ORE RESEARCH & EXPLORATION

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CERTIFICATE OF ANALYSIS FOR

COPPER BEARING SILTSTONE REFERENCE MATERIAL

OREAS 920

Table 1. Certified Values, SDs, 95% Confidence and Tolerance Limits for OREAS 920

Constituent	Certified Value	1SD	95% Confidence Limits		95% Tolerance Limits	
			Low	High	Low	High
4-Acid Digestion						
Ag, Silver (ppm)	< 0.2	IND	IND	IND	IND	IND
Al, Aluminium (wt.%)	7.69	0.416	7.48	7.90	7.50	7.87
As, Arsenic (ppm)	5.13	0.79	4.79	5.47	4.64	5.61
Ba, Barium (ppm)	546	17.8	537	555	530	562
Be, Beryllium (ppm)	2.88	0.216	2.76	2.99	2.72	3.03
Bi, Bismuth (ppm)	0.69	0.11	0.64	0.74	0.60	0.79
Ca, Calcium (wt.%)	0.497	0.022	0.485	0.508	0.483	0.511
Cd, Cadmium (ppm)	< 0.08	IND	IND	IND	IND	IND
Ce, Cerium (ppm)	94	4.6	91	96	92	95
Co, Cobalt (ppm)	15.6	0.91	15.2	16.0	15.2	16.0
Cr, Chromium (ppm)	79	12	74	85	74	84
Cs, Cesium (ppm)	8.63	0.403	8.39	8.87	8.46	8.80
Cu, Copper (ppm)	112	4.3	111	114	107	117
Dy, Dysprosium (ppm)	6.44	0.269	6.23	6.65	6.29	6.60
Er, Erbium (ppm)	3.69	0.138	3.58	3.79	3.60	3.77
Eu, Europium (ppm)	1.50	0.076	1.44	1.56	1.46	1.54
Fe, Iron (wt.%)	4.14	0.199	4.04	4.24	4.08	4.20
Ga, Gallium (ppm)	20.8	0.90	20.4	21.3	20.3	21.4
Gd, Gadolinium (ppm)	6.97	0.378	6.68	7.27	6.82	7.12
Ge, Germanium (ppm)	< 2	IND	IND	IND	IND	IND
Hf, Hafnium (ppm)	4.60	0.369	4.39	4.81	4.42	4.78
Ho, Holmium (ppm)	1.26	0.055	1.22	1.29	1.22	1.29
In, Indium (ppm)	0.084	0.006	0.081	0.088	0.080	0.089
K, Potassium (wt.%)	2.89	0.097	2.85	2.94	2.82	2.97
La, Lanthanum (ppm)	46.1	2.49	44.8	47.3	44.7	47.5
Li, Lithium (ppm)	29.1	1.53	28.4	29.9	27.9	30.4
Lu, Lutetium (ppm)	0.50	0.046	0.47	0.53	0.48	0.52
Mg, Magnesium (wt.%)	1.38	0.062	1.34	1.41	1.35	1.41
Mn, Manganese (wt.%)	0.060	0.003	0.059	0.062	0.059	0.062

Table 1 continued.

Constituent	Certified Value	1SD	95% Confidence Limits		95% Tolerance Limits	
			Low	High	Low	High
4-Acid Digestion continued						
Mo, Molybdenum (ppm)	0.46	0.07	0.42	0.50	0.37	0.55
Na, Sodium (wt.%)	0.633	0.031	0.617	0.650	0.617	0.650
Nb, Niobium (ppm)	17.4	1.31	16.7	18.0	16.7	18.0
Nd, Neodymium (ppm)	40.4	1.74	39.0	41.8	39.5	41.3
Ni, Nickel (ppm)	41.8	2.75	40.5	43.0	40.4	43.2
P, Phosphorus (wt.%)	0.072	0.005	0.069	0.075	0.070	0.074
Pb, Lead (ppm)	23.5	1.26	23.1	23.8	22.5	24.5
Pr, Praseodymium (ppm)	10.9	0.35	10.6	11.2	10.7	11.1
Rb, Rubidium (ppm)	176	11.7	169	182	170	181
Re, Rhenium (ppb)	< 2	IND	IND	IND	IND	IND
S, Sulphur (wt.%)	0.031	0.004	0.029	0.033	0.029	0.034
Sb, Antimony (ppm)	1.49	0.097	1.43	1.54	1.42	1.55
Sc, Scandium (ppm)	14.3	1.05	13.7	14.9	13.9	14.7
Se, Selenium (ppm)	< 2	IND	IND	IND	IND	IND
Sm, Samarium (ppm)	7.84	0.467	7.44	8.23	7.66	8.01
Sn, Tin (ppm)	5.04	0.404	4.84	5.23	4.88	5.19
Sr, Strontium (ppm)	82	5.0	80	85	80	85
Ta, Tantalum (ppm)	1.25	0.17	1.12	1.37	1.15	1.34
Tb, Terbium (ppm)	1.06	0.049	1.03	1.10	1.04	1.08
Te, Tellurium (ppm)	< 0.05	IND	IND	IND	IND	IND
Th, Thorium (ppm)	19.3	1.59	18.5	20.1	18.7	19.8
Ti, Titanium (wt.%)	0.488	0.021	0.475	0.501	0.473	0.504
Tl, Thallium (ppm)	0.92	0.059	0.89	0.95	0.88	0.96
Tm, Thulium (ppm)	0.54	0.046	0.50	0.57	0.51	0.57
U, Uranium (ppm)	3.74	0.172	3.64	3.84	3.64	3.85
V, Vanadium (ppm)	97	6.1	94	101	94	101
W, Tungsten (ppm)	3.11	0.47	2.87	3.34	2.96	3.25
Y, Yttrium (ppm)	33.2	1.91	32.1	34.3	32.3	34.1
Yb, Ytterbium (ppm)	3.33	0.210	3.18	3.48	3.13	3.52
Zn, Zinc (ppm)	116	6.0	113	119	113	120
Zr, Zirconium (ppm)	151	10.8	145	157	143	160
Aqua Regia Digestion						
Ag, Silver (ppm)	0.099	0.020	0.082	0.116	0.083	0.115
Al, Aluminium (wt.%)	2.43	0.150	2.34	2.51	2.35	2.50
As, Arsenic (ppm)	4.38	0.436	4.23	4.54	4.13	4.64
Au, Gold (ppb)	< 10	IND	IND	IND	IND	IND
B, Boron (ppm)	< 10	IND	IND	IND	IND	IND
Ba, Barium (ppm)	*80**	*3.4**	*78**	*82**	*77**	*83**
Be, Beryllium (ppm)	0.73	0.10	0.67	0.79	0.68	0.79
Bi, Bismuth (ppm)	0.68	0.09	0.64	0.71	0.61	0.75
Ca, Calcium (wt.%)	0.323	0.021	0.310	0.335	0.310	0.336

*Statistics presented above for Ba via aqua regia digestion are based on a consensus of 11 labs. A second consensus of 5 labs exists at ~123ppm with a 1RSD of 15%. This data separation was necessary due to the bi-modal nature of the results received.

Table 1 continued.

Constituent	Certified Value	1SD	95% Confidence Limits		95% Tolerance Limits	
			Low	High	Low	High
Aqua Regia Digestion continued						
Cd, Cadmium (ppm)	0.063	0.008	0.059	0.067	IND	IND
Ce, Cerium (ppm)	72	3.4	69	74	69	74
Co, Cobalt (ppm)	15.0	0.69	14.7	15.3	14.5	15.4
Cr, Chromium (ppm)	42.5	1.80	41.8	43.3	41.0	44.0
Cs, Cesium (ppm)	2.10	0.40	1.85	2.34	2.02	2.17
Cu, Copper (ppm)	110	4.7	108	112	106	114
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.%)	3.63	0.153	3.56	3.70	3.56	3.70
Ga, Gallium (ppm)	6.86	0.656	6.47	7.25	6.68	7.04
Gd, Gadolinium (ppm)	< 7	IND	IND	IND	IND	IND
Ge, Germanium (ppm)	< 0.1	IND	IND	IND	IND	IND
Hf, Hafnium (ppm)	0.61	0.08	0.54	0.67	0.57	0.64
Hg, Mercury (ppm)	< 0.01	IND	IND	IND	IND	IND
Ho, Holmium (ppm)	< 1	IND	IND	IND	IND	IND
In, Indium (ppm)	0.031	0.002	0.030	0.032	0.029	0.034
K, Potassium (wt.%)	0.449	0.067	0.413	0.485	0.429	0.469
La, Lanthanum (ppm)	37.2	3.39	35.4	39.1	36.1	38.4
Li, Lithium (ppm)	21.2	1.53	20.4	22.0	20.2	22.2
Lu, Lutetium (ppm)	< 0.3	IND	IND	IND	IND	IND
Mg, Magnesium (wt.%)	1.10	0.070	1.07	1.14	1.08	1.12
Mn, Manganese (wt.%)	0.053	0.002	0.052	0.053	0.051	0.054
Mo, Molybdenum (ppm)	0.41	0.07	0.37	0.44	0.35	0.46
Na, Sodium (wt.%)	< 0.04	IND	IND	IND	IND	IND
Nb, Niobium (ppm)	0.43	0.08	0.37	0.50	0.38	0.48
Nd, Neodymium (ppm)	32.0	6.1	26.5	37.5	30.4	33.6
Ni, Nickel (ppm)	38.4	1.89	37.4	39.3	37.1	39.6
P, Phosphorus (wt.%)	0.069	0.005	0.067	0.072	0.067	0.072
Pb, Lead (ppm)	21.5	1.44	21.0	22.1	20.3	22.8
Pr, Praseodymium (ppm)	8.17	1.25	6.75	9.60	7.76	8.58
Rb, Rubidium (ppm)	24.8	2.8	22.8	26.9	23.7	25.9
Re, Rhenium (ppb)	< 1	IND	IND	IND	IND	IND
S, Sulphur (wt.%)	0.032	0.004	0.030	0.035	0.030	0.035
Sb, Antimony (ppm)	0.61	0.09	0.55	0.67	0.57	0.65
Sc, Scandium (ppm)	2.91	0.46	2.63	3.20	2.74	3.08
Se, Selenium (ppm)	0.87	0.17	0.72	1.01	IND	IND
Sm, Samarium (ppm)	5.67	1.21	4.61	6.72	5.42	5.91
Sn, Tin (ppm)	1.21	0.22	1.05	1.37	1.14	1.27
Sr, Strontium (ppm)	16.9	0.79	16.5	17.3	16.2	17.5
Ta, Tantalum (ppm)	< 0.05	IND	IND	IND	IND	IND
Tb, Terbium (ppm)	0.73	0.14	0.62	0.83	0.70	0.75
Te, Tellurium (ppm)	< 0.05	IND	IND	IND	IND	IND

Table 1 continued.

Constituent	Certified Value	1SD	95% Confidence Limits		95% Tolerance Limits	
			Low	High	Low	High
Aqua Regia Digestion continued						
Th, Thorium (ppm)	15.3	1.22	14.6	16.0	14.8	15.8
Ti, Titanium (wt.%)	0.123	0.025	0.108	0.138	0.113	0.133
Tl, Thallium (ppm)	0.15	0.02	0.13	0.16	0.14	0.16
Tm, Thulium (ppm)	< 0.5	IND	IND	IND	IND	IND
U, Uranium (ppm)	2.15	0.28	1.98	2.32	2.07	2.23
V, Vanadium (ppm)	26.3	2.26	25.1	27.6	25.1	27.5
W, Tungsten (ppm)	< 0.6	IND	IND	IND	IND	IND
Y, Yttrium (ppm)	18.8	2.9	17.2	20.4	18.1	19.5
Yb, Ytterbium (ppm)	< 1.5	IND	IND	IND	IND	IND
Zn, Zinc (ppm)	106	5.1	104	108	102	111
Zr, Zirconium (ppm)	21.3	1.67	20.3	22.3	19.9	22.7
Peroxide Fusion ICP						
Al, Aluminium (wt.%)	7.88	0.374	7.63	8.13	7.67	8.09
As, Arsenic (ppm)	< 5	IND	IND	IND	IND	IND
Ba, Barium (ppm)	560	18.4	549	571	546	574
Be, Beryllium (ppm)	< 3	IND	IND	IND	IND	IND
Bi, Bismuth (ppm)	< 0.8	IND	IND	IND	IND	IND
Ca, Calcium (wt.%)	0.528	0.058	0.486	0.569	0.474	0.581
Cd, Cadmium (ppm)	< 0.2	IND	IND	IND	IND	IND
Ce, Cerium (ppm)	93	4.9	89	96	91	95
Co, Cobalt (ppm)	16.1	1.08	15.5	16.8	15.2	17.1
Cr, Chromium (ppm)	101	11	93	110	90	113
Cs, Cesium (ppm)	8.98	0.475	8.67	9.30	8.56	9.41
Cu, Copper (ppm)	113	12	106	120	102	124
Dy, Dysprosium (ppm)	6.33	0.304	6.12	6.54	6.13	6.54
Er, Erbium (ppm)	3.74	0.338	3.47	4.01	3.58	3.90
Eu, Europium (ppm)	1.59	0.084	1.55	1.64	IND	IND
Fe, Iron (wt.%)	4.19	0.140	4.11	4.27	4.10	4.29
Ga, Gallium (ppm)	21.0	1.37	20.0	22.0	20.3	21.7
Gd, Gadolinium (ppm)	7.39	0.602	6.88	7.90	7.21	7.56
Hf, Hafnium (ppm)	7.50	0.565	6.79	8.22	IND	IND
Ho, Holmium (ppm)	1.34	0.085	1.27	1.40	IND	IND
In, Indium (ppm)	< 0.2	IND	IND	IND	IND	IND
K, Potassium (wt.%)	2.94	0.139	2.84	3.03	2.80	3.08
La, Lanthanum (ppm)	47.7	1.93	46.5	48.9	45.9	49.6
Li, Lithium (ppm)	27.8	2.64	26.3	29.2	26.4	29.1
Lu, Lutetium (ppm)	0.56	0.06	0.49	0.64	IND	IND
Mg, Magnesium (wt.%)	1.39	0.061	1.35	1.42	1.34	1.43
Mn, Manganese (wt.%)	0.063	0.003	0.061	0.065	0.061	0.065
Mo, Molybdenum (ppm)	< 1	IND	IND	IND	IND	IND
Nb, Niobium (ppm)	17.2	2.6	14.9	19.4	16.7	17.6
Nd, Neodymium (ppm)	41.0	2.21	39.3	42.7	39.9	42.2
Ni, Nickel (ppm)	44.0	3.88	41.3	46.8	IND	IND

Table 1 continued.

Constituent	Certified Value	1SD	95% Confidence Limits		95% Tolerance Limits	
			Low	High	Low	High
Peroxide Fusion ICP continued						
P, Phosphorus (wt.%)	0.070	0.007	0.063	0.076	0.066	0.074
Pb, Lead (ppm)	22.9	3.2	20.7	25.0	21.2	24.5
Pr, Praseodymium (ppm)	11.3	0.46	11.0	11.6	10.7	11.8
Rb, Rubidium (ppm)	179	5.9	174	183	174	183
S, Sulphur (wt.%)	< 0.05	IND	IND	IND	IND	IND
Sb, Antimony (ppm)	< 2	IND	IND	IND	IND	IND
Si, Silicon (wt.%)	30.72	0.576	30.19	31.24	29.58	31.86
Sm, Samarium (ppm)	7.86	0.393	7.61	8.12	7.60	8.13
Sn, Tin (ppm)	< 6	IND	IND	IND	IND	IND
Sr, Strontium (ppm)	82	4.3	79	85	78	86
Ta, Tantalum (ppm)	1.44	0.23	1.23	1.65	IND	IND
Tb, Terbium (ppm)	1.12	0.073	1.07	1.18	IND	IND
Th, Thorium (ppm)	19.5	1.23	18.6	20.5	18.9	20.1
Ti, Titanium (wt.%)	0.496	0.024	0.481	0.511	0.486	0.506
Tl, Thallium (ppm)	0.94	0.078	0.88	1.00	IND	IND
Tm, Thulium (ppm)	0.57	0.045	0.54	0.60	IND	IND
U, Uranium (ppm)	3.96	0.217	3.82	4.11	3.84	4.08
V, Vanadium (ppm)	100	5.1	96	104	95	104
W, Tungsten (ppm)	< 5	IND	IND	IND	IND	IND
Y, Yttrium (ppm)	34.5	1.40	33.4	35.6	33.6	35.4
Yb, Ytterbium (ppm)	3.55	0.259	3.34	3.76	3.30	3.80
Zn, Zinc (ppm)	122	10.6	118	126	107	138

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 920 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 920 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 920.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 920

Constituent	Unit	Value	Constituent	Unit	Value	Constituent	Unit	Value
4-Acid Digestion								
B	ppm	*< 5*	Hg	ppm	*< 1*	Ru	ppm	*< 0.1*
Aqua Regia Digestion								
Pd	ppb	*< 10*	Pt	ppb	*< 5*	Ru	ppm	*< 0.005*
Infrared Combustion								
S	wt.%	*0.035*						
Peroxide Fusion ICP								
Ag	ppm	*< 1*	Re	ppm	*< 0.1*	Te	ppm	*< 6*
B	ppm	*68*	Sc	ppm	*15.2*	Zr	ppm	*250*
Ge	ppm	*2.04*	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-α=0.99) at least 95% of subsamples (ρ=0.95) will have concentrations lying between between 107 and 117 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 920 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 176 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 920 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 920

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	< 0.2	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
Al, wt.%	7.69	0.416	6.86	8.52	6.44	8.94	5.41%	10.81%	16.22%	7.30	8.07
As, ppm	5.13	0.79	3.54	6.72	2.74	7.51	15.50%	31.00%	46.50%	4.87	5.38
Ba, ppm	546	18	510	581	493	599	3.26%	6.51%	9.77%	519	573
Be, ppm	2.88	0.216	2.44	3.31	2.23	3.53	7.52%	15.04%	22.55%	2.73	3.02
Bi, ppm	0.69	0.11	0.47	0.91	0.36	1.02	15.81%	31.62%	47.44%	0.66	0.73
Ca, wt.%	0.497	0.022	0.453	0.541	0.431	0.563	4.41%	8.81%	13.22%	0.472	0.522
Cd, ppm	< 0.08	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
Ce, ppm	94	4.6	84	103	80	107	4.89%	9.78%	14.67%	89	98
Co, ppm	15.6	0.91	13.8	17.4	12.9	18.3	5.82%	11.65%	17.47%	14.8	16.4
Cr, ppm	79	12	56	102	44	114	14.62%	29.24%	43.86%	75	83
Cs, ppm	8.63	0.403	7.82	9.44	7.42	9.84	4.67%	9.35%	14.02%	8.20	9.06
Cu, ppm	112	4	104	121	99	125	3.81%	7.63%	11.44%	107	118
Dy, ppm	6.44	0.269	5.90	6.98	5.63	7.25	4.18%	8.37%	12.55%	6.12	6.76
Er, ppm	3.69	0.138	3.41	3.96	3.27	4.10	3.75%	7.50%	11.25%	3.50	3.87
Eu, ppm	1.50	0.076	1.35	1.65	1.27	1.73	5.04%	10.09%	15.13%	1.43	1.58
Fe, wt.%	4.14	0.199	3.74	4.54	3.54	4.74	4.81%	9.61%	14.42%	3.93	4.35
Ga, ppm	20.8	0.90	19.0	22.6	18.1	23.5	4.31%	8.63%	12.94%	19.8	21.9
Gd, ppm	6.97	0.378	6.22	7.73	5.84	8.11	5.42%	10.84%	16.26%	6.62	7.32
Ge, ppm	< 2	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
Hf, ppm	4.60	0.369	3.86	5.34	3.49	5.71	8.02%	16.04%	24.06%	4.37	4.83
Ho, ppm	1.26	0.055	1.15	1.37	1.09	1.42	4.37%	8.73%	13.10%	1.19	1.32
In, ppm	0.084	0.006	0.072	0.096	0.066	0.103	7.21%	14.41%	21.62%	0.080	0.089
K, wt.%	2.89	0.097	2.70	3.09	2.60	3.18	3.34%	6.67%	10.01%	2.75	3.04
La, ppm	46.1	2.49	41.1	51.1	38.6	53.5	5.40%	10.80%	16.20%	43.8	48.4
Li, ppm	29.1	1.53	26.1	32.2	24.6	33.7	5.24%	10.47%	15.71%	27.7	30.6
Lu, ppm	0.50	0.046	0.41	0.59	0.36	0.63	9.14%	18.27%	27.41%	0.47	0.52
Mg, wt.%	1.38	0.062	1.25	1.50	1.19	1.56	4.53%	9.06%	13.58%	1.31	1.45
Mn, wt.%	0.060	0.003	0.054	0.066	0.052	0.069	4.80%	9.60%	14.40%	0.057	0.063
Mo, ppm	0.46	0.07	0.33	0.59	0.26	0.66	14.32%	28.65%	42.97%	0.44	0.48
Na, wt.%	0.633	0.031	0.572	0.695	0.541	0.726	4.85%	9.70%	14.55%	0.602	0.665

Nb, ppm	17.4	1.31	14.7	20.0	13.4	21.3	7.53%	15.05%	22.58%	16.5	18.2

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	40.4	1.74	36.9	43.9	35.2	45.6	4.31%	8.63%	12.94%	38.4	42.4
Ni, ppm	41.8	2.75	36.3	47.3	33.5	50.0	6.57%	13.15%	19.72%	39.7	43.9
P, wt.%	0.072	0.005	0.062	0.082	0.057	0.087	7.12%	14.25%	21.37%	0.068	0.076
Pb, ppm	23.5	1.26	21.0	26.0	19.7	27.3	5.36%	10.72%	16.08%	22.3	24.7
Pr, ppm	10.9	0.35	10.2	11.6	9.8	12.0	3.25%	6.50%	9.75%	10.4	11.4
Rb, ppm	176	12	152	199	141	211	6.64%	13.28%	19.93%	167	184
Re, ppb	< 2	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
S, wt.%	0.031	0.004	0.024	0.039	0.021	0.042	11.26%	22.52%	33.78%	0.030	0.033
Sb, ppm	1.49	0.097	1.29	1.68	1.20	1.78	6.52%	13.04%	19.56%	1.41	1.56
Sc, ppm	14.3	1.05	12.2	16.4	11.2	17.4	7.31%	14.62%	21.93%	13.6	15.0
Se, ppm	< 2	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
Sm, ppm	7.84	0.467	6.90	8.77	6.43	9.24	5.96%	11.92%	17.88%	7.44	8.23
Sn, ppm	5.04	0.404	4.23	5.84	3.82	6.25	8.03%	16.05%	24.08%	4.78	5.29
Sr, ppm	82	5.0	72	92	67	97	6.07%	12.13%	18.20%	78	86
Ta, ppm	1.25	0.17	0.90	1.59	0.73	1.77	13.92%	27.84%	41.76%	1.18	1.31
Tb, ppm	1.06	0.049	0.97	1.16	0.92	1.21	4.57%	9.14%	13.70%	1.01	1.12
Te, ppm	< 0.05	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
Th, ppm	19.3	1.59	16.1	22.4	14.5	24.0	8.23%	16.46%	24.69%	18.3	20.2
Ti, wt.%	0.488	0.021	0.447	0.530	0.426	0.551	4.26%	8.52%	12.78%	0.464	0.513
Tl, ppm	0.92	0.059	0.80	1.04	0.74	1.10	6.41%	12.81%	19.22%	0.88	0.97
Tm, ppm	0.54	0.046	0.45	0.63	0.40	0.67	8.49%	16.99%	25.48%	0.51	0.56
U, ppm	3.74	0.172	3.40	4.09	3.22	4.26	4.61%	9.22%	13.83%	3.55	3.93
V, ppm	97	6.1	85	110	79	116	6.21%	12.42%	18.63%	93	102
W, ppm	3.11	0.47	2.18	4.04	1.71	4.51	15.00%	30.01%	45.01%	2.95	3.26
Y, ppm	33.2	1.91	29.4	37.1	27.5	39.0	5.74%	11.48%	17.22%	31.6	34.9
Yb, ppm	3.33	0.210	2.91	3.75	2.70	3.96	6.32%	12.65%	18.97%	3.16	3.49
Zn, ppm	116	6	104	128	98	134	5.15%	10.29%	15.44%	110	122
Zr, ppm	151	11	130	173	119	184	7.17%	14.34%	21.51%	144	159
Aqua Regia Digestion											
Ag, ppm	0.099	0.020	0.060	0.138	0.040	0.157	19.73%	39.45%	59.18%	0.094	0.104
Al, wt.%	2.43	0.150	2.13	2.73	1.98	2.88	6.19%	12.38%	18.57%	2.31	2.55

As, ppm	4.38	0.436	3.51	5.26	3.08	5.69	9.93%	19.87%	29.80%	4.17	4.60

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	< 10	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
B, ppm	< 10	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
Ba, ppm	*80**	*3.4**	*73**	*87**	*70**	*90**	*4.27%*	*8.53%*	*12.80%*	*76*	*84*
Be, ppm	0.73	0.10	0.53	0.94	0.43	1.04	13.84%	27.67%	41.51%	0.70	0.77
Bi, ppm	0.68	0.09	0.49	0.87	0.40	0.96	13.92%	27.83%	41.75%	0.64	0.71
Ca, wt.%	0.323	0.021	0.280	0.365	0.259	0.387	6.59%	13.19%	19.78%	0.307	0.339
Cd, ppm	0.063	0.008	0.046	0.079	0.038	0.088	13.11%	26.21%	39.32%	0.060	0.066
Ce, ppm	72	3.4	65	78	61	82	4.78%	9.56%	14.34%	68	75
Co, ppm	15.0	0.69	13.6	16.3	12.9	17.0	4.59%	9.18%	13.77%	14.2	15.7
Cr, ppm	42.5	1.80	38.9	46.1	37.1	47.9	4.23%	8.46%	12.69%	40.4	44.6
Cs, ppm	2.10	0.40	1.30	2.89	0.90	3.29	18.96%	37.91%	56.87%	1.99	2.20
Cu, ppm	110	5	101	120	96	124	4.30%	8.60%	12.90%	105	116
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.%	3.63	0.153	3.32	3.94	3.17	4.09	4.23%	8.46%	12.68%	3.45	3.81
Ga, ppm	6.86	0.656	5.54	8.17	4.89	8.82	9.57%	19.13%	28.70%	6.51	7.20
Gd, ppm	< 7	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
Ge, ppm	< 0.1	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
Hf, ppm	0.61	0.08	0.44	0.78	0.35	0.86	13.94%	27.88%	41.82%	0.58	0.64
Hg, ppm	< 0.01	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
Ho, ppm	< 1	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
In, ppm	0.031	0.002	0.028	0.035	0.026	0.036	5.73%	11.46%	17.19%	0.030	0.033
K, wt.%	0.449	0.067	0.316	0.582	0.249	0.649	14.83%	29.67%	44.50%	0.427	0.471
La, ppm	37.2	3.39	30.5	44.0	27.1	47.4	9.09%	18.19%	27.28%	35.4	39.1
Li, ppm	21.2	1.53	18.2	24.3	16.6	25.8	7.23%	14.46%	21.69%	20.2	22.3
Lu, ppm	< 0.3	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
Mg, wt.%	1.10	0.070	0.96	1.24	0.89	1.31	6.31%	12.63%	18.94%	1.05	1.16
Mn, wt.%	0.053	0.002	0.049	0.056	0.047	0.058	3.44%	6.88%	10.32%	0.050	0.055
Mo, ppm	0.41	0.07	0.27	0.54	0.20	0.61	16.89%	33.78%	50.67%	0.39	0.43
Na, wt.%	< 0.04	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND

*Statistics presented above for Ba via aqua regia digestion are based on a consensus of 11 labs. A second consensus of 5 labs exists at ~123ppm with a 1RSD of 15%. This data separation was necessary due to the bi-modal nature of the results received.

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											
Nb, ppm	0.43	0.08	0.27	0.60	0.19	0.68	18.81%	37.62%	56.43%	0.41	0.45
Nd, ppm	32.0	6.1	19.8	44.2	13.6	50.4	19.13%	38.26%	57.39%	30.4	33.6
Ni, ppm	38.4	1.89	34.6	42.2	32.7	44.1	4.92%	9.84%	14.76%	36.5	40.3
P, wt.%	0.069	0.005	0.060	0.079	0.055	0.084	6.79%	13.57%	20.36%	0.066	0.073
Pb, ppm	21.5	1.44	18.7	24.4	17.2	25.9	6.68%	13.36%	20.04%	20.5	22.6
Pr, ppm	8.17	1.25	5.66	10.68	4.41	11.94	15.35%	30.71%	46.06%	7.76	8.58
Rb, ppm	24.8	2.8	19.2	30.5	16.4	33.3	11.37%	22.74%	34.12%	23.6	26.1
Re, ppb	< 1	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
S, wt.%	0.032	0.004	0.024	0.041	0.019	0.045	13.49%	26.98%	40.47%	0.031	0.034
Sb, ppm	0.61	0.09	0.43	0.79	0.34	0.89	15.02%	30.05%	45.07%	0.58	0.64
Sc, ppm	2.91	0.46	2.00	3.83	1.54	4.28	15.71%	31.41%	47.12%	2.77	3.06
Se, ppm	0.87	0.17	0.52	1.21	0.35	1.39	19.85%	39.69%	59.54%	0.83	0.91
Sm, ppm	5.67	1.21	3.25	8.08	2.04	9.29	21.32%	42.64%	63.97%	5.38	5.95
Sn, ppm	1.21	0.22	0.76	1.65	0.54	1.87	18.38%	36.75%	55.13%	1.15	1.27
Sr, ppm	16.9	0.79	15.3	18.5	14.5	19.3	4.70%	9.41%	14.11%	16.0	17.7
Ta, ppm	< 0.05	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
Tb, ppm	0.73	0.14	0.44	1.02	0.29	1.16	19.91%	39.83%	59.74%	0.69	0.76
Te, ppm	< 0.05	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
Th, ppm	15.3	1.22	12.9	17.7	11.6	19.0	7.98%	15.97%	23.95%	14.5	16.1
Ti, wt.%	0.123	0.025	0.074	0.173	0.049	0.198	20.15%	40.30%	60.45%	0.117	0.129
Tl, ppm	0.15	0.02	0.10	0.19	0.08	0.21	14.58%	29.16%	43.75%	0.14	0.16
Tm, ppm	< 0.5	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
U, ppm	2.15	0.28	1.60	2.70	1.32	2.98	12.85%	25.70%	38.54%	2.04	2.26
V, ppm	26.3	2.26	21.8	30.9	19.5	33.1	8.60%	17.20%	25.79%	25.0	27.7
W, ppm	< 0.6	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
Y, ppm	18.8	2.9	12.9	24.7	10.0	27.6	15.62%	31.24%	46.86%	17.9	19.7
Yb, ppm	< 1.5	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
Zn, ppm	106	5	96	117	91	122	4.82%	9.64%	14.47%	101	112
Zr, ppm	21.3	1.67	18.0	24.6	16.3	26.3	7.84%	15.67%	23.51%	20.2	22.4
Peroxide Fusion ICP											
Al, wt.%	7.88	0.374	7.13	8.63	6.76	9.00	4.75%	9.50%	14.25%	7.49	8.27
As, ppm	< 5	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											
Ba, ppm	560	18	523	597	505	615	3.29%	6.58%	9.87%	532	588
Be, ppm	< 3	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
Bi, ppm	< 0.8	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
Ca, wt.%	0.528	0.058	0.411	0.644	0.352	0.703	11.07%	22.13%	33.20%	0.501	0.554
Cd, ppm	< 0.2	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
Ce, ppm	93	4.9	83	102	78	107	5.27%	10.54%	15.81%	88	97
Co, ppm	16.1	1.08	14.0	18.3	12.9	19.4	6.71%	13.41%	20.12%	15.3	17.0
Cr, ppm	101	11	80	123	69	134	10.59%	21.17%	31.76%	96	106
Cs, ppm	8.98	0.475	8.03	9.93	7.56	10.41	5.28%	10.57%	15.85%	8.53	9.43
Cu, ppm	113	12	90	136	79	148	10.17%	20.34%	30.51%	107	119
Dy, ppm	6.33	0.304	5.73	6.94	5.42	7.25	4.80%	9.61%	14.41%	6.02	6.65
Er, ppm	3.74	0.338	3.06	4.41	2.73	4.75	9.04%	18.07%	27.11%	3.55	3.93
Eu, ppm	1.59	0.084	1.43	1.76	1.34	1.85	5.28%	10.56%	15.84%	1.51	1.67
Fe, wt.%	4.19	0.140	3.91	4.47	3.77	4.61	3.33%	6.66%	10.00%	3.98	4.40
Ga, ppm	21.0	1.37	18.2	23.7	16.9	25.1	6.54%	13.09%	19.63%	19.9	22.0
Gd, ppm	7.39	0.602	6.18	8.59	5.58	9.19	8.16%	16.31%	24.47%	7.02	7.76
Hf, ppm	7.50	0.565	6.37	8.63	5.81	9.20	7.53%	15.05%	22.58%	7.13	7.88
Ho, ppm	1.34	0.085	1.17	1.51	1.08	1.59	6.33%	12.66%	18.99%	1.27	1.40
In, ppm	< 0.2	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
K, wt.%	2.94	0.139	2.66	3.21	2.52	3.35	4.73%	9.47%	14.20%	2.79	3.08
La, ppm	47.7	1.93	43.9	51.6	41.9	53.5	4.05%	8.10%	12.14%	45.3	50.1
Li, ppm	27.8	2.64	22.5	33.1	19.8	35.7	9.52%	19.05%	28.57%	26.4	29.2
Lu, ppm	0.56	0.06	0.45	0.68	0.39	0.74	10.10%	20.20%	30.31%	0.54	0.59
Mg, wt.%	1.39	0.061	1.26	1.51	1.20	1.57	4.39%	8.79%	13.18%	1.32	1.45
Mn, wt.%	0.063	0.003	0.056	0.069	0.053	0.072	5.10%	10.20%	15.30%	0.060	0.066
Mo, ppm	< 1	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
Nb, ppm	17.2	2.6	11.9	22.5	9.2	25.1	15.40%	30.80%	46.21%	16.3	18.0
Nd, ppm	41.0	2.21	36.6	45.4	34.4	47.6	5.39%	10.78%	16.16%	39.0	43.1
Ni, ppm	44.0	3.88	36.3	51.8	32.4	55.7	8.81%	17.62%	26.43%	41.8	46.2
P, wt.%	0.070	0.007	0.055	0.085	0.048	0.092	10.66%	21.32%	31.98%	0.066	0.073
Pb, ppm	22.9	3.2	16.6	29.2	13.4	32.3	13.79%	27.58%	41.37%	21.7	24.0
Pr, ppm	11.3	0.46	10.3	12.2	9.9	12.7	4.10%	8.20%	12.31%	10.7	11.8

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											
Rb, ppm	179	6	167	190	161	196	3.31%	6.62%	9.93%	170	187
S, wt.%	< 0.05	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
Sb, ppm	< 2	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
Si, wt.%	30.72	0.576	29.56	31.87	28.99	32.44	1.88%	3.75%	5.63%	29.18	32.25
Sm, ppm	7.86	0.393	7.08	8.65	6.68	9.04	5.00%	10.00%	15.00%	7.47	8.26
Sn, ppm	< 6	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
Sr, ppm	82	4.3	73	91	69	95	5.30%	10.60%	15.90%	78	86
Ta, ppm	1.44	0.23	0.98	1.90	0.75	2.14	16.04%	32.09%	48.13%	1.37	1.51
Tb, ppm	1.12	0.073	0.98	1.27	0.91	1.34	6.48%	12.95%	19.43%	1.07	1.18
Th, ppm	19.5	1.23	17.1	22.0	15.9	23.2	6.30%	12.59%	18.89%	18.6	20.5
Ti, wt.%	0.496	0.024	0.448	0.544	0.424	0.568	4.82%	9.64%	14.46%	0.471	0.521
Tl, ppm	0.94	0.078	0.78	1.10	0.71	1.17	8.27%	16.54%	24.82%	0.89	0.99
Tm, ppm	0.57	0.045	0.48	0.66	0.43	0.70	7.92%	15.85%	23.77%	0.54	0.60
U, ppm	3.96	0.217	3.53	4.40	3.31	4.61	5.48%	10.96%	16.44%	3.76	4.16
V, ppm	100	5.1	90	110	85	115	5.13%	10.27%	15.40%	95	105
W, ppm	< 5	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
Y, ppm	34.5	1.40	31.7	37.3	30.3	38.7	4.06%	8.12%	12.17%	32.8	36.2
Yb, ppm	3.55	0.259	3.03	4.07	2.78	4.33	7.28%	14.56%	21.84%	3.37	3.73
Zn, ppm	122	11	101	144	90	154	8.70%	17.39%	26.09%	116	128

Note: intervals may appear asymmetric due to rounding

PREPARER AND SUPPLIER OF THE REFERENCE MATERIAL

Reference material OREAS 920 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 920 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 920 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 920 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.