ORE RESEARCH & EXPLORATION

OREAS Reference Materials ABN 28006859856
37A Hosie Street · Bayswater North · Vic 3153 · Australia
61 3 9729 0333 61 3 9729 8338
info@ore.com.au www.ore.com.au

CERTIFICATE OF ANALYSIS FOR

LOW GRADE COPPER ORE REFERENCE MATERIAL

OREAS 922

Table 1. Certified Values, SDs, 95% Confidence and Tolerance Limits for OREAS 922

Constituent	Certified Value	1SD	95% Confidence Limits		95% Tolerance Limits	
			Low	High	Low	High
4-Acid Digestion						
Ag, Silver (ppm)	0.888	0.109	0.842	0.934	0.755	1.021
Al, Aluminium (wt.%)	7.33	0.426	7.13	7.53	7.11	7.54
As, Arsenic (ppm)	6.91	0.82	6.69	7.13	6.15	7.67
Ba, Barium (ppm)	468	19.2	459	477	454	482
Be, Beryllium (ppm)	2.40	0.237	2.29	2.51	2.21	2.58
Bi, Bismuth (ppm)	10.1	1.3	9.6	10.6	9.1	11.1
Ca, Calcium (wt.%)	0.475	0.024	0.463	0.486	0.462	0.487
Cd, Cadmium (ppm)	0.29	0.03	0.27	0.31	0.27	0.31
Ce, Cerium (ppm)	86	3.4	84	88	84	88
Co, Cobalt (ppm)	20.4	1.21	19.8	21.0	19.9	20.9
Cr, Chromium (ppm)	75	10	70	80	72	78
Cs, Cesium (ppm)	7.27	0.438	7.02	7.52	7.09	7.45
Cu, Copper (ppm)	2122	86.4	2089	2155	2055	2189
Dy, Dysprosium (ppm)	5.39	0.166	5.26	5.51	5.25	5.52
Er, Erbium (ppm)	3.11	0.151	2.98	3.23	3.02	3.19
Eu, Europium (ppm)	1.39	0.088	1.31	1.46	1.36	1.42
Fe, Iron (wt.%)	5.53	0.332	5.38	5.69	5.41	5.66
Ga, Gallium (ppm)	20.4	1.02	19.9	20.9	19.9	20.9
Gd, Gadolinium (ppm)	6.18	0.232	5.98	6.38	6.02	6.33
Ge, Germanium (ppm)	< 2	IND	IND	IND	IND	IND
Hf, Hafnium (ppm)	3.78	0.282	3.62	3.93	3.63	3.92
Ho, Holmium (ppm)	1.04	0.039	1.02	1.06	1.02	1.07
In, Indium (ppm)	0.31	0.021	0.30	0.32	0.30	0.32
K, Potassium (wt.%)	2.54	0.063	2.52	2.56	2.47	2.61
La, Lanthanum (ppm)	43.4	1.99	42.3	44.4	42.2	44.5
Li, Lithium (ppm)	30.8	1.76	29.9	31.7	29.7	31.9
Lu, Lutetium (ppm)	0.41	0.020	0.40	0.43	0.40	0.43
Mg, Magnesium (wt.%)	1.58	0.083	1.54	1.62	1.54	1.62
Mn, Manganese (wt.%)	0.083	0.004	0.081	0.085	0.081	0.085

Table 1 continued.

Constituent	Certified Value	1SD	95% Confidence Limits		95% Tolerance Limits	
			Low	High	Low	High
4-Acid Digestion continued						
Mo, Molybdenum (ppm)	0.74	0.12	0.71	0.78	0.64	0.85
Na, Sodium (wt.%)	0.441	0.024	0.429	0.453	0.429	0.453
Nb, Niobium (ppm)	14.9	0.74	14.5	15.4	14.4	15.5
Nd, Neodymium (ppm)	36.7	1.50	35.5	37.8	35.8	37.5
Ni, Nickel (ppm)	37.9	2.66	36.7	39.1	36.5	39.2
P, Phosphorus (wt.%)	0.066	0.004	0.064	0.068	0.063	0.069
Pb, Lead (ppm)	59	3.2	58	60	57	62
Pr, Praseodymium (ppm)	10.0	0.49	9.6	10.4	9.8	10.3
Rb, Rubidium (ppm)	164	9.4	159	170	161	168
Re, Rhenium (ppb)	< 2	IND	IND	IND	IND	IND
S, Sulphur (wt.%)	0.386	0.019	0.377	0.394	0.373	0.398
Sb, Antimony (ppm)	1.35	0.089	1.30	1.40	1.27	1.43
Sc, Scandium (ppm)	13.1	0.64	12.8	13.5	12.7	13.5
Se, Selenium (ppm)	3.76	0.82	3.28	4.25	3.46	4.07
Sm, Samarium (ppm)	6.95	0.393	6.63	7.28	6.79	7.12
Sn, Tin (ppm)	9.95	0.690	9.64	10.27	9.68	10.22
Sr, Strontium (ppm)	58	3.0	56	59	56	59
Ta, Tantalum (ppm)	1.24	0.14	1.14	1.34	1.20	1.28
Tb, Terbium (ppm)	0.93	0.039	0.90	0.97	0.91	0.96
Te, Tellurium (ppm)	< 0.05	IND	IND	IND	IND	IND
Th, Thorium (ppm)	17.2	1.07	16.6	17.7	16.8	17.5
Ti, Titanium (wt.%)	0.427	0.026	0.417	0.437	0.409	0.446
Tl, Thallium (ppm)	0.85	0.051	0.82	0.87	0.82	0.88
Tm, Thulium (ppm)	0.44	0.05	0.41	0.48	0.41	0.47
U, Uranium (ppm)	3.31	0.178	3.21	3.40	3.22	3.39
V, Vanadium (ppm)	91	4.0	89	93	87	95
W, Tungsten (ppm)	3.81	0.309	3.62	3.99	3.62	4.00
Y, Yttrium (ppm)	28.9	1.94	27.9	30.0	28.1	29.8
Yb, Ytterbium (ppm)	2.80	0.142	2.70	2.89	2.70	2.90
Zn, Zinc (ppm)	267	8.3	264	271	257	277
Zr, Zirconium (ppm)	127	9.2	123	131	122	133
Aqua Regia Digestion						
Ag, Silver (ppm)	0.851	0.078	0.820	0.882	0.771	0.931
Al, Aluminium (wt.%)	2.72	0.152	2.63	2.80	2.67	2.76
As, Arsenic (ppm)	6.12	0.477	5.93	6.30	5.66	6.58
Au, Gold (ppb)	< 5	IND	IND	IND	IND	IND
Ba, Barium (ppm)	70	13	63	77	68	72
Be, Beryllium (ppm)	0.65	0.08	0.61	0.70	0.62	0.68
Bi, Bismuth (ppm)	10.3	1.3	9.8	10.8	9.4	11.2
Ca, Calcium (wt.%)	0.324	0.018	0.313	0.334	0.311	0.337
Cd, Cadmium (ppm)	0.28	0.022	0.26	0.29	0.26	0.30
Ce, Cerium (ppm)	63	7	59	68	62	65
Co, Cobalt (ppm)	19.4	1.14	18.8	19.9	18.9	19.8

Table 1 continued.

Constituent	Certified Value	1SD	95% Confidence Limits		95% Tolerance Limits	
			Low	High	Low	High
Aqua Regia Digestion continued						
Cr, Chromium (ppm)	40.7	1.48	40.0	41.5	39.2	42.2
Cs, Cesium (ppm)	1.76	0.23	1.61	1.91	1.71	1.82
Cu, Copper (ppm)	2176	82.6	2142	2209	2114	2237
Dy, Dysprosium (ppm)	< 5	IND	IND	IND	IND	IND
Er, Erbium (ppm)	< 3	IND	IND	IND	IND	IND
Eu, Europium (ppm)	< 1.5	IND	IND	IND	IND	IND
Fe, Iron (wt.%)	5.05	0.189	4.96	5.14	4.95	5.15
Ga, Gallium (ppm)	7.62	0.426	7.36	7.88	7.37	7.88
Gd, Gadolinium (ppm)	4.44	0.80	3.66	5.21	4.21	4.66
Ge, Germanium (ppm)	0.10	0.01	0.09	0.11	IND	IND
Hf, Hafnium (ppm)	0.61	0.055	0.57	0.66	0.58	0.64
Hg, Mercury (ppm)	< 0.05	IND	IND	IND	IND	IND
Ho, Holmium (ppm)	< 0.7	IND	IND	IND	IND	IND
In, Indium (ppm)	0.24	0.023	0.22	0.25	0.23	0.25
K, Potassium (wt.%)	0.376	0.058	0.345	0.406	0.361	0.390
La, Lanthanum (ppm)	32.5	4.0	30.3	34.6	31.4	33.5
Li, Lithium (ppm)	22.8	1.32	22.1	23.5	21.9	23.7
Lu, Lutetium (ppm)	< 0.3	IND	IND	IND	IND	IND
Mg, Magnesium (wt.%)	1.33	0.056	1.31	1.36	1.31	1.36
Mn, Manganese (wt.%)	0.073	0.002	0.072	0.075	0.072	0.075
Mo, Molybdenum (ppm)	0.69	0.08	0.64	0.74	0.63	0.75
Na, Sodium (wt.%)	0.021	0.004	0.019	0.022	0.019	0.022
Nb, Niobium (ppm)	0.35	0.033	0.33	0.38	0.32	0.38
Nd, Neodymium (ppm)	27.5	4.9	23.1	31.9	26.3	28.7
Ni, Nickel (ppm)	34.3	1.64	33.4	35.1	33.2	35.3
P, Phosphorus (wt.%)	0.063	0.003	0.062	0.065	0.061	0.065
Pb, Lead (ppm)	60	3.8	58	62	58	62
Pr, Praseodymium (ppm)	7.33	0.674	6.43	8.23	7.11	7.54
Rb, Rubidium (ppm)	22.7	3.6	20.4	25.1	21.9	23.6
Re, Rhenium (ppb)	< 1	IND	IND	IND	IND	IND
S, Sulphur (wt.%)	0.386	0.025	0.373	0.399	0.375	0.398
Sb, Antimony (ppm)	0.57	0.08	0.52	0.62	0.52	0.62
Sc, Scandium (ppm)	3.15	0.46	2.84	3.45	2.98	3.32
Se, Selenium (ppm)	3.44	0.47	3.20	3.69	3.06	3.82
Sm, Samarium (ppm)	4.98	0.97	4.12	5.83	4.77	5.18
Sn, Tin (ppm)	3.83	0.39	3.58	4.08	3.70	3.96
Sr, Strontium (ppm)	15.0	0.69	14.7	15.3	14.6	15.4
Ta, Tantalum (ppm)	< 0.05	IND	IND	IND	IND	IND
Tb, Terbium (ppm)	0.62	0.12	0.53	0.71	0.60	0.64
Te, Tellurium (ppm)	< 0.03	IND	IND	IND	IND	IND
Th, Thorium (ppm)	14.5	1.08	13.9	15.2	14.2	14.9
Ti, Titanium (wt.%)	< 0.15	IND	IND	IND	IND	IND
Tl, Thallium (ppm)	0.14	0.02	0.13	0.16	IND	IND

Table 1 continued.

Constituent	Certified Value	1SD	95% Confidence Limits		95% Tolerance Limits	
			Low	High	Low	High
Aqua Regia Digestion continued						
Tm, Thulium (ppm)	< 0.4	IND	IND	IND	IND	IND
U, Uranium (ppm)	1.98	0.26	1.83	2.13	1.91	2.05
V, Vanadium (ppm)	29.4	2.27	28.1	30.7	28.2	30.6
W, Tungsten (ppm)	1.12	0.19	1.01	1.22	0.94	1.30
Y, Yttrium (ppm)	16.0	2.8	14.5	17.6	15.4	16.6
Yb, Ytterbium (ppm)	< 2	IND	IND	IND	IND	IND
Zn, Zinc (ppm)	256	12.8	250	262	248	264
Zr, Zirconium (ppm)	22.3	3.0	20.6	24.0	20.7	23.9
Peroxide Fusion ICP						
Al, Aluminium (wt.%)	7.59	0.230	7.41	7.78	7.42	7.76
As, Arsenic (ppm)	< 8	IND	IND	IND	IND	IND
Ba, Barium (ppm)	481	12.2	474	488	468	494
Be, Beryllium (ppm)	< 3	IND	IND	IND	IND	IND
Bi, Bismuth (ppm)	10.8	1.04	10.1	11.5	9.8	11.8
Ca, Calcium (wt.%)	0.486	0.040	0.470	0.503	0.447	0.525
Cd, Cadmium (ppm)	< 0.5	IND	IND	IND	IND	IND
Ce, Cerium (ppm)	88	5.5	83	92	85	90
Co, Cobalt (ppm)	20.9	1.37	20.3	21.5	19.5	22.3
Cr, Chromium (ppm)	90	12	83	98	84	96
Cs, Cesium (ppm)	7.50	0.315	7.24	7.75	7.31	7.68
Cu, Copper (ppm)	2215	89.4	2166	2264	2153	2276
Dy, Dysprosium (ppm)	5.75	0.219	5.55	5.94	5.62	5.88
Er, Erbium (ppm)	3.38	0.274	3.14	3.62	3.26	3.50
Eu, Europium (ppm)	1.52	0.101	1.44	1.60	IND	IND
Fe, Iron (wt.%)	5.71	0.209	5.59	5.83	5.61	5.82
Ga, Gallium (ppm)	21.2	1.39	20.2	22.2	20.7	21.8
Gd, Gadolinium (ppm)	6.94	0.668	6.36	7.52	6.76	7.13
Hf, Hafnium (ppm)	5.93	0.69	5.19	6.67	IND	IND
Ho, Holmium (ppm)	1.20	0.085	1.13	1.27	IND	IND
In, Indium (ppm)	0.34	0.05	0.30	0.37	IND	IND
K, Potassium (wt.%)	2.60	0.100	2.53	2.66	2.51	2.69
La, Lanthanum (ppm)	45.6	3.50	44.1	47.1	43.7	47.5
Li, Lithium (ppm)	28.8	3.3	26.5	31.1	27.2	30.4
Lu, Lutetium (ppm)	0.49	0.07	0.40	0.57	IND	IND
Mg, Magnesium (wt.%)	1.61	0.059	1.57	1.65	1.58	1.65
Mn, Manganese (wt.%)	0.088	0.003	0.086	0.090	0.086	0.090
Mo, Molybdenum (ppm)	< 1	IND	IND	IND	IND	IND
Nb, Niobium (ppm)	15.2	2.0	13.5	16.9	14.7	15.8
Nd, Neodymium (ppm)	38.9	1.07	38.1	39.6	37.9	39.8
Ni, Nickel (ppm)	43.4	8.3	37.5	49.3	41.8	44.9
P, Phosphorus (wt.%)	0.066	0.005	0.062	0.069	0.061	0.070
Pb, Lead (ppm)	64	5.4	60	67	58	70
Pr, Praseodymium (ppm)	10.6	0.35	10.4	10.9	10.4	10.9

Table 1 continued.

Constituent	Certified Value	1SD	95% Confidence Limits		95% Tolerance Limits	
			Low	High	Low	High
Peroxide Fusion ICP continued						
Rb, Rubidium (ppm)	167	5.2	163	172	165	170
S, Sulphur (wt.%)	0.389	0.017	0.379	0.399	0.358	0.420
Sb, Antimony (ppm)	< 2	IND	IND	IND	IND	IND
Si, Silicon (wt.%)	30.51	0.909	29.93	31.10	29.26	31.76
Sm, Samarium (ppm)	7.31	0.273	7.11	7.51	7.10	7.53
Sn, Tin (ppm)	10.0	1.6	8.6	11.4	7.8	12.3
Sr, Strontium (ppm)	58	3.3	56	61	54	62
Ta, Tantalum (ppm)	1.33	0.16	1.19	1.47	IND	IND
Tb, Terbium (ppm)	1.02	0.064	0.97	1.08	IND	IND
Th, Thorium (ppm)	17.7	0.78	17.0	18.3	17.2	18.1
Ti, Titanium (wt.%)	0.439	0.020	0.427	0.451	0.426	0.452
Tl, Thallium (ppm)	0.88	0.056	0.85	0.92	IND	IND
Tm, Thulium (ppm)	0.51	0.06	0.46	0.57	IND	IND
U, Uranium (ppm)	3.59	0.146	3.48	3.71	3.49	3.70
V, Vanadium (ppm)	92	5.8	89	96	88	96
W, Tungsten (ppm)	< 5	IND	IND	IND	IND	IND
Y, Yttrium (ppm)	31.1	1.00	30.3	31.9	30.3	31.9
Yb, Ytterbium (ppm)	3.17	0.268	2.95	3.40	3.02	3.33
Zn, Zinc (ppm)	277	18.3	265	288	254	300

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 922 is one of a suite of sixteen copper CRMs (OREAS 920 to OREAS 935) prepared from material from the CSA mine located near the town of Cobar in central western New South Wales, Australia. The copper ore body is hosted by the Early Devonian CSA Siltstone, a thinly bedded turbiditic sequence of carbonaceous siltstones and mudstones with minor coarser units. The CSA Siltstone is part of the Cobar Supergroup, consisting of lower syn-rift sediments and upper post-rift sag phase sediments. The mineralisation is structurally controlled and confined to a number of steeply dipping bodies within a major shear zone on the eastern margin of the Early Devonian Cobar Basin. It is characterised by low-grade greenschist alteration and epigenetic low-grade mineralisation enveloping higher-grade shoots of vein complexes or sub-massive to massive sulphides. The sulphides include chalcopyrite, pyrrhotite, pyrite, sphalerite, galena, bornite and cubanite. Iron-rich chlorite and silica are prominent alterations in the siltstone host.

COMMINUTION AND HOMOGENISATION PROCEDURES

The material constituting OREAS 922 was prepared in the following manner:

- drying to constant mass at 105°C;
- preliminary blending of copper ores and barren siltstone materials;
- multi-stage milling to approximately 99% less than 75 microns;
- final homogenisation;
- packaging in 10g units in laminated foil pouches.

ANALYTICAL PROGRAM

Twenty two commercial analytical laboratories participated in the program to characterise the analytes reported in Table 1. The following methods were employed for method specific certification:

- Four acid (HCl-HNO_3-HF-$HClO_4$) digestion with ICP-OES, ICP-MS or AAS finish (19 laboratories);
- Aqua regia digestion with ICP-OES, ICP-MS or AAS finish (19 laboratories);
- Peroxide fusion with ICP-OES, ICP-MS or AAS finish (12 laboratories).

For the round robin program ten 300g test units were taken at predetermined intervals during the bagging stage, immediately following final homogenisation, and are considered representative of the entire batch. The six samples received by each laboratory were obtained by taking two 20g scoop splits from each of three separate 300g 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 1 presents the certified values together with their associated 1SD's, 95% confidence and tolerance limits and Table 2 shows indicative values. Table 3 provides performance gate intervals for the certified values of each analytical method group based on their pooled 1SD's. Tabulated results of all elements 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 (**Datapack for OREAS 922.xlsx**).

STATISTICAL ANALYSIS

Certified Values, Standard Deviations, Confidence and Tolerance Limits have been determined for each analytical method following removal of individual and laboratory outliers (Table 1). 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. Indicative values (Table 2) are provided where i) the number of laboratories reporting a particular analyte is insufficient (< 5) to support certification; ii) interlaboratory consensus is poor; or iii) a significant proportion of results are outlying or results are multimodal.

Table 2. Indicative Values for OREAS 922

Constituent	Unit	Value	Constituent	Unit	Value	Constituent	Unit	Value
4-Acid Digestion								
B	ppm	*9.00*	Hg	ppm	*< 1*	Ru	ppm	*< 0.1*
Aqua Regia Digestion								
B	ppm	*35.6*	Pt	ppb	*< 5*			
Pd	ppb	*< 10*	Ru	ppm	*< 0.005*			
Infrared Combustion								
S	wt.%	*0.398*						
Peroxide Fusion ICP								
Ag	ppm	*2.83*	Re	ppm	*< 0.1*	Te	ppm	*< 6*
B	ppm	*42.5*	Sc	ppm	*12.0*	Zr	ppm	*206*
Ge	ppm	*2.36*	Se	ppm	*< 20*			

Standard Deviation values (1SDs) are reported in Table 1 and 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.

Performance Gates (Table 3) are 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.

A second method utilises a 5% window calculated directly from the certified value. Standard deviation is also shown in relative per cent 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.

Tolerance Limits (ISO Guide 3207) 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 copper by 4-acid digestion, where 99% of the time ($1-\alpha=0.99$) at least 95% of subsamples ($\rho=0.95$) will have concentrations lying between between 2055 and 2189 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).

The homogeneity of OREAS 922 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 175 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 922 is fit-for-purpose as a certified reference material (see 'Intended Use' below).

PARTICIPATING LABORATORIES

Accurassay, Thunder Bay, ON, Canada
Acme, Santiago, Chile
Acme, Vancouver, BC, Canada
Actlabs, Ancaster, Ontario, Canada
Actlabs, Kamloops, BC, Canada
Actlabs, Thunder Bay, Ontario, Canada
ALS, Brisbane, QLD, Australia
ALS, Burnie, TAS, Australia
ALS, Loughrea, County Galway, Ireland
ALS, Vancouver, BC, Canada
Amdel (BV), Cardiff, NSW, Australia
Intertek Genalysis, Perth, WA, Australia
Intertek Testing Services, Adelaide, SA, Australia
Intertek Testing Services, Beijing, China
Intertek Testing Services, Jakarta Selatan, Indonesia
Intertek Genalysis, Johannesburg, Sth Africa
Intertek Testing Services, Muntinlupa, Philippines
Labtium Oy, Rovaniemi, Finland
MINTEK, Randburg, Sth Africa
PT. Geoservices, Cikarang, Indonesia
SGS, Booysens, Gauteng, South Africa
SGS Didipio, Makati City, Philippines
SGS, Lakefield, Ontario, Canada
SGS Nui Phao, Ha Noi, Vietnam
SGS, Vancouver, BC, Canada
SGS, Vespasiano, MG, Brazil
Shiva Analyticals, Bangalore North, Karnataka, India
Ultra Trace (BV), Perth, WA, Australia

Table 3. Performance Gates for OREAS 922

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											
Ag, ppm	0.888	0.109	0.671	1.105	0.562	1.214	12.23%	24.46%	36.69%	0.844	0.933
Al, wt.%	7.33	0.426	6.48	8.18	6.05	8.61	5.82%	11.63%	17.45%	6.96	7.69
As, ppm	6.91	0.82	5.27	8.56	4.44	9.38	11.91%	23.81%	35.72%	6.57	7.26
Ba, ppm	468	19	430	506	410	526	4.10%	8.20%	12.30%	445	491
Be, ppm	2.40	0.237	1.92	2.87	1.69	3.11	9.88%	19.76%	29.64%	2.28	2.52
Bi, ppm	10.1	1.3	7.6	12.7	6.3	13.9	12.52%	25.04%	37.56%	9.6	10.6
Ca, wt.%	0.475	0.024	0.426	0.523	0.402	0.547	5.10%	10.20%	15.31%	0.451	0.498
Cd, ppm	0.29	0.03	0.22	0.36	0.19	0.39	11.68%	23.36%	35.04%	0.28	0.31
Ce, ppm	86	3.4	79	92	76	96	3.94%	7.88%	11.82%	81	90
Co, ppm	20.4	1.21	18.0	22.8	16.7	24.0	5.95%	11.91%	17.86%	19.4	21.4
Cr, ppm	75	10	56	95	46	104	12.98%	25.96%	38.94%	71	79
Cs, ppm	7.27	0.438	6.39	8.15	5.96	8.59	6.03%	12.06%	18.09%	6.91	7.63
Cu, ppm	2122	86	1949	2295	1863	2381	4.07%	8.14%	12.22%	2016	2228
Dy, ppm	5.39	0.166	5.05	5.72	4.89	5.88	3.08%	6.16%	9.25%	5.12	5.65
Er, ppm	3.11	0.151	2.80	3.41	2.65	3.56	4.86%	9.72%	14.57%	2.95	3.26
Eu, ppm	1.39	0.088	1.21	1.57	1.13	1.65	6.33%	12.65%	18.98%	1.32	1.46
Fe, wt.%	5.53	0.332	4.87	6.20	4.54	6.53	5.99%	11.99%	17.98%	5.26	5.81
Ga, ppm	20.4	1.02	18.4	22.4	17.3	23.4	4.99%	9.98%	14.98%	19.4	21.4
Gd, ppm	6.18	0.232	5.71	6.64	5.48	6.87	3.76%	7.53%	11.29%	5.87	6.48
Ge, ppm	< 2	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
Hf, ppm	3.78	0.282	3.21	4.34	2.93	4.62	7.46%	14.93%	22.39%	3.59	3.97
Ho, ppm	1.04	0.039	0.97	1.12	0.93	1.16	3.72%	7.44%	11.15%	0.99	1.10
In, ppm	0.31	0.021	0.27	0.35	0.25	0.37	6.83%	13.66%	20.49%	0.29	0.33
K, wt.%	2.54	0.063	2.41	2.67	2.35	2.73	2.50%	5.00%	7.50%	2.41	2.67
La, ppm	43.4	1.99	39.4	47.4	37.4	49.3	4.59%	9.17%	13.76%	41.2	45.5
Li, ppm	30.8	1.76	27.3	34.3	25.5	36.1	5.71%	11.41%	17.12%	29.3	32.3
Lu, ppm	0.41	0.020	0.37	0.45	0.35	0.47	4.77%	9.55%	14.32%	0.39	0.43
Mg, wt.%	1.58	0.083	1.42	1.75	1.33	1.83	5.23%	10.46%	15.69%	1.50	1.66
Mn, wt.%	0.083	0.004	0.075	0.091	0.071	0.095	4.93%	9.86%	14.79%	0.079	0.087
Mo, ppm	0.74	0.12	0.51	0.98	0.39	1.10	16.08%	32.16%	48.24%	0.71	0.78
Na, wt.%	0.441	0.024	0.394	0.488	0.370	0.512	5.38%	10.76%	16.14%	0.419	0.463
Nb, ppm	14.9	0.74	13.5	16.4	12.7	17.2	4.95%	9.90%	14.85%	14.2	15.7

Table 3 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											
Nd, ppm	36.7	1.50	33.7	39.7	32.2	41.2	4.08%	8.16%	12.25%	34.8	38.5
Ni, ppm	37.9	2.66	32.6	43.2	29.9	45.8	7.02%	14.03%	21.05%	36.0	39.8
P, wt.%	0.066	0.004	0.058	0.073	0.055	0.077	5.71%	11.42%	17.14%	0.063	0.069
Pb, ppm	59	3.2	53	66	50	69	5.37%	10.73%	16.10%	56	62
Pr, ppm	10.0	0.49	9.1	11.0	8.6	11.5	4.84%	9.69%	14.53%	9.5	10.5
Rb, ppm	164	9	146	183	136	192	5.70%	11.39%	17.09%	156	173
Re, ppb	< 2	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
S, wt.%	0.386	0.019	0.347	0.424	0.328	0.443	4.95%	9.90%	14.85%	0.366	0.405
Sb, ppm	1.35	0.089	1.17	1.53	1.08	1.62	6.59%	13.19%	19.78%	1.28	1.42
Sc, ppm	13.1	0.64	11.9	14.4	11.2	15.0	4.85%	9.70%	14.55%	12.5	13.8
Se, ppm	3.76	0.82	2.12	5.41	1.30	6.23	21.85%	43.71%	65.56%	3.58	3.95
Sm, ppm	6.95	0.393	6.17	7.74	5.77	8.13	5.66%	11.32%	16.98%	6.61	7.30
Sn, ppm	9.95	0.690	8.57	11.33	7.88	12.02	6.93%	13.87%	20.80%	9.46	10.45
Sr, ppm	58	3.0	51	64	48	67	5.29%	10.59%	15.88%	55	60
Ta, ppm	1.24	0.14	0.96	1.52	0.82	1.66	11.32%	22.65%	33.97%	1.18	1.30
Tb, ppm	0.93	0.039	0.86	1.01	0.82	1.05	4.15%	8.29%	12.44%	0.89	0.98
Te, ppm	< 0.05	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
Th, ppm	17.2	1.07	15.0	19.3	13.9	20.4	6.26%	12.53%	18.79%	16.3	18.0
Ti, wt.%	0.427	0.026	0.376	0.479	0.350	0.504	6.00%	12.01%	18.01%	0.406	0.449
Tl, ppm	0.85	0.051	0.75	0.95	0.69	1.00	6.00%	12.00%	17.99%	0.80	0.89
Tm, ppm	0.44	0.05	0.35	0.53	0.31	0.58	10.36%	20.72%	31.08%	0.42	0.47
U, ppm	3.31	0.178	2.95	3.66	2.77	3.84	5.39%	10.77%	16.16%	3.14	3.47
V, ppm	91	4.0	83	99	79	103	4.42%	8.85%	13.27%	86	95
W, ppm	3.81	0.309	3.19	4.43	2.88	4.74	8.13%	16.26%	24.38%	3.62	4.00
Y, ppm	28.9	1.94	25.0	32.8	23.1	34.7	6.70%	13.41%	20.11%	27.5	30.4
Yb, ppm	2.80	0.142	2.52	3.08	2.37	3.22	5.07%	10.13%	15.20%	2.66	2.94
Zn, ppm	267	8	251	284	242	292	3.10%	6.20%	9.31%	254	281
Zr, ppm	127	9	109	146	100	155	7.23%	14.46%	21.69%	121	134
Aqua Regia Digestion											
Ag, ppm	0.851	0.078	0.696	1.007	0.618	1.085	9.15%	18.30%	27.44%	0.809	0.894
Al, wt.%	2.72	0.152	2.41	3.02	2.26	3.17	5.60%	11.21%	16.81%	2.58	2.85
As, ppm	6.12	0.477	5.16	7.07	4.69	7.55	7.79%	15.58%	23.37%	5.81	6.42

Table 3 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
Aqua Regia Digestion continued											
Au, ppb	< 5	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
Ba, ppm	70	13	45	95	32	108	18.12%	36.23%	54.35%	66	73
Be, ppm	0.65	0.08	0.50	0.80	0.42	0.88	11.64%	23.28%	34.92%	0.62	0.68
Bi, ppm	10.3	1.3	7.7	12.9	6.4	14.2	12.50%	25.01%	37.51%	9.8	10.8
Ca, wt.%	0.324	0.018	0.287	0.360	0.269	0.378	5.63%	11.25%	16.88%	0.308	0.340
Cd, ppm	0.28	0.022	0.23	0.32	0.21	0.34	8.02%	16.04%	24.06%	0.26	0.29
Ce, ppm	63	7	49	78	41	85	11.49%	22.99%	34.48%	60	66
Co, ppm	19.4	1.14	17.1	21.6	15.9	22.8	5.91%	11.82%	17.72%	18.4	20.3
Cr, ppm	40.7	1.48	37.8	43.7	36.3	45.2	3.63%	7.26%	10.90%	38.7	42.8
Cs, ppm	1.76	0.23	1.29	2.23	1.06	2.47	13.29%	26.59%	39.88%	1.67	1.85
Cu, ppm	2176	83	2010	2341	1928	2423	3.80%	7.59%	11.39%	2067	2284
Dy, ppm	< 5	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
Er, ppm	< 3	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
Eu, ppm	< 1.5	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
Fe, wt.%	5.05	0.189	4.67	5.43	4.48	5.62	3.75%	7.50%	11.24%	4.80	5.30
Ga, ppm	7.62	0.426	6.77	8.48	6.34	8.90	5.59%	11.19%	16.78%	7.24	8.00
Gd, ppm	4.44	0.80	2.84	6.04	2.04	6.84	18.04%	36.08%	54.12%	4.21	4.66
Ge, ppm	0.10	0.01	0.08	0.12	0.07	0.14	11.10%	22.20%	33.31%	0.10	0.11
Hf, ppm	0.61	0.055	0.50	0.72	0.45	0.78	9.01%	18.02%	27.03%	0.58	0.64
Hg, ppm	< 0.05	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
Ho, ppm	< 0.7	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
In, ppm	0.24	0.023	0.19	0.28	0.17	0.31	9.90%	19.80%	29.69%	0.23	0.25
K, wt.%	0.376	0.058	0.260	0.491	0.203	0.549	15.35%	30.71%	46.06%	0.357	0.394
La, ppm	32.5	4.0	24.5	40.4	20.6	44.3	12.20%	24.39%	36.59%	30.8	34.1
Li, ppm	22.8	1.32	20.2	25.4	18.8	26.7	5.78%	11.55%	17.33%	21.7	23.9
Lu, ppm	< 0.3	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
Mg, wt.%	1.33	0.056	1.22	1.45	1.17	1.50	4.19%	8.37%	12.56%	1.27	1.40
Mn, wt.%	0.073	0.002	0.069	0.078	0.066	0.081	3.25%	6.49%	9.74%	0.070	0.077
Mo, ppm	0.69	0.08	0.53	0.86	0.44	0.94	12.03%	24.05%	36.08%	0.66	0.73
Na, wt.%	0.021	0.004	0.013	0.028	0.010	0.031	17.27%	34.53%	51.80%	0.020	0.022
Nb, ppm	0.35	0.033	0.29	0.42	0.25	0.45	9.32%	18.65%	27.97%	0.34	0.37
Nd, ppm	27.5	4.9	17.7	37.3	12.7	42.2	17.87%	35.74%	53.61%	26.1	28.9

Table 3 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
Aqua Regia Digestion continued											
Ni, ppm	34.3	1.64	31.0	37.6	29.3	39.2	4.79%	9.58%	14.37%	32.6	36.0
P, wt.%	0.063	0.003	0.057	0.070	0.054	0.073	4.79%	9.59%	14.38%	0.060	0.067
Pb, ppm	60	3.8	52	67	49	71	6.30%	12.59%	18.89%	57	63
Pr, ppm	7.33	0.674	5.98	8.67	5.30	9.35	9.20%	18.40%	27.59%	6.96	7.69
Rb, ppm	22.7	3.6	15.6	29.9	12.0	33.5	15.76%	31.51%	47.27%	21.6	23.9
Re, ppb	< 1	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
S, wt.%	0.386	0.025	0.337	0.436	0.312	0.461	6.42%	12.83%	19.25%	0.367	0.406
Sb, ppm	0.57	0.08	0.41	0.73	0.32	0.81	14.30%	28.59%	42.89%	0.54	0.60
Sc, ppm	3.15	0.46	2.22	4.08	1.75	4.54	14.75%	29.50%	44.24%	2.99	3.30
Se, ppm	3.44	0.47	2.50	4.39	2.02	4.86	13.72%	27.45%	41.17%	3.27	3.61
Sm, ppm	4.98	0.97	3.04	6.91	2.08	7.88	19.43%	38.86%	58.29%	4.73	5.22
Sn, ppm	3.83	0.39	3.05	4.61	2.67	5.00	10.14%	20.27%	30.41%	3.64	4.02
Sr, ppm	15.0	0.69	13.6	16.4	12.9	17.1	4.58%	9.17%	13.75%	14.2	15.7
Ta, ppm	< 0.05	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
Tb, ppm	0.62	0.12	0.38	0.86	0.26	0.98	19.41%	38.82%	58.23%	0.59	0.65
Te, ppm	< 0.03	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
Th, ppm	14.5	1.08	12.4	16.7	11.3	17.8	7.45%	14.90%	22.35%	13.8	15.3
Ti, wt.%	< 0.15	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
Tl, ppm	0.14	0.02	0.10	0.18	0.08	0.20	14.62%	29.24%	43.86%	0.14	0.15
Tm, ppm	< 0.4	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
U, ppm	1.98	0.26	1.46	2.49	1.20	2.75	13.04%	26.07%	39.11%	1.88	2.08
V, ppm	29.4	2.27	24.9	33.9	22.6	36.2	7.71%	15.42%	23.13%	27.9	30.9
W, ppm	1.12	0.19	0.75	1.49	0.56	1.67	16.59%	33.18%	49.78%	1.06	1.17
Y, ppm	16.0	2.8	10.4	21.6	7.6	24.4	17.44%	34.89%	52.33%	15.2	16.8
Yb, ppm	< 2	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
Zn, ppm	256	13	231	282	218	294	4.99%	9.97%	14.96%	243	269
Zr, ppm	22.3	3.0	16.3	28.3	13.2	31.4	13.54%	27.08%	40.61%	21.2	23.4
Peroxide Fusion ICP											
Al, wt.%	7.59	0.230	7.13	8.05	6.90	8.28	3.03%	6.07%	9.10%	7.21	7.97
As, ppm	< 8	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
Ba, ppm	481	12	456	505	444	517	2.54%	5.08%	7.62%	457	505
Be, ppm	< 3	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND

Table 3 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
Peroxide Fusion ICP continued											
Bi, ppm	10.8	1.04	8.7	12.9	7.7	13.9	9.67%	19.34%	29.01%	10.3	11.3
Ca, wt.%	0.486	0.040	0.407	0.566	0.367	0.606	8.17%	16.35%	24.52%	0.462	0.511
Cd, ppm	< 0.5	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
Ce, ppm	88	5.5	77	99	71	104	6.29%	12.57%	18.86%	83	92
Co, ppm	20.9	1.37	18.2	23.6	16.8	25.0	6.55%	13.10%	19.65%	19.9	21.9
Cr, ppm	90	12	66	115	54	127	13.46%	26.92%	40.37%	86	95
Cs, ppm	7.50	0.315	6.87	8.12	6.55	8.44	4.20%	8.40%	12.60%	7.12	7.87
Cu, ppm	2215	89	2036	2393	1946	2483	4.04%	8.07%	12.11%	2104	2325
Dy, ppm	5.75	0.219	5.31	6.19	5.09	6.41	3.81%	7.62%	11.43%	5.46	6.04
Er, ppm	3.38	0.274	2.83	3.93	2.56	4.20	8.10%	16.20%	24.30%	3.21	3.55
Eu, ppm	1.52	0.101	1.32	1.73	1.22	1.83	6.64%	13.29%	19.93%	1.45	1.60
Fe, wt.%	5.71	0.209	5.29	6.13	5.08	6.34	3.67%	7.33%	11.00%	5.43	6.00
Ga, ppm	21.2	1.39	18.4	24.0	17.0	25.4	6.55%	13.10%	19.65%	20.2	22.3
Gd, ppm	6.94	0.668	5.60	8.28	4.94	8.95	9.63%	19.26%	28.89%	6.59	7.29
Hf, ppm	5.93	0.69	4.55	7.31	3.86	8.00	11.63%	23.26%	34.88%	5.63	6.23
Ho, ppm	1.20	0.085	1.03	1.37	0.95	1.46	7.09%	14.17%	21.26%	1.14	1.26
In, ppm	0.34	0.05	0.24	0.43	0.20	0.47	13.81%	27.61%	41.42%	0.32	0.35
K, wt.%	2.60	0.100	2.40	2.80	2.30	2.90	3.84%	7.69%	11.53%	2.47	2.73
La, ppm	45.6	3.50	38.6	52.6	35.1	56.1	7.68%	15.36%	23.05%	43.3	47.9
Li, ppm	28.8	3.3	22.2	35.4	18.9	38.7	11.51%	23.01%	34.52%	27.4	30.2
Lu, ppm	0.49	0.07	0.35	0.62	0.28	0.69	14.05%	28.11%	42.16%	0.46	0.51
Mg, wt.%	1.61	0.059	1.50	1.73	1.44	1.79	3.64%	7.28%	10.92%	1.53	1.69
Mn, wt.%	0.088	0.003	0.082	0.093	0.079	0.096	3.19%	6.37%	9.56%	0.083	0.092
Mo, ppm	< 1	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
Nb, ppm	15.2	2.0	11.3	19.1	9.4	21.1	12.86%	25.72%	38.58%	14.5	16.0
Nd, ppm	38.9	1.07	36.7	41.0	35.7	42.1	2.76%	5.52%	8.28%	36.9	40.8
Ni, ppm	43.4	8.3	26.8	59.9	18.5	68.2	19.10%	38.20%	57.30%	41.2	45.5
P, wt.%	0.066	0.005	0.056	0.075	0.051	0.080	7.33%	14.66%	21.99%	0.062	0.069
Pb, ppm	64	5.4	53	74	47	80	8.44%	16.89%	25.33%	60	67
Pr, ppm	10.6	0.35	9.9	11.3	9.6	11.7	3.30%	6.60%	9.90%	10.1	11.2
Rb, ppm	167	5	157	178	152	183	3.12%	6.25%	9.37%	159	176
S, wt.%	0.389	0.017	0.355	0.423	0.338	0.440	4.41%	8.81%	13.22%	0.369	0.408

Table 3 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
Peroxide Fusion ICP continued											
Sb, ppm	< 2	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
Si, wt.%	30.51	0.909	28.69	32.33	27.79	33.24	2.98%	5.96%	8.94%	28.99	32.04
Sm, ppm	7.31	0.273	6.77	7.86	6.49	8.13	3.73%	7.46%	11.20%	6.95	7.68
Sn, ppm	10.0	1.6	6.9	13.2	5.3	14.7	15.71%	31.41%	47.12%	9.5	10.5
Sr, ppm	58	3.3	52	65	49	68	5.61%	11.23%	16.84%	55	61
Ta, ppm	1.33	0.16	1.01	1.65	0.85	1.80	11.97%	23.93%	35.90%	1.26	1.39
Tb, ppm	1.02	0.064	0.90	1.15	0.83	1.22	6.27%	12.54%	18.81%	0.97	1.07
Th, ppm	17.7	0.78	16.1	19.2	15.3	20.0	4.42%	8.84%	13.26%	16.8	18.5
Ti, wt.%	0.439	0.020	0.400	0.478	0.381	0.498	4.45%	8.89%	13.34%	0.417	0.461
Tl, ppm	0.88	0.056	0.77	0.99	0.71	1.05	6.35%	12.70%	19.06%	0.84	0.93
Tm, ppm	0.51	0.06	0.39	0.64	0.33	0.70	12.16%	24.32%	36.48%	0.49	0.54
U, ppm	3.59	0.146	3.30	3.89	3.15	4.03	4.07%	8.15%	12.22%	3.41	3.77
V, ppm	92	5.8	81	104	75	109	6.25%	12.50%	18.76%	88	97
W, ppm	< 5	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
Y, ppm	31.1	1.00	29.1	33.1	28.1	34.1	3.23%	6.46%	9.69%	29.5	32.6
Yb, ppm	3.17	0.268	2.64	3.71	2.37	3.98	8.43%	16.87%	25.30%	3.02	3.33
Zn, ppm	277	18	240	313	222	331	6.60%	13.20%	19.80%	263	290

Note: intervals may appear asymmetric due to rounding

PREPARER AND SUPPLIER OF THE REFERENCE MATERIAL

Reference material OREAS 922 has been prepared and certified by:

ORE Research & Exploration Pty Ltd
37A Hosie Street
Bayswater North VIC 3153
AUSTRALIA

Tel: +613-9729 0333
Fax: +613-9729 8338
Web: www.ore.com.au
Email: info@ore.com.au

It has been packaged in 10g units in laminated foil pouches.

INTENDED USE

OREAS 922 is intended for the following uses:

- for the monitoring of laboratory performance in the analysis of geological samples for the analytes reported in Table 1;

- 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 922 has been prepared from mineralised and altered carbonaceous siltstones and mudstones from the CSA mine located near the town of Cobar in central western New South Wales, Australia. It has been packaged in robust foil laminate pouches and under normal storage conditions has long-term stability beyond 10 years.

INSTRUCTIONS FOR THE CORRECT USE OF THE REFERENCE MATERIAL

The certified values for OREAS 922 refer to the concentration level in its packaged state. It should not be dried 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.

CERTIFYING OFFICER

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

REFERENCES

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.