

CERTIFICATE OF ANALYSIS FOR

URANIUM-BEARING

CERTIFIED REFERENCE MATERIAL

OREAS 101b

SUMMARY STATISTICS OREAS 101b

Constituent	Certified Values	
	Fusion	4 Acid
Uranium, U (ppm)	396	387
Thorium, Th (ppm)	37.1	36.4
Cerium, Ce (ppm)	1331	1325
Lanthanum, La (ppm)	789	754

Note: Full list of certified elements shown in Table 1 below.

Table 1. Certified Values, SD's, 95% Confidence and Tolerance Limits for OREAS 101b.

Constituent	Certified Value	SD	95% Confidence Limits		95% Tolerance Limits	
			Low	High	Low	High
Fusion						
Cerium, Ce (ppm)	1331	135	1247	1416	1279	1383
Cobalt, Co (ppm)	47	4.6	45	50	45	49
Copper, Cu (ppm)	416	27	395	437	407	425
Dysprosium, Dy (ppm)	32.1	1.5	31.2	32.9	30.6	33.6
Ersium, Er (ppm)	18.7	1.2	18.0	19.4	17.9	19.5
Europium, Eu (ppm)	7.77	0.49	7.48	8.05	7.44	8.10
Iron, Fe (wt.%)	10.8	0.29	10.6	10.9	10.5	11.0
Gadolinium, Gd (ppm)	41	6.0	37	44	39	43
Holmium, Ho (ppm)	6.34	0.49	6.05	6.63	6.04	6.64
Potassium, K (ppm)	2.42	0.19	2.30	2.54	2.37	2.47
Lanthanum, La (ppm)	789	66	748	830	769	810
Lutetium, Lu (ppm)	2.58	0.21	2.44	2.72	2.46	2.70
Magnesium, Mg (wt.%)	1.23	0.054	1.20	1.27	1.21	1.25
Manganese, Mn (ppm)	931	37	908	954	911	951
Molybdenum, Mo (ppm)	20.9	1.4	20.0	21.8	19.9	22.0
Neodymium, Nd (ppm)	378	35	357	399	363	392
Phosphorous, P (ppm)	1197	88	1137	1257	1142	1253
Praseodymium, Pr (ppm)	127	9	121	132	123	131
Samarium, Sm (ppm)	48	3.0	46	49	46	49
Terbium, Tb (ppm)	5.37	0.34	5.16	5.59	5.10	5.65
Thorium, Th (ppm)	37.1	2.5	35.6	38.6	35.9	38.4
Titanium, Ti (wt.%)	0.386	0.008	0.381	0.391	0.378	0.395
Thulium, Tm (ppm)	2.66	0.14	2.59	2.74	2.57	2.75
Uranium, U (ppm)	396	29	378	415	386	406
Vanadium, V (ppm)	80	10	73	86	77	82
Yttrium, Y (ppm)	178	8	174	183	173	183
Ytterbium, Yb (ppm)	17.6	1.6	16.6	18.6	16.8	18.4
4 Acid						
Cerium, Ce (ppm)	1325	89	1259	1390	1315	1334
Cobalt, Co (ppm)	45	2.9	43	47	44	46
Copper, Cu (ppm)	412	20	400	423	402	421
Dysprosium, Dy (ppm)	27	2.5	25	29	26	28
Ersium, Er (ppm)	15	1.3	14	17	15	16
Europium, Eu (ppm)	8.1	0.55	7.7	8.5	7.7	8.5
Iron, Fe (wt.%)	10.7	0.46	10.4	11.0	10.5	10.9
Gadolinium, Gd (ppm)	40	5.3	36	44	38	42
Holmium, Ho (ppm)	5.2	0.45	4.8	5.5	4.9	5.4
Potassium, K (ppm)	2.36	0.15	2.27	2.45	2.30	2.42
Lanthanum, La (ppm)	754	50	725	783	736	773
Lutetium, Lu (ppm)	1.96	0.21	1.81	2.11	1.88	2.04

Note: intervals may appear asymmetric due to rounding.

Table 1 continued.

Constituent	Certified Value	SD	95% Confidence Limits		95% Tolerance Limits	
			Low	High	Low	High
4 Acid continued						
Magnesium, Mg (wt.%)	1.23	0.05	1.20	1.26	1.21	1.26
Manganese, Mn (ppm)	927	62	892	963	912	942
Molybdenum, Mo (ppm)	20.1	1.2	19.4	20.8	19.6	20.6
Neodymium, Nd (ppm)	388	27	368	408	372	404
Nickel, Ni (ppm)	8.2	1.52	7.3	9.1	7.6	8.7
Phosphorous, P (ppm)	1118	26	1103	1132	1095	1141
Lead, Pb (ppm)	23	3.4	21	25	22	24
Praseodymium, Pr (ppm)	127	11	119	135	121	133
Samarium, Sm (ppm)	48	4.0	45	51	46	50
Terbium, Tb (ppm)	5.4	0.89	4.8	6.0	5.2	5.5
Thorium, Th (ppm)	36.4	3.2	34.5	38.3	35.4	37.4
Titanium, Ti (wt.%)	0.35	0.028	0.33	0.37	0.34	0.36
Thulium, Tm (ppm)	2.08	0.18	1.94	2.22	2.00	2.16
Uranium, U (ppm)	387	20	375	399	381	393
Vanadium, V (ppm)	77	8.5	72	82	75	78
Yttrium, Y (ppm)	133	13	126	140	130	136
Ytterbium, Yb (ppm)	13.9	1.2	13.1	14.8	13.4	14.4

Note: intervals may appear asymmetric due to rounding.

INTRODUCTION

OREAS reference materials are intended to provide a low cost method of evaluating and improving the quality of analysis of geological samples. 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. To the analyst they provide an effective means of calibrating analytical equipment, assessing new techniques and routinely monitoring in-house procedures.

SOURCE MATERIAL

OREAS 101b is one of four CRM's prepared by Ore Research & Exploration Pty Ltd from material from the Proterozoic Mt. Gee uranium prospect, Mount Painter Inlier, South Australia. The mineralisation at Mt. Gee lies within the Paralana Mineral System, host to a number of granitic and haematitic breccia bodies extending northeasterly over a distance of 11km. Mt. Gee is believed to be of hydrothermal origin and has been described as an IOCG variant.

COMMUNITION AND HOMOGENISATION PROCEDURES

The material constituting OREAS 101b was prepared in the following manner:

- a) drying to constant mass at 105⁰ C;

- b) crushing;
- c) milling to 100% minus 35 microns;
- d) homogenisation;
- e) packaging into 10g units sealed in laminated foil pouches.

ANALYTICAL PROGRAM FOR OREAS 101b

Fifteen commercial laboratories participated in the analytical program to certify Ce, Co, Cu, Dy, Er, Eu, Fe, Gd, Ho, K, La, Lu, Mg, Mn, Mo, Nd, Ni, P, Pb, Pr, Sm, Tb, Th, Ti, Tm, U, V, Y and Yb by both fusion and four acid analytical 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 (PDM³) are presented in an appendix (Tables A2 – A59). 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) fusion methods - sodium peroxide fusion ICPOES/MS, lithium borate fusion ICPOES/MS and lithium borate fusion XRF;
- b) four acid (HF-HCl-HNO₃-HClO₄) digest ICPOES/MS

A batch of six 20g pulp samples was submitted to each of the participating laboratories for analysis. The six samples comprising each batch were scoop-split in duplicate from three of fourteen 400g master samples. The three master samples selected for sampling were chosen to maximise their representation and duplicate samples were taken to enable within- and between-unit analysis of variance treatment. The master samples were taken at regular intervals during the bagging stage and immediately following homogenisation. Table 1 (above) presents the certified values together with their associated 1SD's, 95% confidence and tolerance limits. Indicative (uncertified) values are provided in Table 2 for the major and trace elements determined by borate fusion XRF (Al₂O₃ to Zn) and laser ablation with ICP-MS (Ag to Zr) and are the means of duplicate assays from Bureau Veritas, Perth. Table 3 provides performance gate intervals for the certified values based on their associated standard deviations. The summary statistics are also available in Excel format (**OREAS 101b DataPack.xlsx**).

STATISTICAL EVALUATION OF OREAS 101b

Certified Value and Confidence Intervals

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{x} is the mean of means.

The confidence intervals 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 ($p-1$).

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

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

where

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

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

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

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

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

where

T is the median value in a data set;
 S is the median of all absolute deviations from the sample median multiplied by 1.483, a correction factor to make the estimator consistent with the usual parameter of a normal distribution.

The z -score test is used in combination with a second method of individual outlier detection that determines the percent deviation of the individual value from the median. Outliers in general are selected on the basis of z -scores > 2.5 and with percent deviations $> 1.5\%$. In certain instances statistician's prerogative has been employed in discriminating outliers. Each laboratory data set is tested for outlying status based on z -score discrimination and rejected if $|z_i| > 2.5$. After individual and entire lab data set outliers have been eliminated a non-iterative 3 standard deviation filter is applied, with those values lying outside this window also relegated to outlying status. Individual outliers and, more rarely, laboratory means

deemed to be outlying are shown left justified and in bold in the tabulated results (see Appendix) and have been omitted in the determination of certified values.

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

Table 2. Indicative Values for OREAS 101b.

Constituent	Unit	Value	Constituent	Unit	Value	Constituent	Unit	Value
Laser Ablation ICP-MS								
Ag	ppm	0.450	Ho	ppm	6.50	Sn	ppm	9.80
As	ppm	14.0	In	ppm	0.050	Sr	ppm	22.1
Ba	ppm	171	La	ppm	804	Ta	ppm	2.94
Be	ppm	7.00	Lu	ppm	2.50	Tb	ppm	5.40
Bi	ppm	0.36	Mn	wt. %	0.090	Te	ppm	0.40
Cd	ppm	< 0.1	Mo	ppm	19.0	Th	ppm	36.9
Ce	ppm	1295	Nb	ppm	56	Ti	wt. %	0.368
Co	ppm	41.8	Nd	ppm	369	Tl	ppm	0.15
Cr	ppm	32.0	Ni	ppm	11.0	Tm	ppm	2.99
Cs	ppm	2.43	Pb	ppm	19.0	U	ppm	385
Cu	ppm	391	Pr	ppm	129	V	ppm	75
Dy	ppm	32.3	Rb	ppm	187	W	ppm	17.6
Er	ppm	19.0	Re	ppm	0.055	Y	ppm	179
Eu	ppm	8.68	Sb	ppm	0.65	Yb	ppm	17.7
Ga	ppm	18.7	Sc	ppm	8.70	Zn	ppm	10.0
Gd	ppm	35.1	Se	ppm	3.75	Zr	ppm	371
Hf	ppm	10.8	Sm	ppm	50			
Borate Fusion XRF								
Al ₂ O ₃	wt. %	10.48	Fe ₂ O ₃	wt. %	15.27	Pb	ppm	12.5
As	ppm	20.0	K ₂ O	wt. %	2.86	SiO ₂	wt. %	62.40
Ba	ppm	145	MgO	wt. %	2.08	Sn	ppm	< 10
CaO	wt. %	1.64	MnO	wt. %	0.130	SO ₃	wt. %	0.225
Co	ppm	40.0	Na ₂ O	wt. %	0.100	TiO ₂	wt. %	0.646
Cr	ppm	30.0	Ni	ppm	20.0	U	ppm	385
Cu	ppm	400	P ₂ O ₅	wt. %	0.286	Zn	ppm	25.0
Thermogravimetry								
LOI ¹⁰⁰⁰	wt. %	3.48						

Note: the number of significant figures reported is not a reflection of the level of certainty of stated values. They are instead an artefact of ORE's in-house CRM-specific LIMS.

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

$$\begin{aligned} \text{Lower limit is } \bar{x} - k'_2(n, p, 1 - \alpha) s_g'' \\ \text{Upper limit is } \bar{x} + k'_2(n, p, 1 - \alpha) s_g'' \end{aligned}$$

where

- n is the number of results;
- $1 - \alpha$ is the confidence level;
- p is the proportion of results expected within the tolerance limits;
- k'_2 is the factor for two – sided tolerance limits (m, α unknown);
- s_g'' is the corrected grand standard deviation

The meaning of these tolerance intervals may be illustrated for uranium by fusion, where 99% of the time at least 95% of subsamples will have concentrations lying between 386 and 406 ppm (see Table 1). 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

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

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

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

The weighting factors were applied to compensate for the considerable variation in analytical precision amongst participating laboratories. Hence, weighting factors for each data set have been constructed so as to be inversely proportional to the standard deviation of that data set. 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 $1 - s_i / 2s'_g < 0$). Data sets displaying poor resolution (i.e. where the ratio of the reading increment divided by the measured value is $< 1/20$) were also omitted.

It should be noted that estimates of tolerance by this method are considered conservative as a significant proportion of the observed variance, even in those laboratories exhibiting the best analytical precision, can presumably be attributed to measurement error. Despite the limitations of this method, the tolerance intervals presented in Table 1 are considered to confirm a high level of homogeneity for this CRM.

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 after removal of all individual and lab dataset (batch) outliers as well as application of a non-iterative 3 standard deviation filter. 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 3. 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. It is important to note that performance gates calculated from a single submission round robin, as in the present case, do not take reproducibility errors (batch-to-batch bias) into consideration. This omission is offset, however, by the inclusion of errors associated with inter-lab bias as these are generally of greater magnitude than reproducibility errors.

Table 3. Performance gates for OREAS 101b.

Constituent	Certified Value	Performance Gates						
		1SD	2SD		3SD		5%	
			Low	High	Low	High	Low	High
Fusion								
Ce (ppm)	1331	135	1062	1601	927	1735	1265	1398
Co (ppm)	47	5	38	56	33	61	45	50
Cu (ppm)	416	27	362	470	335	497	395	437
Dy (ppm)	32.1	1.5	29.2	35.0	27.7	36.5	30.5	33.7
Er (ppm)	18.7	1.2	16.2	21.2	15.0	22.4	17.8	19.6
Eu (ppm)	7.77	0.49	6.78	8.76	6.29	9.25	7.38	8.16
Fe (wt.%)	10.8	0.3	10.2	11.3	9.9	11.6	10.2	11.3
Gd (ppm)	41	6	29	53	23	59	39	43
Ho (ppm)	6.34	0.49	5.36	7.32	4.87	7.81	6.03	6.66
K (wt.%)	2.42	0.19	2.05	2.79	1.86	2.97	2.30	2.54
La (ppm)	789	66	657	921	591	987	750	829
Lu (ppm)	2.58	0.21	2.16	3.00	1.95	3.22	2.45	2.71
Mg (wt.%)	1.23	0.05	1.12	1.34	1.07	1.40	1.17	1.29
Mn (ppm)	931	37	858	1004	822	1041	885	978
Mo (ppm)	20.9	1.4	18.1	23.8	16.7	25.2	19.9	22.0
Nd (ppm)	378	35	307	448	272	484	359	397
P (ppm)	1197	88	1021	1373	933	1461	1137	1257
Pr (ppm)	127	9	108	145	99	154	120	133
Sm (ppm)	48	3	42	53	39	56	45	50
Tb (ppm)	5.37	0.34	4.70	6.05	4.36	6.38	5.10	5.64
Th (ppm)	37.1	2.5	32.1	42.1	29.6	44.6	35.3	39.0
Ti (wt.%)	0.386	0.008	0.371	0.402	0.363	0.410	0.367	0.406
Tm (ppm)	2.66	0.14	2.38	2.94	2.25	3.08	2.53	2.80
U (ppm)	396	29	338	455	308	484	377	416
V (ppm)	80	10	59	100	49	110	76	84
Y (ppm)	178	8	162	195	154	203	169	187
Yb (ppm)	17.6	1.6	14.4	20.8	12.8	22.4	16.7	18.5
4 Acid								
Ce (ppm)	1325	89	1147	1503	1058	1592	1258	1391
Co (ppm)	45	3	39	51	36	54	43	47
Cu (ppm)	412	20	372	452	352	472	391	432
Dy (ppm)	27	2	22	32	19	34	26	28
Er (ppm)	15	1	13	18	12	19	15	16
Eu (ppm)	8.1	0.6	7.0	9.2	6.5	9.8	7.7	8.5
Fe (wt.%)	10.7	0.5	9.8	11.6	9.3	12.1	10.2	11.2
Gd (ppm)	40	5	29	51	24	56	38	42
Ho (ppm)	5.2	0.4	4.3	6.1	3.8	6.5	4.9	5.4
K (wt.%)	2.36	0.15	2.05	2.66	1.90	2.82	2.24	2.48
La (ppm)	754	50	654	854	604	904	716	792
Lu (ppm)	1.96	0.21	1.54	2.38	1.33	2.59	1.86	2.06
Mg (wt.%)	1.23	0.05	1.14	1.33	1.09	1.38	1.17	1.29
Mn (ppm)	927	62	802	1052	740	1115	881	973
Mo (ppm)	20.1	1.2	17.7	22.5	16.5	23.7	19.1	21.1
Nd (ppm)	388	27	334	442	307	469	368	407
Ni (ppm)	8.2	1.5	5.1	11.2	3.6	12.7	7.8	8.6
P (ppm)	1118	26	1065	1171	1038	1197	1062	1174
Pb (ppm)	23	3	16	30	13	33	22	24
Pr (ppm)	127	11	105	149	95	160	121	133
Sm (ppm)	48	4	40	56	36	60	46	51
Tb (ppm)	5.4	0.9	3.6	7.1	2.7	8.0	5.1	5.6
Th (ppm)	36.4	3.2	30.0	42.9	26.7	46.1	34.6	38.2
Ti (wt.%)	0.35	0.03	0.29	0.41	0.27	0.43	0.33	0.37
Tm (ppm)	2.08	0.18	1.73	2.44	1.55	2.62	1.98	2.19
U (ppm)	387	20	346	427	326	448	368	406
V (ppm)	77	9	60	94	51	102	73	81
Y (ppm)	133	13	106	160	93	173	126	139
Yb (ppm)	13.9	1.2	11.5	16.3	10.3	17.6	13.2	14.6

Note: Intervals values may appear asymmetric due to rounding.

For the second method a simple $\pm 5\%$ error bar on the certified value is used as the window of acceptability (refer Table 3).

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
Activation Laboratories, Perth, WA, Australia
ALS Chemex, Brisbane, QLD, Australia
ALS Chemex, Lima, South America
ALS Chemex, North Vancouver, BC, Canada
ALS Chemex, Perth, WA, Australia
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Genalysis Laboratory Services, Perth, WA, Australia
OMAC Laboratories, Loughrea, County Galway, Ireland
SGS Booyens, Johannesburg, South Africa
SGS, Lakefield, ON, Canada
SGS, Townsville, QLD, Australia
SGS, Welshpool, WA, Australia
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PREPARER AND SUPPLIER

Certified reference material OREAS 101b is prepared, certified and supplied by:



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It is available in unit sizes of 10g (single-use laminated foil pouches).

INTENDED USE

OREAS 101b is a reference material intended for the following:

- i) for the monitoring of laboratory performance in the analysis of Ce, Co, Cu, Dy, Er, Eu, Fe, Gd, Ho, K, La, Lu, Mg, Mn, Mo, Nd, Ni, P, Pb, Pr, Sm, Tb, Th, Ti, Tm, U, V, Y and Yb in geological samples;

- ii) for the calibration of instruments used in the determination of the concentration of Ce, Co, Cu, Dy, Er, Eu, Fe, Gd, Ho, K, La, Lu, Mg, Mn, Mo, Nd, Ni, P, Pb, Pr, Sm, Tb, Th, Ti, Tm, U, V, Y and Yb;
- iii) for the verification of analytical methods for Ce, Co, Cu, Dy, Er, Eu, Fe, Gd, Ho, K, La, Lu, Mg, Mn, Mo, Nd, Ni, P, Pb, Pr, Sm, Tb, Th, Ti, Tm, U, V, Y and Yb
- iv) for the preparation of secondary reference materials of similar composition;

STABILITY AND STORAGE INSTRUCTIONS

OREAS 101b has been prepared from uranium-bearing granitic and haematitic breccias. It has been packaged in robust foil laminate pouches and is considered to have long-term stability under normal storage conditions.

INSTRUCTIONS FOR CORRECT USE

The certified values for OREAS 101b refer to the concentration levels of Ce, Co, Cu, Dy, Er, Eu, Fe, Gd, Ho, K, La, Lu, Mg, Mn, Mo, Nd, Ni, P, Pb, Pr, Sm, Tb, Th, Ti, Tm, U, V, Y and Yb after drying at 105°C. The material should therefore be dried at 105°C prior to weighing and analysis or the values corrected for moisture content.

HANDLING INSTRUCTIONS

Fine powders pose a risk to eyes and lungs and therefore standard precautions such as the use of safety glasses and dust masks are advised.

TRACEABILITY

The analytical samples were selected in a manner to represent the entire batch of prepared CRM. This 'representivity' was maintained in each submitted laboratory sample batch and ensures the user that the data is traceable from sample selection through to the analytical results that underlie the consensus values. Each analytical data set has been validated by its assayer through the inclusion of internal reference materials and QC checks during analysis. The laboratories were chosen on the basis of their competence (from past performance in inter-laboratory programs) for a particular analytical method, analyte or analyte suite, and sample matrix. Most of these laboratories have and maintain ISO 17025 accreditation. The certified and non-certified (indicative) values presented in this report are calculated from the means of accepted data following robust statistical treatment as detailed in this report.

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.

QMS ACCREDITED

ORE Pty Ltd is accredited to ISO 9001:2008 by Lloyd's Register Quality Assurance Ltd for its quality management system including development, manufacturing, certification and supply of CRMs.



CERTIFYING OFFICER

A handwritten signature in blue ink, appearing to read 'S. Hamlyn'.

September 22, 2008

Craig Hamlyn (B.Sc. Hons - Geology), Technical Manager - ORE P/L

REFERENCES

ISO Guide 30 (1992), Terms and definitions used in connection with reference materials.

ISO Guide 31 (2000), Reference materials – Contents of certificates and labels.

ISO Guide 3207 (1975), Statistical interpretation of data - Determination of a statistical tolerance interval.

ISO Guide 35 (2006), Certification of reference materials - General and statistical principals.

APPENDIX

Analytical Results for OREAS 101b

Table A1. Explanation of abbreviations used in Tables A2 – A59.

Abbreviation	Explanation
Std.Dev.	one standard deviation
Rel.Std.Dev.	one relative standard deviation (%)
PDM ³	percent deviation of lab mean from corrected mean of means
NR	not reported
PF	sodium peroxide fusion
BF	lithium metaborate fusion
4A	four acid (HF–HNO ₃ –HClO ₄ –HCl) digest
OES	inductively coupled plasma optical emission spectrometry
MS	inductively coupled plasma mass spectrometry
XRF	x-ray fluorescence

Table A2. Analytical results for fusion U in OREAS 101b (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A PF*OES	Lab B PF*MS	Lab C PF*OES	Lab D PF*MS	Lab E PF*MS	Lab F PF*MS	Lab G -	Lab H -	Lab I BF*MS	Lab J BF*MS	Lab K BF*MS	Lab L -	Lab M -	Lab N BF*OES	Lab O BF*OES
1	407	376	363	377	429	380	NR	421	370	380	418	NR	NR	445	385
2	402	394	363	369	438	380	NR	427	350	387	415	NR	NR	439	361
3	400	406	362	384	432	380	NR	436	340	390	424	NR	NR	456	387
4	397	387	369	375	431	390	NR	438	359	380	414	NR	NR	452	366
5	406	412	357	389	434	380	NR	438	391	369	415	NR	NR	444	357
6	398	395	397	394	430	380	NR	425	346	377	429	NR	NR	442	362
Mean	402	395	368	381	432	382		431	359	381	419			446	370
Median	401	395	363	381	432	380		432	355	380	417			444	364
Std.Dev.	4	13	14	9	3	4		7	19	7	6			6	13
Rel.Std.Dev.	1.03%	3.27%	3.91%	2.45%	0.77%	1.07%		1.73%	5.21%	1.96%	1.44%			1.45%	3.47%
PDM ³	1.34%	-0.34%	-7.09%	-3.79%	9.02%	-3.70%		8.70%	-9.34%	-4.00%	5.76%			12.6%	-6.76%

Table A3. Analytical results for fusion Ce in OREAS 101b (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A PF*MS	Lab B PF*MS	Lab C PF*MS	Lab D PF*OES	Lab E PF*MS	Lab F PF*MS	Lab G -	Lab H BF*MS	Lab I BF*MS	Lab J BF*MS	Lab K BF*MS	Lab L -	Lab M -	Lab N BF*OES	Lab O BF*OES
1	1239	1400	1366	1480	1481	1300	NR	1393	1200	1230	1445	NR	NR	1165	1217
2	1204	1420	1394	1410	1534	1200	NR	1444	1330	1250	1430	NR	NR	1182	1193
3	1195	1460	1397	1410	1591	1300	NR	1459	1090	1255	1450	NR	NR	1204	1262
4	1219	1370	1448	1410	1573	1200	NR	1458	1160	1250	1420	NR	NR	1202	1227
5	1223	1440	1358	1400	1675	1200	NR	1442	1250	1210	1435	NR	NR	1146	1193
6	1209	1360	1425	1480	1666	1300	NR	1400	1130	1225	1460	NR	NR	1173	1194
Mean	1215	1408	1398	1432	1587	1250		1433	1193	1237	1440			1179	1214
Median	1214	1410	1396	1410	1582	1250		1443	1180	1240	1440			1177	1205
Std.Dev.	16	39	34	38	75	55		29	87	18	14			22	27
Rel.Std.Dev.	1.29%	2.78%	2.45%	2.63%	4.73%	4.38%		2.02%	7.28%	1.44%	1.01%			1.89%	2.26%
PDM ³	-8.74%	5.79%	5.01%	7.54%	19.2%	-6.11%		7.63%	-10.4%	-7.11%	8.17%			-11.5%	-8.80%

Table A4. Analytical results for fusion Co in OREAS 101b (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A PF*MS	Lab B PF*OES	Lab C PF*MS	Lab D PF*MS	Lab E PF*MS	Lab F PF*MS	Lab G -	Lab H BF*MS	Lab I BF*MS	Lab J BF*MS	Lab K BF*MS	Lab L -	Lab M -	Lab N BF*OES	Lab O -
1	49.0	20.0	46.0	52.0	48.0	54.0	NR	42.0	45.0	44.3	46.5	NR	NR	48.4	NR
2	47.0	40.0	46.0	51.0	49.2	52.0	NR	40.9	42.0	46.3	46.4	NR	NR	46.4	NR
3	48.0	60.0	47.0	53.0	50.3	52.0	NR	40.5	39.0	45.1	46.0	NR	NR	46.7	NR
4	49.0	60.0	47.0	50.0	49.4	49.0	NR	41.3	41.0	45.8	46.3	NR	NR	48.0	NR
5	47.0	40.0	45.0	53.0	54.0	56.0	NR	43.5	45.0	43.9	46.3	NR	NR	46.1	NR
6	48.0	40.0	49.0	54.0	52.6	50.0	NR	40.5	46.0	45.0	47.3	NR	NR	46.4	NR
Mean	48.0	43.3	46.7	52.2	50.6	52.2		41.5	43.0	45.1	46.5			47.0	
Median	48.0	40.0	46.5	52.5	49.9	52.0		41.1	43.5	45.1	46.4			46.6	
Std.Dev.	0.9	15.1	1.4	1.5	2.3	2.6		1.2	2.8	0.9	0.4			1.0	
Rel.Std.Dev.	1.86%	34.7%	2.93%	2.82%	4.55%	4.91%		2.81%	6.41%	1.99%	0.95%			2.04%	
PDM ³	1.60%	-8.28%	-1.22%	10.4%	7.08%	10.4%		-12.3%	-8.99%	-4.61%	-1.65%			-0.52%	

Table A5. Analytical results for fusion Cu in OREAS 101b (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A PF*MS	Lab B PF*OES	Lab C PF*MS	Lab D PF*MS	Lab E PF*OES	Lab F PF*MS	Lab G -	Lab H BF*MS	Lab I BF*MS	Lab J BF*MS	Lab K BF*MS	Lab L -	Lab M -	Lab N -	Lab O -
1	451	400	650	430	376	440	NR	445	434	376	387	NR	NR	NR	NR
2	455	420	491	430	386	430	NR	453	410	400	389	NR	NR	NR	NR
3	437	400	513	450	388	430	NR	451	410	399	388	NR	NR	NR	NR
4	459	420	574	420	381	400	NR	456	400	393	389	NR	NR	NR	NR
5	457	400	527	450	386	420	NR	457	404	377	388	NR	NR	NR	NR
6	453	400	556	440	383	420	NR	448	400	392	391	NR	NR	NR	NR
Mean	452	407	552	437	383	423		452	410	390	389				
Median	454	400	542	435	385	425		452	407	393	389				
Std.Dev.	8	10	57	12	4	14		5	13	11	1				
Rel.Std.Dev.	1.74%	2.54%	10.2%	2.77%	1.14%	3.23%		1.06%	3.11%	2.71%	0.35%				
PDM ³	8.61%	-2.28%	32.6%	4.93%	-7.85%	1.72%		8.52%	-1.56%	-6.41%	-6.61%				

Table A6. Analytical results for fusion Dy in OREAS 101b (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A PF*MS	Lab B PF*MS	Lab C PF*MS	Lab D PF*MS	Lab E PF*MS	Lab F PF*MS	Lab G PF*OES	Lab H BF*MS	Lab I BF*MS	Lab J BF*MS	Lab K BF*MS	Lab L -	Lab M -	Lab N BF*OES	Lab O BF*OES
1	31.6	33.0	31.6	32.2	34.1	33.0	33.0	33.8	30.4	29.9	32.0	NR	NR	30.6	29.7
2	32.1	34.5	31.2	30.8	35.0	33.0	32.0	34.2	32.4	30.2	32.0	NR	NR	31.4	28.3
3	32.0	35.5	30.0	31.5	37.2	32.0	33.0	33.4	26.8	31.0	32.5	NR	NR	31.7	30.1
4	32.3	35.0	33.5	31.1	36.1	32.0	32.0	34.8	30.3	29.6	31.6	NR	NR	31.5	28.6
5	31.4	34.5	34.3	30.9	38.1	33.0	34.0	33.4	32.3	28.7	31.6	NR	NR	30.4	28.4
6	30.6	33.5	33.7	32.4	38.5	33.0	32.0	32.7	31.0	29.1	32.6	NR	NR	31.2	26.1
Mean	31.7	34.3	32.4	31.5	36.5	32.7	32.7	33.7	30.5	29.8	32.1			31.1	28.5
Median	31.8	34.5	32.6	31.3	36.7	33.0	32.5	33.6	30.7	29.8	32.0			31.3	28.5
Std.Dev.	0.6	0.9	1.7	0.7	1.7	0.5	0.8	0.7	2.0	0.8	0.4			0.5	1.4
Rel.Std.Dev.	1.95%	2.71%	5.23%	2.16%	4.78%	1.58%	2.5%	2.16%	6.69%	2.75%	1.33%			1.67%	4.90%
PDM ³	-1.35%	6.96%	0.88%	-1.92%	13.7%	1.77%	1.77%	4.99%	-4.88%	-7.32%	-0.15%			-3.08%	-11.1%

Table A7. Analytical results for fusion Er in OREAS 101b (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A PF*MS	Lab B PF*MS	Lab C PF*MS	Lab D PF*MS	Lab E PF*MS	Lab F PF*MS	Lab G PF*OES	Lab H BF*MS	Lab I BF*MS	Lab J BF*MS	Lab K BF*MS	Lab L -	Lab M -	Lab N BF*OES	Lab O BF*OES
1	19.0	19.5	18.2	17.7	20.8	20.0	19.0	18.0	17.5	19.1	20.1	NR	NR	18.3	17.7
2	18.6	20.5	17.7	16.8	21.0	20.0	18.0	18.0	19.5	19.4	19.8	NR	NR	18.0	16.7
3	18.9	21.0	17.1	17.6	22.0	20.0	19.0	18.4	16.0	19.8	19.9	NR	NR	18.4	18.2
4	19.1	21.0	19.1	17.1	21.7	20.0	18.0	18.0	16.9	19.2	19.9	NR	NR	18.7	17.3
5	19.0	22.0	19.8	17.4	22.8	20.0	19.0	17.1	19.3	18.4	19.8	NR	NR	17.8	16.9
6	18.6	20.0	19.4	18.1	23.1	20.0	18.0	16.6	18.9	19.2	20.7	NR	NR	18.5	15.6
Mean	18.9	20.7	18.6	17.5	21.9	20.0	18.5	17.7	18.0	19.2	20.0			18.3	17.1
Median	19.0	20.8	18.7	17.5	21.8	20.0	18.5	18.0	18.2	19.2	19.9			18.4	17.1
Std.Dev.	0.2	0.9	1.1	0.5	0.9	0.0	0.5	0.7	1.4	0.5	0.4			0.3	0.9
Rel.Std.Dev.	1.15%	4.24%	5.67%	2.63%	4.26%	0.00%	3.0%	3.88%	7.93%	2.42%	1.79%			1.81%	5.30%
PDM ³	0.84%	10.5%	-0.86%	-6.74%	16.9%	6.89%	-1.12%	-5.44%	-3.71%	2.35%	6.98%			-2.21%	-8.75%

Table A8. Analytical results for fusion Eu in OREAS 101b (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A PF*MS	Lab B PF*MS	Lab C PF*MS	Lab D PF*MS	Lab E PF*MS	Lab F PF*MS	Lab G PF*OES	Lab H BF*MS	Lab I BF*MS	Lab J BF*MS	Lab K BF*MS	Lab L -	Lab M -	Lab N BF*OES	Lab O BF*OES
1	7.70	7.80	7.80	7.70	8.38	< 8	6.90	7.48	7.34	7.86	7.67	NR	NR	7.69	6.50
2	7.80	8.40	7.70	7.40	8.76	< 8	6.80	7.82	8.69	8.07	7.67	NR	NR	7.68	6.08
3	7.70	8.60	7.60	7.60	8.97	< 8	7.00	7.90	6.65	8.30	7.81	NR	NR	7.80	6.54
4	7.70	8.80	8.40	7.40	9.00	< 8	6.80	7.79	7.16	8.33	7.55	NR	NR	7.85	6.19
5	7.70	8.80	8.60	7.50	9.63	< 8	7.30	7.71	8.39	7.70	7.54	NR	NR	7.68	6.09
6	7.70	8.40	8.50	7.70	9.39	< 8	6.80	7.49	8.27	7.95	7.84	NR	NR	7.85	5.56
Mean	7.72	8.47	8.10	7.55	9.02	< 8	6.93	7.70	7.75	8.04	7.68			7.76	6.16
Median	7.70	8.50	8.10	7.55	8.99	< 8	6.85	7.75	7.81	8.01	7.67			7.75	6.14
Std.Dev.	0.04	0.37	0.45	0.14	0.45	-	0.20	0.17	0.81	0.25	0.13			0.08	0.36
Rel.Std.Dev.	0.53%	4.40%	5.52%	1.83%	4.95%	-	2.8%	2.27%	10.5%	3.09%	1.64%			1.09%	5.78%
PDM ³	-0.67%	8.98%	4.26%	-2.82%	16.1%	-	-10.8%	-0.90%	-0.24%	3.43%	-1.14%			-0.14%	-20.7%

Table A9. Analytical results for fusion Fe in OREAS 101b (abbreviations as in Table A1; values in wt.%).

Replicate No.	Lab A PF*MS	Lab B PF*OES	Lab C PF*OES	Lab D PF*OES	Lab E PF*OES	Lab F PF*MS	Lab G PF*OES	Lab H BF*MS	Lab I BF*OES	Lab J -	Lab K BF*MS	Lab L -	Lab M -	Lab N BF*OES	Lab O BF*OES
1	11.20	10.90	10.87	11.00	10.29	11.00	10.20	10.66	10.50	NR	10.60	NR	NR	10.99	10.64
2	11.17	11.20	10.82	10.90	10.56	11.00	10.70	10.75	10.71	NR	10.55	NR	NR	10.93	10.69
3	11.05	11.10	10.72	10.80	10.64	11.00	10.60	10.81	10.72	NR	10.60	NR	NR	11.04	10.74
4	11.19	10.90	10.72	10.80	10.42	10.00	10.70	10.90	10.67	NR	10.60	NR	NR	10.94	10.67
5	11.26	11.10	10.76	11.00	10.48	10.00	10.10	11.25	10.47	NR	10.45	NR	NR	10.92	10.55
6	11.23	11.00	10.86	10.90	10.49	11.00	10.10	10.70	10.60	NR	10.60	NR	NR	11.08	10.58
Mean	11.18	11.03	10.79	10.90	10.48	10.67	10.40	10.85	10.61		10.57			10.98	10.65
Median	11.20	11.05	10.79	10.90	10.48	11.00	10.40	10.78	10.63		10.60			10.96	10.65
Std.Dev.	0.07	0.12	0.07	0.09	0.12	0.52	0.30	0.22	0.11		0.06			0.07	0.07
Rel.Std.Dev.	0.65%	1.10%	0.63%	0.82%	1.17%	4.84%	2.85%	2.00%	1.00%		0.57%			0.60%	0.68%
PDM ³	4.01%	2.62%	0.37%	1.38%	-2.53%	-0.79%	-3.27%	0.88%	-1.32%		-1.72%			2.13%	-0.99%

Table A10. Analytical results for fusion Gd in OREAS 101b (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A PF*MS	Lab B PF*MS	Lab C PF*MS	Lab D PF*MS	Lab E PF*MS	Lab F PF*MS	Lab G PF*OES	Lab H BF*MS	Lab I BF*MS	Lab J BF*MS	Lab K BF*MS	Lab L -	Lab M -	Lab N BF*OES	Lab O BF*OES
1	33.1	36.0	39.8	40.2	45.0	50.0	37.0	40.3	30.8	49.6	48.1	NR	NR	34.8	39.7
2	33.2	36.0	38.7	39.0	46.2	51.0	36.0	42.3	34.4	49.1	46.5	NR	NR	36.2	38.9
3	33.1	38.0	37.8	39.5	48.7	50.0	38.0	42.1	28.3	50.8	47.7	NR	NR	36.5	40.3
4	33.6	36.0	42.4	39.2	47.4	49.0	36.0	42.1	30.3	48.6	46.9	NR	NR	36.5	39.1
5	32.5	38.0	43.9	38.8	50.3	49.0	39.0	42.0	42.1	48.0	46.4	NR	NR	34.9	37.3
6	33.7	38.0	44.2	40.8	51.0	50.0	37.0	40.3	35.8	48.5	47.9	NR	NR	35.6	35.0
Mean	33.2	37.0	41.1	39.6	48.1	49.8	37.2	41.5	33.6	49.1	47.3			35.8	38.4
Median	33.2	37.0	41.1	39.4	48.1	50.0	37.0	42.0	32.6	48.9	47.3			35.9	39.0
Std.Dev.	0.4	1.1	2.7	0.8	2.3	0.8	1.2	1.0	5.0	1.0	0.7			0.8	1.9
Rel.Std.Dev.	1.29%	2.96%	6.66%	1.95%	4.82%	1.51%	3.15%	2.33%	14.8%	2.03%	1.57%			2.12%	5.05%
PDM ³	-18.9%	-9.64%	0.45%	-3.33%	17.5%	21.7%	-9.23%	1.38%	-17.9%	19.9%	15.4%			-12.7%	-6.26%

Table A11. Analytical results for fusion Ho in OREAS 101b (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A PF*MS	Lab B PF*MS	Lab C PF*MS	Lab D PF*MS	Lab E PF*MS	Lab F PF*MS	Lab G PF*OES	Lab H BF*MS	Lab I BF*MS	Lab J BF*MS	Lab K BF*MS	Lab L -	Lab M -	Lab N BF*OES	Lab O BF*OES
1	6.70	6.80	3.10	6.40	6.90	7.00	6.10	6.20	6.00	6.12	6.60	NR	NR	NR	5.96
2	6.40	7.40	5.80	6.20	7.11	7.00	5.80	6.40	6.60	6.33	6.61	NR	NR	NR	5.60
3	6.40	7.60	5.60	6.30	7.52	7.00	5.90	6.42	5.30	6.23	6.70	NR	NR	NR	6.16
4	6.60	6.80	6.20	6.20	7.29	7.00	5.70	6.42	5.80	6.00	6.52	NR	NR	NR	5.79
5	6.60	7.60	6.50	6.20	7.78	6.00	6.30	6.26	6.50	6.01	6.56	NR	NR	NR	5.77
6	6.50	7.20	6.40	6.50	7.90	7.00	5.80	6.22	6.40	6.05	6.69	NR	NR	NR	5.44
Mean	6.53	7.23	5.60	6.30	7.42	6.83	5.93	6.32	6.10	6.12	6.61				5.79
Median	6.55	7.30	6.00	6.25	7.41	7.00	5.85	6.33	6.20	6.09	6.61				5.78
Std.Dev.	0.12	0.37	1.27	0.13	0.39	0.41	0.23	0.11	0.50	0.13	0.07				0.25
Rel.Std.Dev.	1.85%	5.07%	22.7%	2.01%	5.22%	5.97%	3.8%	1.69%	8.16%	2.16%	1.07%				4.40%
PDM ³	3.01%	14.1%	-11.7%	-0.67%	16.9%	7.74%	-6.45%	-0.34%	-3.82%	-3.45%	4.28%				-8.76%

Table A12. Analytical results for fusion K in OREAS 101b (abbreviations as in Table A1; values in wt.%).

Replicate No.	Lab A PF*OES	Lab B PF*OES	Lab C PF*OES	Lab D PF*OES	Lab E PF*OES	Lab F PF*OES	Lab G PF*OES	Lab H BF*MS	Lab I BF*OES	Lab J -	Lab K BF*MS	Lab L -	Lab M -	Lab N BF*OES	Lab O BF*OES
1	2.56	2.30	2.40	2.75	2.13	2.60	2.46	1.80	2.24	NR	2.48	NR	NR	2.41	2.36
2	2.56	2.30	2.34	2.73	2.22	2.70	2.60	2.08	2.38	NR	2.44	NR	NR	2.41	2.36
3	2.56	2.20	2.37	2.72	2.18	2.80	2.49	2.08	2.34	NR	2.43	NR	NR	2.41	2.36
4	2.54	2.30	2.39	2.72	2.17	2.70	2.64	2.19	2.38	NR	2.46	NR	NR	2.37	2.35
5	2.54	2.30	2.36	2.74	2.20	2.70	2.67	1.94	2.40	NR	2.43	NR	NR	2.37	2.36
6	2.53	2.30	2.40	2.76	2.21	2.60	2.48	2.52	2.33	NR	2.45	NR	NR	2.42	2.35
Mean	2.55	2.28	2.38	2.74	2.18	2.68	2.56	2.10	2.35		2.45			2.40	2.36
Median	2.55	2.30	2.38	2.74	2.19	2.70	2.55	2.08	2.36		2.45			2.41	2.36
Std.Dev.	0.01	0.04	0.02	0.02	0.03	0.08	0.09	0.25	0.06		0.02			0.02	0.01
Rel.Std.Dev.	0.52%	1.79%	0.98%	0.60%	1.50%	2.81%	3.56%	11.7%	2.46%		0.79%			1.04%	0.26%
PDM ³	5.39%	-5.57%	-1.75%	13.2%	-9.71%	11.0%	5.73%	-13.0%	-2.96%		1.25%			-0.70%	-2.52%

Table A13. Analytical results for fusion La in OREAS 101b (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A PF*MS	Lab B PF*MS	Lab C PF*MS	Lab D PF*OES	Lab E PF*MS	Lab F PF*MS	Lab G -	Lab H BF*MS	Lab I BF*MS	Lab J BF*MS	Lab K BF*MS	Lab L -	Lab M -	Lab N BF*OES	Lab O BF*OES
1	757	791	828	780	851	800	NR	796	693	768	853	NR	NR	727	760
2	731	844	837	760	881	790	NR	834	745	787	832	NR	NR	730	723
3	736	847	837	740	918	790	NR	841	634	786	843	NR	NR	742	761
4	740	816	877	770	895	760	NR	839	672	782	823	NR	NR	743	699
5	728	840	822	770	981	780	NR	834	754	752	844	NR	NR	718	701
6	737	801	825	780	982	790	NR	802	683	764	843	NR	NR	727	692
Mean	738	823	838	767	918	785		824	697	773	840			731	723
Median	736	828	833	770	906	790		834	688	775	843			729	712
Std.Dev.	10	24	20	15	54	14		20	46	14	11			10	31
Rel.Std.Dev.	1.37%	2.91%	2.42%	1.96%	5.88%	1.76%		2.42%	6.53%	1.82%	1.26%			1.30%	4.32%
PDM ³	-6.49%	4.31%	6.15%	-2.85%	16.3%	-0.52%		4.46%	-11.7%	-2.02%	6.40%			-7.37%	-8.42%

Table A14. Analytical results for fusion Lu in OREAS 101b (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A PF*MS	Lab B PF*MS	Lab C PF*MS	Lab D PF*MS	Lab E PF*MS	Lab F PF*MS	Lab G -	Lab H BF*MS	Lab I BF*MS	Lab J BF*MS	Lab K BF*MS	Lab L -	Lab M -	Lab N BF*OES	Lab O BF*OES
1	2.70	2.60	2.60	2.50	2.76	< 8	NR	NR	2.37	2.39	2.60	NR	NR	2.65	2.39
2	2.59	2.60	2.50	2.40	2.81	< 8	NR	NR	2.52	2.53	2.59	NR	NR	2.71	2.20
3	2.67	2.80	2.40	2.50	3.08	< 8	NR	NR	2.20	2.50	2.63	NR	NR	2.77	2.38
4	2.62	2.80	2.70	2.40	2.88	< 8	NR	NR	2.34	2.45	2.56	NR	NR	2.75	2.29
5	2.61	2.80	2.80	2.40	3.04	< 8	NR	NR	2.53	2.37	2.58	NR	NR	2.72	2.22
6	2.64	2.80	2.90	2.50	3.03	< 8	NR	NR	2.47	2.43	2.62	NR	NR	2.74	2.05
Mean	2.64	2.73	2.65	2.45	2.93	< 8			2.41	2.45	2.60			2.72	2.25
Median	2.63	2.80	2.65	2.45	2.95	< 8			2.42	2.44	2.60			2.73	2.26
Std.Dev.	0.04	0.10	0.19	0.05	0.13	-			0.13	0.06	0.03			0.04	0.13
Rel.Std.Dev.	1.54%	3.78%	7.06%	2.24%	4.54%	-			5.28%	2.53%	0.99%			1.53%	5.68%
PDM ³	2.15%	5.83%	2.60%	-5.14%	13.5%	-			-6.88%	-5.33%	0.54%			5.44%	-12.7%

Table A15. Analytical results for fusion Mg in OREAS 101b (abbreviations as in Table A1; values in wt.%).

Replicate No.	Lab A PF*OES	Lab B PF*OES	Lab C PF*OES	Lab D PF*OES	Lab E PF*OES	Lab F PF*OES	Lab G PF*OES	Lab H BF*MS	Lab I BF*OES	Lab J -	Lab K BF*MS	Lab L -	Lab M -	Lab N BF*OES	Lab O BF*OES
1	1.27	1.24	1.26	1.21	1.16	1.10	1.18	1.28	1.24	NR	1.28	NR	NR	1.25	1.30
2	1.26	1.22	1.24	1.20	1.20	1.10	1.20	1.30	1.22	NR	1.27	NR	NR	1.23	1.31
3	1.27	1.20	1.24	1.19	1.19	1.10	1.23	1.30	1.23	NR	1.28	NR	NR	1.25	1.31
4	1.28	1.21	1.24	1.19	1.16	1.10	1.23	1.33	1.22	NR	1.28	NR	NR	1.22	1.30
5	1.29	1.26	1.23	1.21	1.18	1.10	1.21	1.27	1.24	NR	1.28	NR	NR	1.24	1.30
6	1.26	1.23	1.25	1.19	1.17	1.20	1.19	1.30	1.26	NR	1.28	NR	NR	1.26	1.29
Mean	1.27	1.23	1.24	1.20	1.18	1.12	1.21	1.30	1.23		1.28			1.24	1.30
Median	1.27	1.23	1.24	1.20	1.18	1.10	1.21	1.30	1.23		1.28			1.25	1.30
Std.Dev.	0.01	0.02	0.01	0.01	0.02	0.04	0.02	0.02	0.02		0.00			0.02	0.01
Rel.Std.Dev.	0.92%	1.76%	0.74%	0.82%	1.37%	3.66%	1.71%	1.57%	1.30%		0.32%			1.27%	0.69%
PDM ³	3.15%	-0.50%	0.90%	-2.80%	-4.65%	-9.43%	-2.13%	5.34%	0.12%		3.69%			0.78%	5.54%

Table A16. Analytical results for fusion Mn in OREAS 101b (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A PF*OES	Lab B PF*OES	Lab C PF*OES	Lab D PF*MS	Lab E PF*OES	Lab F PF*OES	Lab G PF*OES	Lab H BF*MS	Lab I BF*OES	Lab J -	Lab K BF*MS	Lab L -	Lab M -	Lab N -	Lab O BF*OES
1	957	960	920	1050	856	910	900	929	937	NR	900	NR	NR	NR	939
2	953	960	900	1060	874	880	900	929	937	NR	1000	NR	NR	NR	955
3	949	980	900	1090	882	900	900	929	953	NR	1000	NR	NR	NR	941
4	953	980	920	1030	866	900	900	929	945	NR	1000	NR	NR	NR	945
5	967	940	910	1080	871	870	900	1007	945	NR	900	NR	NR	NR	944
6	966	980	930	1090	872	950	900	929	953	NR	1000	NR	NR	NR	947
Mean	958	967	913	1067	870	902	900	942	945		967				945
Median	955	970	915	1070	871	900	900	929	945		1000				944
Std.Dev.	7	16	12	24	9	28	0	32	7		52				6
Rel.Std.Dev.	0.78%	1.69%	1.33%	2.27%	1.00%	3.09%	0.00%	3.36%	0.73%		5.34%				0.60%
PDM ³	2.84%	3.82%	-1.91%	14.6%	-6.55%	-3.16%	-3.34%	1.20%	1.48%		3.82%				1.49%

Table A17. Analytical results for fusion Mo in OREAS 101b (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A PF*MS	Lab B PF*MS	Lab C PF*MS	Lab D PF*MS	Lab E PF*MS	Lab F PF*MS	Lab G -	Lab H BF*MS	Lab I BF*MS	Lab J BF*MS	Lab K BF*MS	Lab L -	Lab M -	Lab N -	Lab O -
1	22.0	20.0	21.7	21.7	21.3	23.0	NR	19.9	20.0	19.0	22.0	NR	NR	NR	NR
2	21.0	20.0	21.9	21.6	21.6	20.0	NR	20.2	18.0	19.0	22.0	NR	NR	NR	NR
3	23.0	20.0	21.7	23.1	21.9	21.0	NR	20.6	17.0	20.0	23.0	NR	NR	NR	NR
4	22.0	10.0	23.0	22.4	21.9	21.0	NR	20.6	18.0	19.0	22.0	NR	NR	NR	NR
5	21.0	20.0	21.5	21.0	23.3	21.0	NR	20.4	20.0	19.0	22.0	NR	NR	NR	NR
6	21.0	20.0	21.1	23.6	23.1	21.0	NR	20.1	20.0	19.0	22.0	NR	NR	NR	NR
Mean	21.7	18.3	21.8	22.2	22.2	21.2		20.3	18.8	19.2	22.2				
Median	21.5	20.0	21.7	22.1	21.9	21.0		20.3	19.0	19.0	22.0				
Std.Dev.	0.8	4.1	0.6	1.0	0.8	1.0		0.3	1.3	0.4	0.4				
Rel.Std.Dev.	3.77%	22.3%	2.93%	4.43%	3.61%	4.65%		1.33%	7.1%	2.13%	1.84%				
PDM ³	3.51%	-12.4%	4.23%	6.22%	5.95%	1.13%		-2.91%	-10.0%	-8.43%	5.90%				

Table A18. Analytical results for fusion Nd in OREAS 101b (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A PF*MS	Lab B PF*MS	Lab C PF*MS	Lab D PF*MS	Lab E PF*MS	Lab F PF*MS	Lab G PF*OES	Lab H BF*MS	Lab I BF*MS	Lab J BF*MS	Lab K BF*MS	Lab L -	Lab M -	Lab N BF*OES	Lab O BF*OES
1	377	406	391	420	407	380	370	373	313	340	372	NR	NR	387	353
2	367	418	382	409	420	370	350	381	337	347	363	NR	NR	399	331
3	367	421	373	412	434	370	380	388	285	349	372	NR	NR	403	353
4	370	414	422	404	432	360	360	390	298	349	367	NR	NR	390	336
5	374	422	424	407	461	380	380	381	329	338	365	NR	NR	386	328
6	369	417	415	421	462	380	360	369	303	340	377	NR	NR	394	345
Mean	371	416	401	412	436	373	367	380	311	344	369			393	341
Median	369	418	403	411	433	375	365	381	308	344	370			392	341
Std.Dev.	4	6	22	7	22	8	12	8	20	5	5			7	11
Rel.Std.Dev.	1.11%	1.40%	5.55%	1.69%	5.00%	2.19%	3.3%	2.17%	6.29%	1.46%	1.42%			1.73%	3.21%
PDM ³	-1.96%	10.2%	6.11%	9.06%	15.3%	-1.21%	-2.98%	0.61%	-17.8%	-9.02%	-2.27%			4.02%	-9.77%

Table A19. Analytical results for fusion Ni in OREAS 101b (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A PF*OES	Lab B PF*OES	Lab C PF*OES	Lab D PF*MS	Lab E PF*OES	Lab F PF*MS	Lab G -	Lab H BF*MS	Lab I BF*MS	Lab J BF*MS	Lab K BF*MS	Lab L -	Lab M -	Lab N BF*OES	Lab O -
1	<20	<50	21.0	<20	5.0	< 25	NR	<15	10.0	<5	11.0	NR	NR	<20	NR
2	<20	<50	19.0	10.0	4.9	< 25	NR	<15	10.0	<5	11.0	NR	NR	<20	NR
3	<20	<50	20.0	20.0	5.7	< 25	NR	<15	10.0	<5	12.0	NR	NR	<20	NR
4	<20	<50	19.0	10.0	6.6	< 25	NR	<15	10.0	<5	13.0	NR	NR	<20	NR
5	<20	<50	21.0	10.0	5.6	< 25	NR	<15	10.0	<5	10.0	NR	NR	<20	NR
6	<20	<50	17.0	10.0	7.3	< 25	NR	<15	10.0	<5	10.0	NR	NR	<20	NR
Mean			19.5	12.0	5.9				10.0		11.2				
Median			19.5	10.0	5.7				10.0		11.0				
Std.Dev.			1.5	4.5	0.9				0.0		1.2				
Rel.Std.Dev.			7.78%	37.3%	15.7%				0.00%		10.5%				
PDM ³			110.6%	29.57%	-36.5%				7.98%		20.57%				

Table A20. Analytical results for fusion P in OREAS 101b (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A PF*OES	Lab B PF*OES	Lab C PF*OES	Lab D PF*OES	Lab E PF*OES	Lab F -	Lab G -	Lab H BF*MS	Lab I BF*OES	Lab J -	Lab K BF*MS	Lab L -	Lab M -	Lab N BF*OES	Lab O BF*OES
1	1300	1400	1200	900	1042	NR	NR	1222	1266	NR	1100	NR	NR	1213	1016
2	1300	1200	1200	800	1061	NR	NR	1266	1266	NR	1100	NR	NR	1227	1194
3	1200	1300	1210	700	1154	NR	NR	1135	1266	NR	1200	NR	NR	1218	1357
4	1200	1300	1190	800	1077	NR	NR	1266	1222	NR	1100	NR	NR	1152	1208
5	1200	1400	1180	700	1102	NR	NR	1178	1266	NR	1100	NR	NR	1170	1108
6	1400	1500	1080	900	1058	NR	NR	1178	1266	NR	1200	NR	NR	1179	1128
Mean	1267	1350	1177	800	1082			1207	1258		1133			1193	1168
Median	1250	1350	1195	800	1069			1200	1266		1100			1196	1161
Std.Dev.	82	105	48	89	41			53	18		52			30	115
Rel.Std.Dev.	6.45%	7.77%	4.12%	11.2%	3.76%			4.38%	1.42%		4.56%			2.53%	9.85%
PDM ³	5.81%	12.8%	-1.71%	-33.2%	-9.58%			0.86%	5.12%		-5.33%			-0.33%	-2.39%

Table A21. Analytical results for fusion Pb in OREAS 101b (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A PF*MS	Lab B PF*MS	Lab C PF*OES	Lab D PF*MS	Lab E PF*MS	Lab F PF*MS	Lab G -	Lab H BF*MS	Lab I BF*MS	Lab J BF*MS	Lab K BF*MS	Lab L -	Lab M -	Lab N -	Lab O -
1	30.0	60.0	<15	13.0	11.8	29.0	NR	17.0	17.0	13.0	20.7	NR	NR	NR	NR
2	28.0	50.0	<15	22.0	12.7	24.0	NR	17.1	8.0	13.0	21.5	NR	NR	NR	NR
3	28.0	50.0	<15	15.0	11.3	33.0	NR	17.6	8.0	12.0	20.9	NR	NR	NR	NR
4	30.0	60.0	<15	20.0	11.9	25.0	NR	21.7	8.0	12.0	21.2	NR	NR	NR	NR
5	29.0	20.0	<15	20.0	15.9	22.0	NR	17.1	13.0	11.0	20.9	NR	NR	NR	NR
6	27.0	30.0	<15	16.0	12.3	< 20	NR	16.5	18.0	11.0	20.2	NR	NR	NR	NR
Mean	28.7	45.0		17.7	12.6	26.6		17.8	12.0	12.0	20.9				
Median	28.5	50.0		18.0	12.1	25.0		17.1	10.5	12.0	20.9				
Std.Dev.	1.2	16.4		3.5	1.7	4.4		1.9	4.7	0.9	0.4				
Rel.Std.Dev.	4.22%	36.5%		19.8%	13.2%	16.5%		10.6%	39.1%	7.45%	2.12%				
PDM ³	56.1%	145%		-3.8%	-31.1%	44.9%		-2.9%	-34.6%	-34.6%	13.82%				

Table A22. Analytical results for fusion Pr in OREAS 101b (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A PF*MS	Lab B PF*MS	Lab C PF*MS	Lab D PF*MS	Lab E PF*MS	Lab F PF*MS	Lab G PF*OES	Lab H BF*MS	Lab I BF*MS	Lab J BF*MS	Lab K BF*MS	Lab L -	Lab M -	Lab N BF*OES	Lab O BF*OES
1	119	125	132	132	134	130	110	125	126	123	124	NR	NR	128	120
2	115	140	129	128	138	130	110	128	127	126	122	NR	NR	129	113
3	117	145	126	128	144	130	120	130	119	127	125	NR	NR	132	121
4	118	139	140	126	143	120	110	129	124	125	122	NR	NR	130	114
5	119	139	143	127	151	130	120	128	116	122	122	NR	NR	125	112
6	118	138	139	131	152	130	110	125	122	123	126	NR	NR	128	113
Mean	118	138	135	129	144	128	113	127	122	124	123			129	116
Median	118	139	136	128	144	130	110	128	123	124	123			129	114
Std.Dev.	1	7	7	2	7	4	5	2	4	2	2			2	4
Rel.Std.Dev.	1.24%	4.85%	5.04%	1.82%	4.77%	3.18%	4.56%	1.61%	3.5%	1.59%	1.47%			1.73%	3.43%
PDM ³	-7.23%	8.61%	6.38%	1.51%	13.4%	1.25%	-10.6%	0.41%	-3.49%	-2.30%	-2.76%			1.53%	-8.78%

Table A23. Analytical results for fusion Sm in OREAS 101b (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A PF*MS	Lab B PF*MS	Lab C PF*MS	Lab D PF*MS	Lab E PF*MS	Lab F PF*MS	Lab G PF*OES	Lab H BF*MS	Lab I BF*MS	Lab J BF*MS	Lab K BF*MS	Lab L -	Lab M -	Lab N BF*OES	Lab O BF*OES
1	48.9	50.0	50.1	49.3	51.9	49.0	43.0	47.7	43.4	46.4	46.6	NR	NR	47.0	47.3
2	46.8	52.0	49.5	47.4	53.0	47.0	42.0	49.7	50.3	47.4	46.8	NR	NR	47.1	44.4
3	47.5	54.5	47.7	47.7	55.5	47.0	44.0	50.0	39.7	47.8	47.4	NR	NR	47.7	47.3
4	48.2	52.5	54.6	47.6	55.1	47.0	43.0	49.7	41.7	47.7	46.5	NR	NR	47.3	44.3
5	46.6	53.5	54.8	47.6	57.8	48.0	45.0	49.0	49.1	46.3	46.3	NR	NR	46.5	43.6
6	45.8	48.0	53.4	49.0	58.0	49.0	43.0	48.1	49.5	46.0	48.2	NR	NR	47.4	43.8
Mean	47.3	51.8	51.7	48.1	55.2	47.8	43.3	49.1	45.6	46.9	47.0			47.2	45.1
Median	47.2	52.3	51.8	47.7	55.3	47.5	43.0	49.4	46.3	46.9	46.7			47.2	44.3
Std.Dev.	1.1	2.4	3.0	0.8	2.5	1.0	1.0	1.0	4.6	0.8	0.7			0.4	1.7
Rel.Std.Dev.	2.39%	4.60%	5.76%	1.71%	4.49%	2.06%	2.38%	1.96%	10.0%	1.68%	1.52%			0.84%	3.79%
PDM ³	-0.47%	8.90%	8.76%	1.22%	16.2%	0.65%	-8.81%	3.23%	-4.01%	-1.24%	-1.17%			-0.73%	-5.10%

Table A24. Analytical results for fusion Tb in OREAS 101b (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A PF*MS	Lab B PF*MS	Lab C PF*MS	Lab D PF*MS	Lab E PF*MS	Lab F PF*MS	Lab G -	Lab H BF*MS	Lab I BF*MS	Lab J BF*MS	Lab K BF*MS	Lab L -	Lab M -	Lab N BF*OES	Lab O BF*OES
1	4.84	5.40	5.40	5.40	6.57	< 8	NR	5.40	5.10	5.67	6.47	NR	NR	5.37	5.12
2	5.20	5.80	5.30	5.10	6.75	< 8	NR	5.57	5.60	5.81	6.43	NR	NR	5.41	4.88
3	4.91	5.60	5.10	5.40	7.13	< 8	NR	5.62	4.70	5.91	6.53	NR	NR	5.58	5.16
4	5.16	5.60	5.80	5.20	6.91	< 8	NR	5.59	5.20	5.78	6.43	NR	NR	5.54	4.89
5	4.78	5.60	5.90	5.30	7.47	< 8	NR	5.43	5.90	5.52	6.34	NR	NR	5.36	4.82
6	4.96	5.60	5.90	5.50	7.48	< 8	NR	5.42	5.60	5.56	6.52	NR	NR	5.37	4.53
Mean	4.98	5.60	5.57	5.32	7.05	< 8		5.50	5.35	5.71	6.45			5.44	4.90
Median	4.94	5.60	5.60	5.35	7.02	< 8		5.50	5.40	5.73	6.45			5.39	4.89
Std.Dev.	0.17	0.13	0.34	0.15	0.38	-		0.10	0.43	0.15	0.07			0.10	0.23
Rel.Std.Dev.	3.43%	2.26%	6.19%	2.77%	5.33%	-		1.82%	8.08%	2.66%	1.09%			1.78%	4.68%
PDM ³	-7.41%	4.22%	3.60%	-1.05%	31.2%	-		2.44%	-0.43%	6.23%	20.1%			1.21%	-8.80%

Table A25. Analytical results for fusion Th in OREAS 101b (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A PF*MS	Lab B PF*MS	Lab C PF*MS	Lab D PF*MS	Lab E PF*MS	Lab F PF*MS	Lab G -	Lab H BF*MS	Lab I BF*MS	Lab J BF*MS	Lab K BF*MS	Lab L -	Lab M -	Lab N BF*OES	Lab O BF*OES
1	34.6	34.0	42.0	44.3	41.4	36.0	NR	35.1	39.2	35.7	38.7	NR	NR	40.3	37.3
2	34.6	36.0	42.2	35.0	41.3	36.0	NR	35.5	36.5	36.5	39.0	NR	NR	40.7	32.0
3	34.6	37.5	41.3	48.1	40.4	35.0	NR	36.3	35.4	36.6	39.1	NR	NR	42.5	36.9
4	34.4	35.5	42.6	36.1	40.8	36.0	NR	36.2	37.2	35.6	38.6	NR	NR	39.9	37.3
5	35.2	34.5	40.3	35.3	41.4	36.0	NR	33.7	36.9	35.0	38.2	NR	NR	42.0	33.6
6	34.7	35.0	39.7	38.9	40.5	36.0	NR	35.2	37.6	34.9	39.6	NR	NR	38.6	36.0
Mean	34.7	35.4	41.4	39.6	41.0	35.8		35.3	37.1	35.7	38.9			40.7	35.5
Median	34.6	35.3	41.7	37.5	41.1	36.0		35.4	37.1	35.7	38.9			40.5	36.4
Std.Dev.	0.3	1.2	1.1	5.4	0.5	0.4		1.0	1.3	0.7	0.5			1.4	2.2
Rel.Std.Dev.	0.78%	3.51%	2.76%	13.7%	1.15%	1.14%		2.73%	3.40%	2.01%	1.24%			3.50%	6.29%
PDM ³	-6.55%	-4.57%	11.4%	6.7%	10.4%	-3.45%		-4.77%	0.05%	-3.76%	4.72%			9.57%	-4.34%

Table A26. Analytical results for fusion Ti in OREAS 101b (abbreviations as in Table A1; values in wt.%).

Replicate No.	Lab A PF*OES	Lab B PF*OES	Lab C PF*OES	Lab D PF*MS	Lab E PF*OES	Lab F PF*OES	Lab G PF*OES	Lab H BF*MS	Lab I BF*OES	Lab J -	Lab K BF*MS	Lab L -	Lab M -	Lab N BF*OES	Lab O BF*OES
1	0.400	0.380	0.386	0.457	0.352	0.390	0.370	0.383	0.380	NR	0.410	NR	NR	0.384	0.385
2	0.390	0.390	0.385	0.456	0.362	0.400	0.390	0.387	0.389	NR	0.410	NR	NR	0.384	0.391
3	0.390	0.390	0.382	0.468	0.364	0.400	0.380	0.385	0.389	NR	0.400	NR	NR	0.384	0.387
4	0.400	0.370	0.380	0.446	0.357	0.420	0.390	0.393	0.383	NR	0.400	NR	NR	0.378	0.389
5	0.400	0.380	0.382	0.471	0.360	0.390	0.380	0.394	0.376	NR	0.420	NR	NR	0.378	0.387
6	0.400	0.370	0.389	0.475	0.360	0.400	0.370	0.384	0.382	NR	0.410	NR	NR	0.384	0.387
Mean	0.397	0.380	0.384	0.462	0.359	0.400	0.380	0.388	0.383		0.408			0.382	0.388
Median	0.400	0.380	0.384	0.463	0.360	0.400	0.380	0.386	0.382		0.410			0.384	0.387
Std.Dev.	0.005	0.009	0.003	0.011	0.004	0.011	0.009	0.005	0.005		0.008			0.003	0.002
Rel.Std.Dev.	1.30%	2.35%	0.86%	2.38%	1.23%	2.74%	2.35%	1.20%	1.35%		1.84%			0.81%	0.46%
PDM ³	2.67%	-1.64%	-0.60%	19.6%	-7.06%	3.54%	-1.64%	0.37%	-0.82%		5.69%			-1.20%	0.36%

Table A27. Analytical results for fusion Tm in OREAS 101b (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A PF*OES	Lab B PF*MS	Lab C PF*MS	Lab D -	Lab E PF*MS	Lab F PF*MS	Lab G PF*OES	Lab H BF*MS	Lab I BF*MS	Lab J BF*MS	Lab K BF*MS	Lab L -	Lab M -	Lab N BF*OES	Lab O BF*OES
1	2.70	2.80	2.70	NR	2.99	< 10	2.50	2.59	2.59	2.70	2.76	NR	NR	2.94	2.71
2	2.70	3.00	2.60	NR	3.12	< 10	2.40	2.69	2.91	2.71	2.75	NR	NR	2.94	2.49
3	2.70	3.00	2.60	NR	3.19	< 10	2.60	2.72	2.40	2.84	2.81	NR	NR	3.04	2.72
4	2.60	3.00	2.80	NR	3.11	< 10	2.40	2.69	2.55	2.71	2.75	NR	NR	3.05	2.60
5	2.70	3.20	3.00	NR	3.38	< 10	2.70	2.58	2.84	2.67	2.76	NR	NR	2.95	2.50
6	2.70	2.80	2.90	NR	3.29	< 10	2.50	2.64	2.77	2.63	2.90	NR	NR	3.12	2.33
Mean	2.68	2.97	2.77		3.18	< 10	2.52	2.65	2.68	2.71	2.79			3.01	2.56
Median	2.70	3.00	2.75		3.15	< 10	2.50	2.67	2.68	2.71	2.76			3.00	2.55
Std.Dev.	0.04	0.15	0.16		0.14	-	0.12	0.06	0.19	0.07	0.06			0.07	0.15
Rel.Std.Dev.	1.52%	5.07%	5.90%		4.38%	-	4.65%	2.25%	7.28%	2.61%	2.12%			2.49%	5.84%
PDM ³	0.76%	11.4%	3.89%		19.5%	-	-5.50%	-0.41%	0.51%	1.76%	4.70%			12.9%	-3.99%

Table A28. Analytical results for fusion V in OREAS 101b (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A PF*OES	Lab B PF*OES	Lab C PF*OES	Lab D PF*OES	Lab E PF*MS	Lab F PF*MS	Lab G -	Lab H BF*MS	Lab I BF*OES	Lab J BF*MS	Lab K BF*MS	Lab L -	Lab M -	Lab N BF*OES	Lab O BF*OES
1	71	100	72	80	78	95	NR	65	73	90	84	NR	NR	71	70
2	81	100	73	80	80	91	NR	65	75	95	89	NR	NR	73	68
3	76	100	72	80	80	91	NR	65	77	91	98	NR	NR	72	68
4	80	100	73	80	78	84	NR	65	69	91	103	NR	NR	71	69
5	75	100	73	80	78	88	NR	67	78	89	81	NR	NR	65	68
6	78	100	72	80	78	91	NR	63	75	88	84	NR	NR	69	69
Mean	77	100	73	80	79	90		65	75	91	90			70	69
Median	77	100	73	80	78	91		65	75	91	87			71	68
Std.Dev.	4	0	1	0	1	4		1	3	2	9			3	1
Rel.Std.Dev.	4.76%	0.00%	0.76%	0.00%	1.14%	4.10%		1.82%	4.31%	2.67%	9.79%			4.07%	1.14%
PDM ³	-3.52%	25.6%	-9.0%	0.46%	-1.29%	13.0%		-18.6%	-6.45%	13.9%	12.8%			-11.9%	-13.5%

Table A29. Analytical results for fusion Y in OREAS 101b (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A PF*OES	Lab B PF*MS	Lab C PF*MS	Lab D PF*MS	Lab E PF*MS	Lab F PF*MS	Lab G -	Lab H BF*MS	Lab I BF*OES	Lab J BF*MS	Lab K BF*MS	Lab L -	Lab M -	Lab N BF*OES	Lab O BF*OES
1	175	183	180	191	175	170	NR	170	173	168	186	NR	NR	169	174
2	171	183	181	185	181	170	NR	170	193	172	188	NR	NR	172	178
3	176	187	177	192	187	170	NR	172	177	172	185	NR	NR	176	177
4	177	184	185	183	186	160	NR	173	191	171	183	NR	NR	174	177
5	171	184	177	189	198	170	NR	175	172	167	184	NR	NR	166	178
6	175	189	187	192	194	170	NR	169	174	168	189	NR	NR	171	179
Mean	174	185	181	189	187	168		172	180	169	186			171	177
Median	175	184	181	190	187	170		171	176	169	185			171	177
Std.Dev.	2	2	4	4	8	4		2	9	3	2			4	2
Rel.Std.Dev.	1.40%	1.32%	2.27%	2.03%	4.46%	2.43%		1.23%	5.26%	1.49%	1.29%			2.09%	0.90%
PDM ³	-2.39%	3.81%	1.66%	5.87%	4.86%	-5.54%		-3.67%	1.00%	-4.93%	4.09%			-3.99%	-0.62%

Table A30. Analytical results for fusion Yb in OREAS 101b (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A PF*OES	Lab B PF*MS	Lab C PF*MS	Lab D PF*MS	Lab E PF*MS	Lab F -	Lab G -	Lab H BF*MS	Lab I BF*MS	Lab J BF*MS	Lab K BF*MS	Lab L -	Lab M -	Lab N BF*OES	Lab O BF*OES
1	17.1	15.1	19.1	17.8	19.4	18.0	NR	17.3	16.6	16.4	18.5	NR	NR	18.1	16.4
2	17.1	14.9	18.7	17.0	19.6	18.0	NR	17.9	18.2	17.0	18.7	NR	NR	18.2	15.3
3	17.7	15.8	17.8	16.9	20.7	18.0	NR	18.1	15.2	17.3	19.0	NR	NR	18.6	16.7
4	17.7	14.3	20.1	17.1	20.5	18.0	NR	17.9	16.0	16.6	18.5	NR	NR	18.2	15.5
5	17.4	15.2	21.0	17.0	21.5	18.0	NR	17.4	17.7	15.7	18.2	NR	NR	17.8	15.3
6	17.5	14.4	19.7	17.9	21.6	18.0	NR	17.4	17.9	16.6	18.8	NR	NR	18.3	15.3
Mean	17.4	15.0	19.4	17.3	20.5	18.0		17.7	16.9	16.6	18.6			18.2	15.7
Median	17.5	15.0	19.4	17.1	20.6	18.0		17.6	17.2	16.6	18.6			18.2	15.4
Std.Dev.	0.3	0.6	1.1	0.4	0.9	0.0		0.4	1.2	0.6	0.3			0.3	0.6
Rel.Std.Dev.	1.56%	3.71%	5.78%	2.57%	4.53%	0.00%		2.03%	7.04%	3.35%	1.50%			1.44%	4.01%
PDM ³	-1.07%	-15.1%	10.2%	-1.83%	16.7%	2.24%		0.33%	-3.82%	-5.90%	5.55%			3.33%	-10.6%

Table A31. Analytical results for 4-acid U in OREAS 101b (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A	Lab B	Lab C	Lab D	Lab E	Lab F	Lab G	Lab H	Lab I	Lab J	Lab K	Lab L	Lab M	Lab N	Lab O
1	4A*MS	4A*MS	4A*MS	4A*MS	4A*MS	4A*MS	4A*OES	4A*MS	4A*MS	4A*MS	4A*MS	4A*MS	4A*MS	4A*MS	4A*OES
2	387	387	378	394	425	350	387	377	409	323	376	363	309	408	399
3	391	383	376	403	422	350	396	376	397	315	377	347	309	383	405
4	385	394	378	405	429	360	400	375	432	323	376	370	308	392	397
5	380	392	379	394	420	350	408	375	394	330	377	360	319	394	398
6	381	390	383	396	450	340	400	363	401	314	376	352	305	402	406
Mean	394	372	383	406	436	350	394	388	402	324	374	341	302	395	401
Median	386	386	380	400	430	350	398	376	406	322	376	356	309	395	401
Std.Dev.	386	389	379	400	427	350	398	376	402	323	376	356	309	394	400
Rel.Std.Dev.	5	8	3	6	11	6	7	8	14	6	1	11	6	9	4
PDM ³	1.37%	2.08%	0.76%	1.40%	2.63%	1.81%	1.77%	2.06%	3.40%	1.87%	0.29%	3.03%	1.86%	2.21%	0.90%

Table A32. Analytical results for 4-acid Ce in OREAS 101b (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A	Lab B	Lab C	Lab D	Lab E	Lab F	Lab G	Lab H	Lab I	Lab J	Lab K	Lab L	Lab M	Lab N	Lab O
	4A*MS	4A*MS	4A*MS	4A*OES	4A*MS	4A*OES	4A*OES	4A*MS	4A*MS	4A*MS	4A*MS	4A*MS	4A*MS	4A*MS	4A*OES
1	1210	1400	1365	1340	1432	1200	>1000	1432	1330	>500	>500	>500	>500	1253	1391
2	1170	1420	1367	1350	1431	1200	>1000	1374	1320	>500	>500	>500	>500	1189	1387
3	1171	1460	1363	1350	1429	1200	>1000	1386	1400	>500	>500	>500	>500	1222	1372
4	1177	1370	1365	1330	1430	1200	>1000	1433	1290	>500	>500	>500	>500	1246	1364
5	1164	1440	1416	1310	1515	1200	>1000	1390	1320	>500	>500	>500	>500	1245	1386
6	1184	1360	1328	1310	1469	1200	>1000	1417	1310	>500	>500	>500	>500	1224	1378
Mean	1179	1408	1367	1332	1451	1200	>1000	1405	1328	>500	>500	>500	>500	1230	1380
Median	1174	1410	1365	1335	1431	1200	>1000	1404	1320	>500	>500	>500	>500	1235	1382
Std.Dev.	17	39	28	18	35	0	-	25	38	-	-	-	-	24	10
Rel.Std.Dev.	1.41%	2.78%	2.05%	1.38%	2.41%	0.00%	-	1.78%	2.83%	-	-	-	-	1.92%	0.72%
PDM ³	-11.0%	6.32%	3.23%	0.54%	9.55%	-9.40%	-	6.10%	0.28%	-	-	-	-	-7.15%	4.17%

Table A33. Analytical results for 4-acid Co in OREAS 101b (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A 4A*MS	Lab B 4A*OES	Lab C 4A*MS	Lab D 4A*MS	Lab E 4A*MS	Lab F 4A*OES	Lab G 4A*OES	Lab H 4A*MS	Lab I 4A*OES	Lab J 4A*MS	Lab K 4A*MS	Lab L 4A*MS	Lab M 4A*MS	Lab N 4A*MS	Lab O 4A*OES
1	43.3	45.0	43.0	46.8	46.8	45.0	51.0	44.2	49.0	42.8	45.2	43.1	39.0	45.0	45.9
2	44.0	50.0	42.9	48.0	47.1	44.0	49.0	41.6	46.0	39.9	46.2	42.5	40.8	45.0	44.6
3	43.9	50.0	43.5	47.4	46.6	46.0	50.0	42.9	48.0	41.6	45.8	44.8	38.9	44.0	44.8
4	41.3	50.0	43.8	46.1	47.3	46.0	51.0	41.3	48.0	41.2	45.8	43.9	41.0	46.0	45.0
5	43.3	45.0	44.6	46.6	48.4	45.0	50.0	40.8	47.0	40.2	44.9	44.2	38.6	48.0	45.3
6	43.8	45.0	42.6	47.5	47.6	46.0	50.0	41.7	47.0	42.5	43.6	42.5	38.4	47.0	43.9
Mean	43.3	47.5	43.4	47.1	47.3	45.3	50.2	42.1	47.5	41.4	45.3	43.5	39.5	45.8	44.9
Median	43.6	47.5	43.3	47.1	47.2	45.5	50.0	41.7	47.5	41.4	45.5	43.5	39.0	45.5	44.9
Std.Dev.	1.0	2.7	0.7	0.7	0.6	0.8	0.8	1.2	1.0	1.2	0.9	0.9	1.1	1.5	0.7
Rel.Std.Dev.	2.33%	5.77%	1.68%	1.47%	1.34%	1.80%	1.50%	2.97%	2.21%	2.85%	2.06%	2.18%	2.90%	3.21%	1.51%
PDM ³	-3.74%	5.68%	-3.45%	4.71%	5.22%	0.86%	11.6%	-6.38%	5.68%	-7.97%	0.67%	-3.22%	-12.2%	1.97%	-0.07%

Table A34. Analytical results for 4-acid Cu in OREAS 101b (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A 4A*MS	Lab B 4A*OES	Lab C 4A*MS	Lab D 4A*MS	Lab E 4A*OES	Lab F 4A*OES	Lab G 4A*OES	Lab H 4A*MS	Lab I 4A*OES	Lab J 4A*MS	Lab K 4A*MS	Lab L 4A*MS	Lab M 4A*MS	Lab N 4A*MS	Lab O 4A*OES
1	423	406	412	410	373	490	423	439	403	405	426	398	395	425	432
2	425	406	417	419	360	490	436	417	403	385	424	385	395	411	445
3	418	410	426	416	365	490	446	424	425	390	418	398	393	429	440
4	417	410	422	403	377	500	453	409	410	400	419	391	403	438	434
5	416	400	436	408	375	480	447	401	404	387	415	386	403	433	447
6	418	418	415	412	372	490	437	414	400	392	414	378	394	430	446
Mean	420	408	421	411	370	490	440	417	408	393	419	389	397	428	441
Median	418	408	420	411	373	490	442	415	404	391	419	389	395	429	443
Std.Dev.	4	6	9	6	6	6	11	13	9	8	5	8	5	9	7
Rel.Std.Dev.	0.86%	1.47%	2.08%	1.39%	1.72%	1.29%	2.42%	3.16%	2.25%	1.98%	1.15%	2.03%	1.15%	2.19%	1.50%
PDM ³	1.90%	-0.81%	2.35%	-0.08%	-10.1%	19.0%	6.96%	1.34%	-1.01%	-4.50%	1.86%	-5.43%	-3.52%	3.86%	7.04%

Table A35. Analytical results for 4-acid Dy in OREAS 101b (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 -	Lab F -	Lab G -	Lab H 4A*MS	Lab I 4A*MS	Lab J -	Lab K 4A*MS	Lab L 4A*MS	Lab M -	Lab N -	Lab O -
1	26.2	29.6	27.9	25.7	NR	37.0	NR	27.5	25.4	NR	23.0	29.6	NR	NR	NR
2	25.5	29.8	28.1	26.3	NR	38.0	NR	28.1	25.2	NR	23.9	29.7	NR	NR	NR
3	25.5	30.5	26.4	26.1	NR	37.0	NR	26.1	26.6	NR	23.4	31.9	NR	NR	NR
4	26.7	31.1	27.2	25.1	NR	37.0	NR	26.4	24.3	NR	23.1	31.2	NR	NR	NR
5	24.9	31.1	29.0	25.1	NR	36.0	NR	26.0	25.2	NR	23.0	30.4	NR	NR	NR
6	25.5	28.1	29.6	26.0	NR	37.0	NR	28.0	25.3	NR	22.6	29.2	NR	NR	NR
Mean	25.7	30.0	28.0	25.7		37.0		27.0	25.3		23.2	30.3			
Median	25.5	30.2	28.0	25.9		37.0		27.0	25.3		23.1	30.1			
Std.Dev.	0.6	1.1	1.2	0.5		0.6		1.0	0.7		0.4	1.0			
Rel.Std.Dev.	2.48%	3.79%	4.17%	2.00%		1.71%		3.56%	2.91%		1.90%	3.44%			
PDM ³	-4.33%	11.8%	4.36%	-4.29%		37.7%		0.55%	-5.71%		-13.8%	12.9%			

Table A36. Analytical results for 4-acid Er in OREAS 101b (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 -	Lab F 4A*MS	Lab G -	Lab H 4A*MS	Lab I 4A*MS	Lab J -	Lab K 4A*MS	Lab L 4A*MS	Lab M -	Lab N -	Lab O -
1	14.0	15.6	16.0	15.3	NR	23.0	NR	15.1	16.8	NR	13.5	17.3	NR	NR	NR
2	14.0	16.1	16.1	15.7	NR	23.0	NR	14.4	16.1	NR	14.0	17.2	NR	NR	NR
3	14.1	15.5	15.3	15.5	NR	22.0	NR	14.3	17.4	NR	13.9	18.5	NR	NR	NR
4	14.2	14.3	15.8	15.3	NR	22.0	NR	14.9	15.7	NR	13.8	17.8	NR	NR	NR
5	13.8	15.5	16.7	15.3	NR	22.0	NR	14.5	16.0	NR	13.6	17.7	NR	NR	NR
6	14.0	15.2	17.1	15.8	NR	22.0	NR	15.6	16.3	NR	13.4	16.8	NR	NR	NR
Mean	14.0	15.4	16.2	15.5		22.3		14.8	16.4		13.7	17.5			
Median	14.0	15.5	16.1	15.4		22.0		14.7	16.2		13.7	17.5			
Std.Dev.	0.1	0.6	0.7	0.2		0.5		0.5	0.6		0.2	0.6			
Rel.Std.Dev.	0.86%	3.90%	4.09%	1.44%		2.31%		3.36%	3.77%		1.80%	3.29%			
PDM ³	-9.40%	-0.47%	4.67%	0.28%		44.7%		-4.14%	6.11%		-11.5%	13.5%			

Table A37. Analytical results for 4-acid Eu in OREAS 101b (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 -	Lab F 4A*MS	Lab G -	Lab H 4A*MS	Lab I 4A*MS	Lab J -	Lab K 4A*MS	Lab L 4A*MS	Lab M -	Lab N -	Lab O -
1	7.64	8.45	8.41	7.18	NR	8.20	NR	8.30	8.49	NR	7.94	8.70	NR	NR	NR
2	7.29	9.15	8.26	7.32	NR	8.30	NR	8.00	8.16	NR	8.25	8.57	NR	NR	NR
3	7.41	8.75	7.84	7.32	NR	8.40	NR	8.00	8.72	NR	7.97	9.26	NR	NR	NR
4	7.55	8.25	8.14	7.07	NR	8.40	NR	8.50	7.88	NR	8.01	9.04	NR	NR	NR
5	7.16	8.50	8.61	6.97	NR	8.10	NR	8.30	8.30	NR	7.88	8.98	NR	NR	NR
6	7.43	8.25	8.73	7.29	NR	8.10	NR	8.50	8.10	NR	7.77	8.33	NR	NR	NR
Mean	7.41	8.56	8.33	7.19		8.25		8.27	8.28		7.97	8.81			
Median	7.42	8.48	8.34	7.24		8.25		8.30	8.23		7.96	8.84			
Std.Dev.	0.17	0.34	0.32	0.15		0.14		0.23	0.30		0.16	0.34			
Rel.Std.Dev.	2.33%	4.02%	3.89%	2.03%		1.67%		2.72%	3.60%		2.02%	3.88%			
PDM ³	-8.62%	5.49%	2.70%	-11.4%		1.69%		1.90%	2.00%		-1.76%	8.64%			

Table A38. Analytical results for 4-acid Fe in OREAS 101b (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*OES	Lab E 4A*OES	Lab F 4A*OES	Lab G -	Lab H 4A*MS	Lab I 4A*OES	Lab J 4A*MS	Lab K 4A*MS	Lab L 4A*MS	Lab M 4A*MS	Lab N 4A*MS	Lab O 4A*OES
1	11.28	11.00	10.64	16.73	8.99	10.00	NR	10.74	11.10	10.10	10.85	9.29	10.15	10.50	10.89
2	11.31	11.10	10.34	16.87	8.08	11.00	NR	10.75	11.30	9.56	10.70	9.07	10.25	9.99	11.12
3	11.10	11.20	10.52	16.58	8.47	11.00	NR	10.82	11.50	9.79	10.45	9.49	10.10	10.64	10.83
4	11.13	11.10	10.87	16.01	8.83	11.00	NR	10.91	11.30	10.05	10.35	9.05	10.40	10.54	10.88
5	11.05	11.30	10.73	16.01	8.86	11.00	NR	10.69	11.30	9.62	10.30	9.10	10.20	10.66	11.02
6	10.80	11.30	10.39	16.30	8.86	11.00	NR	10.67	11.00	9.87	10.15	8.77	10.15	10.57	10.96
Mean	11.11	11.17	10.58	16.42	8.68	10.83		10.76	11.25	9.83	10.47	9.13	10.21	10.48	10.95
Median	11.12	11.15	10.58	16.44	8.84	11.00		10.75	11.30	9.83	10.40	9.09	10.18	10.56	10.93
Std.Dev.	0.18	0.12	0.20	0.37	0.34	0.41		0.09	0.18	0.22	0.26	0.24	0.11	0.25	0.11
Rel.Std.Dev.	1.65%	1.08%	1.93%	2.23%	3.93%	3.77%		0.83%	1.57%	2.24%	2.50%	2.66%	1.05%	2.38%	0.98%
PDM ³	3.84%	4.36%	-1.11%	53.4%	-18.9%	1.24%		0.59%	5.14%	-8.12%	-2.19%	-14.7%	-4.60%	-2.03%	2.32%

Table A39. Analytical results for 4-acid Gd in OREAS 101b (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 -	Lab F 4A*MS	Lab G -	Lab H 4A*MS	Lab I 4A*MS	Lab J -	Lab K 4A*MS	Lab L 4A*MS	Lab M -	Lab N -	Lab O -
1	35.3	37.0	40.5	35.1	NR	50.0	NR	34.9	41.4	NR	41.8	45.1	NR	NR	NR
2	35.0	38.4	39.5	36.1	NR	51.0	NR	34.6	40.2	NR	43.7	44.9	NR	NR	NR
3	33.9	38.4	37.1	35.9	NR	50.0	NR	34.2	43.3	NR	42.8	48.0	NR	NR	NR
4	35.8	35.6	38.0	34.2	NR	51.0	NR	35.0	38.9	NR	42.9	47.9	NR	NR	NR
5	32.9	36.2	39.5	34.5	NR	48.0	NR	33.5	40.3	NR	42.2	47.5	NR	NR	NR
6	34.5	35.0	40.6	35.5	NR	50.0	NR	35.9	40.3	NR	41.6	44.8	NR	NR	NR
Mean	34.6	36.8	39.2	35.2		50.0		34.7	40.7		42.5	46.4			
Median	34.8	36.6	39.5	35.3		50.0		34.8	40.3		42.5	46.3			
Std.Dev.	1.1	1.4	1.4	0.8		1.1		0.8	1.5		0.8	1.6			
Rel.Std.Dev.	3.07%	3.88%	3.55%	2.16%		2.19%		2.33%	3.65%		1.85%	3.41%			
PDM ³	-13.6%	-8.06%	-1.98%	-11.9%		25.0%		-13.3%	1.86%		6.27%	15.9%			

Table A40. Analytical results for 4-acid Ho in OREAS 101b (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 -	Lab F -	Lab G -	Lab H 4A*MS	Lab I 4A*MS	Lab J -	Lab K 4A*MS	Lab L 4A*MS	Lab M -	Lab N -	Lab O -
1	5.00	5.30	5.04	4.60	NR	5.30	NR	5.50	5.90	NR	4.41	5.59	NR	NR	NR
2	5.02	5.44	5.07	4.69	NR	5.50	NR	5.20	5.70	NR	4.60	5.47	NR	NR	NR
3	5.02	5.46	4.76	4.62	NR	5.40	NR	5.10	6.00	NR	4.46	5.89	NR	NR	NR
4	5.04	5.04	4.94	4.49	NR	5.40	NR	5.40	5.60	NR	4.47	5.77	NR	NR	NR
5	4.87	5.36	5.18	4.51	NR	5.10	NR	5.30	5.80	NR	4.40	5.68	NR	NR	NR
6	4.91	4.90	5.33	4.63	NR	5.30	NR	5.70	5.60	NR	4.35	5.46	NR	NR	NR
Mean	4.98	5.25	5.05	4.59		5.33		5.37	5.77		4.45	5.64			
Median	5.01	5.33	5.06	4.61		5.35		5.35	5.75		4.44	5.64			
Std.Dev.	0.07	0.23	0.20	0.08		0.14		0.22	0.16		0.09	0.17			
Rel.Std.Dev.	1.40%	4.36%	3.88%	1.66%		2.56%		4.03%	2.83%		1.94%	3.01%			
PDM ³	-3.56%	1.73%	-2.08%	-11.1%		3.35%		3.99%	11.7%		-13.8%	9.4%			

Table A41. Analytical results for 4-acid K in OREAS 101b (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*OES	Lab E 4A*OES	Lab F -	Lab G -	Lab H 4A*MS	Lab I 4A*OES	Lab J 4A*MS	Lab K 4A*MS	Lab L 4A*MS	Lab M 4A*MS	Lab N 4A*MS	Lab O 4A*OES
1	2.57	2.36	2.50	2.44	2.25	NR	NR	2.62	2.50	2.16	2.42	2.33	2.14	2.30	2.48
2	2.59	2.30	2.45	2.47	2.18	NR	NR	2.46	2.55	2.04	2.39	2.27	2.13	2.16	2.46
3	2.52	2.33	2.51	2.45	2.18	NR	NR	2.54	2.65	2.07	2.34	2.36	2.12	2.24	2.48
4	2.55	2.38	2.51	2.40	2.26	NR	NR	2.51	2.54	2.13	2.37	2.31	2.17	2.22	2.46
5	2.56	2.29	2.52	2.39	2.25	NR	NR	2.38	2.53	2.05	2.33	2.29	2.17	2.24	2.50
6	2.50	2.32	2.47	2.45	2.22	NR	NR	2.53	2.49	2.09	2.35	2.23	2.12	2.25	2.50
Mean	2.55	2.33	2.49	2.43	2.22			2.51	2.54	2.09	2.37	2.30	2.14	2.24	2.48
Median	2.55	2.33	2.50	2.45	2.23			2.52	2.54	2.08	2.36	2.30	2.14	2.24	2.48
Std.Dev.	0.03	0.03	0.03	0.03	0.04			0.08	0.06	0.05	0.03	0.05	0.02	0.05	0.02
Rel.Std.Dev.	1.33%	1.49%	1.09%	1.29%	1.64%			3.23%	2.2%	2.24%	1.43%	1.99%	1.08%	2.04%	0.62%
PDM ³	8.01%	-1.23%	5.68%	3.15%	-5.74%			6.26%	7.81%	-11.4%	0.32%	-2.57%	-9.22%	-5.26%	5.11%

Table A42. Analytical results for 4-acid La in OREAS 101b (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*OES	Lab E 4A*MS	Lab F 4A*MS	Lab G 4A*OES	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*MS	Lab O 4A*OES
1	736	826	902	754	790	720	780	817	760	700	>500	750	690	756	831
2	717	810	908	761	788	710	730	815	757	670	>500	720	700	723	851
3	714	831	913	754	787	730	740	800	792	690	>500	760	680	729	838
4	728	814	911	740	784	730	680	837	738	700	>500	730	710	735	836
5	727	809	933	740	833	710	790	798	773	670	>500	730	700	736	847
6	739	787	894	745	810	730	700	864	741	690	>500	710	690	740	841
Mean	727	813	910	749	799	722	737	822	760	687	>500	733	695	736	841
Median	728	812	910	750	789	725	735	816	759	690	>500	730	695	735	840
Std.Dev.	10	15	13	9	19	10	43	25	20	14	-	19	10	11	7
Rel.Std.Dev.	1.37%	1.90%	1.44%	1.15%	2.41%	1.36%	5.86%	3.05%	2.66%	1.99%	-	2.54%	1.51%	1.54%	0.89%
PDM ³	-3.63%	7.78%	20.7%	-0.69%	5.90%	-4.31%	-2.32%	8.97%	0.79%	-8.95%	-	-2.77%	-7.85%	-2.36%	11.5%

Table A43. Analytical results for 4-acid Lu in OREAS 101b (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*MS	Lab F -	Lab G 4A*OES	Lab H -	Lab I 4A*MS	Lab J -	Lab K 4A*MS	Lab L 4A*MS	Lab M -	Lab N -	Lab O -
1	1.79	2.06	1.98	1.60	2.13	1.90	2.30	NR	2.00	NR	1.65	2.08	NR	NR	NR
2	1.79	2.04	2.00	1.70	2.16	1.90	2.20	NR	2.00	NR	1.71	2.11	NR	NR	NR
3	1.78	2.10	1.86	1.60	2.15	1.90	2.40	NR	2.10	NR	1.68	2.23	NR	NR	NR
4	1.78	2.00	1.94	1.60	2.11	2.00	2.30	NR	1.90	NR	1.68	2.20	NR	NR	NR
5	1.72	2.20	2.04	1.60	2.26	1.80	2.20	NR	2.00	NR	1.67	2.17	NR	NR	NR
6	1.81	2.00	2.07	1.70	2.18	1.90	2.20	NR	2.00	NR	1.63	2.04	NR	NR	NR
Mean	1.78	2.07	1.98	1.63	2.16	1.90	2.27		2.00		1.67	2.14			
Median	1.79	2.05	1.99	1.60	2.15	1.90	2.25		2.00		1.68	2.14			
Std.Dev.	0.03	0.08	0.07	0.05	0.05	0.06	0.08		0.06		0.03	0.07			
Rel.Std.Dev.	1.73%	3.66%	3.78%	3.16%	2.38%	3.33%	3.60%		3.16%		1.65%	3.44%			
PDM ³	-9.22%	5.48%	1.14%	-16.6%	10.5%	-3.03%	15.7%		2.08%		-14.8%	9.14%			

Table A44. Analytical results for 4-acid Mg in OREAS 101b (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*OES	Lab E 4A*OES	Lab F 4A*OES	Lab G -	Lab H 4A*MS	Lab I 4A*OES	Lab J 4A*MS	Lab K 4A*MS	Lab L 4A*MS	Lab M 4A*MS	Lab N 4A*MS	Lab O 4A*OES
1	1.32	1.24	1.26	1.25	1.12	1.20	NR	1.36	1.21	1.11	1.28	1.15	1.13	1.21	1.26
2	1.33	1.24	1.21	1.27	1.08	1.20	NR	1.26	1.23	1.07	1.25	1.12	1.14	1.18	1.25
3	1.30	1.24	1.28	1.26	1.10	1.20	NR	1.31	1.27	1.09	1.23	1.17	1.12	1.23	1.24
4	1.30	1.24	1.27	1.23	1.13	1.20	NR	1.33	1.22	1.11	1.22	1.12	1.16	1.21	1.24
5	1.29	1.22	1.26	1.22	1.13	1.20	NR	1.22	1.22	1.07	1.21	1.12	1.15	1.22	1.23
6	1.30	1.20	1.23	1.24	1.11	1.20	NR	1.27	1.19	1.10	1.23	1.10	1.12	1.21	1.24
Mean	1.31	1.23	1.25	1.25	1.11	1.20		1.29	1.22	1.09	1.24	1.13	1.14	1.21	1.24
Median	1.30	1.24	1.26	1.25	1.12	1.20		1.29	1.22	1.10	1.23	1.12	1.14	1.21	1.24
Std.Dev.	0.01	0.02	0.03	0.02	0.02	0.00		0.05	0.03	0.02	0.03	0.03	0.02	0.02	0.01
Rel.Std.Dev.	0.96%	1.36%	2.04%	1.50%	1.70%	0.00%		3.96%	2.17%	1.68%	2.02%	2.24%	1.44%	1.38%	0.70%
PDM ³	5.94%	-0.22%	1.42%	1.00%	-9.78%	-2.65%		4.79%	-0.76%	-11.4%	0.32%	-8.33%	-7.79%	-1.84%	0.66%

Table A45. Analytical results for 4-acid Mn in OREAS 101b (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*OES	Lab F 4A*OES	Lab G -	Lab H 4A*MS	Lab I 4A*OES	Lab J 4A*MS	Lab K 4A*MS	Lab L 4A*MS	Lab M 4A*MS	Lab N 4A*MS	Lab O 4A*OES
1	959	976	887	974	812	870	NR	1021	1010	887	975	897	854	963	1016
2	959	972	862	987	777	940	NR	974	1020	849	964	871	861	925	1001
3	941	972	884	987	795	880	NR	993	1040	874	939	906	861	947	998
4	944	980	892	959	822	940	NR	939	1000	888	937	870	887	968	993
5	947	978	887	968	811	900	NR	939	1010	854	929	871	865	959	986
6	927	978	869	992	804	910	NR	999	993	882	936	854	863	959	990
Mean	946	976	880	978	804	907		978	1012	872	947	878	865	954	997
Median	946	977	886	981	807	905		984	1010	878	938	871	862	959	996
Std.Dev.	12	3	12	13	16	29		33	16	17	18	19	11	16	10
Rel.Std.Dev.	1.28%	0.34%	1.35%	1.32%	1.98%	3.25%		3.41%	1.63%	1.94%	1.94%	2.21%	1.31%	1.64%	1.04%
PDM ³	2.06%	5.27%	-5.06%	5.47%	-13.3%	-2.20%		5.44%	9.18%	-5.91%	2.11%	-5.28%	-6.68%	2.85%	7.59%

Table A46. Analytical results for 4-acid Mo in OREAS 101b (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*MS	Lab F 4A*OES	Lab G 4A*OES	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*MS	Lab O 4A*OES
1	21.0	21.0	21.3	16.5	20.8	27.0	19.0	20.1	19.2	19.8	18.7	21.2	21.6	19.0	20.8
2	21.1	21.5	20.7	16.8	20.9	30.0	20.0	19.2	18.9	18.6	18.6	20.6	21.9	18.0	20.6
3	21.5	21.0	21.5	17.4	21.1	27.0	20.0	19.8	19.2	18.9	18.5	21.9	21.4	18.6	20.7
4	21.5	21.0	20.9	17.3	20.8	25.0	20.0	19.3	17.6	19.3	18.7	21.5	22.0	19.4	20.7
5	20.9	20.0	22.1	17.6	21.2	24.0	19.0	19.2	18.9	18.9	18.3	21.4	20.9	18.0	20.7
6	21.3	21.0	20.9	17.4	20.9	25.0	20.0	19.3	17.3	19.9	17.8	21.0	20.8	18.0	20.4
Mean	21.2	20.9	21.2	17.2	20.9	26.3	19.7	19.5	18.5	19.2	18.4	21.3	21.4	18.5	20.6
Median	21.2	21.0	21.1	17.4	20.9	26.0	20.0	19.3	18.9	19.1	18.6	21.3	21.5	18.3	20.7
Std.Dev.	0.3	0.5	0.5	0.4	0.2	2.2	0.5	0.4	0.8	0.5	0.4	0.4	0.5	0.6	0.1
Rel.Std.Dev.	1.21%	2.35%	2.43%	2.46%	0.91%	8.20%	2.63%	1.93%	4.5%	2.71%	1.97%	2.10%	2.34%	3.26%	0.72%
PDM ³	5.49%	4.00%	5.58%	-14.6%	4.11%	30.9%	-2.21%	-3.13%	-7.93%	-4.49%	-8.39%	5.74%	6.57%	-8.01%	2.59%

Table A47. Analytical results for 4-acid Nd in OREAS 101b (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 -	Lab F 4A*MS	Lab G -	Lab H 4A*MS	Lab I 4A*MS	Lab J -	Lab K 4A*MS	Lab L 4A*MS	Lab M -	Lab N -	Lab O -
1	348	421	411	388	NR	350	NR	390	405	NR	361	406	NR	NR	NR
2	338	418	417	396	NR	350	NR	373	397	NR	367	399	NR	NR	NR
3	340	415	390	398	NR	370	NR	371	419	NR	359	433	NR	NR	NR
4	347	408	405	380	NR	370	NR	389	386	NR	364	420	NR	NR	NR
5	340	424	428	380	NR	380	NR	378	407	NR	357	419	NR	NR	NR
6	344	380	439	393	NR	380	NR	402	395	NR	347	401	NR	NR	NR
Mean	343	411	415	389		367		384	402		359	413			
Median	342	417	414	391		370		384	401		360	413			
Std.Dev.	4	16	17	8		14		12	11		7	13			
Rel.Std.Dev.	1.21%	3.93%	4.18%	2.02%		3.73%		3.12%	2.84%		1.93%	3.20%			
PDM ³	-11.6%	5.97%	6.96%	0.34%		-5.46%		-1.02%	3.52%		-7.40%	6.48%			

Table A48. Analytical results for 4-acid Ni in OREAS 101b (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*OES	Lab F 4A*OES	Lab G 4A*OES	Lab H 4A*MS	Lab I 4A*OES	Lab J 4A*MS	Lab K 4A*MS	Lab L 4A*MS	Lab M 4A*MS	Lab N 4A*MS	Lab O 4A*OES
1	7.0	24.0	8.5	9.0	5.8	< 20	11.0	6.6	10.0	8.6	7.6	6.8	8.9	8.9	9.2
2	7.0	22.0	8.4	9.0	5.3	< 20	10.0	5.8	10.0	7.8	7.7	7.9	8.8	7.3	9.1
3	5.0	22.0	8.7	9.0	5.6	< 20	12.0	6.2	10.0	8.3	7.6	7.9	8.9	7.7	9.0
4	10.0	20.0	8.8	9.0	5.9	< 20	10.0	5.2	10.0	8.0	7.8	7.4	9.0	9.8	9.4
5	6.0	18.0	9.1	9.0	5.8	< 20	12.0	5.1	10.0	7.7	7.3	7.0	8.6	6.8	9.4
6	7.0	20.0	8.5	9.0	5.8	< 20	10.0	5.3	10.0	8.2	7.9	8.1	8.6	8.4	9.0
Mean	7.0	21.0	8.7	9.0	5.7	< 20	10.8	5.7	10.0	8.1	7.7	7.5	8.8	8.2	9.2
Median	7.0	21.0	8.6	9.0	5.8	< 20	10.5	5.6	10.0	8.1	7.7	7.7	8.9	8.1	9.1
Std.Dev.	1.7	2.1	0.3	0.0	0.2	-	1.0	0.6	0.0	0.3	0.2	0.5	0.2	1.1	0.2
Rel.Std.Dev.	23.9%	10.0%	2.98%	0.0%	3.68%	-	9.08%	10.6%	0.00%	4.13%	2.71%	7.11%	1.90%	13.5%	1.93%
PDM ³	-14.2%	157%	6.18%	10.3%	-30.2%	-	32.7%	-30.2%	22.5%	-0.76%	-6.27%	-7.91%	7.82%	-0.15%	12.2%

Table A49. Analytical results for 4-acid P in OREAS 101b (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*OES	Lab E 4A*OES	Lab F -	Lab G 4A*OES	Lab H 4A*MS	Lab I 4A*OES	Lab J 4A*MS	Lab K 4A*MS	Lab L 4A*MS	Lab M 4A*MS	Lab N 4A*MS	Lab O 4A*OES
1	1252	1250	1119	1080	1143	1100	990	NR	1110	1150	1260	1140	1120	1100	1180
2	1248	1200	1106	1100	1070	1100	1000	NR	1140	1110	1230	1110	1110	1100	1162
3	1218	1200	1110	1110	1097	1100	960	NR	1140	1160	1210	1140	1090	1100	1161
4	1236	1250	1114	1090	1148	1100	980	NR	1110	1180	1200	1120	1130	1100	1161
5	1272	1200	1126	1080	1141	1100	1030	NR	1100	1110	1180	1110	1140	1100	1163
6	1227	1250	1097	1110	1141	1100	980	NR	1050	1130	1200	1080	1130	1100	1161
Mean	1242	1225	1112	1095	1123	1100	990		1108	1140	1213	1117	1120	1100	1164
Median	1242	1225	1112	1095	1141	1100	985		1110	1140	1205	1115	1125	1100	1161
Std.Dev.	19	27	10	14	32	0	24		33	28	28	23	18	0	8
Rel.Std.Dev.	1.56%	2.24%	0.91%	1.26%	2.86%	0.00%	2.39%		2.99%	2.48%	2.31%	2.02%	1.60%	0.00%	0.65%
PDM ³	11.1%	9.60%	-0.51%	-2.03%	0.51%	-1.58%	-11.4%		-0.84%	2.00%	8.56%	-0.09%	0.21%	-1.58%	4.19%

Table A50. Analytical results for 4-acid Pb in OREAS 101b (abbreviations as in Table A1; values in ppm).

Replicate No.	Lab A 4A*MS	Lab B 4A*MS	Lab C 4A*OES	Lab D 4A*MS	Lab E 4A*MS	Lab F -	Lab G 4A*OES	Lab H 4A*MS	Lab I 4A*OES	Lab J 4A*MS	Lab K 4A*MS	Lab L 4A*MS	Lab M 4A*MS	Lab N 4A*MS	Lab O 4A*OES
1	25.0	20.0	7.5	10.0	17.5	29.0	29.0	21.6	20.0	24.8	20.7	22.5	21.6	9.6	25.8
2	25.0	20.0	7.4	12.0	16.9	30.0	29.0	19.7	21.0	23.2	21.5	22.6	21.9	9.0	25.0
3	24.0	21.0	7.5	11.0	17.4	33.0	28.0	21.0	23.0	23.4	20.9	23.8	21.7	9.6	23.6
4	24.0	20.0	7.5	12.0	18.1	30.0	30.0	19.1	22.0	24.0	21.2	23.3	22.6	9.1	23.6
5	24.0	21.0	7.6	12.0	17.4	37.0	29.0	17.4	25.0	23.2	20.9	23.2	21.7	8.5	23.4
6	25.0	17.0	7.6	12.0	17.5	26.0	27.0	19.3	24.0	24.5	20.2	22.1	22.9	9.0	22.9
Mean	24.5	19.8	7.5	11.5	17.5	30.8	28.7	19.7	22.5	23.9	20.9	22.9	22.1	9.1	24.0
Median	24.5	20.0	7.5	12.0	17.4	30.0	29.0	19.5	22.5	23.7	20.9	22.9	21.8	9.1	23.6
Std.Dev.	0.5	1.5	0.1	0.8	0.4	3.8	1.0	1.5	1.9	0.7	0.4	0.6	0.5	0.4	1.1
Rel.Std.Dev.	2.24%	7.42%	1.00%	7.3%	2.11%	12.2%	3.60%	7.57%	8.31%	2.90%	2.12%	2.72%	2.48%	4.58%	4.62%
PDM ³	5.70%	-14.4%	-67.6%	-50.4%	-24.7%	33.0%	23.7%	-15.1%	-2.92%	2.90%	-9.83%	-1.13%	-4.79%	-60.6%	3.75%

Table A51. Analytical results for 4-acid Pr in OREAS 101b (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 -	Lab F 4A*OES	Lab G -	Lab H 4A*MS	Lab I 4A*MS	Lab J -	Lab K 4A*MS	Lab L 4A*MS	Lab M -	Lab N -	Lab O -
1	115	142	135	120	NR	120	NR	124	138	NR	114	139	NR	NR	NR
2	112	140	138	123	NR	120	NR	120	135	NR	117	138	NR	NR	NR
3	113	142	126	123	NR	130	NR	124	140	NR	115	148	NR	NR	NR
4	114	137	131	118	NR	130	NR	120	130	NR	115	144	NR	NR	NR
5	113	142	139	118	NR	120	NR	117	134	NR	113	143	NR	NR	NR
6	113	130	142	122	NR	130	NR	121	134	NR	111	137	NR	NR	NR
Mean	113	139	135	121		125		121	135		114	141			
Median	113	141	136	121		125		120	135		114	141			
Std.Dev.	1	5	6	2		5		2	3		2	4			
Rel.Std.Dev.	1.17%	3.42%	4.27%	1.94%		4.38%		1.99%	2.58%		1.99%	3.13%			
PDM ³	-10.9%	9.21%	6.40%	-5.08%		-1.67%		-5.03%	6.32%		-10.4%	11.2%			

Table A52. Analytical results for 4-acid Sm in OREAS 101b (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 -	Lab F 4A*MS	Lab G -	Lab H 4A*MS	Lab I 4A*MS	Lab J -	Lab K 4A*MS	Lab L 4A*MS	Lab M -	Lab N -	Lab O -
1	48.2	55.6	51.8	47.4	NR	46.0	NR	45.5	48.3	NR	42.2	52.5	NR	NR	NR
2	47.1	54.5	51.9	48.3	NR	46.0	NR	44.0	46.9	NR	43.6	51.4	NR	NR	NR
3	47.0	56.1	48.9	48.2	NR	46.0	NR	44.5	49.4	NR	42.8	55.5	NR	NR	NR
4	47.7	52.3	50.9	46.3	NR	45.0	NR	44.0	46.7	NR	42.6	53.9	NR	NR	NR
5	47.0	54.5	53.9	46.3	NR	47.0	NR	44.3	47.8	NR	42.1	53.8	NR	NR	NR
6	46.9	50.0	54.5	47.6	NR	48.0	NR	46.0	46.6	NR	41.2	50.6	NR	NR	NR
Mean	47.3	53.8	52.0	47.4		46.3		44.7	47.6		42.4	53.0			
Median	47.1	54.5	51.9	47.5		46.0		44.4	47.4		42.4	53.2			
Std.Dev.	0.5	2.3	2.0	0.9		1.0		0.8	1.1		0.8	1.8			
Rel.Std.Dev.	1.07%	4.25%	3.89%	1.86%		2.23%		1.87%	2.31%		1.89%	3.41%			
PDM ³	-1.84%	11.7%	7.89%	-1.75%		-3.86%		-7.22%	-1.20%		-12.0%	9.86%			

Table A53. Analytical results for 4-acid Tb in OREAS 101b (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*MS	Lab F 4A*MS	Lab G 4A*OES	Lab H 4A*MS	Lab I 4A*MS	Lab J -	Lab K 4A*MS	Lab L 4A*MS	Lab M -	Lab N -	Lab O -
1	4.60	5.35	4.93	4.09	6.82	5.70	6.90	4.70	5.10	NR	4.80	6.12	NR	NR	NR
2	4.60	5.20	4.88	4.22	6.87	5.80	6.60	4.70	5.10	NR	4.99	6.08	NR	NR	NR
3	4.35	5.70	4.53	4.16	6.78	5.70	7.00	4.50	5.40	NR	4.90	6.50	NR	NR	NR
4	4.76	5.05	4.77	3.99	6.80	5.80	6.60	4.60	4.90	NR	4.87	6.42	NR	NR	NR
5	4.40	5.20	4.94	4.06	7.20	5.50	6.60	4.70	5.00	NR	4.75	6.28	NR	NR	NR
6	4.55	4.90	5.14	4.12	6.99	5.70	6.30	4.80	5.10	NR	4.68	6.02	NR	NR	NR
Mean	4.55	5.23	4.87	4.11	6.91	5.70	6.67	4.67	5.10		4.83	6.24			
Median	4.58	5.20	4.91	4.11	6.84	5.70	6.60	4.70	5.10		4.84	6.20			
Std.Dev.	0.15	0.28	0.20	0.08	0.16	0.11	0.25	0.10	0.17		0.11	0.19			
Rel.Std.Dev.	3.29%	5.26%	4.18%	1.95%	2.32%	1.92%	3.75%	2.21%	3.28%		2.30%	3.13%			
PDM ³	-15.1%	-2.29%	-9.17%	-23.3%	29.0%	6.42%	24.5%	-12.9%	-4.78%		-9.79%	16.4%			

Table A54. Analytical results for 4-acid Th in OREAS 101b (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*MS	Lab F 4A*MS	Lab G 4A*OES	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*MS	Lab O 4A*OES
1	36.4	32.6	40.4	34.6	38.4	37.0	41.0	35.5	39.0	35.3	41.6	34.8	29.3	36.4	15.7
2	37.0	32.3	40.2	35.7	39.6	36.0	40.0	33.3	38.6	33.7	40.3	34.9	29.7	35.0	15.3
3	36.4	33.1	40.9	36.1	39.3	37.0	42.0	34.5	39.1	33.9	39.0	37.4	29.4	36.0	16.1
4	35.7	32.5	40.9	34.8	39.0	37.0	41.0	32.9	35.9	34.7	42.0	36.7	30.6	36.1	16.0
5	36.1	32.6	42.2	35.1	40.2	37.0	40.0	32.5	39.0	33.4	40.7	36.4	29.0	37.7	15.8
6	37.1	30.0	40.8	35.6	40.8	37.0	39.0	34.3	34.1	35.3	40.4	34.8	29.8	36.5	15.6
Mean	36.4	32.2	40.9	35.3	39.6	36.8	40.5	33.8	37.6	34.4	40.7	35.8	29.6	36.3	15.7
Median	36.4	32.6	40.9	35.4	39.5	37.0	40.5	33.8	38.8	34.3	40.6	35.7	29.6	36.3	15.7
Std.Dev.	0.5	1.1	0.7	0.6	0.9	0.4	1.0	1.1	2.1	0.8	1.1	1.1	0.6	0.9	0.3
Rel.Std.Dev.	1.46%	3.42%	1.71%	1.64%	2.18%	1.11%	2.59%	3.34%	5.62%	2.42%	2.61%	3.19%	1.87%	2.41%	1.89%
PDM ³	0.06%	-11.6%	12.3%	-3.04%	8.59%	1.12%	11.2%	-7.11%	3.28%	-5.60%	11.6%	-1.62%	-18.6%	-0.39%	-56.8%

Table A55. Analytical results for 4-acid Ti in OREAS 101b (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*OES	Lab F 4A*OES	Lab G -	Lab H -	Lab I 4A*OES	Lab J 4A*MS	Lab K 4A*MS	Lab L 4A*MS	Lab M 4A*MS	Lab N 4A*MS	Lab O 4A*OES
1	0.360	0.385	0.370	0.338	0.223	0.390	NR	NR	0.380	0.323	0.358	0.348	0.322	0.301	0.350
2	0.367	0.390	0.352	0.340	0.207	0.390	NR	NR	0.400	0.299	0.360	0.344	0.322	0.295	0.351
3	0.360	0.395	0.369	0.344	0.197	0.380	NR	NR	0.380	0.310	0.347	0.352	0.321	0.311	0.354
4	0.361	0.385	0.374	0.334	0.228	0.380	NR	NR	0.380	0.308	0.347	0.345	0.333	0.324	0.356
5	0.362	0.385	0.369	0.337	0.223	0.380	NR	NR	0.380	0.299	0.344	0.340	0.325	0.295	0.354
6	0.348	0.380	0.360	0.337	0.223	0.390	NR	NR	0.360	0.303	0.341	0.330	0.322	0.314	0.345
Mean	0.360	0.387	0.366	0.338	0.217	0.385			0.380	0.307	0.350	0.343	0.324	0.307	0.352
Median	0.361	0.385	0.369	0.338	0.223	0.385			0.380	0.306	0.347	0.345	0.322	0.306	0.353
Std.Dev.	0.006	0.005	0.008	0.003	0.012	0.005			0.013	0.009	0.008	0.008	0.005	0.012	0.004
Rel.Std.Dev.	1.68%	1.34%	2.29%	1.00%	5.63%	1.42%			3.33%	2.95%	2.21%	2.21%	1.40%	3.80%	1.14%
PDM ³	2.86%	10.6%	4.56%	-3.23%	-38.0%	10.1%			8.68%	-12.2%	-0.04%	-1.85%	-7.29%	-12.3%	0.58%

Table A56. Analytical results for 4-acid Tm in OREAS 101b (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*MS	Lab F 4A*MS	Lab G -	Lab H 4A*MS	Lab I 4A*MS	Lab J -	Lab K 4A*MS	Lab L 4A*MS	Lab M -	Lab N -	Lab O -
1	2.03	2.10	2.10	1.87	NR	2.10	NR	2.10	2.40	NR	1.80	2.31	NR	NR	NR
2	2.03	2.14	2.12	1.93	NR	2.10	NR	2.10	2.30	NR	1.85	2.28	NR	NR	NR
3	1.98	2.44	2.01	1.87	NR	2.10	NR	2.00	2.40	NR	1.82	2.46	NR	NR	NR
4	2.02	2.04	2.07	1.83	NR	2.10	NR	2.00	2.30	NR	1.82	2.42	NR	NR	NR
5	1.92	2.22	2.21	1.83	NR	2.00	NR	2.00	2.30	NR	1.80	2.38	NR	NR	NR
6	1.98	2.20	2.22	1.90	NR	2.10	NR	2.10	2.30	NR	1.76	2.26	NR	NR	NR
Mean	1.99	2.19	2.12	1.87		2.08		2.05	2.33		1.81	2.35			
Median	2.00	2.17	2.11	1.87		2.10		2.05	2.30		1.81	2.35			
Std.Dev.	0.04	0.14	0.08	0.04		0.04		0.05	0.05		0.03	0.08			
Rel.Std.Dev.	2.14%	6.35%	3.83%	2.09%		1.96%		2.67%	2.21%		1.66%	3.43%			
PDM ³	-4.35%	5.09%	1.81%	-10.2%		-0.03%		-1.63%	12.0%		-13.2%	12.8%			

Table A57. Analytical results for 4-acid V in OREAS 101b (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*OES	Lab E 4A*MS	Lab F 4A*MS	Lab G 4A*OES	Lab H 4A*MS	Lab I 4A*OES	Lab J 4A*MS	Lab K 4A*MS	Lab L 4A*MS	Lab M 4A*MS	Lab N 4A*MS	Lab O 4A*OES
1	80.0	75.0	73.0	65.0	70.4	98.0	80.0	88.0	88.0	72.0	76.0	69.0	68.0	79.0	78.3
2	79.0	80.0	73.2	66.0	66.6	99.0	80.0	86.0	89.0	68.0	77.0	68.0	68.0	77.0	77.6
3	77.0	75.0	73.4	68.0	66.7	97.0	81.0	86.0	87.0	70.0	74.0	70.0	68.0	77.0	77.3
4	82.0	75.0	74.1	66.0	69.9	99.0	81.0	87.0	86.0	71.0	73.0	68.0	69.0	77.0	77.1
5	78.0	80.0	74.4	65.0	70.7	96.0	80.0	87.0	87.0	69.0	74.0	68.0	69.0	81.0	76.7
6	77.0	80.0	72.5	65.0	69.2	97.0	79.0	83.0	85.0	70.0	74.0	66.0	68.0	78.0	77.1
Mean	78.8	77.5	73.4	65.8	68.9	97.7	80.2	86.2	87.0	70.0	74.7	68.2	68.3	78.2	77.4
Median	78.5	77.5	73.3	65.5	69.5	97.5	80.0	86.5	87.0	70.0	74.0	68.0	68.0	77.5	77.2
Std.Dev.	1.9	2.7	0.7	1.2	1.8	1.2	0.8	1.7	1.4	1.4	1.5	1.3	0.5	1.6	0.6
Rel.Std.Dev.	2.46%	3.53%	0.96%	1.78%	2.67%	1.24%	0.94%	2.00%	1.63%	2.02%	2.02%	1.95%	0.76%	2.05%	0.72%
PDM ³	2.73%	0.99%	-4.31%	-14.2%	-10.2%	27.3%	4.47%	12.3%	13.4%	-8.78%	-2.70%	-11.2%	-11.0%	1.86%	0.81%

Table A58. Analytical results for 4-acid Y in OREAS 101b (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*MS	Lab F 4A*OES	Lab G 4A*OES	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*MS	Lab O 4A*OES
1	123	143	134	135	139	160	130	125	148	127	135	137	121	110	134
2	120	146	132	137	139	160	140	119	147	122	137	133	122	105	134
3	122	149	136	138	138	160	140	121	155	122	135	143	121	105	133
4	118	141	134	133	136	160	140	118	144	125	136	139	125	106	133
5	120	149	139	135	144	160	140	119	149	120	133	138	115	107	133
6	120	142	134	138	138	160	130	117	144	128	129	136	119	108	132
Mean	120	145	135	136	139	160	137	120	148	124	134	138	120	107	133
Median	120	145	134	136	138	160	140	119	148	123	135	138	121	106	133
Std.Dev.	2	4	2	2	3	0	5	3	4	3	3	3	3	2	1
Rel.Std.Dev.	1.47%	2.43%	1.72%	1.47%	1.89%	0.00%	3.78%	2.48%	2.75%	2.54%	2.00%	2.50%	2.80%	1.80%	0.50%
PDM ³	-9.34%	9.14%	1.40%	2.37%	4.53%	20.4%	2.87%	-9.82%	11.3%	-6.91%	0.80%	3.50%	-9.42%	-19.6%	0.30%

Table A59. Analytical results for 4-acid Yb in OREAS 101b (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*MS	Lab F 4A*MS	Lab G 4A*OES	Lab H 4A*MS	Lab I 4A*MS	Lab J -	Lab K 4A*MS	Lab L 4A*MS	Lab M -	Lab N -	Lab O -
1	13.0	15.1	13.2	12.9	14.4	21.0	16.0	13.8	14.5	NR	11.9	14.4	NR	NR	NR
2	13.1	14.9	13.4	13.3	14.3	21.0	16.0	13.7	14.2	NR	12.3	14.3	NR	NR	NR
3	13.2	15.8	12.7	12.9	14.4	21.0	17.0	13.6	14.8	NR	12.1	15.5	NR	NR	NR
4	13.3	14.3	13.0	12.6	14.4	21.0	17.0	13.4	14.1	NR	12.0	15.1	NR	NR	NR
5	12.8	15.2	13.7	12.7	15.1	20.0	15.0	13.7	14.2	NR	11.9	14.9	NR	NR	NR
6	13.4	14.4	14.0	13.1	14.5	22.0	15.0	14.9	14.5	NR	11.6	14.0	NR	NR	NR
Mean	13.1	15.0	13.3	12.9	14.5	21.0	16.0	13.9	14.4		12.0	14.7			
Median	13.1	15.0	13.3	12.9	14.4	21.0	16.0	13.7	14.4		11.9	14.6			
Std.Dev.	0.2	0.6	0.5	0.3	0.3	0.6	0.9	0.5	0.3		0.2	0.6			
Rel.Std.Dev.	1.59%	3.71%	3.54%	1.98%	2.00%	3.01%	5.59%	3.84%	1.84%		1.98%	3.79%			
PDM ³	-5.75%	7.27%	-4.33%	-7.32%	4.11%	50.7%	14.8%	-0.62%	3.21%		-14.3%	5.18%			