ORE RESEARCH & EXPLORATION PTY LTD
6-8 Gatwick Road, Bayswater North, Vic 3153 AUSTRALIA
Telephone: 61-3-9729 0333 Facsimile: 61-3-9729 4777

CERTIFICATE OF ANALYSIS FOR

MINERALISED GABBRONORITE
REFERENCE MATERIAL OREAS 13P

SUMMARY STATISTICS

Recommended value and 95% confidence interval

Constituent	Recommended value	95% Confidence Interval	
		Low	High
Copper, Cu (ppm)	2504	2439	2569
Gold, Au (ppb)	47	45	49
Nickel, Ni (ppm)	2261	2233	2289
Palladium, Pd (ppb)	70	68	72
Platinum, Pt (ppb)	47	46	48

Prepared by:
Ore Research & Exploration Pty Ltd
September 2004

INTRODUCTION

OREAS certified reference materials (CRMs) are intended to provide a low cost method of evaluating and improving the quality of precious and base metal 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 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.

As a rule only source materials exhibiting a high 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 CRMs exhibiting homogeneity that matches or exceeds that of currently available international reference materials. In certain instances CRMs 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 CRM 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 blind standard to the assay laboratory. The more conventional pulped standards have a grain size of minus 20 to 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 MATERIAL

Reference material OREAS 13P is one of two Ni-Cu-Pt-Pd-Au CRMs prepared from RC drill samples from the West Musgrave region of Western Australia. The samples from which both CRMs were derived were obtained from a mafic magma conduit within granulite country rock south of the Giles Complex in the Musgrave Block. OREAS 13P is a mineralised leuco gabbronorite containing disseminated Fe-Ni-Cu sulphides while its counterpart, OREAS 14P, is a magmatic massive sulphide with ore grade concentrations of nickel and copper.

COMMINUTION AND HOMOGENISATION PROCEDURES

The material constituting OREAS 13P was prepared in the following manner:

a) drying to constant mass at 105^0 C;
b) crushing;
c) milling to minus 20 microns;
d) homogenisation;
e) packaging into 100g lots sealed under N_2 in laminated foil pouches.

ANALYSIS OF OREAS 13P

Fifteen analytical laboratories participated in the analytical program. Their results together with uncorrected means, medians, one sigma standard deviations, relative standard deviations and percent deviation of lab means from the corrected mean of means (PDM^3) are presented in an appendix (Tables 2 to 30). The analytical methods employed by each laboratory are indicated as codes at the head of each laboratory data set and explained in Table 1 (Appendix).

The intent of the certification program was to obtain total concentration values for the elements of interest hence four acid (including HF) digest, borate or alkali fusion methods were employed for the lithophile elements and base metals in combination with an ICP-OES, ICP-MS or AAS reading method. Chromium and zirconium were both under-reported by 4 acid digest compared to fusion methods, presumably due to the presence of refractory host phases and/or volatilisation during digestion, and method dependent values are therefore provided for these elements. No distinction was observed between sulphur determined by 4 acid ICP-OES and Leco and the results were pooled for statistical analysis.

For gold and the platinum group elements (PGEs) lead fire assay was used for gold, platinum and palladium and nickel sulphide fire assay for the six PGEs and gold with ICP-MS as the reading method. Iridium, osmium, rhodium and ruthenium concentrations are close to detection levels and their recommended values are approximations only. No statistical bias was observed between either method for platinum and palladium and results were therefore combined for treatment, while for gold under-reporting was evident to varying degrees for nickel sulphide collection and these results have been discarded. Gold, together with Ca, Cr, Co, Fe, Sc and Na, have been determined by instrumental neutron activation analysis (INAA) on a reduced analytical subsample of 0.5g to confirm homogeneity.

Samples used for the round robin evaluation were taken at regular intervals throughout the packaging of the standard and then laboratory sample sets were taken from these in a sequence designed to maximise their representation. The twenty INAA subsamples, on which much of the homogeneity evaluation is based, were also taken at regular intervals during packaging and are considered representative of the entire batch.

STATISTICAL EVALUATION OF ANALYTICAL DATA FOR OREAS 13P

Recommended Value and Confidence Limits

The certified value is the mean of means of accepted replicate values of accepted participating laboratories computed according to the formulae

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

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

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.*

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).

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

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

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 from each laboratory data set was based on *z* scores (rejected if $|z_i| > 2.5$) computed from the robust estimators of location and scale, *T* and *S*, respectively, according to the formulae

$$S = 1.483 \underset{j=1.....n}{\text{median}} / x_j - \underset{i=1.....n}{\text{median}} (x_i) /$$

$$z_i = \frac{x_i - T}{S}$$

where

T is the median value in a data set;
S is the median of all absolute deviations from the sample median multiplied by 1.483, a correction factor to make the estimator consistent with the usual parameter of a normal distribution.

Individual outliers and, more rarely, laboratory means deemed to be outlying are shown in bold in the tabulated results (Appendix) and have been omitted in the determination of recommended values.

The magnitude of the confidence interval is inversely proportional to the number of participating laboratories and interlaboratory agreement. It is a measure of the reliability of the recommended value, i.e. the narrower the confidence interval the greater the certainty in the recommended value.

Table 1. Recommended values and 95% confidence intervals for OREAS 13P

Constituent	Recommended value	95% Confidence Interval	
		Low	High
Aluminium, Al (wt. %)	10.16	10.07	10.26
Arsenic, As (ppm)	~ 1.2	IND	IND
Barium, Ba (ppm)	247	234	261
Calcium, Ca (wt. %)	6.87	6.68	7.06
Chromium, Cr (ppm)*	144	133	155
Chromium, Cr (ppm)**	123	112	134
Cobalt, Co (ppm)	88	85	91
Copper, Cu (ppm)	2504	2439	2569
Gold, Au (ppb)	47	45	49
Iridium, Ir (ppb)	2.2	1.9	2.6
Iron, Fe (wt. %)	7.58	7.37	7.95
Lead, Pb (ppm)	13	11	15
Magnesium, Mg (wt. %)	3.28	3.13	3.44
Manganese, Mn (ppm)	1124	1030	1160
Nickel, Ni (ppm)	2261	2233	2289
Osmium, Os (ppb)	~ 3	IND	IND
Palladium, Pd (ppb)	70	68	72
Phosphorus, P (ppm)	746	717	775
Platinum, Pt (ppb)	47	46	48
Potassium, K (wt. %)	0.46	0.43	0.49
Rhodium, Rh (ppb)	3	3	4
Ruthenium, Ru (ppb)	6	4	7
Scandium, Sc (ppm)	18.7	18.0	19.5
Sodium, Na (wt. %)	1.89	1.83	1.96
Strontium, Sr (ppm)	338	322	355
Sulphur, S (wt. %): ICP	1.47	1.39	1.55
Sulphur, S (wt. %): Leco	1.44	1.38	1.49
Titanium, Ti (ppm)	3380	3299	3461
Vanadium, V (ppm)	98	92	104
Zinc, Zn (ppm)	91	84	97
Zirconium, Zr (ppm)*	82	80	84
Zirconium, Zr (ppm)**	29	24	33

*Analysis by fusion; **analysis by 4-acid digest; IND - indeterminate

Statement of Homogeneity

The standard deviation of each laboratory data set includes error due to both the imprecision of the analytical method employed and to possible inhomogeneity of the material analysed. The standard deviation of the pooled individual analyses of all participating laboratories includes error due to the imprecision of each analytical method, to possible inhomogeneity of the material analysed and, in particular, to deficiencies in accuracy of each analytical method. In determining tolerance intervals for elements other than gold that component of error attributable to measurement inaccuracy was eliminated by transformation of the individual results of each data set to a common mean (the uncorrected grand mean) according to the formula

$$x'_{ij} = x_{ij} - \bar{x}_i + \frac{\sum_{i=1}^{p}\sum_{j=1}^{n_i} x_{ij}}{\sum_{i=1}^{p} n_i}$$

where

x_{ij} *is the* j*th raw result reported by laboratory* i;

x'_{ij} *is the* j*th transformed result reported by laboratory* i;

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

p *is the number of participating laboratories*;

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

Table 2. Recommended values and tolerance limits for OREAS 13P.

Constituent	Recommended value	Tolerance limits 1-α= 0.99, ρ= 0.95	
		Low	High
Aluminium, Al (wt. %)	10.16	10.06	10.26
Arsenic, As (ppm)	~ 1.2	IND	IND
Barium, Ba (ppm)	247	243	252
Calcium, Ca (wt. %)	6.87	6.79	6.95
Chromium, Cr (ppm)*	144	141	147
Chromium, Cr (ppm)**	123	111	134
Cobalt, Co (ppm)	88	87	89
Copper, Cu (ppm)	2504	2476	2532
Gold, Au (ppb)	47	45	50
Iridium, Ir (ppb)	2.2	1.8	2.7
Iron, Fe (wt. %)	7.58	7.65	7.65
Lead, Pb (ppm)	13	11	14
Magnesium, Mg (wt. %)	3.28	3.25	3.32
Manganese, Mn (ppm)	1124	1074	1115
Nickel, Ni (ppm)	2261	2250	2273
Osmium, Os (ppb)	~ 3	IND	IND
Palladium, Pd (ppb)	70	68	72
Phosphorus, P (ppm)	746	728	764
Platinum, Pt (ppb)	47	44	49
Potassium, K (wt. %)	0.46	0.45	0.46
Rhodium, Rh (ppb)	3	3	4
Ruthenium, Ru (ppb)	6	4	8
Scandium, Sc (ppm)	18.7	18.7	18.8
Sodium, Na (wt. %)	1.89	1.87	1.92
Strontium, Sr (ppm)	338	332	345
Sulphur, S (wt. %): ICP	1.47	1.45	1.49
Sulphur, S (wt. %): Leco	1.44	1.40	1.48
Titanium, Ti (ppm)	3380	3346	3414
Vanadium, V (ppm)	98	95	100
Zinc, Zn (ppm)	91	87	94
Zirconium, Zr (ppm)*	82	80	85
Zirconium, Zr (ppm)**	29	27	30

*Analysis by fusion; **analysis by 4-acid digest; IND - indeterminate

The homogeneity of each constituent was determined from tables of factors for two-sided tolerance limits for normal distributions (ISO 3207) in which

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

where

n *is the number of results*;
$1-\alpha$ *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, α *unknown*);
s_g'' *is the corrected grand standard deviation.*

The meaning of these tolerance limits may be illustrated for copper, where 99% of the time at least 95% of subsamples will have concentrations lying between 2476 and 2532 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 (IS0 Guide 35).

The corrected grand standard deviation, s_g'', used to compute the tolerance intervals is the weighted means of standard deviations of all data sets for a particular constituent according to the formula

$$s_g'' = \frac{\sum_{i=1}^{p}\left(s_i\left(1 - \frac{s_i}{s_g'}\right)\right)}{\sum_{i=1}^{p}\left(1 - \frac{s_i}{s_g'}\right)}$$

where

$1 - \left(\frac{s_i}{2s_g'}\right)$ *is the weighting factor for laboratory i ;*

s_g' *is the grand standard deviation computed from the transformed (i.e. means - adjusted) results*

according to the formula

$$s_g' = \left[\frac{\sum_{i=j}^{p}\sum_{j=i}^{n_i}\left(x_{ij}' - \bar{x}_i'\right)^2}{\sum_{i=1}^{p} n_i - 1}\right]^{1/2}$$

where $\bar{x}_i'$ *is the transformed mean for laboratory i*

The weighting factors were applied to compensate for the considerable variation in analytical precision amongst participating laboratories. Hence, weighting factors for each data set have been constructed so as to be inversely proportional to the standard deviation

of that data set. A weighting factor of zero was applied to those data sets where $s_l / 2s_g' > 1$ (i.e. where the weighting factor $1 - s_l / 2s_g' < 0$). It should be noted that estimates of tolerance by this method are considered conservative as a significant proportion of the observed variance, even in those laboratories exhibiting the best analytical precision, can presumably be attributed to measurement error.

For gold a more simplified procedure was used in the determination of homogeneity. This entailed using the high precision INAA data alone, obtained on an analytical subsample weight of 0.5g (compared to 40-50g for the fire assay method). By employing a sufficiently reduced subsample weight in a series of determinations by the same method, analytical error becomes negligible in comparison to subsampling error. The corresponding standard deviation at a 50g subsample weight can then be determined from the observed standard deviation of the 0.5g data using the known relationship between the two parameters (Kleeman, 1967). The homogeneity of gold was then determined from tables of factors for two-sided tolerance limits for normal distributions. The high level of repeatability indicated by the low standard deviations in the laboratory data sets in Table A9 (particularly the 0.5 g INAA data) is consistent with the narrow calculated tolerance interval and is confirmation of the excellent homogeneity of gold in OREAS 13P.

For elements other than gold, outliers were removed prior to the calculation of tolerance intervals and a weighting factor of zero was applied to those data sets where $s_l / 2s_g' > 1$ (i.e. where the weighting factor $1 - s_l / 2s_g' < 0$).

Performance Gates

Performance gates provide an indication of a level of performance that might reasonably be expected from a routine laboratory being monitored by this standard in a QA/QC program. They incorporate errors attributable to bias, precision and inhomogeneity and are simply calculated from the standard deviation of the pooled individual analyses (fire assay data only) 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 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.

Performance gates have been calculated for one, two and three standard deviations of the accepted pool of certification data and are presented in Table 3. 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 3. Proposed performance gates for OREAS 13P

Constituent	Recommended Value	Performance Gates					
		1σ		2σ		3σ	
		Low	High	Low	High	Low	High
Aluminium, Al (wt. %)	10.16	10.03	10.29	9.90	10.43	9.77	10.56
Arsenic, As (ppm)	~ 1.2	IND	IND	IND	IND	IND	IND
Barium, Ba (ppm)	247	229	265	211	284	193	302
Calcium, Ca (wt. %)	6.87	6.60	7.14	6.34	7.40	6.07	7.67
Chromium, Cr (ppm)*	144	139	150	133	155	128	161
Chromium, Cr (ppm)**	123	111	135	99	147	87	159
Cobalt, Co (ppm)	88	83	92	79	97	75	101
Copper, Cu (ppm)	2504	2398	2610	2292	2716	2186	2822
Gold, Au (ppb)	47	44	51	40	54	37	57
Iridium, Ir (ppb)	2.2	1.8	2.7	1.4	3.1	1.0	3.5
Iron, Fe (wt. %)	7.58	7.29	7.88	6.99	8.18	6.69	8.48
Lead, Pb (ppm)	13	10	16	6	20	3	23
Magnesium, Mg (wt. %)	3.28	3.09	3.47	2.90	3.66	2.71	3.85
Manganese, Mn (ppm)	1124	1061	1188	997	1252	934	1315
Nickel, Ni (ppm)	2261	2213	2310	2164	2358	2116	2406
Osmium, Os (ppb)	~ 3	IND	IND	IND	IND	IND	IND
Palladium, Pd (ppb)	70	65	75	59	81	54	86
Phosphorus, P (ppm)	746	704	787	662	829	621	871
Platinum, Pt (ppb)	47	45	49	43	51	41	53
Potassium, K (wt. %)	0.46	0.42	0.49	0.39	0.52	0.36	0.56
Rhodium, Rh (ppb)	3	3	4	2	5	2	5
Ruthenium, Ru (ppb)	6	4	7	3	9	2	10
Scandium, Sc (ppm)	18.7	17.7	19.8	16.6	20.9	15.6	21.9
Sodium, Na (wt. %)	1.89	1.79	2.00	1.68	2.10	1.58	2.21
Strontium, Sr (ppm)	338	317	360	295	382	273	404
Sulphur, S (wt. %): ICP	1.47	1.43	1.51	1.40	1.54	1.36	1.58
Sulphur, S (wt. %): Leco	1.44	1.38	1.49	1.33	1.54	1.28	1.60
Titanium, Ti (ppm)	3380	3253	3507	3126	3634	2999	3761
Vanadium, V (ppm)	98	90	106	82	113	75	121
Zinc, Zn (ppm)	91	83	99	75	107	67	115
Zirconium, Zr (ppm)*	82	78	87	74	91	69	95
Zirconium, Zr (ppm)**	29	20	37	11	46	2	55

*Analysis by fusion; **analysis by 4-acid digest; IND – indeterminate

PARTICIPATING LABORATORIES

Anglo Analytical Research Laboratories, Johannesburg, South Africa
Acme Analytical Laboratories, Vancouver, BC, Canada
Activation Laboratories, Ancaster, ON, Canada
Actlabs Pacific, Redcliffe, WA, Australia
ALS Chemex, Stafford, QLD, Australia
ALS Chemex, Vancouver, BC, Canada
Amdel Laboratories, Thebarton, SA, Australia
Becquerel Laboratories, Lucas Heights, NSW, Australia
Genalysis Laboratory Services, Maddington, WA, Australia
Geolaboratory, Geological Survey of Finland, Espoo, Finland
OMAC Laboratories, Loughrea, Co. Galway, Ireland
SGS Lakefield, Lakefield, ON, Canada
Falconbridge Ltd. (Sudbury Div.), Falconbridge, ON, Canada
Ultra Trace Laboratories, Canning Vale, WA, Australia
XRAL Laboratories, Toronto, ON, Canada

PREPARER AND SUPPLIER OF THE REFERENCE MATERIAL

The mineralised gabbronorite reference material, OREAS 13P has been prepared and certified and is supplied by:

Ore Research & Exploration Pty Ltd
6-8 Gatwick Road
Bayswater North, VIC 3153
AUSTRALIA

Telephone	(03) 9729 0333	International	+613-9729 0333
Facsimile	(03) 9729 4777	International	+613-9729 4777
Email	info @ore.com.au	Web	www.ore.com.au

It is available in unit sizes of 100g laminated foil packets.

INTENDED USE

OREAS 13P is a reference material intended for the following:

i) for the calibration of instruments used in the determination of the concentration of Ni, Cu, Pt, Pd and Au;
ii) for the verification of analytical methods for Ni, Cu, Pt, Pd and Au;
iii) for the preparation of secondary reference materials of similar composition;

STABILITY AND STORAGE INSTRUCTIONS

OREAS 13P has been prepared from a mineralised gabbronorite sample. Because of its low sulphide content and packaging under nitrogen in robust foil laminate it is considered to have long-term stability under normal storage conditions.

INSTRUCTIONS FOR THE CORRECT USE OF THE REFERENCE MATERIAL

The recommended values for OREAS 13P refers to the concentration level of the certified element values in the packaged state at hygroscopic equilibrium. An equilibrium hygroscopic moisture content of 0.85% has been established for this material. If the reference material is dried by the user prior to analysis, the recommended values should be corrected to the moisture-free 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

ACKNOWLEDGMENTS

The generosity of WMC Resources in providing the source material used to prepare OREAS 13P is gratefully acknowledged.

REFERENCES

ISO Guide 35 (1985), Certification of reference materials - General and statistical principals.
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APPENDIX

Analytical Results for OREAS 13P

Table A1. Explanation of abbreviations used in Tables 2 – 30.

Abbreviation	Explanation
Std.Dev.	one sigma standard deviation
Rel.Std.Dev.	one sigma relative standard deviation
PDM[3]	percent deviation of lab mean from corrected mean of means
-	outlying values shown in bold
AF	alkali fusion
BF	borate fusion
4AD	four acid (HF-HNO3 -HClO4 -HCl) digestion
MAR	modified aqua regia digest
AR	aqua regia digest
FA	lead fire assay
NiS	nickel sulphide fire assay
INAA	instrumental neutron activation analysis
OES	inductively coupled plasma optical emission spectrometry
MS	inductively coupled plasma mass spectrometry
AAS	atomic absorption spectrometry
HGAAS	hydride generation atomic absorption spectrometry
Leco	Leco infrared furnace

Table A2. Analytical results for aluminium in West Musgrave standard OREAS 13P (abbreviations as in Table 1; values in weight percent).

Sample No.	Lab A 4AD*OES	Lab B 4AD*OES	Lab C1 4AD*OES	Lab C2 BF*OES	Lab D 4AD*OES	Lab E 4AD*OES	Lab F 4AD*OES	Lab G AF*OES
1	9.45	10.1	9.57	10.33	**10.01**	10.08	8.14	10.0
2	9.43	10.1	9.78	10.37	10.19	10.35	18.35	10.0
3	9.48	10.2	**10.21**	10.34	10.16	10.46	8.64	10.1
4	9.56	10.4	9.37	10.29	10.21	10.13	14.52	10.2
5	9.34	10.1	9.63	10.31	10.19	9.96	7.72	10.1
Mean	**9.45**	10.2	**9.71**	10.33	10.15	10.19	**11.47**	10.1
Median	9.45	10.1	9.63	10.33	10.19	10.13	8.64	10.1
Std.Dev.	0.08	0.1	0.31	0.03	0.08	0.20	4.74	0.1
Rel.Std.Dev.	0.85%	1.28%	3.24%	0.30%	0.80%	2.00%	41.29%	0.83%
PDM[3]	-7.00%	0.18%	-4.43%	1.64%	-0.10%	0.32%	12.91%	-0.80%

Table A2. continued

Sample No.	Lab H AF*OES	Lab I 4AD*OES	Lab J 4AD*OES
1	10.18	8.70	10.0
2	10.16	8.80	10.0
3	10.12	**8.15**	10.0
4	10.21	**9.15**	10.0
5	10.16	8.77	-
Mean	10.17	**8.71**	10.00
Median	10.16	8.77	10.00
Std.Dev.	0.03	0.36	4.47
Rel.Std.Dev.	0.32%	4.13%	44.72%
PDM[3]	0.04%	-14.2%	-1.59%

Table A3. Analytical results for arsenic in West Musgrave standard OREAS 13P (abbreviations as in Table 1; values in ppm).

Sample No.	Lab A 4AD*OES	Lab B 4AD*OES	Lab C 4AD*OES	Lab D 4AD*OES	Lab E 4AD*OES	Lab F 4AD*OES	Lab G AF*HGAAS	Lab H 4AD*OES
1	6	5	1	<5	1.00	<5	0.7	<3
2	<5	10	2	<5	1.07	10	0.6	11
3	6	5	2	<5	1.15	<5	0.7	7
4	<5	10	3	<5	0.72	<5	0.7	<3
5	<5	10	2	<5	0.73	<5	0.6	<3
Mean	<5	**8**	2	<5	0.93	<5	0.7	-
Median	<5	10	2	<5	1.00	<5	0.7	-
Std.Dev.	-	3	1	-	0.20	-	0.1	-
Rel.Std.Dev.	-	34.23%	35.36%	-	21.29%	-	8.30%	-
PDM[3]	-	567.82%	66.96%	-	-22.05%	-	-44.90%	-

Table A3. continued

Sample No.	Lab I 4AD*OES	Lab J 4AD*OES
1	<5	0.90
2	<5	0.86
3	<5	0.67
4	<5	0.45
5	<5	
Mean	-	0.7
Median	-	0.8
Std.Dev.	-	0.2
Rel.Std.Dev.	-	29%
PDM[3]	-	-40%

Table A4. Analytical results for barium in West Musgrave standard OREAS 13P (abbreviations as in Table 1; values in ppm).

Sample No.	Lab A 4AD*OES	Lab B 4AD*OES	Lab C1 BF*OES	Lab C2 4AD*OES	Lab D 4AD*OES	Lab E 4AD*OES	Lab F 4AD*OES	Lab G AF*OES
1	232	258	255	237	234	274	230	273
2	231	248	253	255	237	281	**280**	275
3	231	250	256	251	236	273	230	271
4	233	240	255	238	236	281	230	276
5	235	236	254	239	235	**315**	220	272
Mean	232	246	255	244	236	285	238	273
Median	232	248	255	239	236	281	230	273
Std.Dev.	2	9	1	8	1	17	24	2
Rel.Std.Dev.	0.72%	3.51%	0.45%	3.43%	0.48%	6.07%	10.0%	0.76%
PDM[3]	-5.98%	-0.31%	3.00%	-1.29%	-4.68%	15.2%	-3.71%	10.6%

Table A4. continued

Sample No.	Lab H AF*OES	Lab I 4AD*OES
1	268	220
2	255	221
3	255	214
4	255	230
5	261	224
Mean	259	222
Median	255	221
Std.Dev.	6	6
Rel.Std.Dev.	2.23%	2.64%
PDM[3]	4.70%	-10.3%

Table A5. Analytical results for calcium in West Musgrave standard OREAS 13P (abbreviations as in Table 1; values in weight percent).

Sample No.	Lab A 4AD*OES	Lab B 4AD*OES	Lab C1 4AD*OES	Lab C2 4AD*OES	Lab C3 BF*OES	Lab D 4AD*OES	Lab E 4AD*OES	Lab F 4AD*OES
1	6.40	7.28	6.34	7.17	7.04	**6.87**	6.62	5.9
2	6.37	7.26	6.87	7.27	7.04	6.98	6.74	**7.5**
3	6.44	7.34	6.55	7.19	7.06	6.97	6.84	6.1
4	6.50	**7.46**	6.41	7.21	6.98	6.98	6.83	6.2
5	6.39	7.27	6.67	**7.42**	6.98	6.95	6.94	5.9
Mean	6.42	7.32	6.57	7.25	7.02	6.95	6.79	**6.32**
Median	6.40	7.28	6.55	7.21	7.04	6.97	6.83	6.10
Std.Dev.	0.05	0.08	0.21	0.10	0.04	0.05	0.12	0.67
Rel.Std.Dev.	0.80%	1.14%	3.22%	1.39%	0.52%	0.67%	1.78%	10.6%
PDM[3]	-6.56%	6.57%	-4.41%	5.55%	2.16%	1.15%	-1.12%	-8.02%

Table A5. continued

Sample No.	Lab G AF*OES	Lab H AF*OES	Lab I 4AD*OES	Lab J 4AD*OES	Lab K INAA
1	7.01	6.97	6.61	7.01	6.11
2	7.05	6.96	6.70	7.05	5.95
3	7.04	6.92	6.54	7.02	5.99
4	7.10	6.97	7.02	7.08	6.84
5	6.98	6.94	6.91		6.65
6					6.56
7					6.29
8					6.06
9					6.44
10					6.73
11					5.58
12					5.87
13					6.12
14					6.61
15					6.06
16					6.80
17					7.13
18					5.82
19					6.55
20					6.92
Mean	7.04	6.95	6.76	7.04	6.35
Median	7.04	6.96	6.70	7.04	6.37
Std.Dev.	0.05	0.02	0.20	0.03	0.43
Rel.Std.Dev.	0.64%	0.31%	3.00%	0.45%	6.70%
PDM[3]	2.41%	1.18%	-1.67%	2.46%	-7.52%

Table A6. Analytical results for chromium in West Musgrave standard OREAS 13P (abbreviations as in Table 1; values in ppm).

Sample No.	Lab A 4AD*OES	Lab B 4AD*OES	Lab C1 4AD*OES	Lab C2 BF*OES	Lab D 4AD*OES	Lab E 4AD*OES	Lab F 4AD*OES	Lab G AF*OES
1	108	130	**111**	120	129	128	115	142
2	109	105	146	120	127	131	**132**	141
3	105	110	140	130	130	126	109	143
4	116	120	137	120	128	135	103	145
5	104	115	133	120	129	143	108	142
Mean	108	116	133	**122**	129	133	113	143
Median	108	115	137	120	129	131	109	142
Std.Dev.	5	10	13	4	1	7	11	2
Rel.Std.Dev.	4.36%	8.29%	9.95%	3.67%	0.89%	5.08%	9.91%	1.06%
PDM[3]	-15.7%	-9.83%	3.76%	-5.16%	-0.03%	3.10%	-11.8%	10.9%

Table A6. continued

Sample No.	Lab H AF*OES	Lab I 4AD*OES	Lab J 4AD*OES	Lab K INAA
1	146	128	230	146.8
2	134	128	240	**170.5**
3	141	120	240	146.4
4	144	133	240	157.1
5	140	122		148.7
6				146.0
7				148.9
8				157.5
9				150.0
10				155.0
11				139.8
12				154.5
13				146.0
14				148.2
15				**159.3**
16				148.3
17				144.4
18				148.9
19				153.6
20				147.9
Mean	141	126	**238**	150.9
Median	141	128	240	148.8
Std.Dev.	5	5	5	6.7
Rel.Std.Dev.	3.25%	4.13%	2.11%	4.46%
PDM[3]	9.61%	-1.90%	84.6%	17.3%

Table A7. Analytical results for cobalt in West Musgrave standard OREAS 13P (abbreviations as in Table 1; values in ppm).

Sample No.	Lab A 4AD*OES	Lab B 4AD*OES	Lab C1 4AD*OES	Lab C2 4AD*OES	Lab D 4AD*OES	Lab E 4AD*OES	Lab F 4AD*OES	Lab G AF*OES
1	79	88	87	88.8	75	**86.7**	85	92
2	78	86	95	86.9	76	91.1	**101**	90
3	81	88	93	88.7	74	91.5	87	90
4	80	88	89	94.3	73	91.4	84	93
5	80	88	87	90.4	75	91.5	85	89
Mean	79.6	87.6	90.2	89.8	**74.6**	90.4	88.4	90.8
Median	80.0	88.0	89.0	88.8	75.0	91.4	85.0	90.0
Std.Dev.	1.1	0.9	3.6	2.8	1.1	2.1	7.1	1.6
Rel.Std.Dev.	1.43%	1.02%	4.03%	3.11%	1.53%	2.32%	8.06%	1.81%
PDM[3]	-9.40%	-0.29%	2.67%	2.24%	-15.1%	2.93%	0.62%	3.35%

Table A7. continued

Sample No.	Lab I 4AD*OES	Lab J 4AD*OES	Lab K INAA
1	72	110	89.8
2	72	110	90.1
3	71	110	90.5
4	**76**	110	87.2
5	74		90.4
6			91.3
7			85.3
8			87.3
9			88.7
10			88.2
11			89.0
12			86.9
13			87.6
14			85.1
15			88.6
16			85.5
17			88.5
18			87.1
19			92.5
20			84.6
Mean	**73.0**	**110.0**	88.2
Median	72.0	110.0	88.4
Std.Dev.	2.0	0.0	2.2
Rel.Std.Dev.	2.74%	0.00%	2.45%
PDM[3]	-16.9%	25.2%	0.40%

Table A8. Analytical results for copper in West Musgrave standard OREAS 13P (abbreviations as in Table 1; values in ppm).

Sample No.	Lab A 4AD*OES	Lab B 4AD*OES	Lab C1 4AD*MS	LAB C2 4AD*OES	Lab D 4AD*OES	Lab E 4AD*OES	Lab F 4AD*OES	Lab G AF*OES
1	2489	2470	2319	2510	2587	2336	2380	2600
2	2456	2460	**2499**	**2550**	2585	2359	**2890**	2580
3	2500	2470	2421	2500	2589	2386	2440	2600
4	2462	**2520**	2281	2500	2576	2366	2400	2640
5	2486	2450	2309	2480	2578	2400	2390	2580
Mean	2479	2474	2366	2508	2583	2369	2500	2600
Median	2486	2470	2319	2500	2585	2366	2400	2600
Std.Dev.	19	27	91	26	6	25	219	24
Rel.Std.Dev.	0.76%	1.09%	3.86%	1.03%	0.22%	1.04%	8.77%	0.94%
PDM[3]	-1.04%	-1.22%	-5.54%	0.16%	3.13%	-5.39%	-0.18%	3.81%

Table A8. continued

Sample No.	Lab H 4AD*OES	Lab I 4AD*OES	Lab J 4AD*OES	Lab L 4AD*OES	Lab M AR*OES
1	2467	2400	2700	2570	2670
2	2505	2420	2700	2620	2570
3	2487	2380	2700		2600
4	2520	2450	2700		
5	2489	2470			
Mean	2494	2424	2700	2595	2613
Median	2489	2420	2700	2595	2600
Std.Dev.	20	36	0	35	51
Rel.Std.Dev.	0.80%	1.50%	0.00%	1.36%	1.96%
PDM[3]	-0.44%	-3.22%	7.80%	3.61%	4.34%

Table A9. Analytical results for gold in West Musgrave standard OREAS 13P (abbreviations as in Table 1; values in ppb).

Sample No.	Lab A FA*MS (50g)	Lab B FA*MS (40g)	Lab C1 FA*MS (50g)	Lab C2 FA*MS (50g)	Lab D FA*MS (50g)	Lab F1 FA*MS (40g)	Lab F2 FA*MS (40g)	Lab G1 FA*MS (50g)
1	48	**45**	46	52	45	48	56	47
2	50	50	45	50	46	42	39	46
3	52	49	45		45	**23**		50
4	55	49	45		46	**17**		52
5	50	50	46		46	49		50
Mean	51.0	48.6	45.4	51.0	45.6	35.8	47.5	49.0
Median	50.0	49.0	45.0	51.0	46.0	42.0	47.5	50.0
Std.Dev.	2.6	2.1	0.5	1.4	0.5	14.8	12.0	2.4
Rel.Std.Dev.	5.19%	4.27%	1.21%	2.77%	1.20%	41.4%	25.3%	5.00%
PDM[3]	8.35%	3.25%	-3.55%	8.35%	-3.12%	-23.9%	0.92%	4.10%

Table A9. continued

Sample No.	Lab G2 FA*MS (50g)	Lab H FA*MS (50g)	Lab I FA*MS (50g)	Lab K INAA (0.5g)	Lab M FA*MS (5g)	Lab N FA*MS (50g)
1	41	45.4	60	47	60.8	44
2		48.2	59	50	55.4	46
3		49.5	58	44	56.5	
4		47.6	60	49		
5		46.4	**54**	47		
6				48		
7				34		
8				46		
9				**25**		
10				42		
11				46		
12				47		
13				40		
14				42		
15				**33**		
16				48		
17				58		
18				43		
19				50		
20				52		
Mean	41.0	47.4	**58.2**	44.7	**57.6**	44.7
Median	41.0	47.6	59.0	46.3	56.5	44.7
Std.Dev.	-	1.6	2.5	7.3	2.9	1.6
Rel.Std.Dev.	-	3.35%	4.28%	16.4%	4.96%	3.50%
PDM[3]	-12.9%	0.75%	23.6%	-5.07%	22.3%	-5.08%

Table A10. Analytical results for iridium via NiS*MS in West Musgrave standard OREAS 13P (abbreviations as in Table 1; values in ppb).

Sample No.	Lab A NiS*MS	Lab B NiS*MS	Lab F NiS*MS	Lab G NiS*MS	Lab L NiS*MS	Lab M NiS*MS	Lab N NiS*MS
1	2	3	<2	2.1	<20	2.17	3.2
2	<2	2	<2	1.9	<20	2.11	2.2
3		2				2.22	
Mean	-	2.3	-	2.0	-	2.17	2.7
Median	-	2.0	-	2.0	-	2.17	2.7
Std.Dev.	-	0.6	-	0.1	-	0.06	0.7
Rel.Std.Dev.	-	24.7%	-	7.07%	-	2.54%	26.2%
PDM[3]	-	-3.27%	4.17%	-	-10.7%	-	20.5%

Table A11. Analytical results for iron in West Musgrave standard OREAS 13P (abbreviations as in Table 1; values in weight percent).

Sample No.	Lab A 4AD*OES	Lab B 4AD*OES	Lab C1 4AD*OES	Lab C2 4AD*OES	Lab D 4AD*OES	Lab E 4AD*OES	Lab F 4AD*OES	Lab G AF*OES
1	7.59	8.04	6.99	7.61	7.43	**7.86**	6.96	7.69
2	**7.52**	**7.70**	**7.64**	7.68	7.53	8.13	**8.99**	7.65
3	7.61	7.81	7.28	7.57	7.50	8.09	7.20	7.80
4	7.58	8.03	7.09	7.57	7.52	8.12	7.39	7.79
5	7.57	7.97	7.10	7.57	7.47	**8.26**	6.92	7.75
Mean	7.57	7.91	7.22	7.60	7.49	8.09	7.49	7.74
Median	7.58	7.97	7.10	7.57	7.50	8.12	7.20	7.75
Std.Dev.	0.03	0.15	0.26	0.05	0.04	0.15	0.86	0.06
Rel.Std.Dev.	0.44%	1.89%	3.56%	0.60%	0.54%	1.81%	11.5%	0.84%
PDM[3]	-0.14%	4.29%	-4.81%	0.22%	-1.25%	6.69%	-1.22%	2.00%

Table A11. continued

Sample No.	Lab H AF*OES	Lab I 4AD*OES	Lab J 4AD*OES	Lab K INAA
1	7.54	6.17	7.35	8.05
2	7.55	6.23	7.35	8.00
3	7.50	6.06	7.40	7.76
4	7.56	6.53	7.40	7.80
5	7.52	6.41		7.78
6				7.73
7				7.77
8				7.91
9				8.03
10				8.03
11				7.80
12				7.83
13				7.68
14				7.66
15				7.84
16				7.86
17				7.75
18				7.70
19				**8.14**
20				7.57
Mean	7.53	**6.28**	7.38	7.83
Median	7.54	6.23	7.38	7.80
Std.Dev.	0.02	0.19	0.03	0.15
Rel.Std.Dev.	0.32%	3.00%	0.39%	1.91%
PDM[3]	-0.67%	-17.2%	-2.76%	3.30%

Table A12. Analytical results for lead in West Musgrave standard OREAS 13P (abbreviations as in Table 1; values in ppm).

Sample No.	Lab A 4AD*OES	Lab B 4AD*OES	Lab C 4AD*OES	Lab D 4AD*OES	Lab E 4AD*OES	Lab F 4AD*OES	Lab G 4AD*OES	Lab H 4AD*OES
1	<5	15	13.5	11	14.8	8	<20	15.4
2	<5	15	14.4	10	15.2	14	21	16.4
3	<5	10	14.9	10	15.1	20	<20	18.5
4	<5	20	13.9	9	15.3	12	<20	12.9
5	<5	20	13.5	9	**16.6**	14	20	16.4
Mean	-	16.0	14.0	9.8	15.4	13.6	-	15.9
Median	-	15.0	13.9	10.0	15.2	14.0	-	16.4
Std.Dev.	-	4.2	0.6	0.8	0.7	4.3	-	2.0
Rel.Std.Dev.	-	26.1%	4.32%	8.54%	4.51%	31.9%	-	12.8%
PDM[3]	-	23.3%	8.20%	-24.5%	18.7%	4.81%	-	22.7%

Table A12. continued

Sample No.	Lab I 4AD*OES	Lab J 4AD*OES
1	9	9.3
2	11	9.6
3	9	9.8
4	8	9.5
5	12	
Mean	9.8	10
Median	9.0	10
Std.Dev.	1.6	0
Rel.Std.Dev.	16.8%	2.18%
PDM[3]	-24.5%	-26.4%

Table A13. Analytical results for magnesium in West Musgrave standard OREAS 13P (abbreviations as in Table 1; values in weight percent).

Sample No.	Lab A 4AD*OES	Lab B 4AD*OES	Lab C1 BF*OES	Lab C2 4AD*OES	Lab D 4AD*OES	Lab E 4AD*OES	Lab F 4AD*OES	Lab G AF*OES
1	3.170	3.55	3.27	3.03	**3.44**	3.31	2.9	3.51
2	**3.140**	3.52	3.28	**3.31**	3.51	3.36	**4.09**	3.49
3	3.181	3.59	3.25	3.24	3.50	3.38	2.92	3.53
4	3.169	3.65	3.24	3.07	3.51	3.38	**3.34**	3.53
5	3.176	3.54	3.25	3.08	3.51	3.34	2.86	3.49
Mean	3.167	3.57	3.26	3.15	3.49	3.35	3.22	3.51
Median	3.170	3.55	3.25	3.08	3.51	3.36	2.92	3.51
Std.Dev.	0.016	0.05	0.02	0.12	0.03	0.03	0.52	0.02
Rel.Std.Dev.	0.51%	1.44%	0.50%	3.87%	0.87%	0.88%	16.2%	0.57%
PDM[3]	-3.57%	8.70%	-0.80%	-4.21%	6.38%	2.09%	-1.90%	6.87%

Table A13. continued

Sample No.	Lab H AF*OES	Lab I 4AD*OES	Lab J 4AD*OES
1	3.345	3.14	3.26
2	3.333	3.16	3.27
3	3.318	2.97	3.25
4	3.345	3.28	3.26
5	3.334	3.14	
Mean	3.335	3.14	3.26
Median	3.334	3.14	3.26
Std.Dev.	0.011	0.11	0.01
Rel.Std.Dev.	0.33%	3.52%	0.25%
PDM[3]	1.54%	-4.46%	-0.74%

Table A14. Analytical results for manganese in West Musgrave standard OREAS 13P (abbreviations as in Table 1; values in ppm).

Sample No.	Lab A 4AD*OES	Lab B 4AD*OES	Lab C 4AD*OES	Lab D 4AD*OES	Lab E 4AD*OES	Lab F 4AD*OES	Lab G AF*OES	Lab H AF*OES
1	1021	1120	1081	1108	1168	1035	1190	1160
2	1006	1120	**1224**	1115	1170	**1230**	1200	1160
3	1020	1130	1174	1113	**1197**	1045	1200	1150
4	1013	1150	1108	1112	**1121**	1025	1180	1160
5	1016	1120	1106	1109	1168	1020	1180	1160
Mean	1015	1128	1139	1111	1165	1071	1190	1158
Median	1016	1120	1108	1112	1168	1035	1190	1160
Std.Dev.	6	13	59	3	28	89	10	4
Rel.Std.Dev.	0.60%	1.16%	5.17%	0.26%	2.36%	8.35%	0.84%	0.39%
PDM[3]	-9.71%	0.32%	1.26%	-1.16%	3.60%	-4.75%	5.83%	2.99%

Table A14. continued

Sample No.	Lab I 4AD*OES	Lab J 4AD*OES
1	917	1200
2	926	1200
3	905	1200
4	968	1200
5	950	
Mean	**933**	1200
Median	926	1200
Std.Dev.	26	0
Rel.Std.Dev.	2.73%	0.00%
PDM[3]	-17.0%	6.72%

Table A15. Analytical results for nickel in West Musgrave standard OREAS 13P (abbreviations as in Table 1; values in ppm).

Sample No.	Lab A 4AD*OES	Lab B 4AD*OES	Lab C1 4AD*OES	Lab C2 BF*OES	Lab D 4AD*OES	Lab E 4AD*OES	Lab F 4AD*OES	Lab G AF*OES
1	2177	2310	2254	2216	2291	2247	2260	2350
2	2166	2300	2208	2224	**2301**	2277	**2660**	2320
3	2176	2280	2199	2250	2293	2233	2280	2350
4	2171	2320	2235	2224	2290	2277	2230	2340
5	**2221**	2320	2144	**2256**	2295	2222	2230	2310
Mean	2182	2306	2208	2234	2294	2251	2332	2334
Median	2176	2310	2208	2224	2293	2247	2260	2340
Std.Dev.	22	17	42	18	4	25	185	18
Rel.Std.Dev.	1.01%	0.73%	1.91%	0.80%	0.19%	1.11%	7.92%	0.78%
PDM[3]	-3.61%	1.86%	-2.48%	-1.32%	1.33%	-0.56%	3.01%	3.10%

Table A15. continued

Sample No.	Lab H 4AD*OES	Lab I 4AD*OES	Lab J 4AD*OES	Lab L 4AD*OES	Lab M AR*OES
1	2236	2080	2300	2310	2260
2	2279	2080	2300	2310	2260
3	2239	2060	2300		2260
4	2252	2110	2300		
5	2264	2120			
Mean	2254	**2090**	2300	2310	2260
Median	2252	2080	2300	2310	2260
Std.Dev.	18	24	0	0	0
Rel.Std.Dev.	0.79%	1.17%	0.00%	0.00%	0.00%
PDM[3]	-0.43%	-7.68%	1.60%	2.04%	-0.17%

Table A16. Analytical results for osmium in West Musgrave standard OREAS 13P (abbreviations as in Table 1; values in ppb).

Sample No.	Lab A NiS*MS	Lab B NiS*MS	Lab F NiS*MS	Lab G NiS*MS	Lab M NiS*MS	Lab N NiS*MS
1	4	3	4	<3	3.4	2.0
2	3	2	3	<3	3.3	<2
3		2			3.4	
Mean	4	**2**	3.5	-	3.4	-
Median	4	2	3.5	-	3.4	-
Std.Dev.	1	1	0.7	-	0.1	-
Rel.Std.Dev.	20.2%	24.7%	20.2%	-	2.52%	-
PDM[3]	1.19%	-32.5%	1.2%	-	-2.38%	-

Table A17. Analytical results for palladium in West Musgrave standard OREAS 13P (abbreviations as in Table 1; values in ppb).

Sample No.	Lab A2 NiS*MS	Lab B2 NiS*MS	Lab F3 NiS*MS	Lab G2 NiS*MS	Lab L NiS*MS	Lab N NiS*MS
1	75	68	76	67	80	55
2	75	62	77	58	70	80
3		54				
Mean	75.0	61	76.5	62.5	75	68
Median	75.0	62	76.5	62.5	75	68
Std.Dev.	0.0	7	0.7	6.4	7	18
Rel.Std.Dev.	0.00%	11.5%	0.92%	10.2%	9.43%	26.2%
PDM[3]	7.30%	-12.3%	9.45%	-10.6%	7.30%	-3.43%

Table A17. continued

Sample No.	Lab A1 FA*MS	Lab B1 FA*MS	Lab C1 FA*MS	Lab C2 FA*MS	Lab D FA*MS	Lab F1 FA*MS	Lab F2 FA*MS	Lab G1 FA*MS
1	73	**65**	72.1	69.1	70	72	72	57
2	71	74	73.5	66.3	71	59	63	
3	73	71	73.9		70		**32**	
4	74	72	73.0		70		**23**	
5	70	72	73.9		70		74	
Mean	72.2	71	73.3	67.7	70	65.5	52.8	**57.0**
Median	73.0	72	73.5	67.7	70	65.5	63.0	57.0
Std.Dev.	1.6	4	0.8	2.0	0	9.2	23.7	-
Rel.Std.Dev.	2.28%	5.14%	1.03%	2.92%	0.64%	14.0%	44.8%	-
PDM[3]	3.29%	1.15%	4.84%	-3.14%	0.43%	-6.29%	-24.5%	-18.5%

Table A17. continued

Sample No.	Lab G3 FA*MS	Lab H FA*MS	Lab I FA*MS	Lab M FA*OES	Lab N FA*MS	Lab P FA*MS
1	60	66.3	71	79.3	70.7	75
2	67	68.9	71	70.5	70.2	71
3	72	69.4	68	68.7		
4	64	70.6	69			
5	75	66.2	65			
Mean	68	68.3	69	72.8	70	73
Median	67	68.9	69	70.5	70	73
Std.Dev.	6	2.0	2	5.7	0	3
Rel.Std.Dev.	8.91%	2.86%	3.62%	7.79%	0.50%	3.87%
PDM[3]	-3.29%	-2.31%	-1.6%	4.20%	0.81%	4.44%

Table A18. Analytical results for phosphorous in West Musgrave standard OREAS 13P (abbreviations as in Table 1; values in ppm).

Sample No.	Lab A 4AD*OES	Lab B 4AD*OES	Lab C 4AD*OES	Lab D 4AD*OES	Lab E 4AD*OES	Lab F 4AD*OES	Lab G 4AD*OES	Lab H AF*ICP
1	736	720	760	770	**670**	690	800	1030
2	**722**	720	830	750	760	**940**	800	770
3	729	720	830	780	770	690	700	770
4	734	740	780	790	780	770	800	960
5	734	740	760	750	730	690	800	1130
Mean	731	728	792	768	742	756	780	**932**
Median	734	720	780	770	760	690	800	960
Std.Dev.	6	11	36	18	44	109	45	160
Rel.Std.Dev.	0.77%	1.50%	4.50%	2.33%	5.98%	14.4%	5.73%	17.1%
PDM[3]	-1.98%	-2.38%	6.20%	2.99%	-0.50%	1.38%	4.60%	25.0%

Table A18. continued

Sample No.	Lab I 4AD*OES	Lab J 4AD*OES
1	691	580
2	680	580
3	679	580
4	717	580
5	706	
Mean	695	**580**
Median	691	580
Std.Dev.	17	0
Rel.Std.Dev.	2.39%	0.00%
PDM[3]	-6.86%	-22.2%

Table A19. Analytical results for platinum in West Musgrave standard OREAS 13P (abbreviations as in Table 1; values in ppb).

Sample No.	Lab A1 NiS*MS	Lab B1 NiS*MS	Lab F3 NiS*MS	Lab G2 NiS*MS	Lab L NiS*MS	Lab M NiS*MS	Lab N2 NiS*MS
1	49	**56**	57	48	40	45.5	50
2	44	40	53	43	40	46.1	58
3		39				43.3	
Mean	46.5	**45.0**	**55.0**	45.5	**40.0**	45.0	**54.0**
Median	46.5	40.0	55.0	45.5	40.0	45.5	54.0
Std.Dev.	3.5	9.5	2.8	3.5	0.0	1.5	5.7
Rel.Std.Dev.	7.60%	21.2%	5.14%	7.77%	0.00%	3.28%	10.5%
PDM[3]	-0.69%	-3.90%	17.5%	-2.83%	-14.6%	-3.97%	15.3%

Table A19. continued

Sample No.	Lab A2 FA*MS	Lab B2 FA*MS	Lab C1 FA*MS	Lab C2 FA*MS	Lab D FA*MS	Lab F1 FA*MS	Lab F2 FA*MS	Lab H FA*AAS
1	48	43.5	46.6	48.9	48	49.0	44.5	47.3
2	48	50.0	46.9	47.2	49	41.0	**39.5**	48.1
3	50	47.0	45.2		48		**20.5**	48.4
4	50	46.0	45.6		48		**15.0**	48.5
5	49	48.0	46.2		48		47.0	46.3
Mean	49.0	46.9	46.1	48.1	48.2	**45.0**	33.3	47.7
Median	49.0	47.0	46.2	48.1	48.0	45.0	39.5	48.1
Std.Dev.	1.0	2.4	0.7	1.2	0.4	5.7	14.6	0.9
Rel.Std.Dev.	2.04%	5.14%	1.52%	2.50%	0.93%	12.6%	43.8%	1.93%
PDM[3]	4.65%	0.16%	-1.55%	2.62%	2.94%	-3.90%	-28.9%	1.91%

Table A19. continued

Sample No.	Lab I FA*MS	Lab G1 FA*AAS	Lab G3 FA*MS	Lab N1 FA*MS
1	47.7	49	39.8	47.9
2	48.5	47		48.0
3	46.1	55		
4	47.1	55		
5	44.1	61		
Mean	46.7	**53.4**	**39.8**	48.0
Median	47.1	55.0	39.8	48.0
Std.Dev.	1.7	5.5	-	0.0
Rel.Std.Dev.	3.63%	10.4%	-	0.10%
PDM[3]	-0.27%	14.0%	-15.0%	2.47%

Table A20. Analytical results for potassium in West Musgrave standard OREAS 13P (abbreviations as in Table 1; values in weight percent).

Sample No.	Lab A 4AD*OES	Lab B 4AD*OES	Lab C BF*OES	Lab D 4AD*OES	Lab E 4AD*OES	Lab F 4AD*OES	Lab G AF*OES	Lab H AF*OES
1	0.456	0.491	0.48	0.47	0.429	0.42	0.51	0.48
2	0.456	**0.486**	0.46	0.47	0.434	**0.78**	0.53	0.48
3	0.454	**0.501**	0.46	0.47	0.434	0.44	0.53	0.48
4	0.455	0.493	0.50	0.47	0.426	**0.61**	0.52	0.48
5	**0.463**	0.492	0.48	0.47	0.414	0.40	0.56	0.48
Mean	0.457	0.493	0.48	0.47	0.427	0.53	0.53	0.48
Median	0.456	0.492	0.48	0.47	0.429	0.440	0.53	0.48
Std.Dev.	0.004	0.005	0.02	0.00	0.008	0.163	0.02	0.00
Rel.Std.Dev.	0.77%	1.10%	3.52%	0.00%	1.92%	30.7%	3.53%	0.00%
PDM[3]	-0.32%	7.56%	3.94%	2.63%	-6.71%	15.7%	15.7%	4.81%

Table A20. continued

Sample No.	Lab I 4AD*OES	Lab J 4AD*OES
1	0.46	0.50
2	0.45	**0.54**
3	0.43	0.51
4	0.47	0.50
5	0.45	
Mean	0.45	0.51
Median	0.45	0.51
Std.Dev.	0.01	0.02
Rel.Std.Dev.	3.28%	3.69%
PDM[3]	-1.30%	11.91%

Table A21. Analytical results for rhodium in West Musgrave standard OREAS 13P (abbreviations as in Table 1; values in ppb).

Sample No.	Lab A NiS*MS	Lab B NiS*MS	Lab C1 FA*MS	Lab C2 FA*MS	Lab F NiS*MS	Lab G NiS*MS	Lab L NiS*MS	Lab M NiS*MS	Lab N NiS*MS
1	4	3	1.7	2.2	4	3	<20	3.8	3.0
2	4	3	**1.2**	2.6	4	3	<20	3.5	3.5
3		2	1.9					3.4	
4			2.1						
5			1.9						
Mean	4.0	2.7	**1.8**	**2.4**	4.0	3.0	-	3.5	3.3
Median	4.0	3.0	1.9	2.4	4.0	3.0	-	3.5	3.3
Std.Dev.	0.0	0.6	0.4	0.3	0.0	0.0	-	0.2	0.4
Rel.Std.Dev.	0.00%	21.7%	21.0%	12.9%	0.00%	0.00%	-	5.70%	10.9%
PDM[3]	17.3%	-21.8%	-48.7%	-29.0%	17.3%	-12.0%	-	3.9%	-4.7%

Table A22. Analytical results for ruthenium via NiS*MS in West Musgrave standard OREAS 13P (abbreviations as in Table 1; values in ppb).

Sample No.	Lab A NiS*MS	Lab B NiS*MS	Lab F NiS*MS	Lab G NiS*MS	Lab L NiS*MS	Lab M NiS*MS	Lab N NiS*MS
1	8	6	7	6	<20	4.6	<5
2	5	4	8	6	<20	4.3	<5
3		4				4.9	
Mean	7	5	8	6	-	4.6	-
Median	7	4	8	6	-	4.6	-
Std.Dev.	2	1	1	0	-	0.3	-
Rel.Std.Dev.	32.6%	24.7%	9.43%	0.00%	-	6.76%	-
PDM[3]	11.1%	-20.2%	28.2%	2.5%	-	-21.6%	-

Table A23. Analytical results for scandium in West Musgrave standard OREAS 13P (abbreviations as in Table 1; values in ppm).

Sample No.	Lab A 4AD*MS	Lab B 4AD*MS	Lab C1 4AD*MS	Lab C2 BF*OES	Lab D 4AD*MS	Lab E 4AD*MS	Lab G AF*OES	Lab H AF*OES
1	18	19.2	12	20	19	19.6	20	17.4
2	18	19.0	12	20	19	19.9	19	17.4
3	18	19.0	13	20	19	19.9	19	17.4
4	18	19.4	11	19	19	19.9	20	17.4
5	18	19.4	12	20	19	**19.1**	19	17.3
Mean	18	19.2	**12**	20	19	19.7	19.4	17.4
Median	18	19.2	12	20	19	19.9	19.0	17.4
Std.Dev.	0	0.2	1	0	0	0.4	0.5	0.0
Rel.Std.Dev.	0.00%	1.04%	5.89%	2.26%	0.00%	1.79%	2.82%	0.26%
PDM[3]	-4.00%	2.40%	-36.0%	5.6%	1.34%	4.89%	3.47%	-7.30%

Table A23. continued

Sample No.	Lab I 4AD*MS	Lab K INAA
1	17	19.0
2	17	19.1
3	17	19.2
4	17	19.0
5	17	19.2
6		19.1
7		19.3
8		19.3
9		**18.7**
10		19.0
11		19.1
12		19.2
13		**18.7**
14		19.3
15		19.2
16		18.8
17		19.2
18		19.3
19		19.1
20		19.5
Mean	17	19.1
Median	17	19.1
Std.Dev.	0	0.2
Rel.Std.Dev.	0.00%	1.05%
PDM[3]	-9.33%	1.93%

Table A24. Analytical results for sodium in West Musgrave standard OREAS 13P (abbreviations as in Table 1; values in weight percent).

Sample No.	Lab A 4AD*MS	Lab B 4AD*MS	Lab C1 4AD*MS	Lab C2 BF*OES	Lab D 4AD*MS	Lab E 4AD*MS	Lab F 4AD*OES	Lab G 4AD*MS
1	1.83	2.04	1.68	1.87	1.95	1.84	1.75	2.01
2	1.80	2.05	1.76	1.85	1.98	1.86	**2.22**	1.98
3	1.82	2.07	1.86	1.85	1.97	1.87	1.81	2.00
4	1.81	**2.11**	1.68	1.87	1.97	1.89	1.82	2.02
5	1.82	2.05	1.76	1.87	1.97	1.89	1.75	1.97
Mean	1.82	2.06	1.75	1.86	1.97	1.87	1.87	2.00
Median	1.82	2.05	1.76	1.87	1.97	1.87	1.81	2.00
Std.Dev.	0.01	0.03	0.07	0.01	0.01	0.02	0.20	0.02
Rel.Std.Dev.	0.55%	1.35%	4.16%	0.56%	0.56%	1.09%	10.6%	1.04%
PDM[3]	-3.97%	9.02%	-7.72%	-1.65%	3.95%	-1.25%	-1.23%	5.43%

Table A24. continued

Sample No.	Lab H AF*OES	Lab I 4AD*MS	Lab J 4AD*OES	Lab K INAA
1	1.98	1.75	2.00	1.94
2	1.98	1.73	2.00	1.93
3	1.96	**1.65**	1.96	1.94
4	1.98	**1.82**	1.95	1.94
5	1.97	1.73		1.94
6				**1.90**
7				1.93
8				1.93
9				1.93
10				1.94
11				1.94
12				1.93
13				**1.88**
14				1.93
15				1.93
16				1.94
17				1.94
18				1.94
19				1.94
20				1.94
Mean	1.97	1.74	1.98	1.93
Median	1.98	1.73	1.98	1.94
Std.Dev.	0.01	0.06	0.03	0.02
Rel.Std.Dev.	0.45%	3.49%	1.33%	0.78%
PDM[3]	4.26%	-8.31%	4.45%	1.99%

Table A25. Analytical results for strontium in West Musgrave standard OREAS 13P (abbreviations as in Table 1; values in ppm).

Sample No.	Lab A 4AD*OES	Lab B 4AD*OES	Lab C1 4AD*OES	Lab C2 BF*MS	Lab D 4AD*OES	Lab E 4AD*OES	Lab F 4AD*OES	Lab G BF*MS
1	313	352	321	338	357	344	349	367
2	310	353	350	325	360	341	**446**	376
3	314	357	349	339	361	342	353	365
4	315	**364**	318	354	363	347	364	363
5	311	354	331	351	360	351	343	377
Mean	313	356	334	341	360	345	371	370
Median	313	354	331	339	360	344	353	367
Std.Dev.	2	5	15	12	2	4	43	6
Rel.Std.Dev.	0.66%	1.36%	4.53%	3.39%	0.60%	1.12%	11.5%	1.75%
PDM[3]	-7.65%	5.17%	-1.39%	0.86%	6.41%	1.92%	9.60%	9.19%

Table A25. continued

Sample No.	Lab H AF*OES	Lab I 4AD*OES
1	319	296
2	318	298
3	316	**285**
4	318	**310**
5	318	301
Mean	318	298
Median	318	298
Std.Dev.	1	9
Rel.Std.Dev.	0.34%	3.03%
PDM[3]	-6.12%	-12.0%

Table A26. Analytical results for sulphur in West Musgrave standard OREAS 13P (abbreviations as in Table 1; values in weight percent).

Sample No.	Lab A 4AD*OES	Lab B 4AD*OES	Lab D 4AD*OES	Lab I 4AD*OES	Lab J 4AD*OES	Lab A Leco	Lab B Leco	Lab C Leco
1	1.45	1.47	1.45	1.32	1.43	1.40	1.52	1.19
2	1.45	1.50	1.47	1.31	1.40	1.41	1.54	1.29
3	1.44	1.51	1.47	1.30	1.41	1.41	1.57	1.27
4	1.45	1.53	1.44	1.37	1.44	1.39	1.43	1.21
5	1.48	1.53	1.44	1.35		1.39	1.48	1.21
Mean	1.45	1.51	1.5	1.33	1.42	1.40	1.51	**1.23**
Median	1.45	1.51	1.5	1.32	1.42	1.40	1.52	1.21
Std.Dev.	0.01	0.02	0.0	0.03	0.02	0.01	0.05	0.04
Rel.Std.Dev.	0.90%	1.65%	1.04%	2.19%	1.29%	0.71%	3.61%	3.51%
PDM[3]	1.25%	5.05%	1.29%	-7.35%	-1.08%	-2.47%	5.05%	-14.0%

Table A26. continued

Sample No.	Lab F Leco	Lab G Leco	Lab H Leco	Lab I Leco
1	1.41	1.35	1.412	1.59
2	**1.83**	1.38	1.424	1.55
3	1.43	1.42	1.459	1.65
4	1.51	1.45	1.442	1.58
5	1.40	1.42	1.461	1.56
Mean	1.52	1.40	1.44	1.59
Median	1.43	1.42	1.44	1.58
Std.Dev.	0.18	0.04	0.02	0.04
Rel.Std.Dev.	11.92%	2.79%	1.49%	2.47%
PDM[3]	5.61%	-2.19%	0.29%	10.5%

Table A27. Analytical results for titanium in West Musgrave standard OREAS 13P (abbreviations as in Table 1; values in ppm).

Sample No.	Lab A 4AD*OES	Lab B 4AD*OES	Lab C1 4AD*OES	Lab C2 BF*OES	Lab D 4AD*OES	Lab E 4AD*OES	Lab F 4AD*OES	Lab G AF*OES
1	3384	3400	3410	3500	3386	3535	3300	3300
2	3346	3400	**3780**	3600	3422	3598	**4500**	3300
3	3399	3500	3610	3500	3404	3551	3400	3300
4	3372	3500	3460	3500	3417	3588	3600	3300
5	3385	3400	3420	3500	3403	3572	3300	3300
Mean	3377	3440	3536	3520	3406	3569	3620	3300
Median	3384	3400	3460	3500	3404	3572	3400	3300
Std.Dev.	20	55	158	45	14	26	507	0
Rel.Std.Dev.	0.59%	1.59%	4.47%	1.27%	0.41%	0.73%	14.00%	0.00%
PDM[3]	-0.08%	1.78%	4.62%	4.15%	0.79%	5.59%	7.11%	-2.36%

Table A27. continued

Sample No.	Lab H AF*OES	Lab I 4AD*OES	Lab J 4AD*OES
1	3270	3200	3230
2	3270	3200	3200
3	3260	3100	3230
4	3280	3300	3230
5	3260	3200	
Mean	3268	3200	3223
Median	3270	3200	3230
Std.Dev.	8	71	15
Rel.Std.Dev.	0.26%	2.21%	0.47%
PDM[3]	-3.31%	-5.32%	-4.65%

Table A28. Analytical results for vanadium in West Musgrave standard OREAS 13P (abbreviations as in Table 1; values in ppm).

Sample No.	Lab A 4AD*OES	Lab B 4AD*OES	Lab C1 4AD*OES	Lab C2 BF*MS	Lab D 4AD*OES	Lab E 4AD*OES	Lab F 4AD*OES	Lab G BF*MS
1	95	104	103	102	102	151	95	98
2	95	102	116	95	104	145	**108**	100
3	94	104	111	102	103	152	95	99
4	94	108	104	107	103	155	92	100
5	97	106	106	103	103	**163**	95	103
Mean	95.0	104.8	108.0	101.8	103.0	**153.3**	97.0	100.0
Median	95.0	104.0	106.0	102.0	103.0	152.4	95.0	100.0
Std.Dev.	1.2	2.3	5.4	4.3	0.7	6.8	6.3	1.9
Rel.Std.Dev.	1.29%	2.18%	5.03%	4.25%	0.69%	4.41%	6.48%	1.87%
PDM[3]	-2.91%	7.11%	10.38%	4.04%	5.27%	56.7%	-0.86%	2.20%

Table A28. continued

Sample No.	Lab H AF*OES	Lab I 4AD*OES	Lab J 4AD*OES
1	88.5	84	180
2	88.6	84	180
3	88.0	83	180
4	88.6	88	180
5	89.1	87	
Mean	88.6	85.2	**180**
Median	88.6	84.0	180
Std.Dev.	0.4	2.2	0
Rel.Std.Dev.	0.44%	2.54%	0.00%
PDM[3]	-9.49%	-12.9%	84.0%

Table A29. Analytical results for zinc in West Musgrave standard OREAS 13P (abbreviations as in Table 1; values in ppm).

Sample No.	Lab A 4AD*OES	Lab B 4AD*OES	Lab C 4AD*OES	Lab D 4AD*OES	Lab E 4AD*OES	Lab F 4AD*OES	Lab G 4AD*OES	Lab H 4AD*OES	Lab O 4AD*OES
1	88	108	87	101	112	88	83.1	91.6	83
2	86	102	91	102	110	**108**	82.0	93.1	83
3	87	102	90	102	114	90	81.4	89.7	82
4	87	104	84	100	113	88	79.8	91.5	**87**
5	87	106	87	102	**126**	86	81.3	92.2	85
Mean	87.0	104.4	87.8	101.4	114.7	**92.0**	81.5	91.6	84.0
Median	87.0	104.0	87.0	102.0	112.8	88.0	81.4	91.6	83.0
Std.Dev.	0.7	2.6	2.8	0.9	6.3	9.1	1.2	1.2	2.0
Rel.Std.Dev.	0.81%	2.50%	3.16%	0.88%	5.50%	9.84%	1.47%	1.36%	2.38%
PDM[3]	-4.00%	15%	-3.12%	11.9%	26.5%	1.5%	-10.0%	1.1%	-7.31%

Table A30. Analytical results for zirconium in West Musgrave standard OREAS 13P (note: fusion methods report total Zr, acid digest methods are partial; abbreviations as in Table 1; abbreviations as in Table 1; values in ppm).

Sample No.	Lab A 4AD*OES	Lab B 4AD*OES	Lab C1 4AD*OES	Lab C2 BF*MS	Lab D 4AD*OES	Lab E 4AD*OES	Lab G BF*MS	Lab H AF*OES
1	24	27	24.1	80.5	31	36.1	77.3	**83.0**
2	24	27	26.1	77.1	31	36.3	89.1	81.2
3	23	29	26.1	82.2	31	35.5	77.0	81.8
4	**28**	29	24.6	87.3	32	36.0	80.5	81.8
5	24	30	24.9	83.6	31	36.4	91.1	81.5
Mean	24.6	28.4	25.2	82.1	31.2	36.0	83.0	81.9
Median	24.0	29.0	24.9	82.2	31.0	36.1	80.5	81.8
Std.Dev.	1.9	1.3	0.9	3.8	0.4	0.3	6.7	0.7
Rel.Std.Dev.	7.92%	4.72%	3.59%	4.59%	1.43%	0.96%	8.03%	0.84%

Table A30. continued

Sample No.	Lab J 4AD*OES	Lab O 4AD*OES
1	34	39.3
2	28	50.6
3	22	48.9
4	23	58.8
5		45.1
Mean	26.8	**48.5**
Median	25.5	48.9
Std.Dev.	5.5	7.2
Rel.Std.Dev.	20.6%	14.8%