

# African Mineral Standards

## *Certificate of Analysis*

PGE Ore Reference Material AMIS0001

### Recommended Concentrations and two "Between Laboratory" Standard Deviations

Platinum:  $0.765 \pm 0.070$  g/t

Palladium:  $1.04 \pm 0.08$  g/t

Nickel:  $0.234 \pm 0.022$  %

Copper:  $0.169 \pm 0.014$  %

### Provisional Value and two "Between Laboratory Standard Deviations

Gold:  $0.12 \pm 0.024$  g/t

### Indicative Values

Rhodium: 0.06 g/t

Ruthenium: 0.05 g/t

Iridium: 0.01 g/t

**Intended Use:** AMIS-1 is suitable for monitoring the accuracy of a single analysis of PGE ores hosted by Platreef or other similar mafic rock. The material can be used for routine quality control by inserting within a batch of samples, method development and calibration of equipment.

**Origin of Material:** This standard was made using Platreef material from the northern limb of the Bushveld Complex supplied by Anglo Platinum Limited. The Platreef is a Pt/Pd/Ni/Cu ore. This specific Platreef was obtained from the 150/80 bench at the northern end of the Sandsloot open pit.

**Approximate Mineral and Chemical Composition:** AMIS-1 comprises approximately 65% B-Pyroxenite, 30% A-Pyroxenite and <5% Serpentinite. Mineralization in this Platreef comprises 2-5% disseminated or net textured magmatic sulphides, mainly pyrrhotite, pentlandite and chalcopyrite. The PGE's occur as micron-sized satellite grains around but rarely within the sulphides.

Fe <sub>2</sub> O <sub>3</sub> %	MnO %	Cr <sub>2</sub> O <sub>3</sub> %	TiO <sub>2</sub> %	CaO %	SiO <sub>2</sub> %	Al <sub>2</sub> O <sub>3</sub> %	MgO %	Na <sub>2</sub> O%	K <sub>2</sub> O %
10.2	0.18	0.15	0.26	10.8	47.2	7.2	17.9	0.63	0.21

Co ppm	Pb ppm	V ppm	Rb ppm	Sr ppm	Sc ppm	Zn ppm	C %	S %
81	17	78	13	70	19	56	0.23	1.07

**Method of Preparation:** The material was crushed, dry-milled and air-classified to 100% <54µm. Wet sieve particle size analysis of random samples confirmed the material was 100% <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.

**Method of Analysis:** NiS collection ICP-OES or ICP-MS finish for Pt, Pd, Au, Rh, Ru, Ir.

Pb collection ICP-OES or ICP-MS finish for Pt, Pd, Au.

4 acid "total" digestion ICP-OES or ICP-MS finish for Cu & Ni.

**Method of Certification:** Ten laboratories were each given eight randomly selected packages of standard. The round robin results for Pt, Pd, Cu and Ni are displayed below:

Lab	Pt, g/t	Pd, g/t	Cu, %	Ni, %
1	0.767	1.071	0.165	0.232
1	0.778	1.077	0.164	0.233
1	0.772	1.082	0.164	0.235
1	0.773	1.089	0.162	0.234
1	0.779	1.084	0.164	0.235
1	0.731	1.026	0.164	0.235
1	0.759	1.086	0.163	0.235
1	0.775	1.093	0.163	0.235
2	0.739	1.020	0.171	0.215
2	0.722	0.990	0.176	0.228
2	0.749	1.035	0.179	0.231
2	0.774	1.055	0.181	0.232
2	0.767	1.060	0.180	0.231
2	0.758	1.025	0.179	0.229
2	0.739	1.015	0.180	0.231
2	0.742	1.025	0.176	0.227
3	0.813	0.944	0.181	0.241
3	0.809	0.938	0.179	0.238
3	0.810	0.946	0.180	0.235
3	0.811	0.948	0.179	0.235
3	0.817	0.936	0.178	0.231
3	0.816	0.926	0.179	0.234

# AFRICAN MINERAL STANDARDS

A division of Set Point Industrial Technology (Pty) Ltd



Lab	Pt, g/t	Pd, g/t	Cu, %	Ni, %
3	0.815	0.925	0.178	0.229
3	0.824	0.926	0.178	0.240
4	0.817	1.068	0.164	0.226
4	0.811	1.083	0.165	0.231
4	0.798	1.080	0.167	0.232
4	0.812	1.080	0.166	0.227
4	0.795	1.061	0.167	0.233
4	0.813	1.067	0.163	0.224
4	0.825	1.076	0.164	0.226
4	0.796	1.083	0.165	0.230
5	0.862	1.208	0.180	0.210
5	0.756	0.987	0.180	0.220
5	0.806	1.052	0.180	0.220
5	0.750	1.004	0.170	0.220
5	0.755	0.950	0.180	0.220
5	0.793	1.010	0.180	0.220
5	0.690	0.920	0.170	0.210
5	0.790	1.068	0.180	0.210
6	0.737	1.064	0.16	0.25
6	0.707	1.036	0.17	0.25
6	0.704	1.022	0.17	0.25
6	0.707	1.073	0.16	0.25
6	0.725	1.065	0.16	0.25
6	0.681	1.005	0.16	0.25
6	0.688	1.047	0.16	0.25
6	0.691	1.061	0.16	0.25
7	0.744	1.043	0.173	0.248
7	0.732	1.055	0.171	0.248
7	0.724	1.006	0.172	0.251
7	0.720	0.971	0.167	0.246
7	0.728	0.981	0.167	0.248
7	0.689	0.951	0.170	0.253
7	0.721	1.009	0.169	0.248
7	0.753	1.000	0.172	0.258
8	0.759	1.004	0.167	0.230
8	0.741	1.024	0.163	0.230
8	0.759	1.017	0.160	0.228
8	0.774	1.009	0.158	0.228
8	0.778	1.025	0.160	0.228
8	0.757	1.007	0.158	0.229
8	0.776	1.008	0.155	0.232
8	0.774	1.002	0.156	0.227
9	0.782	1.088	0.175	0.246
9	0.783	1.090	0.169	0.248
9	0.806	1.140	0.172	0.245
9	0.782	1.158	0.173	0.250
9	0.797	1.070	0.171	0.249
9	0.762	1.024	0.171	0.249
9	0.778	1.099	0.169	0.239
9	0.776	1.072	0.175	0.244
10	0.772	0.940	0.167	0.227
10	0.758	1.010	0.163	0.226
10	0.761	0.947	0.160	0.226
10	0.755	0.991	0.160	0.223
10	0.733	0.970	0.161	0.225
10	0.773	1.070	0.164	0.222
10	0.748	1.050	0.162	0.226
10	0.777	1.010	0.160	0.225

The mean and standard deviation for all data was calculated. Outliers were defined as samples beyond the mean  $\pm 2$  Standard Deviations from all data. These outliers were removed from the data (shown in red) and a new mean and standard deviation was determined. This method is different from that used to calculate the Confidence Interval shown on many Government-produced standards in that the actual "between-laboratory" standard deviation is used in the calculations. This produces upper and lower limits that reflect actual individual analyses rather than a grouped set of analyses. The limits can therefore be used to monitor accuracy from individual analyses, unlike the Certified Limits published on other standards which quote a Confidence Interval.

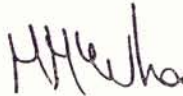
**Participating Laboratories:** (Not in same order as in the table of assays)

Set Point Laboratories ( Pty ) Ltd  
Anglo American Research Laboratories ( Pty ) Ltd  
Mineral Process Laboratories Impala Platinum Ltd  
Moruo Analytical Services ( Pty ) Ltd  
ALS Chemex South Africa ( Pty ) Ltd  
Genalysis Laboratory Services ( Pty ) Ltd  
Ultra Trace ( Pty ) Ltd  
Mintek Analytical Science Division  
Anglo Platinum Research  
SGS Lakefield Research Africa ( Pty ) Ltd

**Availability:** This product is available in Laboratory Packs containing 1kg of material and Explorer Packs containing 110g or 160g 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. Other packaging is available on application.

**Legal Notice:** This certificate and the reference material described in it have been prepared with due care and attention. However AMIS, Set Point Technology (Pty) Ltd, Mike McWha, Dr Barry Smee and Smee and Associates Ltd; accept no liability for any decisions or actions taken following the use of the reference material.

**Certifying Officers:**



**African Mineral Standards:** \_\_\_\_\_

**Mike McWha**  
BSc (Hons), FGSSA, MAusIMM, Pr.Sci.Nat



**Geochemist:** \_\_\_\_\_

**Barry W. Smee**  
BSc, PhD, P.Geo, (B.C.)