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CERTIFICATE OF ANALYSIS FOR

MULTI-ELEMENT REFERENCE

MATERIAL OREAS 44P

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REPORT 44P-2_Revised

SUMMARY STATISTICS

Recommended values and 95% confidence intervals

Constituent	Recommended value	95% Confidence interval	
		Low	High
Aluminium, Al (%)	3.74	3.63	3.85
Arsenic, As (ppm)	109	102	116
Barium, Ba (ppm)	408	389	427
Calcium, Ca (%)	0.33	0.32	0.34
Copper, Cu (ppm)	423	411	435
Gold, Au (ppb)	67	65	69
Iron, Fe (%)	34.51	34.31	34.71
Lead, Pb (ppm)	217	206	228
Magnesium, Mg (%)	0.48	0.45	0.51
Manganese, Mn (ppm)	880	810	950
Molybdenum, Mo (ppm)	417	393	441
Nickel, Ni (ppm)	471	454	488
Phosphorous, P (ppm)	410	390	430
Potassium, K (%)	1.24	1.18	1.30
Silicon, Si (%)	17.04	16.97	17.11
Sodium, Na (%)	0.15	0.11	0.19
Sulphur, S (ppm)	170	140	200
Titanium, Ti (ppm)	2100	1970	2230
Tungsten, W (ppm)	24	19	29
Zinc, Zn (ppm)	625	607	643

INTRODUCTION

OREAS reference materials (RM) are intended to provide a low cost method of evaluating and improving the quality of analysis of geological samples. To the analyst they provide an effective means of calibrating analytical equipment, assessing new techniques and routinely monitoring in-house procedures. To the explorationist they provide an important control in analytical data sets pertaining to exploration from the grass roots level through to prospect evaluation. To the mine geologist they enable improved performance in grade control.

As a rule only source materials exhibiting an exceptional level of homogeneity of the element(s) of interest are used in the preparation of these materials. This has enabled Ore Research & Exploration to produce a range of gold RM's exhibiting homogeneity that matches or exceeds that of currently available international reference materials. In many instances RM's produced from a single source are sufficiently homogeneous to produce a relatively coarse-grained form designed to simulate drill chip samples. These have a grain size of minus 3mm and are designated with a "C" suffix to the RM identification number. These standards are packaged in 1kg units following homogenisation and are intended for submission to analytical laboratories in subsample sizes of as little as 250g. They offer the added advantages of providing a check on both sample preparation and analytical procedures while acting as a transparent standard to the assay laboratory. The more conventional pulped standards have a grain size of minus 75 microns and a higher degree of homogeneity. These standards are distinguished by a "P" suffix to the standard identification number. In line with ISO recommendations successive batch numbers are now designated by the lower case suffixes "a", "b", "c", "d", etc.

SOURCE MATERIALS

The multi-element reference material OREAS 44P is a composite standard produced from a range of oxidised materials including Blackwood greywacke (central Victoria), Bulong laterite (Yilgarn, Western Australia), Iron Monarch hematite ore (Whyalla, South Australia) Hilton North gossan and Mount Oxide ferruginous mudstone (Mount Isa region, Queensland). The dominant constituent, a gold-bearing greywacke, was obtained from the flank of a mineralised shear zone within Ordovician flysch sediments in the Blackwood area of central Victoria. The sedimentary succession hosting the shear zone consists predominantly of medium-grained greywackes together with subordinate interbedded siltstone and slate. Hydrothermal alteration in the vicinity of the mineralisation is indicated by the development of phyllite. The shear zone, in which gold grades attain a maximum, is manifested by foliated sericitic and chloritic fault gouge and goethitic quartz veins. The very homogeneous distribution of gold on a mesoscopic scale and uniform concentration gradient away from the ore zone suggests the gold is extremely fine-grained and evenly disseminated.

COMMINUTION AND HOMOGENISATION PROCEDURES

The various constituents comprising OREAS 44P were prepared in the following manner:

a) *primary crushing in a large (36 x 50cm) jaw crusher*
b) *drying in a gas-fired rotary drier*
c) *secondary crushing in a small (10 x 20cm) jaw crusher*
d) *tertiary crushing to minus 3mm in a roller crusher*

At this stage the constituent materials were sampled, reassayed and combined in proportions designed to optimise the concentration levels of the metals of principal interest (Au, Cu, Ni, Pb and Zn). The resultant mixture was then prepared in the following manner:

e) *homogenisation in a paddle blender*
f) *milling in a gamma mill*
g) *screening to minus 75 micron in an air classifier*
h) *homogenisation in a ribbon blender*
i) *bagging into 20kg sublots*

The oversize fraction from the screening stage was re-milled and screened until a negligible amount remained. Throughout the bagging stage twenty-two 1kg test units were taken at random intervals (determined using tables of random numbers), sealed in laminated plastic bags and set aside for laboratory testing.

Prior to bottling in 1kg units each 20kg sublot was further homogenised in a tumble blender to counter the possibility of unmixing during handling. The resultant material constitutes the minus 75 micron reference material OREAS 44P.

ANALYSIS OF OREAS 44P

The certification of OREAS 44P entailed two separate programs, one primarily for major elements utilising mainly university and government research laboratories, and one for trace elements in which commercial assay laboratories played the major role.

Major Elements

Eleven laboratories participated in the major element program and are listed in the section headed Participating Laboratories. Each received one 50g test portion, randomly selected from the 1kg test units described above, with instructions to carry out duplicate major element determinations via borate fusion X-ray fluorescence spectrometry. Three of eleven laboratories used a low dilution technique while the remaining eight used conventional methods. Interlaboratory agreement is good and reflected in the very narrow 95% confidence intervals for the recommended values (refer below).

Trace Elements
Seventeen commercial and nine university and research laboratories participated in the trace element program and are listed in the section headed Participating Laboratories. The latter group was instructed to determine their standard suite of trace constituents using pressed powder pellet or low dilution borate fusion XRF analysis on the same 50g test portion or glass disc used for the major element determinations.

Each commercial laboratory received three 200g subsamples with instructions to carry out duplicate fire assay/graphite furnace AAS or ICP-MS determinations for gold on each subsample. The duplicate assays were to be performed on separate test portions using 50g charges. Selected laboratories were also instructed to conduct single gold determinations on each subsample using an aqua regia digest on a 25-30g portion. The remaining trace elements were determined by a variety of acid digestion (multi-acid/HF, perchloric acid, aqua regia, aqua regia/perchloric acid) and alkali fusion methods in combination with AAS, ICP-OES and ICP-MS. A limited number of laboratories also provided results by XRF pressed powder pellet. Due to limitations in capabilities some laboratories were unable to undertake certain aspects of the test program.

For each laboratory the three 200g subsamples were scoop-split from separate test units taken during the bagging stage. This two-stage nested design for the interlaboratory programme was amenable to analysis of variance (ANOVA) treatment and enabled a comparative assessment of within- and between-unit homogeneity.

For the determination of a statistical tolerance interval for gold, a 30g scoop split was taken from each of the twenty-two random test units and submitted for gold assay via instrumental neutron activation analysis on a reduced analytical subsample weight of 1g.

COMPARISON OF ANALYTICAL METHODS

In Tables 1-9 results for As, Ba, Cu, Au, Pb, Mo, Ni, W and Zn are summarised according to analytical method.

Table 1. Arsenic (ppm).

Method	Mean	95% Confidence Interval	No. of Laboratories	No. of Results
Mixed acid/HF - ICPOES, AAS, ICPMS	105	10	13	68
XRF-PPP & XRF-LD	109	17	11	29
Perchloric - ICPOES, AAS, ICPMS	102	7	9	27
Aqua regia - ICPOES, AAS, ICPMS	95	9	9	27
Aqua regia/perchloric - ICPOES, AAS, ICPMS	97	13	11	32
Alkaline fusion - ICPMS, ICPOES	115	-	2	6
INAA	107	-	1	23
Total			56	212

ICPOES: inductively-coupled plasma optical emission spectroscopy; AAS: atomic absorption spectroscopy; ICPMS: inductively-coupled plasma mass spectrometry; XRF-PPP and XRF-LD: pressed powder pellet and low-dilution borate fusion X-ray fluorescence; INAA: instrumental neutron activation analysis.

Table 2. Barium (ppm); abbreviations as in Table 1.

Method	Mean	95% Confidence Interval	No. of Laboratories	No. of Results
Mixed acid/HF - ICPOES, AAS, ICPMS	396	35	9	51
XRF-PPP & XRF-LD	464	47	15	38
Perchloric - ICPOES, AAS, ICPMS	244	-	4	12
Aqua regia - ICPOES, AAS, ICPMS	167	38	5	15
Aqua regia/perchloric - ICPOES, AAS	197	49	6	18
Alkaline fusion - AAS, ICPOES	400	-	3	9
INAA	352	-	1	23
Total			43	166

Table 3. Copper (ppm); abbreviations as in Table 1.

Method	Mean	95% Confidence Interval	No. of Laboratories	No. of Results
Mixed acid/HF - ICPOES, AAS, ICPMS	421	15	15	76
XRF-PPP & XRF-LD	466	55	8	18
Perchloric - ICPOES, AAS, ICPMS	416	17	12	36
Aqua regia - ICPOES, AAS, ICPMS	410	24	10	30
Aqua regia/perchloric - ICPOES, AAS	410	15	12	36
Alkaline fusion - AAS, ICPOES	438	-	4	12
Total			61	208

Table 4. Gold (ppb); abbreviations as in Table 1, GFAAS: graphite furnace AAS.

Method	Mean	95% Confidence Interval	No. of Laboratories	No. of Results
Lead fire assay - ICPMS, GFAAS, AAS	67	2	13	78
INAA	65	-	1	22
Aqua regia - GFAAS, ICPMS	56	9	8	24
Total			22	124

Table 5. Lead (ppm); abbreviations as in Table 1.

Method	Mean	95% Confidence Interval	No. of Laboratories	No. of Results
Mixed acid/HF - ICPOES, AAS, ICPMS	210	8	14	73
XRF-PPP & XRF-LD	233	19	12	29
Perchloric - ICPOES, AAS, ICPMS	211	10	11	33
Aqua regia - ICPOES, AAS, ICPMS	183	25	9	27
Aqua regia/perchloric - ICPOES, AAS, ICPMS	198	11	11	33
Alkaline fusion - AAS, ICPMS	184	-	3	9
Total			60	204

Table 6. Molybdenum (ppm); abbreviations as in Table 1.

Method	Mean	95% Confidence Interval	No. of Laboratories	No. of Results
Mixed acid/HF - ICPMS, ICPOES, AAS	406	28	11	61
XRF-PPP & XRF-LD	331	31	9	24
Perchloric - ICPMS, ICPOES, AAS	385	30	10	29
Aqua regia - ICPMS, ICPOES, AAS	407	39	8	24
Aqua regia/perchloric - ICPOES, ICPMS, AAS	386	21	7	21
Alkaline fusion - ICPMS, AAS	409	-	3	9
INAA	417	14	1	23
Total			49	191

Table 7. Nickel (ppm); abbreviations as in Table 1.

Method	Mean	95% Confidence Interval	No. of Laboratories	No. of Results
Mixed acid/HF - ICPOES, AAS, ICPMS	460	22	14	73
XRF-PPP & XRF-LD	599	69	10	23
Perchloric - ICPOES, AAS, ICPMS	439	33	11	33
Aqua regia - ICPOES, AAS, ICPMS	401	55	9	27
Aqua regia/perchloric - ICPOES, AAS	441	21	10	30
Alkaline fusion - AAS, ICPOES	507	-	4	12
Total			58	198

Table 8. Tungsten (ppm); abbreviations as in Table 1.

Method	Mean	95% Confidence Interval	No. of Laboratories	No. of Results
Mixed acid/HF - ICPMS, ICPOES	19	5	8	45
XRF-PPP & XRF-LD	28	8	7	19
Perchloric - ICPMS	6	-	3	9
Aqua regia - ICPMS, ICPOES	17	-	3	9
Aqua regia/perchloric - ICPMS, ICPOES	12	-	4	11
Alkaline fusion - ICPMS	26	-	2	6
INAA	25	-	1	23
Total			28	122

Table 9. Zinc (ppm); abbreviations as in Table 1.

Method	Mean	95% Confidence Interval	No. of Laboratories	No. of Results
Mixed acid/HF - ICPOES, AAS, ICPMS	619	20	15	78
XRF-PPP & XRF-LD	616	42	11	26
Perchloric - ICPOES, AAS, ICPMS	588	36	10	30
Aqua regia - ICPOES, AAS, ICPMS	579	42	9	27
Aqua regia/perchloric - ICPOES, AAS, ICPMS	604	26	12	36
Alkaline fusion - AAS, ICPOES	615	-	3	9
INAA	579	-	1	23
Total			60	223

STATISTICAL EVALUATION OF ANALYTICAL DATA FOR OREAS 44P

Recommended Value and Confidence Limits

The recommended value was determined for each element from the mean of means of accepted replicate values of accepted laboratory data sets according to the formulae

$$\overline{x}_i = \frac{1}{n_i} \sum_{j=1}^{n_i} x_{ij}$$

$$\ddot{x} = \frac{1}{p} \sum_{i=1}^{p} \overline{x}_i$$

where

x_{ij} *is the jth result reported by laboratory i;*

p is the number of participating laboratories;

n_i *is the number of results reported by laboratory i;*

$\bar{x}_i$ *is the mean for laboratory i;*

$\ddot{x}$ *is the mean of means.*

Methods incorporating partial acid digestion are not reliable measures of total concentration values and were not used in determining recommended values.

The confidence limits were obtained by calculation of the variance of the consensus value (mean of means) and reference to Student's-*t* distribution with degrees of freedom (*p*-1)

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

$$\text{Confidence limits } = \ddot{x} \pm t_{1-x/2}(p-1)\left(\hat{V}(\ddot{x})\right)^{1/2}$$

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

The distribution of the values are assumed to be symmetrical about the mean in the calculation of the confidence limits.

The test for rejection of individual outliers was based on the test criterion, T, and reference to tables of critical values of T at the 1% level of significance (ASTM E 178-94) as follows:

$$T_{ij} = \left|\left(x_{ij} - \bar{x}_i\right)\right| / s_i$$

where

T_{ij} *is the test criterion for the jth result of laboratory i;*

s_i *is the standard deviation of laboratory i.*

The same principles were applied in testing for outlying laboratory means except for some trace elements were analytical bias between XRF pressed powder pellet determination and the other techniques was indicated. In these instances the XRF PPP results were not used. Recommended major oxide, major element and trace element concentrations are given in Tables 10-12.

Statement of Homogeneity

The variability of replicate assays from each laboratory is a result of both measurement and subsampling errors. In the determination of a statistical tolerance interval it is therefore necessary to eliminate, or at least substantially minimise, those errors attributable to measurement. One way of achieving this is by reducing the analytical subsample weight to a point where most of the variability in replicate assays is due to inhomogeneity of the reference material and measurement error becomes negligible.

Due to limitations imposed by the analytical procedures employed, this approach was impractical for elements other than gold. Homogeneity of this metal was accordingly determined by INAA from twenty-two 1g subsamples obtained in the manner described previously and using tables of factors for two-sided tolerance limits for normal distributions (ISO Guide 3207) in which

$$\text{Lower limit is } \ddot{x} - k_2'(n, p, 1-\alpha)s$$
$$\text{Upper limit is } \ddot{x} + k_2'(n, p, 1-\alpha)s$$

Table 10. Major oxide borate fusion XRF data *(weight percent).*

Constituent	Recommended Value	95% Confidence Interval	No. of Laboratories	No. of Results
SiO_2	36.44	0.15	10	23
TiO_2	0.350	0.022	11	25
Al_2O_3	7.06	0.20	10	23
Fe_2O_3	49.35	0.28	10	23
MnO	0.114	0.009	10	23
MgO	0.79	0.05	11	25
CaO	0.46	0.01	11	25
Na_2O	0.20	0.06	11	24
K_2O	1.49	0.07	11	25
P_2O_5	0.093	0.005	10	23
BaO	0.048	0.003	8	19
SO_3	0.042	0.008	9	20
LOI	2.99	0.12	9	19

Table 11. Major element borate fusion XRF data *(expressed in elemental form; integers as ppm, rest in weight percent).*

Constituent	Recommended Value	95% Confidence Interval	No. of Laboratories	No. of Results
Silicon, Si	17.04	0.07	10	23
Titanium, Ti	2100	130	11	25
Aluminium, Al	3.74	0.11	10	23
Iron, Fe	34.51	0.20	10	23
Manganese, Mn	880	70	10	23
Magnesium, Mg	0.48	0.03	11	25
Calcium, Ca	0.33	0.01	11	25
Sodium, Na	0.15	0.04	11	24
Potassium, K	1.24	0.06	11	25
Phosphorous, P	410	20	10	23
Barium, Ba	430	30	8	19
Sulphur, S	170	30	9	20

where

n is the number of results reported by laboratory Q;

$1-\alpha$ is the confidence level;

p is the proportion of results expected within the tolerance limits;

k_2' is the factor for two-sided tolerance limits (m, σ unknown);

Table 12. Trace element recommended values and 95% confidence intervals (ppm).

Constituent	Recommended Value	95% Confidence Interval
Arsenic, As	109	7
Barium, Ba	408	19
Copper, Cu	423	12
Gold, Au	0.067	0.002
Lead, Pb	217	11
Manganese, Mn	880	70
Molybdenum, Mo	417	24
Nickel, Ni	471	17
Sulphur, S	170	30
Titanium, Ti	2100	130
Tungsten, W	24	5
Zinc, Zn	625	18

and *s* is computed according to the formula

$$s = \left[\frac{\sum_{j=1}^{n} \left(x_j - \bar{x} \right)^2}{n-1} \right]^{1/2}$$

No individual outliers were removed from the results prior to the calculation of tolerance intervals.

From the INAA data set an estimated tolerance interval of ±2ppb at an analytical subsample weight of 50g was obtained (using the sampling constant relationship of Ingamells and Switzer, 1973) and is considered to reflect the actual inhomogeneity of the material under test. The meaning of this tolerance interval may be illustrated for gold (refer Table 13) where 99% of the time at least 95% of 50g-sized subsamples will have concentrations lying between 65 and 69ppb. 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 (IS0 Guide 35).

The two-stage nested design adopted for the interlaboratory programme entailed each laboratory completing two replicate fire assay determinations on each of the three units received. This enabled gold homogeneity to be independently evaluated using an Analysis of Variance (ANOVA) approach. The results of this treatment, modified for unbalanced data, are summarised in Table 14. The between-unit mean square is of similar magnitude to the within-unit mean square for which:

$$Test\ statistic = MS1/MS2 = 1.59$$

and the critical values for the F-test (one-sided) are:

1.79 at the 5% significance level
2.29 at the 1% significance level.

We may conclude, therefore, that there is no evidence to indicate that the between-units variance for gold is greater than that within units and that the homogeneity of the entire batch of OREAS 44P is of an acceptable level.

Table 13. Recommended value and tolerance interval for gold

Constituent	**Recommended value**	**Tolerance interval 1-α=0.99, ρ=0.95**	
		Low	**High**
Gold, Au (ppb)	67	65	69

Table 14. ANOVA table.

Source	**Sum of squares**	**Degrees of freedom**	**Mean square**
Between units	584	24	24.3 (MS1)
Within units	552	36	15.3 (MS2)

Performance Gates

Performance gates provide an indication of a level of performance that might reasonably be expected from a laboratory being monitored by this standard in a QA/QC program. They take into account errors attributable to measurement (analytical bias and precision) and standard variability. For an effective standard the contribution of the latter should be negligible in comparison to measurement errors.

The standard deviations of each element are determined from the pooled individual analyses generated from the certification program. All individual and lab dataset (batch) outliers are removed prior to determination of the standard deviation. These outliers can only be removed if they can be confidently deemed to be analytical rather than arising from inhomogeneity of the CRM. Performance gates have been calculated for one, two and three standard deviations of the accepted pool of certification data and are presented in Table 15. As a guide these intervals may be regarded as informational (1σ), warning or rejection for multiple outliers (2σ), or rejection for individual outliers (3σ) in QC monitoring although their precise application should be at the discretion of the QC manager concerned.

Table 15. Performance Gates for OREAS 44P

Constituent	Certified Value	1σ	Performance Gates					
			2σ		3σ		5% Interval	
			Low	High	Low	High	Low	High
Major elements								
Aluminium oxide, Al_2O_3 (wt.%)	7.06	0.20	6.65	7.47	6.45	7.67	6.71	7.41
Barium oxide, BaO (wt.%)	0.048	0.003	0.042	0.055	0.038	0.058	0.046	0.051
Calcium oxide, CaO (wt.%)	0.456	0.018	0.420	0.493	0.402	0.511	0.434	0.479
Carbon dioxide, CO_2 (ppm)	0.623	0.326	IND	IND	IND	IND	0.591	0.654
Iron/Ferric oxide, Fe_2O_3 (wt.%)	49.35	0.35	48.64	50.06	48.29	50.41	46.88	51.82
Moisture, (wt.%)	0.767	0.249	0.270	1.26	0.021	1.51	0.729	0.805
Potassium oxide, K_2O (wt.%)	1.49	0.10	1.28	1.69	1.18	1.79	1.41	1.56
Loss On Ignition, LOI (wt.%)	2.99	0.15	2.68	3.30	2.53	3.45	2.84	3.14
Magnesium oxide, MgO (wt.%)	0.789	0.052	0.685	0.892	0.634	0.944	0.749	0.828
Manganese oxide, MnO (wt.%)	0.114	0.011	0.092	0.137	0.080	0.148	0.109	0.120
Sodium oxide, Na_2O (wt.%)	0.199	0.085	0.029	0.369	IND	IND	0.189	0.209
Phosphorus pentoxide, P_2O_5 (wt.%)	0.093	0.01	0.078	0.109	0.070	0.117	0.089	0.098
Silicon oxide, SiO_2 (wt.%)	36.44	0.246	35.95	36.93	35.70	37.18	34.62	38.26
Sulphur trioxide, SO_3 (wt.%)	0.042	0.011	0.020	0.064	0.010	0.075	0.040	0.044
Titanium oxide, TiO_2 (wt.%)	0.350	0.032	0.286	0.414	0.254	0.446	0.332	0.367
Minor elements								
4 Acid arsenic, As (ppm)	105	16.8	71	139	55	155	100	110
Perchloric arsenic, As (ppm)	102	9.12	84	120	74	129	97	107
AR arsenic, As (ppm)	95	11.6	72	118	60	130	90	100
3A arsenic, As (ppm)	97	20.4	56	138	36	158	92	102
PF arsenic, As (ppm)	115	16.8	81	148	64	165	109	120
PPPXRF arsenic, As (ppm)	109	24.7	59	158	35	183	103	114
4 Acid barium, Ba (ppm)	396	29.8	336	456	307	485	376	416
Perchloric barium, Ba (ppm)	301	75.0	151	451	76	526	286	316
AR barium, Ba (ppm)	167	30.3	106	227	76	257	158	175
3A barium, Ba (ppm)	197	16.8	163	230	146	247	187	207
PF barium, Ba (ppm)	400	24.7	350	449	326	474	380	420
PPPXRF barium, Ba (ppm)	464	11.2	442	487	431	498	441	488
4 Acid copper, Cu (ppm)	421	29.8	362	481	332	511	400	442
Perchloric copper, Cu (ppm)	416	75.0	266	566	192	641	396	437
AR copper, Cu (ppm)	410	30.3	350	471	319	501	390	431
3A copper, Cu (ppm)	410	24.7	361	460	336	484	390	431
PF copper, Cu (ppm)	438	23.4	392	485	368	509	416	460
PPPXRF copper, Cu (ppm)	466	88.5	289	643	200	732	443	489
Fire assay gold, Au (ppm)	67	5.8	55	78	49	84	63	70
Aqua regia gold, Au (ppm)	56	11.2	34	79	23	90	54	59

Table 15 continued…

Constituent	Certified Value	1σ	Performance Gates					
			2σ		3σ		5% Interval	
			Low	High	Low	High	Low	High
Major elements								
4 Acid lead, Pb (ppm)	210	14.7	180	239	166	254	199	220
Perchloric lead, Pb (ppm)	211	16.0	179	243	163	259	201	222
AR lead, Pb (ppm)	183	33.9	115	251	81	285	174	192
3A lead, Pb (ppm)	198	17.8	162	234	145	251	188	208
PF lead, Pb (ppm)	184	34.4	116	253	81	288	175	194
PPPXRF lead, Pb (ppm)	233	28.6	176	291	147	319	222	245
4 Acid molybdenum, Mo (ppm)	406	43.4	320	493	276	537	386	427
Perchloric molybdenum, Mo (ppm)	385	44.9	296	475	251	520	366	405
AR molybdenum, Mo (ppm)	407	48.4	310	504	261	552	386	427
3A molybdenum, Mo (ppm)	386	24.8	337	436	312	461	367	406
PF molybdenum, Mo (ppm)	442	62.4	318	567	255	629	420	464
PPPXRF molybdenum, Mo (ppm)	331	40.7	250	413	209	454	315	348
4 Acid nickel, Ni (ppm)	460	38.3	383	537	345	575	437	483
Perchloric nickel, Ni (ppm)	439	51.2	337	542	286	593	417	461
AR nickel, Ni (ppm)	401	73.5	254	548	180	621	381	421
3A nickel, Ni (ppm)	444	30.0	384	504	355	534	422	467
PF nickel, Ni (ppm)	507	29.9	447	566	417	596	481	532
PPPXRF nickel, Ni (ppm)	599	99.0	400	797	301	896	569	628
4 Acid tungsten, W (ppm)	19	5.9	7	30	1	36	18	20
Perchloric tungsten, W (ppm)	6	4.8	IND	IND	IND	IND	6	7
AR tungsten, W (ppm)	17	6.6	IND	IND	IND	IND	16	18
3A tungsten, W (ppm)	12	4.2	IND	IND	IND	IND	11	12
PF tungsten, W (ppm)	26	2.4	21	31	19	33	25	27
PPPXRF tungsten, W (ppm)	28	9.6	IND	IND	IND	IND	27	30
4 Acid zinc, Zn (ppm)	618	33.5	551	685	518	719	588	649
Perchloric zinc, Zn (ppm)	588	52.8	483	694	430	746	559	618
AR zinc, Zn (ppm)	579	55.6	467	690	412	746	550	608
3A zinc, Zn (ppm)	604	43.1	518	690	475	734	574	634
PF zinc, Zn (ppm)	615	28.5	558	672	530	701	584	646
PPPXRF zinc, Zn (ppm)	639	65.3	509	770	443	835	607	671

PARTICIPATING LABORATORIES

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Analabs Pty Ltd, East Brisbane, QLD, Australia
Analabs Pty Ltd, Townsville, QLD, Australia
Analabs Pty Ltd, Welshpool, WA, Australia
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PREPARER AND SUPPLIER OF THE REFERENCE MATERIAL

The multi-element geochem reference material, OREAS 44P has been prepared and certified and is supplied by:

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It is available in unit sizes of 60g (laminated foil pouches) and 1kg (plastic jars).

INTENDED USE

OREAS 44P is a reference material intended for the following:

i) for the calibration of instruments used in the determination of the concentration of major and trace elements;
ii) for the verification of analytical methods;
iii) for the preparation of secondary reference materials of similar composition;
iv) as an arbitration sample for commercial transactions.

STABILITY AND STORAGE INSTRUCTIONS

OREAS 44P has been prepared from rock samples obtained within the oxidised zone at various mineralised localities. It is therefore considered to have long-term stability under normal storage conditions.

INSTRUCTIONS FOR THE CORRECT USE OF THE REFERENCE MATERIAL

The recommended values for OREAS 44P refer to the concentration levels after removal of hygroscopic moisture by drying in air to constant mass at 105^0 C. In its undried state a hygroscopic moisture content of approximately 0.77% has been established. If the reference material is not dried by the user prior to analysis, the recommended value should be corrected to the moisture-bearing basis.

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: Dr Paul Hamlyn

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