in QC monitoring although their precise application should be at the discretion of the QC manager concerned.

For the second method a ±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
OMAC Laboratories, Loughrea, Co. Galway, Ireland
SGS, Don Mills, Ontario, Canada
SGS, Welshpool, WA, Australia
Ultra Trace Laboratories, Canning Vale, WA, Australia

PREPARER AND SUPPLIER OF THE REFERENCE MATERIAL

The siltstone reference material OREAS 90 has been prepared and certified and is supplied by:

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

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

INTENDED USE

OREAS 90 is a reference material intended for the following:

i)   for the calibration of instruments used in the determination of the concentration of Ag, Bi, Co, Cu, Pb, S, Sb, Se, Sn and Zn;
ii)   for the verification of analytical methods for Ag, Bi, Co, Cu, Pb, S, Sb, Se, Sn and Zn;
iii)   for the preparation of secondary reference materials of similar composition;

STABILITY AND STORAGE INSTRUCTIONS

OREAS 90 has been prepared from a barren siltstone sample. Because of its very low sulphide content and packaging in robust foil laminate it is considered to have long-term stability under normal storage conditions.

INSTRUCTIONS FOR THE CORRECT USE OF THE REFERENCE MATERIAL

The recommended values for OREAS 90 refer to the concentration levels of Ag, Bi, Co, Cu, Pb, S, Sb, Se, Sn and Zn after removal of hygroscopic moisture by drying in air to constant mass at 105^0 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

February 25, 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 90

Table A1. Explanation of abbreviations used in Tables A2 – A21.

Abbreviation	Explanation
Std.Dev.	one sigma standard deviation
Rel.Std.Dev.	one sigma relative standard deviation
PDM[3]	percent deviation of lab mean from corrected mean of means
-	outlying values shown in bold
AF	alkali fusion
BF	borate fusion
4A	four acid (HF-HNO3 -HClO4 -HCl) digestion
AR	aqua regia digest
OES	inductively coupled plasma optical emission spectrometry
MS	inductively coupled plasma mass spectrometry
AAS	atomic absorption spectrometry
Leco	Leco infrared furnace

Table A2. Analytical results for 4 acid silver in OREAS 90 (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A 4A*MS	Lab B 4A*MS	Lab C 4A*MS	Lab D 4A*MS	Lab E 4A*OES	Lab F 4A*MS	Lab G 4A*MS	Lab H 4A*MS	Lab I 4A*MS	Lab J 4A*MS	Lab K 4A*MS	Lab L 4A*MS	Lab M 4A*MS	Lab N 4A*OES	Lab O 4A*MS	Lab P -
1	<0.5	<0.1	0.06	<0.02	**0.05**	0.031	0.1	<0.05	0.25	0.32	0.05	0.16	0.5	<0.5	0.14	NR
2	<0.5	<0.1	0.04	<0.02	<0.01	0.028	0.1	<0.05	0.27	0.26	0.05	0.13	0.3	<0.5	0.13	NR
3	<0.5	<0.1	0.06	<0.02	<0.01	0.032	<0.1	<0.05	0.24	**0.17**	0.07	0.16	0.3	<0.5	0.13	NR
4	<0.5	<0.1	0.03	<0.02	<0.01	**<0.02**	<0.1	<0.05	0.23	0.34	**0.01**	**0.10**	0.2	<0.5	0.11	NR
5	<0.5	<0.1	0.04	<0.02	<0.01	0.038	<0.1	<0.05	0.24	0.31	0.05	0.17	0.2	<0.5	0.12	NR
Mean	<0.5	<0.1	0.05	<0.02	<0.01	0.03	0.10	<0.05	0.25	0.28	0.05	0.14	0.30	<0.5	0.13	
Median	<0.5	<0.1	0.04	<0.02	<0.01	0.03	0.10	<0.05	0.24	0.31	0.05	0.16	0.30	<0.5	0.13	
Std.Dev.	-	-	0.01	-	-	0.00	0.00	-	0.02	0.07	0.02	0.03	0.12	-	0.01	
Rel.Std.Dev.	-	-	29.2%	-	-	13.0%	0.00%	-	6.16%	24.2%	48.2%	20.0%	40.8%	-	9.05%	
PDM[3]	-	-	-69.7%	-	-	-78.8%	-34.2%	-	61.9%	83.4%	-68.9%	-5.22%	97.5%	-	-17.1%	

Table A3. Analytical results for 4 acid bismuth in OREAS 90 (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A 4A*MS	Lab B 4A*MS	Lab C 4A*MS	Lab D 4A*MS	Lab E 4A*OES	Lab F 4A*MS	Lab G 4A*MS	Lab H 4A*MS	Lab I 4A*MS	Lab J 4A*MS	Lab K 4A*MS	Lab L 4A*MS	Lab M 4A*MS	Lab N -	Lab O 4A*MS	Lab P -
1	0.6	0.95	0.80	0.89	1.00	0.91	0.9	0.22	0.82	0.78	0.84	1.13	1.5	NR	1.04	NR
2	0.7	0.81	1.04	0.93	0.67	1.00	0.9	**0.39**	0.80	**1.05**	0.81	1.18	1.1	NR	**0.84**	NR
3	0.8	0.96	1.14	0.73	0.77	0.93	0.9	0.25	0.85	0.81	0.78	**1.37**	1.0	NR	1.03	NR
4	1.1	0.82	0.82	1.04	0.69	0.81	0.9	0.27	0.78	0.79	0.83	1.17	1.2	NR	1.04	NR
5	1.1	0.80	0.90	0.79	0.84	0.82	0.8	0.20	0.79	0.79	0.80	1.20	1.4	NR	1.07	NR
Mean	0.86	0.87	0.94	0.88	0.79	0.89	0.88	**0.27**	0.81	0.84	0.81	**1.21**	1.24		1.00	
Median	0.80	0.82	0.90	0.89	0.77	0.91	0.90	0.25	0.80	0.79	0.81	1.18	1.20		1.04	
Std.Dev.	0.23	0.08	0.15	0.12	0.13	0.08	0.04	0.07	0.03	0.12	0.02	0.09	0.21		0.09	
Rel.Std.Dev.	26.8%	9.19%	15.6%	13.8%	16.8%	8.90%	5.08%	27.8%	3.43%	13.7%	2.95%	7.69%	16.7%		9.25%	
PDM[3]	-1.15%	-0.23%	8.05%	0.69%	-8.73%	2.76%	1.15%	-69.4%	-7.12%	-3.05%	-6.61%	39.1%	42.5%		15.4%	

Table A4. Analytical results for 4 acid cobalt in OREAS 90 (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A 4A*MS	Lab B 4A*MS	Lab C 4A*MS	Lab D 4A*MS	Lab E 4A*OES	Lab F 4A*MS	Lab G 4A*MS	Lab H 4A*MS	Lab I 4A*MS	Lab J 4A*MS	Lab K 4A*MS	Lab L 4A*MS	Lab M 4A*MS	Lab N 4A*OES	Lab O 4A*MS	Lab P -
1	16	17.5	15.5	14.5	17.4	16.4	16.9	15.9	18.5	15.5	16.0	15.0	15.2	13	15.6	NR
2	16	17.0	15.0	14.5	17.2	16.9	17.3	14.8	18.0	15.3	15.6	15.0	**14.6**	14	15.0	NR
3	16	16.7	15.4	14.4	17.2	**18.6**	17.3	**17.8**	18.0	14.7	15.4	15.3	15.1	13	15.2	NR
4	16	17.0	15.8	15.2	17.8	17.1	17.7	15.3	17.5	15.1	16.2	15.0	**16.5**	14	14.5	NR
5	16	17.0	16.5	15.0	17.8	17.2	17.5	15.7	18.0	14.7	15.3	15.5	15.2	13	15.3	NR
Mean	16.0	17.0	15.6	14.7	17.5	17.2	17.3	15.9	**18.0**	15.1	15.7	15.2	15.3	**13.4**	15.1	
Median	16.0	17.0	15.5	14.5	17.4	17.1	17.3	15.7	18.0	15.1	15.6	15.0	15.2	13.0	15.2	
Std.Dev.	0.00	0.29	0.56	0.36	0.30	0.82	0.30	1.13	0.35	0.36	0.38	0.23	0.70	0.55	0.41	
Rel.Std.Dev.	0.00%	1.69%	3.58%	2.42%	1.74%	4.76%	1.71%	7.11%	1.96%	2.40%	2.44%	1.52%	4.60%	4.09%	2.70%	
PDM[3]	0.59%	7.13%	-1.67%	-7.46%	9.90%	8.39%	9.02%	-0.10%	13.17%	-5.23%	-1.17%	-4.69%	-3.68%	-15.75%	-4.94%	

Table A5. Analytical results for 4 acid copper in OREAS 90 (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A 4A*OES	Lab B 4A*OES	Lab C 4A*MS	Lab D 4A*OES	Lab E 4A*OES	Lab F 4A*OES	Lab G 4A*OES	Lab H 4A*OES	Lab I 4A*OES	Lab J 4A*OES	Lab K 4A*OES	Lab L 4A*OES	Lab M 4A*OES	Lab N 4A*OES	Lab O 4A*OES	Lab P -
1	116	114	109	106	103	117	111	120	105	**123**	112	102	113	118	102	NR
2	115	112	105	108	100	116	112	121	105	121	107	113	112	116	118	NR
3	115	119	103	106	101	117	116	**127**	105	120	100	117	114	117	106	NR
4	114	116	109	110	105	119	112	121	110	119	110	113	116	116	**122**	NR
5	116	114	111	111	109	118	**128**	120	100	119	103	110	115	118	106	NR
Mean	115	115	107	108	103	117	116	122	105	120	107	111	114	117	111	
Median	115	114	109	108	103	117	112	121	105	120	107	113	114	117	106	
Std.Dev.	1	3	3	2	3	1	7	3	4	2	5	6	2	1	9	
Rel.Std.Dev.	0.73%	2.30%	3.12%	2.11%	3.35%	0.97%	6.12%	2.41%	3.37%	1.31%	4.76%	5.06%	1.39%	0.85%	7.83%	
PDM[3]	2.82%	2.64%	-4.41%	-3.43%	-7.68%	4.78%	3.35%	8.59%	-6.29%	7.38%	-4.92%	-0.93%	1.74%	4.42%	-1.11%	

Table A6. Analytical results for 4 acid lead in OREAS 90 (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A 4A*MS	Lab B 4A*MS	Lab C 4A*MS	Lab D 4A*MS	Lab E 4A*OES	Lab F 4A*MS	Lab G 4A*MS	Lab H 4A*MS	Lab I 4A*MS	Lab J 4A*MS	Lab K 4A*MS	Lab L 4A*OES	Lab M 4A*MS	Lab N 4A*OES	Lab O 4A*MS	Lab P -
1	5	8	7.1	6.4	5.6	6.42	6	6.31	6	**9.32**	4.89	7	6.3	7	6.5	NR
2	6	7	7.0	5.6	6.1	**7.54**	6	5.67	7	7.55	4.93	7	6.0	7	5.9	NR
3	5	7	6.5	5.2	6.1	6.71	6	6.83	7	7.25	4.88	9	6.3	7	6.8	NR
4	5	7	6.0	5.9	5.7	6.68	7	6.46	6	7.32	5.15	8	6.0	7	6.3	NR
5	5	7	6.5	6.1	7.1	6.81	7	5.92	6	7.05	5.21	6	6.0	7	6.3	NR
Mean	**5.20**	7.20	6.62	5.84	6.12	6.83	6.40	6.24	6.40	7.70	**5.01**	7.40	6.12	7.00	6.36	
Median	5.00	7.00	6.50	5.90	6.10	6.71	6.00	6.31	6.00	7.32	4.93	7.00	6.00	7.00	6.30	
Std.Dev.	0.45	0.45	0.44	0.46	0.59	0.42	0.55	0.45	0.55	0.92	0.16	1.14	0.16	0.00	0.33	
Rel.Std.Dev.	8.60%	6.21%	6.70%	7.90%	9.69%	6.16%	8.56%	7.29%	8.56%	12.0%	3.11%	15.4%	2.68%	0.00%	5.17%	
PDM[3]	-21.1%	9.29%	0.48%	-11.4%	-7.11%	3.70%	-2.86%	-5.29%	-2.86%	16.8%	-24.0%	12.3%	-7.11%	6.25%	-3.46%	

Table A7. Analytical results for 4 acid and Leco (2 labs) sulphur in OREAS 90 (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A 4A*OES	Lab B 4A*OES	Lab C 4A*MS	Lab D 4A*OES	Lab E 4A*OES	Lab F LECO	Lab G 4A*OES	Lab H 4A*OES	Lab I 4A*OES	Lab J 4A*OES	Lab K 4A*OES	Lab L 4A*OES	Lab M 4A*OES	Lab N 4A*OES	Lab O 4A*OES	Lab P LECO
1	780	764	700	700	700	600	820	784	800	426	1163	**590**	690	700	700	500
2	760	773	700	700	700	600	780	738	800	435	1133	635	620	700	600	500
3	760	796	600	700	700	600	830	858	800	440	1209	670	560	700	600	600
4	780	779	700	700	700	600	780	843	800	443	1298	660	690	700	700	500
5	800	763	700	700	700	600	830	777	800	**463**	1383	650	640	700	700	600
Mean	776	775	680	700	700	600	808	800	800	**441**	**1237**	641	640	700	660	540
Median	780	773	700	700	700	600	820	784	800	440	1209	650	640	700	700	500
Std.Dev.	17	13	45	0	0	0	26	50	0	14	102	31	54	0	55	55
Rel.Std.Dev.	2.16%	1.74%	6.58%	0.00%	0.00%	0.00%	3.20%	6.24%	0.00%	3.18%	8.26%	4.88%	8.49%	0.00%	8.30%	10.1%
PDM[3]	8.56%	8.42%	-4.87%	-2.07%	-2.07%	-16.1%	13.0%	11.9%	11.9%	-38.3%	73.1%	-10.3%	-10.5%	-2.07%	-7.67%	-24.5%

Table A8. Analytical results for 4 acid antimony in OREAS 90 (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A 4A*MS	Lab B 4A*MS	Lab C 4A*MS	Lab D 4A*MS	Lab E 4A*OES	Lab F 4A*MS	Lab G 4A*MS	Lab H 4A*MS	Lab I 4A*MS	Lab J 4A*MS	Lab K 4A*MS	Lab L 4A*MS	Lab M 4A*MS	Lab N -	Lab O 4A*MS	Lab P -
1	0.9	0.94	0.95	0.83	0.80	0.86	**1.8**	0.94	0.88	0.80	0.73	0.9	1.3	NR	0.89	NR
2	0.9	0.88	0.96	0.79	0.79	0.90	1.5	0.94	0.87	0.83	0.77	0.8	1.1	NR	0.83	NR
3	0.9	0.92	0.90	0.87	0.76	1.00	1.4	**1.15**	0.86	0.78	0.70	0.9	1.1	NR	0.85	NR
4	0.9	0.83	0.90	**1.29**	0.83	0.84	1.4	0.89	0.84	0.75	0.77	0.8	1.1	NR	0.83	NR
5	0.9	0.91	0.97	0.87	**0.95**	0.90	1.3	0.96	0.85	0.87	0.74	0.8	1.0	NR	0.82	NR
Mean	0.90	0.90	0.94	0.93	0.83	0.90	**1.48**	0.98	0.86	0.81	0.74	0.84	**1.12**		0.84	
Median	0.90	0.91	0.95	0.87	0.80	0.90	1.40	0.94	0.86	0.80	0.74	0.80	1.10		0.83	
Std.Dev.	0.00	0.04	0.03	0.20	0.07	0.06	0.19	0.10	0.02	0.05	0.03	0.05	0.11		0.03	
Rel.Std.Dev.	0.00%	4.77%	3.59%	21.9%	8.92%	6.85%	13.0%	10.1%	1.84%	5.80%	3.80%	6.52%	9.78%		3.31%	
PDM[3]	4.92%	4.45%	9.11%	8.41%	-3.71%	4.92%	72.5%	13.8%	0.25%	-5.96%	-13.4%	-2.08%	30.6%		-1.61%	

Table A9. Analytical results for 4 acid selenium in OREAS 90 (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A 4A*MS	Lab B 4A*MS	Lab C 4A*MS	Lab D 4A*MS	Lab E 4A*OES	Lab F -	Lab G 4A*MS	Lab H 4A*MS	Lab I 4A*MS	Lab J 4A*MS	Lab K 4A*MS	Lab L 4A*MS	Lab M 4A*MS	Lab N -	Lab O 4A*MS	Lab P -
1	<5	<2	2	1.6	2	NR	<10	0.72	0.39	<0.5	1.28	1.0	1.7	NR	<2	NR
2	<5	<2	2	1.4	2	NR	<10	0.72	0.38	<0.5	1.07	1.0	1.9	NR	<2	NR
3	<5	<2	2	1.5	2	NR	<10	0.75	0.35	<0.5	1.18	0.9	1.7	NR	<2	NR
4	<5	<2	2	1.6	2	NR	<10	0.51	0.37	<0.5	1.21	0.9	1.8	NR	<2	NR
5	<5	<2	2	1.5	2	NR	<10	0.73	0.41	<0.5	1.20	0.7	2.3	NR	<2	NR
Mean	<5	<2	2.00	1.52	2.00		<10	0.69	0.38	<0.5	1.19	0.90	1.88		<2	
Median	<5	<2	2.00	1.50	2.00		<10	0.72	0.38	<0.5	1.20	0.90	1.80		<2	
Std.Dev.	-	-	0.00	0.08	0.00		-	0.10	0.02	-	0.08	0.12	0.25		-	
Rel.Std.Dev.	-	-	0.00%	5.50%	0.00%		-	14.4%	5.88%	-	6.35%	13.6%	13.2%		-	
PDM[3]	-	-	52.1%	15.6%	52.1%		-	-47.8%	-71.1%	-	-9.81%	-31.6%	43.0%		-	

Table A10. Analytical results for 4 acid tin in OREAS 90 (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A 4A*MS	Lab B 4A*MS	Lab C 4A*MS	Lab D 4A*MS	Lab E 4A*OES	Lab F 4A*MS	Lab G 4A*MS	Lab H 4A*MS	Lab I 4A*MS	Lab J 4A*MS	Lab K 4A*MS	Lab L 4A*MS	Lab M 4A*MS	Lab N -	Lab O 4A*MS	Lab P -
1	7	8.1	8.0	7.6	7.6	7.9	11.9	7.20	8	8.73	10.7	8.4	7.7	NR	7.6	NR
2	7	8.1	7.7	7.8	7.4	7.9	10.1	6.23	8	8.60	10.7	8.4	7.4	NR	7.7	NR
3	7	8.1	7.6	7.7	7.3	8.3	9.4	6.07	8	8.74	11.1	8.4	7.1	NR	7.3	NR
4	7	7.9	8.1	7.9	7.8	8.1	9.6	6.25	7	8.87	10.6	8.4	7.5	NR	7.3	NR
5	7	7.9	8.3	8.1	8.2	8.3	9.4	6.38	7	8.63	10.9	8.2	7.5	NR	7.5	NR
Mean	7.00	8.02	7.94	7.82	7.66	8.10	10.1	6.43	7.60	8.72	10.8	8.36	7.44		7.48	
Median	7.00	8.10	8.00	7.80	7.60	8.10	9.60	6.25	8.00	8.73	10.7	8.40	7.50		7.50	
Std.Dev.	0.00	0.11	0.29	0.19	0.36	0.20	1.06	0.45	0.55	0.11	0.19	0.09	0.22		0.18	
Rel.Std.Dev.	0.00%	1.37%	3.63%	2.46%	4.67%	2.47%	10.5%	6.99%	7.21%	1.23%	1.79%	1.07%	2.94%		2.39%	
PDM[3]	-10.6%	2.42%	1.40%	-0.13%	-2.18%	3.44%	28.7%	-17.9%	-2.94%	11.3%	37.7%	6.76%	-4.99%		-4.48%	

Table A11. Analytical results for 4 acid zinc in OREAS 90 (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A 4A*OES	Lab B 4A*OES	Lab C 4A*MS	Lab D 4A*OES	Lab E 4A*OES	Lab F 4A*OES	Lab G 4A*OES	Lab H 4A*OES	Lab I 4A*OES	Lab J 4A*OES	Lab K 4A*OES	Lab L 4A*OES	Lab M 4A*OES	Lab N 4A*OES	Lab O 4A*OES	Lab P -
1	71	103	66	61	59	89	73	67	60	**79**	67	**56**	64	72	72	NR
2	69	98	63	62	57	87	68	67	65	74	62	62	65	74	73	NR
3	71	101	61	62	58	91	75	72	60	76	64	63	60	72	70	NR
4	65	99	62	64	59	89	70	69	70	75	66	62	60	69	70	NR
5	68	**109**	62	63	60	88	71	70	60	75	64	59	59	70	71	NR
Mean	68.8	**102.0**	62.8	62.4	58.6	88.8	71.4	68.9	63.0	75.7	64.4	60.4	61.6	71.4	71.2	
Median	69.0	101.0	62.0	62.0	59.0	89.0	71.0	69.0	60.0	75.3	64.2	62.0	60.0	72.0	71.0	
Std.Dev.	2.5	4.4	1.9	1.1	1.1	1.5	2.7	2.0	4.5	1.9	1.9	2.9	2.7	1.9	1.3	
Rel.Std.Dev.	3.62%	4.27%	3.06%	1.83%	1.95%	1.67%	3.78%	2.86%	7.10%	2.48%	2.93%	4.77%	4.39%	2.73%	1.83%	
PDM[3]	1.43%	50.4%	-7.42%	-8.01%	-13.6%	30.9%	5.26%	1.57%	-7.12%	11.5%	-5.11%	-11.0%	-9.19%	5.26%	4.97%	

Table A12. Analytical results for aqua regia silver in OREAS 90 (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A AR*MS	Lab B AR*MS	Lab C AR*MS	Lab D AR*MS	Lab E AR*OES	Lab F AR*MS	Lab G AR*MS	Lab H AR*MS	Lab I AR*MS	Lab J AR*MS	Lab K AR*MS	Lab L AR*MS	Lab M AR*MS	Lab N AR*OES	Lab O AR*MS	Lab P AR*AAS
1	<0.05	**<0.01**	0.06	0.02	0.05	0.042	<0.1	**0.018**	0.06	0.077	0.117	0.09	0.39	<0.5	0.08	<0.5
2	<0.05	0.05	0.05	0.02	0.05	0.046	<0.1	0.024	0.06	0.095	0.102	0.09	0.20	<0.5	**0.13**	<0.5
3	<0.05	0.03	0.05	0.02	0.05	0.043	<0.1	0.023	0.06	0.085	**0.146**	0.06	0.18	<0.5	0.07	<0.5
4	<0.05	0.01	0.05	0.02	0.04	0.043	<0.1	0.021	0.07	0.080	0.111	0.06	0.11	<0.5	0.07	<0.5
5	<0.05	0.03	0.05	0.03	0.04	0.047	<0.1	0.022	0.06	0.086	0.105	0.08	0.08	<0.5	0.07	<0.5
Mean	<0.05	0.03	0.05	0.02	0.05	0.04	<0.1	0.02	0.06	0.08	0.12	0.08	**0.19**	<0.5	0.08	<0.5
Median	<0.05	0.03	0.05	0.02	0.05	0.04	<0.1	0.02	0.06	0.08	0.11	0.08	0.18	<0.5	0.07	<0.5
Std.Dev.	-	0.02	0.00	0.00	0.01	0.00	-	0.00	0.00	0.01	0.02	0.02	0.12	-	0.03	-
Rel.Std.Dev.	-	54.4%	8.60%	20.3%	11.9%	4.90%	-	9.75%	7.21%	8.22%	15.1%	20.0%	63.1%	-	31.0%	-
PDM[3]	-	-46.8%	-7.84%	-61.0%	-18.5%	-21.7%	-	-61.5%	9.88%	49.7%	106%	34.7%	240%	-	48.9%	-

Table A13. Analytical results for aqua regia bismuth in OREAS 90 (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A AR*MS	Lab B AR*MS	Lab C AR*MS	Lab D AR*MS	Lab E AR*OES	Lab F AR*MS	Lab G AR*MS	Lab H AR*MS	Lab I AR*MS	Lab J AR*MS	Lab K AR*MS	Lab L AR*MS	Lab M AR*MS	Lab N -	Lab O AR*MS	Lab P -
1	0.82	**0.92**	0.72	0.70	0.93	0.90	1.2	0.816	1.01	0.796	1.21	0.99	1.2	NR	0.86	NR
2	0.90	0.72	0.73	0.97	0.93	1.03	1.1	0.698	1.01	0.839	1.19	0.93	1.0	NR	1.04	NR
3	0.88	0.67	0.74	0.80	1.19	1.02	1.0	0.740	0.99	0.754	1.25	0.98	1.0	NR	1.06	NR
4	**0.80**	0.72	**0.65**	0.88	0.82	0.89	0.9	0.750	1.01	0.737	1.22	0.99	1.0	NR	0.83	NR
5	0.88	0.69	0.73	0.83	1.19	1.01	1.1	0.888	1.01	**1.04**	1.18	0.89	1.1	NR	0.95	NR
Mean	0.86	0.74	0.71	0.84	1.01	0.97	1.06	0.78	1.01	0.83	1.21	0.96	1.06		0.95	
Median	0.88	0.72	0.73	0.83	0.93	1.01	1.10	0.75	1.01	0.80	1.21	0.98	1.00		0.95	
Std.Dev.	0.04	0.10	0.04	0.10	0.17	0.07	0.11	0.07	0.01	0.12	0.02	0.04	0.09		0.10	
Rel.Std.Dev.	5.07%	13.5%	5.11%	11.9%	16.7%	7.11%	10.8%	9.60%	0.89%	14.7%	2.03%	4.65%	8.44%		10.9%	
PDM[3]	-7.23%	-19.4%	-22.6%	-9.39%	9.68%	5.13%	14.9%	-15.7%	9.03%	-9.70%	31.1%	3.61%	14.9%		2.75%	

Table A14. Analytical results for aqua regia cobalt in OREAS 90 (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A AR*MS	Lab B AR*MS	Lab C AR*MS	Lab D AR*MS	Lab E AR*OES	Lab F AR*MS	Lab G AR*MS	Lab H AR*MS	Lab I AR*MS	Lab J AR*MS	Lab K AR*MS	Lab L AR*MS	Lab M AR*MS	Lab N AR*OES	Lab O AR*MS	Lab P AR*AAS
1	15.0	18.7	16.4	12.4	15.6	**14.4**	16.1	17.66	16.5	15.2	13.91	14.2	15.9	14	**13.8**	14
2	16.0	17.6	16.2	13.0	15.8	15.0	15.9	16.42	16.5	**16.4**	14.36	14.1	16.1	14	13.2	14
3	16.0	17.9	17.2	13.0	15.8	15.2	16.0	17.86	17.0	15.8	14.76	14.1	**14.7**	13	13.3	14
4	14.5	18.3	16.7	13.0	15.6	15.1	16.3	17.26	16.5	15.7	14.21	13.9	15.8	14	13.4	15
5	16.5	18.5	16.5	13.2	15.8	**15.6**	16.2	17.38	16.5	15.5	14.45	14.3	15.9	13	13.0	14
Mean	15.6	18.2	16.6	12.9	15.7	15.1	16.1	17.3	16.6	15.7	14.3	14.1	15.7	13.6	13.3	14.2
Median	16.0	18.3	16.5	13.0	15.8	15.1	16.1	17.4	16.5	15.7	14.4	14.1	15.9	14.0	13.3	14.0
Std.Dev.	0.8	0.4	0.4	0.3	0.1	0.4	0.2	0.6	0.2	0.5	0.3	0.1	0.6	0.5	0.3	0.4
Rel.Std.Dev.	5.27%	2.46%	2.29%	2.35%	0.70%	2.88%	0.98%	3.20%	1.35%	2.92%	2.18%	1.05%	3.56%	4.03%	2.22%	3.15%
PDM[3]	1.83%	18.8%	8.36%	-15.7%	2.62%	-1.69%	5.10%	13.0%	8.36%	2.61%	-6.40%	-7.83%	2.36%	-11.2%	-12.9%	-7.30%

Table A15. Analytical results for aqua regia copper in OREAS 90 (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A AR*OES	Lab B AR*OES	Lab C AR*MS	Lab D AR*OES	Lab E AR*OES	Lab F AR*OES	Lab G AR*OES	Lab H AR*OES	Lab I AR*OES	Lab J AR*OES	Lab K AR*OES	Lab L AR*OES	Lab M AR*OES	Lab N AR*OES	Lab O AR*OES	Lab P AR*AAS
1	113	126	114	104	99	103	**114**	120	120	120	109	108	106	109	105	103
2	114	123	111	105	**103**	105	109	116	120	116	**101**	106	104	108	104	104
3	113	124	114	105	100	105	110	124	125	121	106	110	102	109	102	103
4	109	123	112	105	101	105	111	118	120	119	107	102	104	108	100	104
5	108	121	114	107	99	109	109	112	120	119	110	109	99	108	102	103
Mean	111	123	113	105	100	105	111	118	121	119	107	107	103	108	103	103
Median	113	123	114	105	100	105	110	118	120	119	107	108	104	108	102	103
Std.Dev.	3	2	1	1	2	2	2	4	2	2	3	3	3	1	2	1
Rel.Std.Dev.	2.43%	1.47%	1.25%	1.04%	1.61%	2.08%	1.87%	3.71%	1.85%	1.48%	3.13%	2.96%	2.57%	0.51%	1.90%	0.53%
PDM[3]	1.37%	12.3%	2.82%	-4.28%	-8.70%	-4.09%	0.64%	7.47%	10.1%	8.26%	-2.91%	-2.64%	-6.28%	-1.36%	-6.64%	-5.91%

Table A16. Analytical results for aqua regia lead in OREAS 90 (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A AR*MS	Lab B AR*MS	Lab C AR*MS	Lab D AR*MS	Lab E AR*OES	Lab F AR*MS	Lab G AR*MS	Lab H AR*MS	Lab I AR*MS	Lab J AR*MS	Lab K AR*MS	Lab L AR*OES	Lab M AR*MS	Lab N AR*OES	Lab O AR*MS	Lab P AR*AAS
1	5	4	5.4	4.2	4.7	4.65	6	6.47	6.0	**6.67**	0.61	8.4	6.0	6	5.2	7
2	5	4	6.0	4.6	4.8	5.20	6	6.22	6.5	4.79	0.56	7.8	6.8	6	5.2	7
3	5	4	6.1	4.7	5.6	4.80	6	5.73	6.0	5.39	0.48	7.4	6.4	6	6.5	7
4	4	4	5.1	4.4	5.8	4.89	6	5.71	6.0	4.88	0.36	7.5	5.3	6	6.2	6
5	5	5	4.8	5.1	5.3	5.42	6	5.84	6.0	5.20	0.29	7.8	5.3	6	5.9	7
Mean	4.80	4.20	5.48	4.60	5.24	4.99	6.00	5.99	6.10	5.39	**0.46**	**7.78**	5.96	6.00	5.80	6.80
Median	5.00	4.00	5.40	4.60	5.30	4.89	6.00	5.84	6.00	5.20	0.48	7.80	6.00	6.00	5.90	7.00
Std.Dev.	0.45	0.45	0.56	0.34	0.48	0.31	0.00	0.33	0.22	0.76	0.14	0.39	0.67	0.00	0.59	0.45
Rel.Std.Dev.	9.32%	10.6%	10.3%	7.37%	9.21%	6.26%	0.00%	5.58%	3.67%	14.1%	29.4%	5.01%	11.2%	0.00%	10.1%	6.58%
PDM[3]	-12.8%	-23.7%	-0.40%	-16.4%	-4.76%	-9.27%	9.05%	8.91%	10.9%	-2.11%	-91.7%	41.4%	8.32%	9.05%	5.41%	23.6%

Table A17. Analytical results for aqua regia sulphur in OREAS 90 (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A AR*OES	Lab B AR*OES	Lab C AR*MS	Lab D AR*MS	Lab E AR*OES	Lab F AR*MS	Lab G AR*OES	Lab H AR*MS	Lab I AR*MS	Lab J AR*OES	Lab K AR*MS	Lab L AR*OES	Lab M AR*OES	Lab N AR*OES	Lab O AR*OES	Lab P -
1	750	742	700	**900**	700	700	773	693	500	621	817	610	721	700	700	NR
2	750	732	700	1100	700	700	752	665	500	611	763	610	653	700	700	NR
3	750	720	700	1300	800	600	707	676	500	611	805	610	651	700	700	NR
4	750	714	700	1400	**2300**	700	778	655	500	617	786	600	624	700	700	NR
5	750	717	800	1300	**3100**	700	731	633	500	616	802	610	625	700	700	NR
Mean	750	725	720	**1200**	1520	680	748	664	**500**	615	795	608	655	700	700	
Median	750	720	700	1300	800	700	752	665	500	616	802	610	651	700	700	
Std.Dev.	0	12	45	200	1114	45	30	23	0	4	21	4	39	0	0	
Rel.Std.Dev.	0.00%	1.61%	6.21%	16.7%	73.3%	6.58%	3.96%	3.39%	0.00%	0.68%	2.63%	0.74%	6.03%	0.00%	0.00%	
PDM[3]	7.22%	3.65%	2.93%	71.6%	117%	-2.79%	6.96%	-5.05%	-28.5%	-12.0%	13.6%	-13.1%	-6.39%	0.07%	0.07%	

Table A18. Analytical results for aqua regia antimony in OREAS 90 (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A AR*MS	Lab B AR*MS	Lab C AR*MS	Lab D AR*MS	Lab E AR*OES	Lab F AR*MS	Lab G AR*MS	Lab H AR*MS	Lab I AR*MS	Lab J AR*MS	Lab K AR*MS	Lab L AR*MS	Lab M AR*MS	Lab N -	Lab O AR*MS	Lab P -
1	0.40	0.48	0.38	0.47	0.27	0.36	0.5	0.574	0.59	0.491	0.540	<0.5	0.4	NR	0.31	NR
2	0.44	0.46	0.36	0.52	0.27	0.42	0.6	0.521	0.61	0.485	0.536	<0.5	0.4	NR	**0.35**	NR
3	0.42	0.42	0.36	0.50	0.29	0.41	0.5	0.534	0.63	0.472	0.657	<0.5	0.5	NR	0.28	NR
4	0.40	0.42	0.35	0.49	0.29	0.37	0.6	0.545	0.64	0.487	0.612	<0.5	0.3	NR	0.29	NR
5	0.40	0.46	0.37	0.51	0.27	0.37	0.5	0.575	0.58	0.481	0.522	<0.5	0.3	NR	0.30	NR
Mean	0.41	0.45	0.36	0.50	0.28	0.39	0.54	0.55	0.61	0.48	0.57	<0.5	0.38		0.31	
Median	0.40	0.46	0.36	0.50	0.27	0.37	0.50	0.55	0.61	0.49	0.54	<0.5	0.40		0.30	
Std.Dev.	0.02	0.03	0.01	0.02	0.01	0.03	0.05	0.02	0.03	0.01	0.06	-	0.08		0.03	
Rel.Std.Dev.	4.34%	5.99%	3.13%	3.86%	3.94%	7.00%	10.1%	4.38%	4.18%	1.51%	10.2%	-	22.0%		8.83%	
PDM[3]	-7.93%	0.12%	-18.7%	11.3%	-37.9%	-13.7%	20.7%	22.9%	36.3%	7.93%	28.1%	-	-15.1%		-31.6%	

Table A19. Analytical results for aqua regia selenium in OREAS 90 (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A AR*MS	Lab B AR*MS	Lab C AR*MS	Lab D AR*MS	Lab E AR*OES	Lab F AR*MS	Lab G AR*MS	Lab H AR*MS	Lab I AR*MS	Lab J AR*MS	Lab K AR*MS	Lab L AR*MS	Lab M AR*MS	Lab N -	Lab O AR*MS	Lab P -
1	<1	1	0.9	1.0	1.0	0.3	<5	1.15	0.58	<0.5	0.578	0.8	1.7	NR	<1	NR
2	<1	<1	0.9	0.9	1.0	0.4	<5	0.807	0.59	<0.5	0.619	0.8	1.1	NR	<1	NR
3	<1	1	0.8	0.9	0.9	0.4	<5	0.954	0.60	<0.5	0.577	0.8	1.4	NR	<1	NR
4	<1	1	0.8	0.9	0.9	0.3	<5	0.798	0.62	<0.5	0.723	0.8	1.3	NR	<1	NR
5	<1	1	0.8	0.9	0.9	0.4	<5	0.908	0.58	<0.5	0.450	0.8	1.4	NR	<1	NR
Mean	<1	1.00	0.84	0.92	0.94	0.36	<5	0.92	0.59	<0.5	0.59	0.80	1.38		<1	
Median	<1	1.00	0.80	0.90	0.90	0.40	<5	0.91	0.59	<0.5	0.58	0.80	1.40		<1	
Std.Dev.	-	0.00	0.05	0.04	0.05	0.05	-	0.14	0.02	-	0.10	0.00	0.22		-	
Rel.Std.Dev.	-	0.00%	6.52%	4.86%	5.83%	15.2%	-	15.5%	2.82%	-	16.6%	0.00%	15.7%		-	
PDM[3]	-	21.1%	1.71%	11.4%	13.8%	-56.4%	-	11.8%	-28.1%	-	-28.6%	-3.13%	67.1%		-	

Table A20. Analytical results for aqua regia tin in OREAS 90 (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A AR*MS	Lab B AR*MS	Lab C AR*MS	Lab D AR*MS	Lab E AR*OES	Lab F AR*MS	Lab G AR*MS	Lab H AR*MS	Lab I AR*MS	Lab J AR*MS	Lab K AR*MS	Lab L AR*MS	Lab M AR*MS	Lab N -	Lab O AR*MS	Lab P -
1	1.0	2.21	1.4	1.5	1.4	1.4	1	2.28	1.7	1.72	1.32	1.6	1.7	NR	1.2	NR
2	1.2	1.98	1.4	1.6	1.4	1.3	1	1.96	1.8	1.75	1.26	1.6	1.8	NR	1.1	NR
3	1.2	1.97	1.4	1.5	1.4	1.3	1	2.07	1.9	1.77	1.30	1.6	1.7	NR	1.2	NR
4	1.0	2.01	1.4	1.5	1.4	1.3	1	1.92	1.7	1.73	1.32	1.6	1.6	NR	1.2	NR
5	1.2	2.08	1.4	1.6	1.4	1.5	1	1.82	1.6	1.80	1.30	1.6	1.5	NR	1.1	NR
Mean	1.12	2.05	1.40	1.54	1.40	1.36	1.00	2.01	1.74	1.75	1.30	1.60	1.66		1.16	
Median	1.20	2.01	1.40	1.50	1.40	1.30	1.00	1.96	1.70	1.75	1.30	1.60	1.70		1.20	
Std.Dev.	0.11	0.10	0.00	0.05	0.00	0.09	0.00	0.18	0.11	0.03	0.03	0.00	0.11		0.05	
Rel.Std.Dev.	9.78%	4.84%	0.00%	3.56%	0.00%	6.58%	0.00%	8.79%	6.55%	1.97%	1.99%	0.00%	6.87%		4.72%	
PDM[3]	-25.5%	36.3%	-6.89%	2.42%	-6.89%	-9.55%	-33.5%	33.7%	15.7%	16.6%	-13.7%	6.41%	10.4%		-22.9%	

Table A21. Analytical results for aqua regia zinc in OREAS 90 (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A AR*OES	Lab B AR*OES	Lab C AR*MS	Lab D AR*OES	Lab E AR*OES	Lab F AR*OES	Lab G AR*OES	Lab H AR*OES	Lab I AR*OES	Lab J AR*OES	Lab K AR*OES	Lab L AR*OES	Lab M AR*OES	Lab N AR*OES	Lab O AR*OES	Lab P AR*AAS
1	59	60	57	54	54	56	63	68.8	70	**65.6**	62.5	**61.2**	**61**	71	59	55
2	58	59	56	56	54	56	62	64.1	70	64.0	58.2	56.1	57	69	60	56
3	58	59	56	55	56	56	62	66.8	**65**	63.9	59.8	56.1	57	70	60	55
4	56	59	55	55	54	56	66	64.9	67	63.7	60.7	55.7	54	69	60	56
5	57	59	55	56	52	60	63	63.6	71	63.7	62.6	55.8	56	68	57	57
Mean	57.6	59.2	55.8	55.2	54.0	56.8	63.2	65.6	**68.6**	64.2	60.8	57.0	57.0	**69.4**	59.2	55.8
Median	58.0	59.0	56.0	55.0	54.0	56.0	63.0	64.9	70.0	63.9	60.7	56.1	57.0	69.0	60.0	56.0
Std.Dev.	1.1	0.4	0.8	0.8	1.4	1.8	1.6	2.1	2.5	0.8	1.9	2.4	2.5	1.1	1.3	0.8
Rel.Std.Dev.	1.98%	0.76%	1.50%	1.52%	2.62%	3.15%	2.60%	3.25%	3.66%	1.25%	3.09%	4.15%	4.47%	1.64%	2.20%	1.50%
PDM[3]	-1.54%	1.20%	-4.61%	-5.64%	-7.69%	-2.90%	8.04%	12.2%	17.3%	9.75%	3.87%	-2.60%	-2.56%	18.6%	1.20%	-4.61%