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CERTIFICATE OF ANALYSIS FOR

VOLCANIC HOSTED MASSIVE SULPHIDE Zn-Pb-Cu-Ag-Au ORE

CERTIFIED REFERENCE MATERIAL

OREAS 620

Summary Statistics for Key Analytes (additional certified values below).

Constituent	Certified Value	1SD	95% Confidence Limits		95% Tolerance Limits	
			Low	High	Low	High
Fire Assay						
Au, Gold (ppm)	0.685	0.021	0.676	0.693	0.673*	0.697*
Infrared Combustion						
S, Sulphur (wt.%)	2.52	0.075	2.48	2.55	2.48	2.55
4-Acid Digestion						
Ag, Silver (ppm)	38.5	1.53	37.8	39.2	37.7	39.3
Cu, Copper (wt.%)	0.173	0.004	0.172	0.175	0.171	0.176
Pb, Lead (wt.%)	0.774	0.022	0.765	0.783	0.762	0.786
Zn, Zinc (wt.%)	3.15	0.097	3.11	3.19	3.09	3.21

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 MATERIALS

OREAS 620 was prepared from Zn and Cu VHMS ores sourced from the Gossan Hill deposit at Golden Grove located 338km NNE of Perth in the Murchison Province of the Archaen Yilgarn Craton, Western Australia. The VHMS deposits are hosted within and underlain by a layered rhyodacitic volcanoclastic succession. The Gossan Hill ores have been blended with fresh, barren rhyodacite material sourced from a quarry approximately 30km east of Melbourne, Australia to achieve the desired grades. The main mineralisation assemblage consists of sphalerite, chalcopyrite and lesser galena with a gangue of pyrite, pyrrhotite and magnetite. Smith *et al*. (as cited in Smith, 2003) noted the ore shoots contain many chalcophile, or partly chalchophile elements namely Fe, S, Cu, Pb, Zn, Co, As, Sb, Bi, Cd, In, Mo, Ag, Sn, Ge, Se, Te, Hg and Au. OREAS 620 is one of a suite of five CRMs ranging in grades from 0.18-3.10% Cu, 1.0-10.2% Zn, 0.25-2.21% Pb, 22-103ppm Ag and 0.68-1.85ppm Au.

COMMINUTION AND HOMOGENISATION PROCEDURES

The material constituting OREAS 620 was prepared in the following manner:

- drying of sulphide bearing ore materials to constant mass at 90°C;
- drying of rhyodacite material to constant mass at 105°C;
- crushing and milling of the ore material to 100% minus 35 microns;
- crushing and milling of the barren material to 98% minus 75 microns;
- blending in appropriate proportions to achieve the desired grades;
- packaging in 10g and 60g units sealed under nitrogen in laminated foil pouches.

ANALYTICAL PROGRAM

Twenty eight commercial analytical laboratories participated in the program to certify the 145 elements reported in Table 1. The following methods were employed:

- Gold via 20-40g* fire assay with AAS (20 labs), ICP-OES (3 labs) finish;
- Instrumental neutron activation analysis for Au on 1g subsamples to confirm homogeneity (1 laboratory);
- Sulphur by Infrared Combustion Analysis (21 labs).
- Peroxide fusion for full elemental suite ICP-OES and ICP-MS (up to 14 laboratories depending on the element).

- 4-Acid digestion (HF-HNO_3-$HClO_4$-HCl) for full elemental suite ICP-OES and ICP-MS or AAS finish (up to 22 laboratories depending on the element).
- 3-Acid digestion (HNO_3-$HClO_4$-HCl) for a limited suite by ICP-OES and AAS (up to 10 laboratories depending on the element).
- Aqua regia digestion (see note below) for full elemental suite ICP-OES and ICP-MS (up to 22 laboratories depending on the element).
- Gold via 15-50g* aqua regia digestion with ICP-MS (11 labs), AAS (5 labs) or graphite furnace AAS (1 lab) finish;

*The certified values (and 95% Confidence Interval and SD) for Au are also applicable to 50g charge weights.

It is important to note that in the analytical industry there is no standardisation of the aqua regia digestion process. Aqua regia is a partial empirical digest and differences in recoveries for various analytes are commonplace. These are caused by variations in the digest conditions which can include the ratio of nitric to hydrochloric acids, acid strength, temperatures, leach times and secondary digestions. Recoveries for sulphide-hosted base metal sulphides approach total values, however, other analytes, in particular the lithophile elements, show greater sensitivity to method parameters. This can result in lack of consensus in an inter-laboratory certification program for these elements. The approach applied here is to report certified values in those instances where reasonable agreement exists amongst a majority of participating laboratories. The results of specific laboratories may differ significantly from the certified values, but will, nonetheless, be valid and reproducible in the context of the specifics of the aqua regia method in use. Users of this reference material should, therefore, be mindful of this limitation when applying the certified values in a quality control program.

For the round robin program twenty 1kg lot samples were taken at predetermined intervals during the bagging stage, immediately following final blending and are considered representative of the entire batch. The six samples received by each laboratory were obtained by taking two 110g scoop splits from each of three separate 1kg lots. 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 145 certified values together with their associated 1SD's, 95% confidence and tolerance limits and Table 2 shows 58 indicative values. Table 3 provides performance gate intervals for the certified values of each method group based on their pooled 1SD's. Tabulated results of all elements (including Au INAA analyses) together with uncorrected means, medians, standard deviations, relative standard deviations and per cent deviation of lab means from the corrected mean of means (PDM^3) are presented in the detailed certification data for this CRM (**OREAS 620 Datapack.xlsx**).

Table 1. Certified Values, SD's, 95% Confidence and Tolerance Limits for OREAS 620.

Constituent	Certified Value	1SD	95% Confidence Limits		95% Tolerance Limits	
			Low	High	Low	High
Fire Assay						
Au, Gold (ppm)	0.685	0.021	0.676	0.693	0.673*	0.697*
Infrared Combustion						
S, Sulphur (wt.%)	2.52	0.075	2.48	2.55	2.48	2.55
Peroxide Fusion ICP						
Ag, Silver (ppm)	40.0	3.10	36.8	43.3	IND	IND
Al, Aluminium (wt.%)	7.06	0.253	6.89	7.22	6.89	7.23
As, Arsenic (ppm)	54	9	46	61	49	58
Ba, Barium (ppm)	2754	127.9	2649	2859	2668	2840
Bi, Bismuth (ppm)	1.94	0.099	1.85	2.02	IND	IND
Ca, Calcium (wt.%)	1.63	0.104	1.58	1.69	1.55	1.72
Cd, Cadmium (ppm)	167	8.5	159	175	160	173
Ce, Cerium (ppm)	69	5.3	62	76	64	73
Co, Cobalt (ppm)	13.4	2.3	11.0	15.8	IND	IND
Cr, Chromium (ppm)	25.5	4.4	19.9	31.1	IND	IND
Cs, Cesium (ppm)	5.45	0.65	4.73	6.17	5.18	5.72
Cu, Copper (wt.%)	0.176	0.006	0.173	0.178	0.170	0.181
Fe, Iron (wt.%)	3.01	0.121	2.95	3.07	2.94	3.08
Ga, Gallium (ppm)	24.2	2.4	21.6	26.8	22.7	25.7
In, Indium (ppm)	1.24	0.16	1.13	1.35	IND	IND
K, Potassium (wt.%)	2.70	0.152	2.61	2.79	2.59	2.81
La, Lanthanum (ppm)	35.9	1.57	34.3	37.4	34.2	37.5
Li, Lithium (ppm)	20.7	3.2	18.7	22.6	19.6	21.7
Mg, Magnesium (wt.%)	0.348	0.015	0.339	0.356	0.334	0.361
Mn, Manganese (ppm)	449	24.2	435	463	430	468
Mo, Molybdenum (ppm)	10.5	1.7	9.0	12.1	IND	IND
Nb, Niobium (ppm)	15.2	2.2	12.8	17.5	IND	IND
Nd, Neodymium (ppm)	33.3	3.6	28.5	38.1	31.5	35.1
P, Phosphorus (ppm)	380	56	320	440	IND	IND
Pb, Lead (wt.%)	0.772	0.037	0.749	0.794	0.753	0.791
Pr, Praseodymium (ppm)	8.96	1.04	7.64	10.29	8.41	9.51
Rb, Rubidium (ppm)	123	8.0	115	130	116	129
S, Sulphur (wt.%)	2.49	0.050	2.47	2.51	2.41	2.57
Sb, Antimony (ppm)	81	5.1	76	86	76	86
Si, Silicon (wt.%)	29.82	0.844	29.28	30.36	28.76	30.87
Sr, Strontium (ppm)	142	7.2	138	146	136	148
Ta, Tantalum (ppm)	1.16	0.24	0.89	1.44	IND	IND
Th, Thorium (ppm)	11.2	1.00	10.3	12.1	10.8	11.6
Ti, Titanium (wt.%)	0.155	0.008	0.151	0.159	IND	IND
Tl, Thallium (ppm)	1.56	0.144	1.41	1.71	IND	IND
U, Uranium (ppm)	4.06	0.65	3.42	4.69	3.88	4.24
V, Vanadium (ppm)	26.9	3.2	24.2	29.6	25.4	28.3
W, Tungsten (ppm)	2.26	0.34	1.93	2.58	IND	IND
Y, Yttrium (ppm)	15.5	1.26	14.2	16.7	14.6	16.3

Table 1 continued.

Constituent	Certified Value	1SD	95% Confidence Limits		95% Tolerance Limits	
			Low	High	Low	High
Peroxide Fusion ICP continued						
Yb, Ytterbium (ppm)	0.88	0.11	0.76	1.01	IND	IND
Zn, Zinc (wt.%)	3.14	0.140	3.07	3.22	3.05	3.23
4-Acid Digestion						
Ag, Silver (ppm)	38.5	1.53	37.8	39.2	37.7	39.3
Al, Aluminium (wt.%)	6.72	0.499	6.47	6.97	6.52	6.93
As, Arsenic (ppm)	50	4.4	49	52	48	52
Ba, Barium (ppm)	2487	253	2307	2667	2365	2609
Be, Beryllium (ppm)	2.36	0.24	2.23	2.48	2.22	2.49
Bi, Bismuth (ppm)	1.93	0.104	1.86	1.99	1.86	1.99
Ca, Calcium (wt.%)	1.60	0.070	1.57	1.64	1.56	1.64
Cd, Cadmium (ppm)	163	8.5	159	167	160	166
Ce, Cerium (ppm)	64	8	58	69	62	66
Co, Cobalt (ppm)	12.1	1.8	11.4	12.9	11.8	12.5
Cr, Chromium (ppm)	21.9	3.6	20.4	23.3	18.3	25.5
Cs, Cesium (ppm)	5.01	0.220	4.82	5.19	4.82	5.20
Cu, Copper (wt.%)	0.173	0.004	0.172	0.175	0.171	0.176
Fe, Iron (wt.%)	2.94	0.144	2.88	3.01	2.88	3.01
Ga, Gallium (ppm)	23.7	1.08	22.9	24.5	22.9	24.5
Hf, Hafnium (ppm)	5.61	0.322	5.42	5.81	5.44	5.79
In, Indium (ppm)	1.15	0.056	1.12	1.19	1.11	1.19
K, Potassium (wt.%)	2.63	0.154	2.56	2.70	2.57	2.69
La, Lanthanum (ppm)	29.7	3.9	27.4	32.0	28.5	30.9
Li, Lithium (ppm)	20.0	1.54	19.1	20.9	19.1	20.9
Lu, Lutetium (ppm)	0.11	0.007	0.10	0.11	IND	IND
Mg, Magnesium (wt.%)	0.341	0.022	0.330	0.352	0.330	0.352
Mn, Manganese (ppm)	440	23.8	430	450	427	453
Mo, Molybdenum (ppm)	9.47	0.699	9.14	9.79	9.20	9.73
Na, Sodium (wt.%)	1.94	0.104	1.89	1.99	1.90	1.98
Nb, Niobium (ppm)	13.1	1.25	12.3	13.9	12.6	13.6
Ni, Nickel (ppm)	15.2	2.4	14.3	16.2	14.0	16.5
P, Phosphorus (ppm)	353	25.0	344	362	340	366
Pb, Lead (wt.%)	0.774	0.022	0.765	0.783	0.762	0.786
Rb, Rubidium (ppm)	116	7.1	111	121	112	120
S, Sulphur (wt.%)	2.47	0.067	2.44	2.50	2.41	2.53
Sb, Antimony (ppm)	76	8	72	79	73	78
Sc, Scandium (ppm)	5.20	0.62	4.83	5.57	4.96	5.44
Se, Selenium (ppm)	< 5	IND	IND	IND	IND	IND
Sn, Tin (ppm)	4.88	0.301	4.71	5.05	4.70	5.06
Sr, Strontium (ppm)	131	8.8	128	135	128	135
Ta, Tantalum (ppm)	1.13	0.22	0.92	1.34	1.06	1.20
Tb, Terbium (ppm)	0.58	0.054	0.53	0.63	0.56	0.61
Th, Thorium (ppm)	11.0	1.09	10.2	11.7	10.4	11.5
Ti, Titanium (wt.%)	0.135	0.015	0.128	0.142	0.130	0.140

Table 1 continued.

Constituent	Certified Value	1SD	95% Confidence Limits		95% Tolerance Limits	
			Low	High	Low	High
4-Acid Digestion continued						
Tl, Thallium (ppm)	1.61	0.158	1.50	1.72	1.56	1.66
U, Uranium (ppm)	4.23	0.197	4.10	4.36	4.10	4.36
V, Vanadium (ppm)	20.7	1.00	20.3	21.2	19.5	22.0
W, Tungsten (ppm)	2.21	0.160	2.09	2.33	2.04	2.38
Y, Yttrium (ppm)	12.3	1.6	11.4	13.2	11.9	12.7
Yb, Ytterbium (ppm)	0.73	0.10	0.65	0.81	IND	IND
Zn, Zinc (wt.%)	3.15	0.097	3.11	3.19	3.09	3.21
Zr, Zirconium (ppm)	202	12.9	195	209	197	206
3-Acid Digestion (no HF)						
Ag, Silver (ppm)	36.8	2.83	34.9	38.7	35.8	37.8
As, Arsenic (ppm)	48.1	5.2	44.7	51.4	44.4	51.7
Cu, Copper (wt.%)	0.171	0.005	0.168	0.174	0.167	0.175
Fe, Iron (wt.%)	2.70	0.145	2.59	2.81	2.62	2.79
Mo, Molybdenum (ppm)	9.32	0.837	8.37	10.28	IND	IND
Pb, Lead (wt.%)	0.777	0.019	0.764	0.791	0.764	0.791
Zn, Zinc (wt.%)	3.13	0.126	3.03	3.22	3.07	3.19
Aqua Regia Digestion						
Ag, Silver (ppm)	38.4	1.31	37.9	39.0	37.7	39.2
Al, Aluminium (wt.%)	1.12	0.090	1.08	1.17	1.09	1.16
As, Arsenic (ppm)	47.2	4.09	45.9	48.6	45.9	48.6
Au, Gold (ppm)	0.666	0.024	0.656	0.675	0.653*	0.679*
Ba, Barium (ppm)	477	49	439	516	460	495
Be, Beryllium (ppm)	0.60	0.09	0.55	0.66	IND	IND
Bi, Bismuth (ppm)	1.88	0.148	1.78	1.98	1.81	1.94
Ca, Calcium (wt.%)	1.29	0.055	1.26	1.31	1.26	1.31
Cd, Cadmium (ppm)	161	7.1	158	164	158	165
Ce, Cerium (ppm)	51	3.0	49	54	50	53
Co, Cobalt (ppm)	12.2	1.05	11.7	12.6	11.8	12.6
Cr, Chromium (ppm)	17.1	2.0	16.4	17.8	15.5	18.7
Cs, Cesium (ppm)	1.22	0.19	1.06	1.37	1.17	1.26
Cu, Copper (wt.%)	0.175	0.005	0.172	0.177	0.171	0.178
Fe, Iron (wt.%)	2.58	0.116	2.53	2.63	2.52	2.64
Ga, Gallium (ppm)	6.44	0.91	5.81	7.07	6.17	6.71
Hf, Hafnium (ppm)	1.41	0.17	1.27	1.55	1.34	1.48
Hg, Mercury (ppm)	2.14	0.102	2.09	2.20	2.03	2.25
In, Indium (ppm)	1.07	0.086	1.00	1.14	1.03	1.11
K, Potassium (wt.%)	0.306	0.053	0.282	0.330	0.296	0.316
La, Lanthanum (ppm)	25.1	3.2	23.4	26.8	24.4	25.8
Li, Lithium (ppm)	9.35	0.811	8.72	9.99	8.72	9.98
Lu, Lutetium (ppm)	0.050	0.009	0.041	0.059	IND	IND
Mg, Magnesium (wt.%)	0.266	0.016	0.259	0.273	0.259	0.274
Mn, Manganese (ppm)	414	15.3	408	421	405	424
Mo, Molybdenum (ppm)	8.97	0.710	8.67	9.28	8.69	9.25

Table 1 continued.

Constituent	Certified Value	1SD	95% Confidence Limits		95% Tolerance Limits	
			Low	High	Low	High
Aqua Regia Digestion continued						
Na, Sodium (wt.%)	0.117	0.016	0.109	0.125	0.112	0.122
Ni, Nickel (ppm)	14.4	1.10	14.1	14.7	13.7	15.2
P, Phosphorus (ppm)	313	22.2	303	323	300	326
Pb, Lead (wt.%)	0.774	0.024	0.764	0.783	0.757	0.791
S, Sulphur (wt.%)	2.47	0.094	2.42	2.51	2.42	2.52
Sb, Antimony (ppm)	62	11	58	67	61	64
Sc, Scandium (ppm)	< 2.5	IND	IND	IND	IND	IND
Se, Selenium (ppm)	< 5	IND	IND	IND	IND	IND
Sn, Tin (ppm)	1.95	0.181	1.80	2.09	1.77	2.13
Sr, Strontium (ppm)	19.7	1.68	19.0	20.4	18.6	20.8
Ta, Tantalum (ppm)	< 0.05	IND	IND	IND	IND	IND
Tb, Terbium (ppm)	0.37	0.05	0.32	0.41	0.35	0.39
Th, Thorium (ppm)	7.46	0.648	7.03	7.90	7.24	7.68
Tl, Thallium (ppm)	0.51	0.049	0.48	0.55	0.49	0.54
U, Uranium (ppm)	2.20	0.27	2.00	2.40	2.12	2.28
V, Vanadium (ppm)	7.35	0.94	6.92	7.79	IND	IND
W, Tungsten (ppm)	0.79	0.09	0.72	0.85	IND	IND
Y, Yttrium (ppm)	6.90	0.76	6.30	7.50	6.72	7.07
Yb, Ytterbium (ppm)	0.38	0.06	0.33	0.43	IND	IND
Zn, Zinc (wt.%)	3.12	0.086	3.09	3.16	3.05	3.20
Zr, Zirconium (ppm)	57	4.2	54	59	55	58

Note: intervals may appear asymmetric due to rounding; *determined from RSD of gold INAA data for 30g and 25g analytical subsample weights for gold fire assay and gold aqua regia, respectively.

STATISTICAL ANALYSIS

Certified Values, Confidence Limits, Standard Deviations and Tolerance Limits (Table 1) have been determined for each analyte following removal of individual, laboratory dataset (batch) and 3SD outliers (single iteration). For individual outliers within a laboratory batch the z-score test is used in combination with a second method that determines the per cent deviation of the individual value from the batch median. Outliers in general are selected on the basis of z-scores > 2.5 and with per cent deviations (i) > 3 and (ii) more than three times the average absolute per cent deviation for the batch. In certain instances statistician's prerogative has been employed in discriminating outliers. Each laboratory data set mean is tested for outlying status based on z-score discrimination and rejected if >2.5. After individual and laboratory data set (batch) outliers have been eliminated a non-iterative 3 standard deviation filter is applied, with those values lying outside this window also relegated to outlying status.

Certified Values are the means of accepted laboratory means after outlier filtering. The INAA data is omitted from determination of the certified value for Au and is used solely for the calculation of Tolerance Limits and homogeneity evaluation of OREAS 620. Indicative (uncertified) values (Table 2) 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.

Table 2. Indicative Values for OREAS 620.

Constituent	Unit	Value	Constituent	Unit	Value	Constituent	Unit	Value
Fire Assay								
Pd	ppb	*< 5*	Pt	ppb	*< 5*			
Infrared Combustion								
C	wt.%	*0.315*						
Peroxide Fusion ICP								
B	ppm	*21.7*	Hf	ppm	*6.31*	Sm	ppm	*5.73*
Be	ppm	*2.49*	Ho	ppm	*0.48*	Sn	ppm	*10.6*
Dy	ppm	*3.19*	Lu	ppm	*0.12*	Tb	ppm	*0.66*
Er	ppm	*1.16*	Ni	ppm	*< 50*	Te	ppm	*< 1*
Eu	ppm	*1.43*	Re	ppb	*< 100*	Tm	ppm	*0.14*
Gd	ppm	*4.97*	Sc	ppm	*5.60*	Zr	ppm	*225*
Ge	ppm	*2.30*	Se	ppm	*< 50*			
4-Acid Digestion								
B	ppm	*< 1*	Ge	ppm	*1.45*	Re	ppb	*< 50*
Dy	ppm	*2.90*	Hg	ppm	*1.07*	Sm	ppm	*5.38*
Er	ppm	*1.02*	Ho	ppm	*0.45*	Te	ppm	*< 0.1*
Eu	ppm	*1.19*	Nd	ppm	*27.4*	Tm	ppm	*0.12*
Gd	ppm	*4.40*	Pr	ppm	*7.34*			
3-Acid Digestion (no HF)								
Bi	ppm	*< 10*	Co	ppm	*11.7*	Ni	ppm	*13.3*
Aqua Regia Digestion								
B	ppm	*< 10*	Ho	ppm	*0.29*	Rb	ppm	*15.0*
Dy	ppm	*1.87*	Nb	ppm	*1.03*	Re	ppb	*< 50*
Er	ppm	*0.63*	Nd	ppm	*21.5*	Sm	ppm	*3.97*
Eu	ppm	*0.82*	Pd	ppb	*< 10*	Te	ppm	*< 0.05*
Gd	ppm	*3.14*	Pr	ppm	*6.09*	Ti	wt.%	*0.030*
Ge	ppm	*< 0.1*	Pt	ppb	*< 5*	Tm	ppm	*0.070*

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.*

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. The SD values include all sources of measurement uncertainty: between-lab variance, within-run variance (precision errors) and CRM variability. For an effective CRM the contribution of the latter should be negligible in comparison to measurement errors. OREAS reference materials have a level of homogeneity such that the observed variance from repeated analysis has its origin almost exclusively in the analytical process rather than the reference material itself.

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 any 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.

Table 3 shows **Performance Gates** 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.

Table 3. Performance Gates for OREAS 620.

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
Fire Assay											
Au, ppm	0.685	0.021	0.642	0.727	0.620	0.749	3.13%	6.27%	9.40%	0.650	0.719
Infrared Combustion											
S, wt.%	2.52	0.075	2.37	2.67	2.29	2.74	2.96%	5.93%	8.89%	2.39	2.64
Peroxide Fusion ICP											
Ag, ppm	40.0	3.10	33.8	46.2	30.7	49.3	7.75%	15.49%	23.24%	38.0	42.0
Al, wt.%	7.06	0.253	6.55	7.56	6.30	7.82	3.58%	7.16%	10.73%	6.71	7.41
As, ppm	54	9	35	73	25	82	17.56%	35.12%	52.69%	51	56
Ba, ppm	2754	128	2498	3010	2371	3138	4.64%	9.29%	13.93%	2616	2892
Bi, ppm	1.94	0.099	1.74	2.14	1.64	2.24	5.09%	10.18%	15.27%	1.84	2.04
Ca, wt.%	1.63	0.104	1.42	1.84	1.32	1.94	6.35%	12.71%	19.06%	1.55	1.71
Cd, ppm	167	9	150	184	141	193	5.12%	10.24%	15.36%	159	175
Ce, ppm	69	5.3	58	79	53	84	7.65%	15.29%	22.94%	65	72
Co, ppm	13.4	2.3	8.8	17.9	6.5	20.2	17.04%	34.08%	51.12%	12.7	14.0

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											
Cr, ppm	25.5	4.4	16.7	34.2	12.4	38.6	17.17%	34.33%	51.50%	24.2	26.8
Cs, ppm	5.45	0.65	4.15	6.74	3.51	7.39	11.88%	23.77%	35.65%	5.18	5.72
Cu, wt.%	0.176	0.006	0.164	0.188	0.158	0.194	3.41%	6.83%	10.24%	0.167	0.184
Fe, wt.%	3.01	0.121	2.77	3.26	2.65	3.38	4.03%	8.06%	12.09%	2.86	3.16
Ga, ppm	24.2	2.4	19.3	29.0	16.9	31.4	10.03%	20.05%	30.08%	23.0	25.4
In, ppm	1.24	0.16	0.92	1.55	0.76	1.71	12.87%	25.75%	38.62%	1.17	1.30
K, wt.%	2.70	0.152	2.39	3.00	2.24	3.15	5.63%	11.26%	16.89%	2.56	2.83
La, ppm	35.9	1.57	32.7	39.0	31.2	40.6	4.38%	8.77%	13.15%	34.1	37.7
Li, ppm	20.7	3.2	14.2	27.1	11.0	30.3	15.57%	31.13%	46.70%	19.6	21.7
Mg, wt.%	0.348	0.015	0.317	0.378	0.302	0.393	4.34%	8.69%	13.03%	0.330	0.365
Mn, ppm	449	24	401	498	377	522	5.39%	10.77%	16.16%	427	472
Mo, ppm	10.5	1.7	7.2	13.8	5.6	15.5	15.68%	31.36%	47.05%	10.0	11.1
Nb, ppm	15.2	2.2	10.7	19.7	8.4	21.9	14.82%	29.64%	44.46%	14.4	15.9
Nd, ppm	33.3	3.6	26.1	40.5	22.4	44.2	10.88%	21.76%	32.64%	31.6	35.0
P, ppm	380	56	268	492	212	548	14.75%	29.49%	44.24%	361	399
Pb, wt.%	0.772	0.037	0.697	0.846	0.660	0.884	4.84%	9.68%	14.52%	0.733	0.810
Pr, ppm	8.96	1.04	6.89	11.04	5.85	12.08	11.59%	23.19%	34.78%	8.52	9.41
Rb, ppm	123	8	107	139	99	147	6.52%	13.05%	19.57%	116	129
S, wt.%	2.49	0.050	2.39	2.59	2.34	2.64	2.01%	4.02%	6.04%	2.37	2.61
Sb, ppm	81	5.1	71	91	66	96	6.30%	12.59%	18.89%	77	85
Si, wt.%	29.82	0.844	28.13	31.51	27.29	32.35	2.83%	5.66%	8.49%	28.33	31.31
Sr, ppm	142	7	127	156	120	164	5.08%	10.16%	15.24%	135	149
Ta, ppm	1.16	0.24	0.68	1.65	0.44	1.89	20.71%	41.42%	62.13%	1.11	1.22
Th, ppm	11.2	1.00	9.2	13.2	8.2	14.2	8.95%	17.91%	26.86%	10.6	11.8
Ti, wt.%	0.155	0.008	0.140	0.170	0.132	0.178	4.88%	9.76%	14.64%	0.147	0.163
Tl, ppm	1.56	0.144	1.27	1.85	1.13	1.99	9.21%	18.41%	27.62%	1.48	1.64
U, ppm	4.06	0.65	2.76	5.36	2.11	6.01	16.02%	32.04%	48.06%	3.85	4.26
V, ppm	26.9	3.2	20.5	33.2	17.3	36.4	11.82%	23.64%	35.46%	25.5	28.2
W, ppm	2.26	0.34	1.58	2.93	1.24	3.27	14.96%	29.92%	44.89%	2.15	2.37
Y, ppm	15.5	1.26	12.9	18.0	11.7	19.3	8.18%	16.36%	24.54%	14.7	16.2
Yb, ppm	0.88	0.11	0.67	1.10	0.56	1.20	12.09%	24.18%	36.26%	0.84	0.93
Zn, wt.%	3.14	0.140	2.86	3.42	2.72	3.56	4.45%	8.90%	13.35%	2.98	3.30

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											
Ag, ppm	38.5	1.53	35.4	41.5	33.9	43.1	3.97%	7.93%	11.90%	36.6	40.4
Al, wt.%	6.72	0.499	5.72	7.72	5.23	8.22	7.43%	14.85%	22.28%	6.39	7.06
As, ppm	50	4.4	41	59	37	63	8.86%	17.71%	26.57%	48	53
Ba, ppm	2487	253	1981	2994	1727	3247	10.18%	20.37%	30.55%	2363	2611
Be, ppm	2.36	0.24	1.87	2.84	1.62	3.09	10.35%	20.71%	31.06%	2.24	2.47
Bi, ppm	1.93	0.104	1.72	2.13	1.61	2.24	5.40%	10.81%	16.21%	1.83	2.02
Ca, wt.%	1.60	0.070	1.46	1.74	1.39	1.81	4.36%	8.73%	13.09%	1.52	1.68
Cd, ppm	163	8	146	180	137	188	5.22%	10.44%	15.65%	155	171
Ce, ppm	64	8	48	80	41	87	12.22%	24.43%	36.65%	61	67
Co, ppm	12.1	1.8	8.6	15.7	6.8	17.5	14.62%	29.24%	43.85%	11.5	12.7
Cr, ppm	21.9	3.6	14.6	29.1	11.0	32.7	16.53%	33.07%	49.60%	20.8	23.0
Cs, ppm	5.01	0.220	4.57	5.45	4.35	5.67	4.39%	8.79%	13.18%	4.76	5.26
Cu, wt.%	0.173	0.004	0.166	0.181	0.162	0.184	2.14%	4.28%	6.43%	0.165	0.182
Fe, wt.%	2.94	0.144	2.65	3.23	2.51	3.38	4.90%	9.81%	14.71%	2.80	3.09
Ga, ppm	23.7	1.08	21.5	25.9	20.5	27.0	4.56%	9.12%	13.67%	22.5	24.9
Hf, ppm	5.61	0.322	4.97	6.26	4.65	6.58	5.73%	11.46%	17.19%	5.33	5.90
In, ppm	1.15	0.056	1.04	1.26	0.98	1.32	4.84%	9.68%	14.52%	1.09	1.21
K, wt.%	2.63	0.154	2.32	2.93	2.17	3.09	5.85%	11.69%	17.54%	2.50	2.76
La, ppm	29.7	3.9	21.9	37.6	17.9	41.5	13.22%	26.44%	39.65%	28.2	31.2
Li, ppm	20.0	1.54	16.9	23.1	15.4	24.6	7.72%	15.43%	23.15%	19.0	21.0
Lu, ppm	0.11	0.007	0.09	0.12	0.08	0.13	7.01%	14.02%	21.04%	0.10	0.11
Mg, wt.%	0.341	0.022	0.298	0.384	0.276	0.406	6.33%	12.67%	19.00%	0.324	0.358
Mn, ppm	440	24	392	488	368	511	5.42%	10.83%	16.25%	418	462
Mo, ppm	9.47	0.699	8.07	10.86	7.37	11.56	7.39%	14.78%	22.17%	8.99	9.94
Na, wt.%	1.94	0.104	1.73	2.15	1.63	2.25	5.38%	10.75%	16.13%	1.84	2.04
Nb, ppm	13.1	1.25	10.6	15.6	9.4	16.9	9.50%	19.00%	28.51%	12.5	13.8
Ni, ppm	15.2	2.4	10.4	20.1	7.9	22.6	16.00%	32.01%	48.01%	14.5	16.0
P, ppm	353	25	303	403	278	428	7.08%	14.16%	21.25%	336	371
Pb, wt.%	0.774	0.022	0.731	0.817	0.709	0.839	2.79%	5.57%	8.36%	0.735	0.813
Rb, ppm	116	7	102	130	95	137	6.10%	12.19%	18.29%	110	122
S, wt.%	2.47	0.067	2.34	2.60	2.27	2.67	2.69%	5.39%	8.08%	2.35	2.59
Sb, ppm	76	8	59	92	50	101	11.17%	22.34%	33.50%	72	79
Sc, ppm	5.20	0.62	3.97	6.44	3.35	7.05	11.88%	23.75%	35.63%	4.94	5.46

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											
Se, ppm	< 5	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
Sn, ppm	4.88	0.301	4.28	5.48	3.98	5.78	6.18%	12.35%	18.53%	4.64	5.12
Sr, ppm	131	9	114	149	105	158	6.72%	13.44%	20.16%	125	138
Ta, ppm	1.13	0.22	0.70	1.56	0.49	1.78	19.03%	38.06%	57.09%	1.07	1.19
Tb, ppm	0.58	0.054	0.48	0.69	0.42	0.75	9.25%	18.51%	27.76%	0.56	0.61
Th, ppm	11.0	1.09	8.8	13.1	7.7	14.2	9.94%	19.89%	29.83%	10.4	11.5
Ti, wt.%	0.135	0.015	0.105	0.165	0.090	0.180	11.11%	22.21%	33.32%	0.128	0.142
Tl, ppm	1.61	0.158	1.29	1.93	1.14	2.09	9.83%	19.66%	29.49%	1.53	1.69
U, ppm	4.23	0.197	3.84	4.63	3.64	4.82	4.67%	9.34%	14.00%	4.02	4.44
V, ppm	20.7	1.00	18.7	22.7	17.8	23.7	4.80%	9.60%	14.40%	19.7	21.8
W, ppm	2.21	0.160	1.89	2.53	1.73	2.69	7.25%	14.50%	21.75%	2.10	2.32
Y, ppm	12.3	1.6	9.2	15.4	7.7	17.0	12.59%	25.18%	37.77%	11.7	12.9
Yb, ppm	0.73	0.10	0.53	0.93	0.43	1.03	13.76%	27.51%	41.27%	0.69	0.77
Zn, wt.%	3.15	0.097	2.96	3.35	2.86	3.44	3.07%	6.14%	9.21%	3.00	3.31
Zr, ppm	202	13	176	227	163	240	6.38%	12.75%	19.13%	192	212
3-Acid Digestion (no HF)											
Ag, ppm	36.8	2.83	31.1	42.4	28.3	45.3	7.68%	15.35%	23.03%	35.0	38.6
As, ppm	48.1	5.2	37.6	58.5	32.4	63.7	10.86%	21.71%	32.57%	45.7	50.5
Cu, wt.%	0.171	0.005	0.161	0.181	0.157	0.186	2.82%	5.64%	8.46%	0.163	0.180
Fe, wt.%	2.70	0.145	2.41	2.99	2.27	3.14	5.38%	10.77%	16.15%	2.57	2.84
Mo, ppm	9.32	0.837	7.65	11.00	6.81	11.83	8.97%	17.95%	26.92%	8.86	9.79
Pb, wt.%	0.777	0.019	0.739	0.816	0.720	0.835	2.45%	4.90%	7.35%	0.739	0.816
Zn, wt.%	3.13	0.126	2.87	3.38	2.75	3.50	4.02%	8.04%	12.07%	2.97	3.28
Aqua Regia Digestion											
Ag, ppm	38.4	1.31	35.8	41.1	34.5	42.4	3.42%	6.84%	10.26%	36.5	40.4
Al, wt.%	1.12	0.090	0.94	1.30	0.85	1.39	8.02%	16.03%	24.05%	1.07	1.18
As, ppm	47.2	4.09	39.1	55.4	35.0	59.5	8.66%	17.33%	25.99%	44.9	49.6
Au, ppm	0.666	0.024	0.618	0.714	0.594	0.738	3.61%	7.22%	10.83%	0.632	0.699
Ba, ppm	477	49	379	576	329	625	10.35%	20.69%	31.04%	453	501
Be, ppm	0.60	0.09	0.43	0.78	0.34	0.86	14.37%	28.74%	43.11%	0.57	0.63
Bi, ppm	1.88	0.148	1.58	2.17	1.44	2.32	7.87%	15.74%	23.61%	1.78	1.97
Ca, wt.%	1.29	0.055	1.18	1.40	1.12	1.45	4.29%	8.58%	12.87%	1.22	1.35
Cd, ppm	161	7	147	175	140	182	4.38%	8.75%	13.13%	153	169

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											
Ce, ppm	51	3.0	45	57	42	60	5.92%	11.85%	17.77%	49	54
Co, ppm	12.2	1.05	10.1	14.3	9.0	15.3	8.62%	17.23%	25.85%	11.6	12.8
Cr, ppm	17.1	2.0	13.2	21.1	11.2	23.0	11.54%	23.07%	34.61%	16.3	18.0
Cs, ppm	1.22	0.19	0.83	1.60	0.64	1.79	15.84%	31.67%	47.51%	1.15	1.28
Cu, wt.%	0.175	0.005	0.164	0.185	0.159	0.191	3.06%	6.12%	9.18%	0.166	0.183
Fe, wt.%	2.58	0.116	2.35	2.81	2.23	2.93	4.51%	9.03%	13.54%	2.45	2.71
Ga, ppm	6.44	0.91	4.61	8.27	3.70	9.18	14.20%	28.40%	42.60%	6.12	6.76
Hf, ppm	1.41	0.17	1.08	1.75	0.91	1.92	11.89%	23.78%	35.67%	1.34	1.48
Hg, ppm	2.14	0.102	1.94	2.34	1.84	2.45	4.76%	9.51%	14.27%	2.03	2.25
In, ppm	1.07	0.086	0.90	1.24	0.81	1.33	8.04%	16.09%	24.13%	1.02	1.13
K, wt.%	0.306	0.053	0.200	0.413	0.147	0.466	17.39%	34.77%	52.16%	0.291	0.322
La, ppm	25.1	3.2	18.7	31.5	15.5	34.7	12.73%	25.46%	38.19%	23.8	26.3
Li, ppm	9.35	0.811	7.73	10.97	6.92	11.78	8.68%	17.35%	26.03%	8.88	9.82
Lu, ppm	0.050	0.009	0.031	0.068	0.022	0.078	18.61%	37.22%	55.82%	0.047	0.052
Mg, wt.%	0.266	0.016	0.235	0.298	0.219	0.313	5.91%	11.81%	17.72%	0.253	0.280
Mn, ppm	414	15	384	445	369	460	3.70%	7.39%	11.09%	394	435
Mo, ppm	8.97	0.710	7.55	10.39	6.84	11.10	7.91%	15.82%	23.73%	8.52	9.42
Na, wt.%	0.117	0.016	0.084	0.150	0.068	0.166	13.96%	27.92%	41.88%	0.111	0.123
Ni, ppm	14.4	1.10	12.2	16.6	11.1	17.7	7.66%	15.32%	22.98%	13.7	15.1
P, ppm	313	22	268	357	246	379	7.11%	14.23%	21.34%	297	328
Pb, wt.%	0.774	0.024	0.726	0.822	0.702	0.846	3.08%	6.17%	9.25%	0.735	0.813
S, wt.%	2.47	0.094	2.28	2.66	2.19	2.75	3.82%	7.65%	11.47%	2.35	2.59
Sb, ppm	62	11	41	84	30	95	17.32%	34.63%	51.95%	59	66
Sc, ppm	< 2.5	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
Se, ppm	< 5	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
Sn, ppm	1.95	0.181	1.59	2.31	1.40	2.49	9.28%	18.55%	27.83%	1.85	2.04
Sr, ppm	19.7	1.68	16.3	23.1	14.7	24.8	8.54%	17.08%	25.63%	18.7	20.7
Ta, ppm	< 0.05	IND	IND	IND	IND	IND	IND	IND	IND	IND	IND
Tb, ppm	0.37	0.05	0.26	0.48	0.20	0.53	14.97%	29.94%	44.91%	0.35	0.38
Th, ppm	7.46	0.648	6.17	8.76	5.52	9.41	8.69%	17.38%	26.07%	7.09	7.84
Tl, ppm	0.51	0.049	0.42	0.61	0.37	0.66	9.48%	18.97%	28.45%	0.49	0.54
U, ppm	2.20	0.27	1.66	2.74	1.39	3.01	12.33%	24.67%	37.00%	2.09	2.31
V, ppm	7.35	0.94	5.48	9.23	4.54	10.16	12.75%	25.50%	38.25%	6.98	7.72

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											
W, ppm	0.79	0.09	0.61	0.97	0.52	1.06	11.37%	22.75%	34.12%	0.75	0.83
Y, ppm	6.90	0.76	5.39	8.41	4.63	9.17	10.97%	21.93%	32.90%	6.55	7.24
Yb, ppm	0.38	0.06	0.26	0.51	0.20	0.57	16.21%	32.42%	48.63%	0.36	0.40
Zn, wt.%	3.12	0.086	2.95	3.30	2.87	3.38	2.74%	5.48%	8.22%	2.97	3.28
Zr, ppm	57	4.2	48	65	44	69	7.40%	14.81%	22.21%	54	59

Note: intervals may appear asymmetric due to rounding

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 0.171 and 0.176wt.%. 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).

For gold by fire assay and by aqua regia digestion, the tolerance limits have been determined by INAA using the reduced analytical subsample method which utilises the known relationship between standard deviation and analytical subsample weight (Ingamells and Switzer, 1973). In this approach the sample aliquot is substantially reduced to a point where most of the variability in replicate assays should be due to inhomogeneity of the reference material and measurement error becomes negligible. In this instance a subsample weight of 1.0 gram was employed and the 1RSD of 3.03% (or 0.557% at a 30g charge weight) confirms the high level of gold homogeneity in OREAS 620. Au by fire assay is reported by 23 laboratories and the charge weights range from 20-40g. The most common charge weight used in this round robin was 30g (18 labs) and tolerance intervals have been calculated at this sample weight. For Au by aqua regia digestion, tolerance limits have been calculated at a 25g sample weight (mode) where the sample catch weights ranged from 15-50g at 17 laboratories.

The homogeneity of OREAS 620 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 145 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 620 is fit-for-purpose as a certified reference material (see 'Intended Use' below).

PARTICIPATING LABORATORIES

Acme Analytical Laboratories S.A. (BV), Santiago, Chile
Actlabs, Ancaster, Ontario, Canada
ALS, Brisbane, QLD, Australia
ALS, Johannesburg, South Africa
ALS, Lima, Peru
ALS, Loughrea, Galway, Ireland
ALS, Orange, NSW, Australia
ALS, Perth, WA, Australia
ALS, Vancouver, BC, Canada
Bureau Veritas Commodities Canada Ltd, Vancouver, BC, Canada
Bureau Veritas Geoanalytical, Adelaide, SA, Australia
Bureau Veritas Geoanalytical, Perth, WA, Australia
Intertek Genalysis, Adelaide, SA, Australia
Intertek Genalysis, Perth, WA, Australia
Intertek Minerals (IMI), Jakarta, Indonesia
Intertek Testing Services, Cupang, Muntinlupa, Philippines
PT Geoservices Ltd, Cikarang, Jakarta Raya, Indonesia
SGS Australia Mineral Services, Perth (Newburn), WA, Australia
SGS Canada Inc., Vancouver, BC, Canada
SGS del Peru, Lima, Peru
SGS Geosol Laboratorios Ltda, Vespasiano, Minas Gerais, Brazil
SGS Lakefield Research Ltd, Lakefield, Ontario, Canada
SGS Mineral Services, Townsville, QLD, Australia

PREPARER AND SUPPLIER OF THE REFERENCE MATERIAL

Reference material OREAS 620 has been prepared, certified and is supplied by:

ORE Research & Exploration Pty Ltd	Tel: +613-9729 0333
37A Hosie Street	Fax: +613-9729 8338
Bayswater North VIC 3153	Web: www.ore.com.au
AUSTRALIA	Email: info@ore.com.au

It is available in unit sizes of 10g and 60g (single-use laminated foil pouches sealed under nitrogen).

INTENDED USE

OREAS 620 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 620 has been prepared from Zn and Cu VHMS ores sourced from the Gossan Hill deposit at Golden Grove and blended with barren rhyodacite rock. It contains reactive sulphide (2.52% S) and has been packaged under a nitrogen environment (single use laminated foil pouches only). In its unopened state and under normal conditions of storage the CRM has a shelf life beyond ten years. Its stability will be monitored at regular intervals and purchasers notified if any changes are observed.

INSTRUCTIONS FOR CORRECT USE

The certified values for OREAS 620 refer to the concentration level in its packaged state. It should not be dried prior to weighing and analysis. The certified values for gold by fire assay and aqua regia digestion are applicable to charge/sample weights ranging 15-50g.

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.

QMS ACCREDITED

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

CERTIFYING OFFICER

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

REFERENCES

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

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