

# AMIS0253

## *Certified Reference Material*

**Platinum (PGM) UG2 Ore  
Bushveld Complex, South Africa**

### *Certificate of Analysis*

**Recommended Concentrations and Limits<sup>1</sup>  
(at two Standard Deviations)**

#### *Certified Concentrations<sup>2</sup>*

Pt Pb Collection	4.03	±	0.32	g/t
Pd Pb Collection	2.34	±	0.18	g/t
Pt NIS	4.13	±	0.4	g/t
Pd NIS	2.44	±	0.3	g/t
Au NiS	0.06	±	0.02	g/t
Ir NiS	0.30	±	0.05	g/t
Rh NiS	0.84	±	0.07	g/t
Ru NiS	1.37	±	0.22	g/t
Cu P	138	±	12	ppm
Ni P	348	±	24	ppm
Ni XRF	1359	±	155	ppm
Specific Gravity	4.04	±	0.18	Dimensionless

#### *Provisional Concentrations*

Au Pb Collection	0.07	±	0.01	g/t
Co M/ICP	209	±	53	ppm
Co P	16	±	2.4	ppm
Cu M/ICP	134	±	23	ppm
Ni M/ICP	1220	±	168	ppm

1. *Manufacturers recommended limits for use of the material as control samples, based on two standard deviations, calculated using "Between Laboratory" statistics for treatment of the data for trivial, non-trivial and technically invalid results. See sections 1, 9 and 12.*
2. *There is additional certified major element data presented on p2 and uncertified trace element data presented as an appendix.*

$$4E = Pt (NiS) + Pd (NiS) + Au 9NiS) + Rh (NiS) = 7.47 \text{ g/t}$$

#### AMIS

(A Division of Torre Analytical Services (Pty) Limited)  
(Reg. No. 1989/000201/07)

A: 11 Avalon Road, West Lake View Ext 11, Modderfontein, South Africa

P: PO Box 856, Isando, 1600, Gauteng, South Africa

T: +27 (0) 11 923-0800

W: [www.amis.co.za](http://www.amis.co.za)

Directors: C E Pettit (British), R Naidoo, N N Robinson, K V Gerber, M Padayachee

## Major Element Recommended Concentrations and Limits (at two Standard Deviations)

### Certified Concentrations

Al <sub>2</sub> O <sub>3</sub>	14.96	±	0.40	%
CaO	1.82	±	0.16	%
Cr <sub>2</sub> O <sub>3</sub>	32.00	±	0.66	%
Fe <sub>2</sub> O <sub>3</sub>	24.28	±	1.02	%
MgO	11.39	±	0.56	%
MnO	0.20	±	0.02	%
SiO <sub>2</sub>	14.16	±	0.34	%

### Provisional Concentrations

K <sub>2</sub> O	0.07	±	0.02	%
Na <sub>2</sub> O	0.31	±	0.06	%
TiO <sub>2</sub>	0.76	±	0.12	%

### Informational Mean

S Comb / LECO	0.06	%
Cu XRF 132		ppm

**1. Intended Use:** AMIS0253 is a certified reference material which may be used to demonstrate the validity of measurement results of a single analysis of PGE, Cu and Ni ore materials; derived from the UG2 Reef; or from other mafic rocks with a similar grade and matrix.

It is a matrix matched Certified Reference Material fit for use as control samples in routine assay laboratory quality control; when inserted within runs of samples and measured in parallel to the unknown. Its purpose is to monitor inter-laboratory or instrument bias and within lab precision. It can be used, indirectly, to establish the traceability of results to an SI system of units.

The recommended concentrations and limits for this material are property values based on a measurement campaign (round robin) and reflect consensus results from the laboratories that participated in the round robin.

Slight variations in analytical procedures between laboratories will reflect as slight biases to the recommended concentrations (see 19). Good laboratories will report results within the two standard deviation levels with a failure rate of <10 %.

The material can also be used for method development and for the calibration of equipment.

**2. Origin of Material:** This standard was made using Pt/Pd UG2 rich chromitite material supplied by Anglo Platinum Limited from the Western limb of the Bushveld Complex.

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**3. Mineral and Chemical Composition:** The UG2 chromitite ore consists of fine to medium size cumulus chromite grains with substantial amounts of post-cumulus orthopyroxene crystals. The footwall is a coarse grained pegmatoidal pyroxenite with sporadic occurrences of chromitite blebs, lenses and stringers. The hanging wall is predominantly fine to medium grained orthopyroxenite with three or more chromitite stringers referred to as the UG2 leaders. The concentrates produced have had most of the chromitite and some of the silicates removed

Major element chemistry data from nineteen of the labs has been compiled and certified. Uncertified summary statistics for trace element data are set out in the appendix.

**4. Appearance:** The material is a very fine powder. It is colored a Medium Dark Grey (Corstor Colour Gauge).

**5. Handling instructions:** The material is packaged in Laboratory Packs and Explorer Packs that must be shaken or otherwise agitated before use. Normal safety precautions for handling fine particulate matter are suggested, such as the use of safety glasses, breathing protection, gloves and a laboratory coat.

**6. Method of Preparation:** The material was crushed, dry-milled and air-classified to <54µm. Wet sieve particle size analysis of random samples confirmed the material was 98.5% <54µm. It was then blended in a bi-conical mixer, systematically divided and then sealed into 1kg Laboratory Packs. Explorer Packs are subdivided from the Laboratory packs as required. Samples were randomly selected for homogeneity testing and third party analysis. Statistical analysis of both homogeneity and the consensus test results were carried out by independent statisticians.

**7. Methods of Analysis requested:**

1. Pt, Pd and Au. ICP-OES or ICP-MS, Pb collection with Ag as a co-collector.
2. Au, Pt, Pd, Rh, Ru and Ir. ICP-MS, nickel sulphide collection.
3. Co, Cu and Ni. Multi-acid total digestion, including HF, with ICP-OES finish.
4. Co, Cu and Ni. Aqua regia digestion with ICP-OES finish.
5. Cr, Co, Cu and Ni. Pressed pellet XRF.
6. S by LECO
7. Specific Gravity. Gas pycnometer.
8. XRF (major elements).
9. Multi acid digest ICP scan – trace elements.

Additionally, XRF analyses were requested for the major elements and a multi-element multi acid digest and ICP scan was requested for the trace elements.

**8. Information requested:**

1. Aliquots used for all determinations.
2. Results for individual PGM's reported in ppb.
3. Results for base metals reported in ppm.
4. QC data, to include replicates, blanks and certified reference materials used.
5. Analytical techniques used.

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**9. Method of Certification:** Thirty three laboratories were each given eight randomly selected packages of sample. Twenty four of the laboratories submitted results in time for the certification.

Final limits were calculated after first determining if all data was compatible within a spread normally expected for similar analytical methods done by reputable laboratories. Data from any one laboratory was then removed from further calculations when the mean of all analyses from that laboratory failed a “t test” of the global means of the other laboratories. The means and standard deviations were then re-calculated using all remaining data. Any analysis that fell outside of the new two standard deviations was removed from the ensuing data base. The mean and standard deviations were again calculated using the remaining data.

The “between-laboratory” standard deviation is used in the calculation to eliminate technically and statistically invalid data. Upper and lower limits are based on the standard deviation of the remaining data, which reflect individual analyses and can be used to monitor accuracy in routine laboratory quality control. This is different to limits based on standard deviations derived from grouped set of analyses (see 12), which provide important measures for precision and trueness, but which are less useful for routine QC.

Standards with an RSD of near or less than 5 % are termed “Certified”, RSD’s of between near 5 % and 15 % are termed “Provisional”, and RSD’s over 15 % are termed “Informational”.

**10. Participating Laboratories:** The 24 out of 33 laboratories that provided results timeously were (not in same order as in the table of assays):

1. Activation Laboratories Pty Ltd (ActLabs) CA
2. ALS Chemex Laboratory Group Johannesburg SA
3. ALS Chemex Laboratory Group Lima (Peru)
4. ALS Chemex Laboratory Group Perth WA
5. ALS Chemex Laboratory Group Vancouver CA
6. Anglo Platinum – Eastern Bushveld Regional Laboratory
7. Anglo Research (Crown Campus)
8. Anglo Research (Germiston Campus)
9. Genalysis Laboratory Services (South Africa) Pty
10. Genalysis Laboratory Services WA
11. Northam Platinum LTD
12. Performance Laboratories SA
13. Rappa Research Laboratory
14. Set Point Laboratories (Isando) SA
15. SGS Australia Pty Ltd (Newburn) WA
16. SGS Chelopech (Bulgaria)
17. SGS Durango (Mexico)
18. SGS Geosol Laboratories Ltda (Brazil)
19. SGS Mineral Services Callao (Peru)
20. SGS Mineral Services Lakefield (Canada)
21. SGS South Africa (Pty) Ltd - Booyens JHB
22. SGS Toronto (Canada)
23. SGS Townsville (Australia)
24. Ultra Trace (Pty) Ltd WA

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**11. Assay Data:** Data as received from the laboratories for the important certified elements listed on p1 are set out below.

Pt Pb Coll g/t	Pt Pb Coll g/t	Pd Pb Coll g/t	Pd Pb Coll g/t	Pt NiS g/t	Pd NiS g/t	Au NiS g/t	Ir NiS g/t	Rh NiS g/t	Ru NiS g/t
4.14	3.93	2.48	2.28	4.15	2.63	0.05	0.29	0.85	1.50
4.08	3.95	2.45	2.22	4.06	2.64	0.06	0.29	0.82	1.42
4.05	4.01	2.46	2.28	4.30	2.54	0.05	0.34	0.87	1.45
3.99	4.08	2.43	2.32	4.06	2.57	0.05	0.30	0.82	1.50
4.01	3.93	2.40	2.30	4.31	2.62	0.05	0.32	0.81	1.47
4.02	4.14	2.37	2.16	4.07	2.59	0.05	0.29	0.81	1.44
4.01	3.93	2.36	2.30	4.20	2.65	0.05	0.31	0.84	1.40
4.11	4.06	2.43	2.23	4.25	2.66	0.06	0.32	0.84	1.50
2.75	3.72	1.58	2.21	4.36	2.61	0.07	0.34	0.89	1.38
2.92	3.78	1.70	2.22	4.37	2.64	0.06	0.34	0.89	1.35
3.38	3.95	1.81	2.27	4.29	2.73	0.07	0.34	0.89	1.39
3.50	4.16	1.95	2.30	4.31	2.68	0.07	0.34	0.89	1.35
2.30	4.05	1.33	2.28	4.38	2.58	0.07	0.34	0.89	1.42
1.99	4.05	1.14	2.24	4.35	2.63	0.07	0.34	0.89	1.32
1.61	3.98	0.97	2.22	4.34	2.48	0.06	0.34	0.88	1.35
2.72	4.16	1.51	2.28	4.33	2.58	0.07	0.34	0.89	1.35
3.34	4.00	1.93	2.32	4.09	2.39	0.06	0.32	0.86	1.26
3.38	4.17	1.96	2.42	4.12	2.38	0.06	0.31	0.86	1.39
3.44	4.25	2.02	2.37	4.25	2.42	0.07	0.33	0.90	1.26
3.26	4.07	1.93	2.34	4.14	2.33	0.06	0.31	0.88	1.34
3.86	4.13	2.05	2.36	3.98	2.42	0.07	0.30	0.85	1.25
3.43	4.19	2.03	2.36	4.00	2.33	0.07	0.29	0.84	1.21
3.32	4.08	2.00	2.35	3.81	2.38	0.06	0.28	0.82	1.33
3.27	4.13	1.95	2.41	4.00	2.36	0.07	0.30	0.83	1.23
4.22	4.08	2.40	2.38	3.94	2.28	0.06	0.29	0.83	1.23
3.80	3.85	2.20	2.18	4.05	2.29	0.06	0.29	0.82	1.25
4.10	3.94	2.33	2.24	4.05	2.24	0.06	0.29	0.84	1.22
4.12	3.96	2.33	2.26	3.89	2.26	0.06	0.28	0.80	1.25
4.13	3.87	2.34	2.17	4.05	2.17	0.08	0.29	0.83	1.22
4.15	3.94	2.35	2.22	3.88	2.11	0.07	0.28	0.80	1.28
4.11	4.21	2.37	2.42	3.99	2.11	0.06	0.29	0.81	1.27
4.14	4.16	2.41	2.32	4.01	2.22	0.06	0.29	0.81	1.25
3.70	4.44	2.17	2.46	3.89	2.34	0.07	0.30	0.81	1.55
3.86	4.38	2.25	2.44	3.97	2.36	0.07	0.32	0.86	1.52
3.59	4.18	2.10	2.38	4.06	2.40	0.07	0.29	0.82	1.50
3.71	4.30	2.18	2.44	3.92	2.30	0.08	0.32	0.85	1.43
3.51	4.35	2.06	2.44	3.78	2.35	0.07	0.30	0.80	1.54
3.71	4.05	2.16	2.33	3.79	2.35	0.07	0.30	0.76	1.51
3.74	4.29	2.21	2.44	3.94	2.41	0.09	0.32	0.83	1.54
4.28	4.20	2.48	2.35	3.98	2.40	0.07	0.29	0.75	1.50
4.10	4.18	2.42	2.46	4.00	2.49	0.06	0.32	0.83	1.33
4.25	4.22	2.41	2.51	4.09	2.52	0.05	0.33	0.82	1.34
3.98	4.07	2.39	2.42	3.93	2.48	0.06	0.33	0.83	1.35
4.18	4.18	2.41	2.47	3.98	2.34	0.06	0.33	0.77	1.33
4.27	4.27	2.37	2.52	3.99	2.52	0.07	0.31	0.83	1.37
4.19	4.36	2.43	2.54	4.08	2.52	0.05	0.32	0.83	1.31
4.22	4.30	2.38	2.56	3.96	2.54	0.06	0.31	0.84	1.31
4.10	3.93	2.40	2.27	3.99	2.37	0.06	0.33	0.83	1.37
3.85	4.06	2.12	2.48	4.42	2.36	0.05	0.26	0.83	
3.94	4.06	2.08	2.37	4.48	2.35	0.04	0.28	0.82	
3.85	3.90	2.11	2.27	4.46	2.33	0.03	0.26	0.83	
3.80	3.97	2.11	2.31	4.12	2.37	0.04	0.27	0.83	
3.68	4.03	2.08	2.43	4.40	2.33	0.06	0.26	0.82	
3.68	4.01	2.04	2.37	4.44	2.30	0.06	0.28	0.81	
3.74	4.01	2.05	2.23	4.50	2.39	0.06	0.27	0.82	
3.74	4.04	2.03	2.29	4.45	2.60		0.28	0.82	
4.03	3.99	2.34	2.30	4.06	2.56		0.28	0.85	
4.05	4.01	2.33	2.37	4.03	2.54		0.28	0.85	
3.99	4.05	2.39	2.33	4.11	2.55		0.30	0.85	
4.03	4.03	2.37	2.38	4.10	2.57		0.28	0.83	
4.08	4.01	2.39	2.36	4.00	2.42		0.30	0.86	
4.10	3.99	2.34	2.32	4.03	2.45		0.28	0.82	
4.08	4.00	2.37	2.30	4.01			0.29	0.82	
4.14	4.05	2.36	2.34	4.05			0.29	0.87	
3.59	4.16	2.06	2.33	4.38			0.33	0.91	
3.71	4.10	2.18	2.35	4.29			0.26	0.90	
3.77	4.12	2.17	2.33	4.26			0.32	0.89	
3.60	4.18	2.02	2.31	4.24			0.32	0.89	
3.68	4.11	2.11	2.37	4.34			0.32	0.90	
3.80	4.07	2.20	2.37	4.07			0.32	0.85	
3.93	4.09	2.32	2.30	4.14			0.30	0.86	
3.85	4.07	2.21	2.33				0.31		

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MATRIX REFERENCE MATERIALS

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Major element data (cont)

Table with 14 columns: Co, Cu, Ni, Ni, Al2O3, CaO, Cr2O3, Fe2O3, K2O, MgO, MnO, SiO2, SG. Rows list various ppm values for each element.

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**12. Measurement of Uncertainty:** The samples used in the certification process were selected in such a way as to represent the entire batch of material and were taken from the final packaged units; therefore all possible sources of uncertainty (sample uncertainty and measurement uncertainty) are included in the final combined standard uncertainty determination.

The uncertainty measurement takes into consideration the between lab and the within lab variances and is calculated from the square roots of the variances of these components using the formula:

$$\text{Combined standard uncertainty} = \sqrt{(\text{between lab. var./no of labs}) + (\text{mean square within lab. var./no of assays})}$$

These uncertainty measurements may be used, by laboratories, as a component for calculating the total uncertainty for method validation according to the relevant ISO guidelines.

Analyte	Method	Unit	S <sup>1</sup>	σL <sup>2</sup>	SW <sup>3</sup>	CSU <sup>4</sup>
Pt	Pb Coll	g/t	0.1607	0.0906	0.1095	0.0254
Pd	Pb Coll	g/t	0.0858	0.0482	0.0618	0.0141
Au	Pb Coll	g/t	0.0074	0.0038	0.0047	0.0010
Pt	NIS	g/t	0.1000	0.1990	0.0940	0.0760
Pd	NIS	g/t	0.1620	0.1820	0.0580	0.0750
Au	NIS	g/t	0.0100	0.0090	0.0050	0.0040
Ir	NIS	g/t	0.0237	0.0240	0.0110	0.0090
Rh	NIS	g/t	0.0367	0.0290	0.0220	0.0110
Ru	NIS	g/t	0.1081	0.1420	0.0410	0.0640
Co	M/ICP	ppm	26.6791	21.1828	5.0505	5.8961
Co	P	ppm	1.1996	0.8302	0.6856	0.2492
Cu	M/ICP	ppm	11.7982	9.8891	2.7679	2.9954
Cu	P	ppm	5.9747	3.8585	3.1361	1.1119
Cu	XRF	ppm	20.2133	25.0225	3.5000	10.2276
Ni	M/ICP	ppm	83.8595	62.7615	23.3267	18.2643
Ni	P	ppm	11.9232	7.5913	7.8732	2.4316
Ni	XRF	ppm	77.5688	85.5492	35.5700	35.2531
Al <sub>2</sub> O <sub>3</sub>	XRF	%	0.2014	0.1198	0.1186	0.0475
CaO	XRF	%	0.1198	0.1046	0.0173	0.0370
Cr <sub>2</sub> O <sub>3</sub>	XRF	%	0.3597	0.4545	0.1830	0.2047
Fe <sub>2</sub> O <sub>3</sub>	XRF	%	0.5082	0.5209	0.1717	0.1852
K <sub>2</sub> O	XRF	%	0.0089	0.0083	0.0044	0.0030
MgO	XRF	%	0.2848	0.1944	0.1359	0.0631
MnO	XRF	%	0.0111	0.0120	0.0055	0.0049
Na <sub>2</sub> O	XRF	%	0.0320	0.0384	0.0096	0.0157
SiO <sub>2</sub>	XRF	%	0.1709	0.1607	0.1058	0.0621
TiO <sub>2</sub>	XRF	%	0.0637	0.0646	0.0143	0.0216
S	Comb/LECO	%	0.0118	0.0141	0.0070	0.0064
SG	pyc		0.0860	0.0687	0.0387	0.0211

- 1 S - Std Dev for use on control charts.
- 2 σL - Betw Lab Std Dev, for use to calculate a measure of accuracy.
- 3 SW - Within Lab Std Dev, for use to calculate a measure of precision.
- 4 CSU - Combined Standard Uncertainty, a component for use to calculate the total uncertainty in method validation.

**13. Certified values:** The Certified, Provisional and Indicated values listed on p1 and p2 of this certificate fulfill the AMIS statistical criteria regarding agreement for certification and have been independently validated by Dr Barry Smees. The Certified values for the Nickel Sulphide only listed on p1 of this certificate fulfill the AMIS statistical criteria regarding agreement for certification and have been independently validated by Allan W. Fraser.

**14. Metrological Traceability:** The values quoted herein are based on the consensus values derived from statistical analysis of the data from an inter laboratory measurement program. Traceability to SI units is via the standards used by the individual laboratories the majority of which are accredited and who have maintained measurement traceability during the analytical process.

**15. Certification:** AMIS0253 is a new material.

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**16. Period of validity:** The certified values are valid for this product, while still sealed in its original packaging, until notification to the contrary. The stability of the material will be subject to continuous testing for the duration of the inventory. Should product stability become an issue, all customers will be notified and notification to that effect will be placed on the [www.amis.co.za](http://www.amis.co.za) website.

**17. Minimum sample size:** The majority of laboratories reporting used a 0.5g sample size for the ICP and a 30g sample size for the fire assay. These are the recommended minimum sample sizes for the use of this material.

**18. Availability:** This product is available in Laboratory Packs containing 1kg of material and Explorer Packs containing custom weights (from 50 to 250g) of material. The Laboratory Packs are sealed bottles delivered in sealed foil pouches. The Explorer Packs contain material in standard geochem envelopes, nitrogen flushed and vacuum sealed in foil pouches.

**19. Recommended use:** The data used to characterize this CRM has been scrutinized using outlier treatment techniques. This, together with the number of participating laboratories, should overcome any “inter-laboratory issues” and should lead to a very accurate measure for the given methods, notwithstanding the underlying assumption that what the good inter-laboratory labs reported was accurate. However an amount of bad data might have had an effect, resulting in limits which in some situations might be too broad for the effective monitoring of a single analytical method, laboratory or production process. Users should set their own limits based on their own data quality objectives and control measurements, after determining the performance characteristics of their own particular method, using a minimum of 20 analyses using this CRM. User set limits should normally be within the limits recommended on p1 and 2 of this certificate.

**20. Legal Notice:** This certificate and the reference material described in it have been prepared with due care and attention. However AMIS, a part of Torre Industries, Nozibele Mbangula and Mike McWha, , Dr Barry Smee and Smee and Associates Ltd and Allan W. Fraser accept no liability for any decisions or actions taken following the use of the reference material.

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## AMIS

(A Division of Torre Analytical Services (Pty) Limited)  
(Reg. No. 1989/000201/07)

A: 11 Avalon Road, West Lake View Ext 11, Modderfontein, South Africa

P: PO Box 856, Isando, 1600, Gauteng, South Africa

T: +27 (0) 11 923-0800

W: [www.amis.co.za](http://www.amis.co.za)

Directors: C E Pettit (British), R Naidoo, N N Robinson, K V Gerber, M Padayachee



**24 December 2011**-Original certification by Dr Barry Smee  
**17 October 2016**-Recertification of NiS (Au, Pt, Pd, Rh, Ru and Ir) by Allan W. Fraser

**Certifying Officers:**



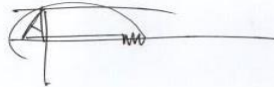
**African Mineral Standards:** \_\_\_\_\_  
**Mike McWha**  
**BSc (Hons), FGSSA, MAusIMM, Pr.Sci.Nat**



**African Mineral Standards:** \_\_\_\_\_  
**Nozibele Mbangula**



**Geochemist:** \_\_\_\_\_  
**Barry W. Smee**  
**BSc, PhD, P.Geo, (B.C.)**



**Geochemist:** \_\_\_\_\_  
**Allan W. Fraser**  
**M.Sc. (Geology), N.D. (Analytical Chem.), Pr.Sci.Nat.**

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### Appendix Trace Elements

Analyte	Method	Unit	Mean	2SD	RSD%	n
Ag	M/ICP	ppm	0.11	0.04	17.95	33
Al	M/ICP	%	7.83	0.46	2.94	76
As	M/ICP	ppm	3.93	3.31	42.13	56
Ba	M/ICP	ppm	32.31	5.48	8.48	69
Be	M/ICP	ppm	0.07	0.04	25.16	32
Bi	M/ICP	ppm	0.07	0.02	11.47	39
Ca	M/ICP	%	1.22	0.17	7.06	78
Cd	M/ICP	ppm	0.31	0.05	8.44	38
Ce	M/ICP	ppm	2.99	0.67	11.15	39
Cr	M/ICP	ppm	212001	17621	4.16	40
Cs	M/ICP	ppm	0.17	0.09	24.63	23
Dy	M/ICP	ppm	0.72	0.87	60.39	16
Er	M/ICP	ppm	0.47	0.55	59.19	16
Eu	M/ICP	ppm	0.18	0.16	45.90	16
Fe	M/ICP	%	15.31	2.21	7.22	71
Ga	M/ICP	ppm	47.49	7.59	8.00	56
Gd	M/ICP	ppm	0.60	0.83	69.16	16
Ge	M/ICP	ppm	0.33	0.09	14.17	31
Hf	M/ICP	ppm	0.20	0.00	0.00	34
Ho	M/ICP	ppm	0.13	0.15	56.57	16
In	M/ICP	ppm	0.03	0.01	17.62	42
K	M/ICP	%	0.06	0.01	12.06	86
La	M/ICP	ppm	1.74	0.38	10.90	45
Li	M/ICP	ppm	2.09	0.52	12.55	71
Lu	M/ICP	ppm	0.03	0.02	36.17	16
Mg	M/ICP	%	6.58	0.89	6.78	87
Mn	M/ICP	ppm	1413	137	4.86	62
Mo	M/ICP	ppm	2.40	0.39	8.02	56
Na	M/ICP	%	0.21	0.03	7.09	96
Nb	M/ICP	ppm	0.78	0.34	21.87	46
Nd	M/ICP	ppm	2.61	2.75	52.79	16
P	M/ICP	ppm	29.66	7.56	12.75	35
Pb	M/ICP	ppm	16.37	2.68	8.18	78
Pr	M/ICP	ppm	0.68	0.66	48.41	16
Rb	M/ICP	ppm	2.61	0.75	14.34	46
Re	M/ICP	ppm	0.002	0.000	0.000	18
S	M/ICP	%	0.06	0.02	12.88	101
Sb	M/ICP	ppm	1.57	0.51	16.35	54
Sc	M/ICP	ppm	11.65	2.69	11.57	72
Se	M/ICP	ppm	12.87	10.44	40.57	39
Si	M/ICP	%	6.66	0.14	1.06	8
Sm	M/ICP	ppm	0.62	0.61	49.45	16
Sn	M/ICP	ppm	0.38	0.12	16.41	40
Sr	M/ICP	ppm	46.52	12.13	13.03	72
Ta	M/ICP	ppm	0.23	0.29	64.90	16
Tb	M/ICP	ppm	0.09	0.11	58.38	16
Te	M/ICP	ppm	0.13	0.08	30.86	42
Th	M/ICP	ppm	0.24	0.13	27.91	55
Ti	M/ICP	%	0.40	0.03	3.83	72
Tl	M/ICP	ppm	0.03	0.01	22.22	41
Tm	M/ICP	ppm	0.05	0.05	59.02	16
U	M/ICP	ppm	0.18	0.09	25.26	53
V	M/ICP	ppm	1446	164	5.67	64
W	M/ICP	ppm	0.30	0.30	50.57	43
Y	M/ICP	ppm	1.64	0.29	8.76	56
Yb	M/ICP	ppm	0.24	0.09	18.08	16
Zn	M/ICP	ppm	614	47.81	3.89	67
Zr	M/ICP	ppm	7.97	2.82	17.70	63

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