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CERTIFICATE OF ANALYSIS FOR

Basalt Blank Pulp

(Quaternary Newer Volcanics Province, Victoria, Australia)

CERTIFIED REFERENCE MATERIAL

OREAS 24d

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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.

OREAS reference materials enable users to successfully achieve process control of these tasks because the observed variance from repeated analysis has its origin almost exclusively in the analytical process rather than the reference material itself.

SOURCE MATERIAL

Certified Reference Material OREAS 24d was prepared from olivine tholeiitic basalt from the Quaternary Newer Volcanics Province in Victoria, Australia. It is characterised by very low background gold of less than 1 parts per billion.

PERFORMANCE GATES

Table 1 below shows intervals calculated for two and three standard deviations. As a guide these intervals may be regarded as warning or rejection for multiple 2SD outliers, or rejection for individual 3SD outliers in QC monitoring, although their precise application should be at the discretion of the QC manager concerned (also see 'Intended Use' section below). Westgard Rules extend the basics of single-rule QC monitoring using multi-rules (for more information visit www.westgard.com/mltirule.htm). A second method utilises a 5% window calculated directly from the certified value.

Standard deviation is also shown in relative percent for one, two and three relative standard deviations (1RSD, 2RSD and 3RSD) to facilitate an appreciation of the magnitude of these numbers and a comparison with the 5% window. Caution should be exercised 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. One approach used at commercial laboratories is to set the acceptance criteria at twice the detection level (DL) ± 10%.

i.e. Certified Value ± 10% ± 2DL (adapted from Govett, 1983).

COMMINUTION AND HOMOGENISATION PROCEDURES

The material constituting OREAS 24d was prepared in the following manner:

- Drying to constant mass at 105° C;
- Multi-stage crushing and milling to 98% minus 75 microns;
- Homogenisation;
- Packaging in 10g and 60g units in laminated foil pouches and 1kg units in plastic wide-mouth jars.

Table 1. Certified Values and Performance Gates for OREAS 24d.

Constituent	Certified Value	Absolute Standard Deviations					Relative Standard Deviations			5% window	
		1SD	2SD Low	2SD High	3SD Low	3SD High	1RSD	2RSD	3RSD	Low	High
Pb Fire Assay											
Au, ppb	< 1	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
4-Acid Digestion											
Ag, ppm	< 0.2	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
Al, wt.%	7.77	0.212	7.34	8.19	7.13	8.40	2.73%	5.46%	8.19%	7.38	8.16
As, ppm	1.35	0.33	0.69	2.02	0.35	2.35	24.64%	49.28%	73.92%	1.28	1.42
Ba, ppm	536	16	504	568	488	584	2.99%	5.99%	8.98%	509	563
Be, ppm	2.14	0.143	1.85	2.42	1.71	2.57	6.70%	13.39%	20.09%	2.03	2.24
Bi, ppm	0.030	0.007	0.015	0.044	0.008	0.052	24.70%	49.40%	74.10%	0.028	0.031
Ca, wt.%	5.62	0.251	5.12	6.12	4.87	6.37	4.46%	8.92%	13.38%	5.34	5.90
Cd, ppm	0.12	0.02	0.08	0.17	0.06	0.19	18.24%	36.47%	54.71%	0.12	0.13
Ce, ppm	59	1.5	56	62	55	64	2.47%	4.93%	7.40%	56	62
Co, ppm	44.2	2.42	39.4	49.0	37.0	51.5	5.47%	10.93%	16.40%	42.0	46.4
Cr, ppm	147	21	105	189	84	210	14.32%	28.65%	42.97%	140	154
Cs, ppm	1.18	0.066	1.04	1.31	0.98	1.37	5.62%	11.24%	16.86%	1.12	1.24
Cu, ppm	43.2	2.29	38.6	47.8	36.3	50.1	5.29%	10.58%	15.88%	41.0	45.4
Fe, wt.%	7.97	0.381	7.21	8.73	6.83	9.11	4.78%	9.55%	14.33%	7.57	8.37
Ga, ppm	22.1	0.84	20.4	23.7	19.5	24.6	3.81%	7.63%	11.44%	21.0	23.2
Hf, ppm	4.70	0.325	4.05	5.35	3.73	5.68	6.91%	13.83%	20.74%	4.47	4.94
In, ppm	0.074	0.011	0.053	0.095	0.042	0.106	14.40%	28.80%	43.19%	0.070	0.077
K, wt.%	1.69	0.059	1.57	1.81	1.51	1.87	3.52%	7.04%	10.56%	1.60	1.77
La, ppm	29.1	2.01	25.1	33.1	23.1	35.2	6.91%	13.83%	20.74%	27.7	30.6
Li, ppm	10.8	0.65	9.4	12.1	8.8	12.7	6.08%	12.16%	18.25%	10.2	11.3
Lu, ppm	0.23	0.03	0.17	0.29	0.14	0.32	12.82%	25.65%	38.47%	0.22	0.24
Mg, wt.%	4.56	0.157	4.25	4.88	4.09	5.03	3.45%	6.89%	10.34%	4.33	4.79
Mn, wt.%	0.115	0.005	0.105	0.125	0.100	0.130	4.36%	8.71%	13.07%	0.109	0.121
Mo, ppm	4.46	0.350	3.76	5.16	3.41	5.51	7.84%	15.69%	23.53%	4.24	4.69
Na, wt.%	2.33	0.109	2.11	2.55	2.00	2.66	4.70%	9.40%	14.09%	2.21	2.45
Nb, ppm	44.6	4.14	36.3	52.8	32.1	57.0	9.29%	18.58%	27.87%	42.3	46.8
Ni, ppm	137	7	123	150	116	157	5.05%	10.10%	15.15%	130	143
P, wt.%	0.252	0.016	0.221	0.284	0.205	0.300	6.33%	12.65%	18.98%	0.240	0.265
Pb, ppm	3.56	0.44	2.68	4.43	2.24	4.87	12.32%	24.65%	36.97%	3.38	3.73
Rb, ppm	37.2	4.2	28.8	45.7	24.5	49.9	11.37%	22.75%	34.12%	35.4	39.1
S, wt.%	0.042	0.004	0.034	0.050	0.030	0.054	9.82%	19.64%	29.46%	0.040	0.044
Sc, ppm	20.0	1.11	17.7	22.2	16.6	23.3	5.56%	11.13%	16.69%	19.0	21.0
Sn, ppm	1.89	0.088	1.71	2.06	1.62	2.15	4.69%	9.37%	14.06%	1.79	1.98
Sr, ppm	748	37	674	823	637	860	4.97%	9.95%	14.92%	711	786
Ta, ppm	3.01	0.240	2.53	3.49	2.29	3.73	7.99%	15.97%	23.96%	2.86	3.16
Tb, ppm	0.79	0.044	0.70	0.87	0.66	0.92	5.56%	11.12%	16.68%	0.75	0.83
Th, ppm	3.78	0.326	3.13	4.43	2.80	4.76	8.63%	17.26%	25.89%	3.59	3.97
Ti, wt.%	1.22	0.053	1.11	1.32	1.06	1.38	4.38%	8.75%	13.13%	1.16	1.28
Tl, ppm	0.12	0.02	0.09	0.16	0.07	0.18	14.60%	29.19%	43.79%	0.12	0.13
U, ppm	1.40	0.089	1.22	1.57	1.13	1.66	6.35%	12.70%	19.05%	1.33	1.47
V, ppm	201	7	188	215	181	221	3.33%	6.66%	9.99%	191	211

SI unit equivalents: ppm (parts per million) ≡ mg/kg ≡ µg/g ≡ 0.0001 wt.% ≡ 1000 ppb (parts per billion).

Note 1: intervals may appear asymmetric due to rounding.

Note 2: the number of decimal places quoted does not imply accuracy of the certified value to this level but are given to minimise rounding errors when calculating 2SD and 3SD windows.

Table 1 continued.

Constituent	Certified Value	Absolute Standard Deviations					Relative Standard Deviations			5% window	
		1SD	2SD Low	2SD High	3SD Low	3SD High	1RSD	2RSD	3RSD	Low	High
4-Acid Digestion continued											
Y, ppm	20.4	0.90	18.6	22.2	17.7	23.1	4.40%	8.80%	13.20%	19.4	21.5
Zn, ppm	104	7	90	117	83	124	6.50%	13.00%	19.50%	98	109
Zr, ppm	205	6	194	216	188	222	2.77%	5.55%	8.32%	195	215

SI unit equivalents: ppm (parts per million) ≡ mg/kg ≡ µg/g ≡ 0.0001 wt.% ≡ 1000 ppb (parts per billion).

Note 1: intervals may appear asymmetric due to rounding.

Note 2: the number of decimal places quoted does not imply accuracy of the certified value to this level but are given to minimise rounding errors when calculating 2SD and 3SD windows.

PHYSICAL PROPERTIES

OREAS 24d was tested in its pulp form at ORE Research & Exploration Pty Ltd's onsite laboratory for various physical properties. Table 2 presents these findings which should be used for informational purposes only.

Table 2. Physical properties of OREAS 24d.

Bulk Density (g/L)	Moisture%	Munsell Notation‡	Munsell Color‡
842	1.22	N8	Very Light Gray

‡The Munsell Rock Color Chart helps geologists and archeologists communicate with colour more effectively by cross-referencing ISCC-NBS colour names with unique Munsell alpha-numeric colour notations for rock colour samples.

ANALYTICAL PROGRAM

Ten commercial analytical laboratories participated in the program to characterise the elements reported in Table 1. The following methods were employed:

- Au via 25-40g fire assay with ICP-OES and/or ICP-MS (10 laboratories) finish;
- Full elemental suite by four acid digestion (HNO_3-$HClO_4$-HCl-HF) with ICP-OES and ICP-MS finish (10 laboratories).

For the round robin program ten 700g test units were taken at predetermined intervals during the bagging stage, immediately following homogenisation and are considered representative of the entire batch. The six samples received by each laboratory were obtained by taking two 100g scoop splits from each of three separate 700g test units. This format enabled nested ANOVA treatment of the results to evaluate homogeneity, i.e. to ascertain whether between-unit variance is greater than within-unit variance.

Table 3 presents the certified values together with their 95% confidence and tolerance limits and Table 4 shows indicative values. Indicative values are provided for the major and trace elements determined by borate fusion XRF (Al_2O_3 to ZrO_2), LOI at 1000°C and laser ablation with ICP-MS (Ag to Zr) and are the means of duplicate assays from Bureau Veritas, Perth.

Tabulated results of all analytes together with uncorrected means, medians, standard deviations, relative standard deviations and percent deviation of lab means from the corrected mean of means (PDM[3]) are presented in the detailed certification data for this CRM (**OREAS 24d DataPack-1.0.190806_133323.xlsx**).

Table 3. 95% Confidence & Tolerance Limits for OREAS 24d.

Constituent	Certified Value	95% Confidence Limits		95% Tolerance Limits	
		Low	High	Low	High
Fire Assay					
Au, Gold (ppb)	< 1	IND	IND	IND	IND
4-Acid Digestion					
Ag, Silver (ppm)	< 0.2	IND	IND	IND	IND
Al, Aluminium (wt.%)	7.77	7.61	7.93	7.64	7.90
As, Arsenic (ppm)	1.35	1.13	1.57	IND	IND
Ba, Barium (ppm)	536	526	547	524	549
Be, Beryllium (ppm)	2.14	2.06	2.21	2.01	2.27
Bi, Bismuth (ppm)	0.030	0.025	0.034	IND	IND
Ca, Calcium (wt.%)	5.62	5.44	5.80	5.54	5.70
Cd, Cadmium (ppm)	0.12	0.10	0.14	IND	IND
Ce, Cerium (ppm)	59	58	60	57	62
Co, Cobalt (ppm)	44.2	42.5	46.0	40.6	47.8
Cr, Chromium (ppm)	147	131	163	138	157
Cs, Caesium (ppm)	1.18	1.13	1.22	1.14	1.21
Cu, Copper (ppm)	43.2	41.6	44.8	41.4	45.0
Fe, Iron (wt.%)	7.97	7.70	8.24	7.85	8.09
Ga, Gallium (ppm)	22.1	21.4	22.7	21.5	22.7
Hf, Hafnium (ppm)	4.70	4.44	4.97	4.50	4.91
In, Indium (ppm)	0.074	0.071	0.076	0.067	0.080
K, Potassium (wt.%)	1.69	1.65	1.73	1.66	1.72
La, Lanthanum (ppm)	29.1	27.7	30.5	28.2	30.1
Li, Lithium (ppm)	10.8	10.2	11.3	10.3	11.2
Lu, Lutetium (ppm)	0.23	0.20	0.26	IND	IND
Mg, Magnesium (wt.%)	4.56	4.45	4.67	4.46	4.66
Mn, Manganese (wt.%)	0.115	0.112	0.119	0.113	0.118
Mo, Molybdenum (ppm)	4.46	4.15	4.78	4.19	4.74
Na, Sodium (wt.%)	2.33	2.25	2.41	2.28	2.38
Nb, Niobium (ppm)	44.6	41.0	48.2	42.1	47.0
Ni, Nickel (ppm)	137	132	141	134	139
P, Phosphorus (wt.%)	0.252	0.241	0.264	0.245	0.260
Pb, Lead (ppm)	3.56	3.24	3.87	3.37	3.74
Rb, Rubidium (ppm)	37.2	34.4	40.1	35.7	38.7
S, Sulphur (wt.%)	0.042	0.038	0.046	IND	IND

SI unit equivalents: ppm (parts per million) ≡ mg/kg ≡ µg/g ≡ 0.0001 wt.% ≡ 1000 ppb (parts per billion).
Note: intervals may appear asymmetric due to rounding.

Table 3 continued.

Constituent	Certified Value	95% Confidence Limits		95% Tolerance Limits	
		Low	High	Low	High
4-Acid Digestion continued					
Sc, Scandium (ppm)	20.0	19.2	20.7	18.9	21.0
Sn, Tin (ppm)	1.89	1.82	1.95	IND	IND
Sr, Strontium (ppm)	748	722	775	732	764
Ta, Tantalum (ppm)	3.01	2.80	3.22	2.90	3.12
Tb, Terbium (ppm)	0.79	0.75	0.83	IND	IND
Th, Thorium (ppm)	3.78	3.53	4.03	3.66	3.90
Ti, Titanium (wt.%)	1.22	1.17	1.26	1.18	1.25
Tl, Thallium (ppm)	0.12	0.11	0.14	IND	IND
U, Uranium (ppm)	1.40	1.34	1.46	IND	IND
V, Vanadium (ppm)	201	197	206	193	210
Y, Yttrium (ppm)	20.4	19.8	21.1	19.7	21.1
Zn, Zinc (ppm)	104	99	109	100	107
Zr, Zirconium (ppm)	205	201	209	196	214

SI unit equivalents: ppm (parts per million) ≡ mg/kg ≡ µg/g ≡ 0.0001 wt.% ≡ 1000 ppb (parts per billion).
Note: intervals may appear asymmetric due to rounding.

Table 4. Indicative Values for OREAS 24d.

Constituent	Unit	Value	Constituent	Unit	Value	Constituent	Unit	Value
Fire Assay								
Pd	ppb	*< 5*	Pt	ppb	*< 5*			
4-Acid Digestion								
Dy	ppm	*4.48*	Nd	ppm	*29.1*	Te	ppm	*< 0.05*
Er	ppm	*2.11*	Pr	ppm	*7.58*	Tm	ppm	*0.27*
Eu	ppm	*1.95*	Re	ppm	*< 0.002*	W	ppm	*0.17*
Gd	ppm	*5.55*	Sb	ppm	*0.11*	Yb	ppm	*1.58*
Ge	ppm	*0.12*	Se	ppm	*< 1*			
Borate Fusion XRF								
Al_2O_3	wt.%	*15.22*	Fe_2O_3	wt.%	*11.69*	SiO_2	wt.%	*47.07*
As	ppm	*< 10*	K_2O	wt.%	*2.05*	Sn	ppm	*< 10*
BaO	ppm	*655*	MgO	wt.%	*7.79*	SO_3	wt.%	*0.094*
CaO	wt.%	*8.30*	MnO	wt.%	*0.158*	SrO	ppm	*850*
Cl	ppm	*40.0*	Na_2O	wt.%	*3.14*	TiO_2	wt.%	*2.11*
Co	ppm	*55*	Ni	ppm	*195*	V_2O_5	ppm	*370*
Cr_2O_3	ppm	*330*	P_2O_5	wt.%	*0.591*	Zn	ppm	*135*
Cu	ppm	*75*	Pb	ppm	*< 10*	ZrO_2	ppm	*300*
Thermogravimetry								
LOI^{1000}	wt.%	*1.55*						
Laser Ablation ICP-MS								
Ag	ppm	*< 0.1*	Hf	ppm	*4.86*	Sm	ppm	*6.06*
As	ppm	*1.30*	Ho	ppm	*0.80*	Sn	ppm	*2.20*
Ba	ppm	*555*	In	ppm	*0.050*	Sr	ppm	*782*

SI unit equivalents: ppm (parts per million) ≡ mg/kg ≡ µg/g ≡ 0.0001 wt.% ≡ 1000 ppb (parts per billion).
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.

Table 4 continued.

Constituent	Unit	Value	Constituent	Unit	Value	Constituent	Unit	Value
Laser Ablation ICP-MS continued								
Be	ppm	*2.40*	La	ppm	*29.9*	Ta	ppm	*3.17*
Bi	ppm	*< 0.02*	Lu	ppm	*0.24*	Tb	ppm	*0.82*
Cd	ppm	*0.10*	Mn	wt.%	*0.120*	Te	ppm	*< 0.2*
Ce	ppm	*58*	Mo	ppm	*4.50*	Th	ppm	*3.79*
Co	ppm	*49.5*	Nb	ppm	*46.5*	Ti	wt.%	*1.29*
Cr	ppm	*202*	Nd	ppm	*30.1*	Tl	ppm	*< 0.2*
Cs	ppm	*1.18*	Ni	ppm	*147*	Tm	ppm	*0.28*
Cu	ppm	*44.0*	Pb	ppm	*4.00*	U	ppm	*1.46*
Dy	ppm	*4.35*	Pr	ppm	*7.16*	V	ppm	*217*
Er	ppm	*2.06*	Rb	ppm	*39.0*	W	ppm	*0.23*
Eu	ppm	*1.93*	Re	ppm	*0.008*	Y	ppm	*19.8*
Ga	ppm	*21.6*	Sb	ppm	*0.10*	Yb	ppm	*1.63*
Gd	ppm	*5.52*	Sc	ppm	*21.5*	Zn	ppm	*98*
Ge	ppm	*0.98*	Se	ppm	*< 5*	Zr	ppm	*206*

SI unit equivalents: ppm (parts per million) ≡ mg/kg ≡ µg/g ≡ 0.0001 wt.% ≡ 1000 ppb (parts per billion).

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.

STATISTICAL ANALYSIS

Standard Deviation values (1SDs) are reported in Table 1. They provide an indication of a level of performance that might reasonably be expected from a laboratory being monitored by this CRM in a QA/QC program. They take into account errors attributable to measurement uncertainty and CRM variability. For an effective CRM the contribution of the latter should be negligible in comparison to measurement errors. The Standard Deviation values include all sources of measurement uncertainty: between-lab variance, within-run variance (precision errors) and CRM variability.

The SD for each analyte's certified value is calculated from the same filtered data set used to determine the certified value, i.e. after removal of all individual, lab dataset (batch) and 3SD outliers (single iteration). These outliers can only be removed after the absolute homogeneity of the CRM has been independently established, i.e. the outliers must be confidently deemed to be analytical rather than arising from inhomogeneity of the CRM. **The standard deviation is then calculated for each analyte from the pooled accepted analyses generated from the certification program.**

In the application of SD's in monitoring performance it is important to note that not all laboratories function at the same level of proficiency and that different methods in use at a particular laboratory have differing levels of precision. Each laboratory has its own inherent SD (for a specific concentration level and analyte-method pair) based on the analytical process and this SD is not directly related to the round robin program.

The majority of data generated in the round robin program was produced by a selection of world class laboratories. The SD's thus generated are more constrained than those that would be produced across a randomly selected group of laboratories. To produce more generally achievable SD's the 'pooled' SD's provided in this report include inter-lab bias. This 'one size fits all' approach may require revision at the discretion of the QC manager concerned following careful scrutiny of QC control charts.

Certified Values, Confidence and Tolerance Limits have been determined for each analytical method following removal of individual and laboratory outliers (Table 3). Certified Values are the mean of means after outlier filtering. The 95% Confidence Limit 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. It should not be used as a control limit for laboratory performance.

95% Confidence Limits are inversely proportional to the number of participating laboratories and inter-laboratory agreement. It is a measure of the reliability of the certified value. A 95% confidence interval indicates a 95% probability that the true value of the analyte under consideration lies between the upper and lower limits. *95% Confidence Limits should not be used as control limits for laboratory performance.*

Indicative (uncertified) values (Table 4) are provided where i) the number of laboratories reporting a particular analyte is insufficient (< 5) to support certification; ii) inter-laboratory consensus is poor; or iii) a significant proportion of results are outlying or reported as less than detection limits.

Homogeneity Evaluation

The tolerance limits (ISO 16269:2014) in Table 3 were determined using an analysis of precision errors method and are considered a conservative estimate of true homogeneity. The meaning of tolerance limits may be illustrated for zinc (by 4-acid digestion) where 99% of the time (1-α=0.99) at least 95% of subsamples (ρ=0.95) will have concentrations lying between 100 and 107 ppm. 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). ***Please note that tolerance limits pertain to the homogeneity of the CRM only and should not be used as control limits for laboratory performance.***

The homogeneity of OREAS 24d has also been evaluated in an ANOVA study for all certified analytes. This study tests the null hypothesis that no statistically significant difference exists between the *between-unit variance* and the *within-unit variance* (i.e. p-values <0.05 indicate rejection of the null hypothesis). Of the 45 certified values, no failures were observed indicating no evidence to reject the null hypothesis. Based on the statistical analysis of the results of the inter-laboratory certification program it can be concluded that OREAS 24d is fit-for-purpose as a certified reference material (see 'Intended Use' below).

PARTICIPATING LABORATORIES

1. Actlabs, Ancaster, Ontario, Canada
2. ALS, Perth, WA, Australia
3. ALS, Vancouver, BC, Canada
4. Bureau Veritas Commodities Canada Ltd, Vancouver, BC, Canada
5. Bureau Veritas Geoanalytical, Adelaide, SA, Australia
6. Bureau Veritas Geoanalytical, Perth, WA, Australia
7. Intertek Genalysis, Adelaide, SA, Australia
8. Intertek Genalysis, Perth, WA, Australia
9. Nagrom, Perth, WA, Australia
10. SGS Lakefield Research Ltd, Lakefield, Ontario, Canada

PREPARER AND SUPPLIER

Certified Reference Material OREAS 24d is prepared, certified and supplied by:

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METROLOGICAL 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 undertaken by ORE Pty Ltd) for a particular analytical method, analyte or analyte suite, and sample matrix. Most of these laboratories have and maintain ISO 17025 accreditation. The certified values presented in this report are calculated from the means of accepted data following robust statistical treatment as detailed in this report.

Guide ISO/TR 16476:2016, section 5.3.1 describes metrological traceability in reference materials as it pertains to the transformation of the measurand. In this section it states, *"Although the determination of the property value itself can be made traceable to appropriate units through, for example, calibration of the measurement equipment used, steps like the transformation of the sample from one physical (chemical) state to another cannot. Such transformations may only be compared with a reference (when available), or among themselves. For some transformations, reference methods have been defined and may be used in certification projects to evaluate the uncertainty associated with such a transformation. In other cases,* ***only a comparison among different laboratories using the same method is possible. In this case, certification takes place on the basis of agreement among independent measurement results*** *(see ISO Guide 35:2006, Clause 10)."*

COMMUTABILITY

The measurements of the results that underlie the certified values contained in this report were undertaken by methods involving pre-treatment (digestion/fusion) of the sample. This served to reduce the sample to a simple and well understood form permitting calibration using simple solutions of the CRM. Due to these methods being well understood and highly effective, commutability is not an issue for this CRM. All OREAS prepared CRMs are sourced from natural ore minerals meaning they will display similar behaviour as routine 'field' samples in the relevant measurement process. Care should be taken to ensure 'matrix matching' as close as practically achievable. The matrix and mineralisation style of the CRM is described in the 'Source Material' section and users should select appropriate CRMs matching these attributes to their field samples.

INTENDED USE

OREAS 24d is intended to cover all activities needed to produce a measurement result. This includes extraction, possible separation steps and the actual measurement process (the signal producing step). OREAS 24d may be used to calibrate the entire procedure by producing a pure substance CRM transformed into a calibration solution.

OREAS 24d is intended for the following uses:

- For the monitoring of laboratory performance in the analysis of analytes reported in Table 1 in geological samples;
- For the verification of analytical methods for analytes reported in Table 1;
- For the calibration of instruments used in the determination of the concentration of analytes reported in Table 1.

STABILITY AND STORAGE INSTRUCTIONS

OREAS 24d was prepared from barren basalt sample. In its unopened state under normal conditions of storage it has a shelf life beyond ten years.

INSTRUCTIONS FOR CORRECT USE

The certified values for OREAS 24d refer to the concentration levels in its packaged state. There is no need for drying prior to weighing and analysis.

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.

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.

DOCUMENT HISTORY

Revision No.	Date	Changes applied
0	29th November, 2019	First publication.

QMS ACCREDITATION

ORE Pty Ltd is accredited to ISO 9001:2015 by Lloyd's Register Quality Assurance Ltd for its quality management system including development, manufacturing, certification and supply of CRMs.

CERTIFYING OFFICER

29th November, 2019

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

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