African Mineral Standards
REFERENCE MATERIALS FOR AFRICAN ORES

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Merensky Reef
PGE Reference Material

AMIS0053

Certificate of Analysis

Recommended Concentrations and two "Between Laboratory" Standard Deviations

Certified Concentrations

Pt (NiS)	2.52	±	0.20	g/t
Pd (NiS)	1.23	±	0.08	g/t
Rh (NiS)	0.18	±	0.016	g/t
Ru (NiS)	0.33	±	0.03	g/t
Ni (P)	1359	±	120	ppm
Ni (M/ICP)	1652	±	156	ppm
Ni (XRF)	1719	±	118	ppm
Cr (XRF)	4895	±	190	ppm
Co (M/ICP)	73.3	±	5.1	ppm
Cu (P)	795	±	66	ppm
Cu (XRF)	810	±	46	ppm
Cu (M/ICP)	812	±	52	ppm
Specific Gravity	3.02	±	0.12	

Provisional Concentrations

Pt (Pb Collection)	2.41	±	0.30	g/t
Pd (Pb Collection)	1.18	±	0.14	g/t
Au (Pb Collection)	0.22	±	0.03	g/t
Au (NiS)	0.22	±	0.036	g/t
Ir (NiS)	0.06	±	0.01	g/t
Cr (M/ICP)	3445	±	502	ppm
Co (P)	37.4	±	5.5	ppm
Co (XRF)	78	±	12	ppm

4E = 4.15 g/t (Pt, Pd, Rh plus Au)

NB Additional certified and uncertified major and trace element data is presented on p2 and as an appendix.

Directors: GJ Horsfield (CEO), MD Evers (CFO)(British), ND Kennelly, SJ Ingram, MC Louw, Dr CJ Rademeyer, N Robinson, MJ Smith, MH Snelling, J Vassiloudis, D Williams

Intended Use: AMIS0053 is suitable for monitoring the accuracy of a single analysis of PGE, Cu and Ni ores hosted by Merensky Reef or similar other mafic rocks. The material can be used for routine quality control by inserting within a batch of samples.

The major and trace element composition of this material has also been determined but it has not been certified. The iterated statistics are set out below and as an appendix and this information may be useful for instrument calibration or method development.

Origin of Material: This standard was made using Merensky Reef Pt/Pd ore material supplied by Anglo Platinum Limited from the Western limb of the Bushveld Complex. This specific material is a blend of ore collected from the Turfontein Mine ore silo.

Mineral and Chemical Composition: The Merensky Reef comprises components of feldspathic pyroxenite, pyroxenite and anorthosite. Peak PGE values are associated with a thin chromitite stringer. Mineralization in this Merensky Reef comprises 2-5% disseminated or net textured magmatic sulphides, predominantly pyrrhotite, pentlandite, chalcopyrite and pyrite. The PGE's occur as micron-sized satellite grains around but rarely within the sulphides.

This major element chemistry (below) is also certified and was determined from (predominantly) XRF data supplied by 12 of the laboratories

Recommended Concentrations and two "Between Laboratory" Standard Deviations

Certified Concentrations

Al_2O_3	10.62	±	0.24	%
CaO	5.98	±	0.16	%
Cr_2O_3	0.71	±	0.02	%
Fe_2O_3	8.43	±	0.18	%
K_2O	0.34	±	0.02	%
MgO	13.14	±	0.46	%
MnO	0.15	±	0.02	%
Na_2O	0.89	±	0.04	%
S	0.38	±	0.03	%
SiO_2	58.5	±	0.42	%
TiO_2	0.20	±	0.01	%

Provisional Concentrations

LOI	0.77	±	0.18	%

Indicated Mean

P_2O_5	0.028 %

Appearance: The material is a very fine Light Blueish Grey powder (Corstor colour chart - 5B 8/1).

Method of preparation: The material was crushed, dry-milled and air-classified to 100% <54um. Wet sieve particle size analysis of random samples confirmed the material was 100% <54um. It was then blended in a bi-conical mixer, systematically divided and then sealed into 1kg Laboratory Packs. Samples were randomly selected for homogeneity testing and third party analysis. Statistical analysis for the consensus test results were carried out by an independent statistician. Explorer Packs are subdivided from the Laboratory packs as required.

Methods of analysis requested:

1. Pt, Pd and Au. Pb collection with Ag as a co-collector, ICP-OES or ICP-MS.
2. Pt, Pd, Au, Rh, Ru, Ir. NiS collection, ICP-OES or ICP-MS.
3. Multi element scan to include Co, Cu and Ni. Multi-acid total digestion, including HF, ICP-OES or ICP-MS.
4. Co, Cu and Ni. Aqua regia digestion with ICP-OES or ICP-MS.
5. Cr, Co, Cu and Ni. Pressed Pellet, XRF.
6. Majors (Al2O3, CaO, Cr2O3, Fe2O3, K2O, MgO, MnO, Na2O, SiO2, TiO2. LOI.) XRF fusion.
7. SG, gas pycnometer.

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.

Method of certification: Twenty nine laboratories were each given eight samples, comprising eight packages of sample scientifically selected from throughout the batch. Certification is based on results from the twenty four labs that returned results timeously.

The 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 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 calculated using all remaining data. Any analysis that fell outside of the mean ±2 standard deviations was removed from the ensuing data base. The mean and standard deviations were again calculated using the remaining data.

This method is different from that used by Government agencies 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 Confidence Limits published on other standards. Standards with an RSD of near or less than 5 % are certified, RSD’s of between near 5 % and 15 % are Provisional, and RSD’s over 15 % are Indicated.

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

1. ACME Analytical Laboratories Ltd CA
2. Activation Laboratories Pty Ltd (ActLabs) CA
3. ALS Chemex Laboratory Group Johannesburg SA
4. ALS Chemex Laboratory Group Perth WA
5. ALS Chemex Laboratory Group Vancouver CA
6. Ammtec Limited WA
7. Anglo Platinum - Eastern Bushveld Regional Laboratory
8. Anglo Platinum - Mogalakwena Analytical Laboratory (PPL)
9. Assayers Canada
10. Barplats Laboratory SA

11. Becquerel Laboratories Inc CA
12. De Bruyn Spectroscopic Solutions
13. Genalysis Laboratory Services WA
14. Intertek Testing Services Ltd Shanghai (ITS Beijing)
15. Intertek Utama Services (Indonesia)
16. Labtium Inc Finland
17. OMAC Laboratories Limited (Ireland)
18. Set Point Laboratories (Isando) SA
19. Set Point Laboratories (Mokopane) SA
20. SGS Australia Pty Ltd (Newburn) WA
21. SGS Lakefield Research Africa Pty Ltd (Booysens) SA
22. SGS Mineral Services Lakefield (Canada)
23. Ultra Trace (Pty) Ltd WA
24. Zimplats Head Office Assay Laboratory

Assay Data: Data as received from the laboratories for the important certified elements listed on p1 is set out below. A proficiency report has been sent to the managers of the participating laboratories. Additional data from this round robin is available on request.

Lab Code	Pt NiS g/t	Pt Pb coll g/t	Pd NiS g/t	Pd Pb coll g/t	Au NiS g/t	Au Pb coll g/t	Rh NiS g/t	Ru NiS g/t	Ir NiS g/t	Co M/ICP ppm	Co Aq Reg ppm	Co XRF ppm	Cr M/ICP ppm	Cr XRF ppm	Cu M/ICP ppm	Cu Aq Reg ppm	Cu XRF ppm	Ni M/ICP ppm	Ni Aq Reg ppm	Ni XRF ppm
A	2.26	2.21	1.28	1.05	0.20	0.21	0.19	0.28	0.06	72.00	40.00	40.00	4920	4880	746	843	753	1540	1530	1660
A	2.26	2.27	1.24	1.11	0.20	0.21	0.18	0.28	0.06	74.00	41.00	41.00	5270	4890	755	854	752	1580	1500	1650
A	2.25	2.24	1.21	1.07	0.19	0.21	0.18	0.29	0.06	76.00	40.00	40.00	5230	4900	787	819	755	1610	1480	1650
A	2.27	2.23	1.26	1.09	0.21	0.21	0.18	0.28	0.06	80.00	41.00	41.00	5480	5160	806	831	741	1650	1490	1610
A	2.25	2.26	1.27	1.08	0.21	0.21	0.19	0.28	0.06	81.00	42.00	42.00	3730	4800	826	909	734	1750	1540	1620
A	2.27	2.27	1.22	1.13	0.19	0.21	0.18	0.27	0.06	77.00	41.00	41.00	4560	4900	827	908	753	1630	1550	1650
A	2.26	2.26	1.29	1.08	0.19	0.21	0.19	0.28	0.06	77.00	41.00	41.00	5090	4910	865	845	759	1670	1510	1660
A	2.26	2.28	1.22	1.12	0.20	0.20	0.17	0.28	0.06	79.00	40.00	40.00	5610	4900	860	851	757	1680	1510	1660
B		2.21		1.18		0.25				70.00	36.00	36.00		4700	770	760	700	1600	1400	1700
B		2.30		1.25		0.23				73.00	36.00	36.00		4800	750	750	900	1700	1400	1700
B		2.27		1.22		0.23				70.00	36.00	36.00		4800	750	760	900	1700	1400	1800
B		2.25		1.19		0.23				72.00	37.00	37.00		4800	760	760	700	1600	1400	1700
B		2.12		1.16		0.22				70.00	37.00	37.00		4800	770	790	700	1600	1400	1700
B		2.25		1.18		0.23				72.00	37.00	37.00		4700	760	760	700	1700	1400	1700
B		2.23		1.18		0.21				68.00	35.00	35.00		4900	740	780	900	1600	1400	1700
B		2.16		1.17		0.23				71.00	37.00	37.00		4900	760	780	700	1600	1400	1700
C		2.50		1.19		0.23				72.00	38.00	38.00	3340	4788	798	894		1600	1470	
C		2.43		1.13		0.21				71.00	36.00	36.00	3390	4720	788	860		1610	1415	
C		2.39		1.13		0.22				70.00	38.00	38.00	3420	4788	775	945		1610	1450	
C		2.19		1.04		0.21				72.00	38.00	38.00	3370	4720	785	955		1620	1450	
C		2.15		1.06		0.22				73.00	39.00	39.00	3390	4788	790	960		1640	1450	
C		2.23		1.08		0.20				72.00	39.00	39.00	3350	4720	797	974		1640	1480	
C		2.56		1.18		0.23				70.00	38.00	38.00	3410	4788	786	972		1620	1460	
C		2.22		1.07		0.19				72.00	39.00	39.00	3410	4788	801	969		1640	1490	
D										74.50					869			1592		
D										75.30					860			1595		
D										75.00					943			1623		
D										75.70					859			1604		
D										76.00					910			1622		
D										75.00					898			1582		
D										75.40					877			1606		
D										75.40					941			1619		
E	2.45	2.41	1.23	1.14	0.29	0.22	0.18	0.30	0.06	73.00	37.00	37.00	3836	4785	787	774	827	1628	1377	1792
E	2.44	2.61	1.20	1.17	0.20	0.22	0.18	0.32	0.06	73.00	37.00	37.00	3736	4906	888	762	889	1642	1363	1776
E	2.57	2.54	1.23	1.19	0.22	0.23	0.18	0.34	0.06	73.00	35.00	35.00	3688	4901	803	765	855	1644	1317	1809
E	2.53	2.35	1.24	1.14	0.20	0.22	0.18	0.34	0.06	74.00	33.00	33.00	3739	4901	813	668	830	1664	1308	1782
E	2.49	2.46	1.21	1.20	0.21	0.26	0.18	0.33	0.06	75.00	34.00	34.00	3711	4891	795	712	815	1637	1281	1783
E	2.42	2.48	1.22	1.13	0.21	0.21	0.18	0.33	0.06	73.00	34.00	34.00	3786	4914	796	728	824	1618	1300	1796
E	2.11	2.59	1.25	1.18	0.21	0.23	0.19	0.33	0.05	74.00	35.00	35.00	3828	4865	802	753	806	1637	1320	1778
E	2.61	2.43	1.22	1.14	0.20	0.23	0.18	0.34	0.06	73.00	35.00	35.00	3558	4850	810	702	814	1660	1392	1777
F	2.70		1.26		0.26		0.18	0.36	0.06											
F	2.56		1.27		0.24		0.18	0.35	0.06											
F	2.60		1.25		0.21		0.18	0.35	0.06											
F	2.67		1.26		0.21		0.18	0.35	0.06											
F	2.60		1.27		0.21		0.18	0.36	0.06											
F	2.64		1.28		0.25		0.18	0.36	0.06											
F	2.56		1.27		0.21		0.18	0.35	0.06											
F	2.69		1.28		0.23		0.18	0.36	0.06											
G		2.54		1.21		0.24				75.00					812			1740		
G		2.66		1.24		0.23				78.00					807			1726		
G		2.57		1.22		0.21				72.00					762			1825		
G		2.59		1.23		0.22				75.00					806			1708		
G		2.58		1.24		0.21				74.00					794			1789		
G		2.51		1.20		0.23				76.00					810			1763		
G		2.68		1.30		0.23				75.00					788			1731		
G		3.03		1.44		0.26				73.00					794			1741		
K					0.23				0.05					5100						1810
K					0.23				0.05					5090						1790
K					0.25				0.06					5020						1770
K					0.23				0.05					5020						1770
K					0.23				0.05					5040						1810
K					0.23				0.06					5040						1700
K					0.24				0.05					4940						1700
K					0.21				0.06					5070						1740
L		2.42		1.25		0.22								4949			802			1652
L		2.46		1.23		0.22								4956			800			1663
L		2.43		1.23		0.20								4960			798			1665
L		2.47		1.27		0.21								4961			804			1676
L		2.37		1.22		0.21								4932			813			1688
L		2.28		1.18		0.24								4963			795			1674
L		2.46		1.27		0.22								4952			797			1645
L		2.24		1.20		0.20								4967			805			1664

Assay Data (cont):

Lab Code	Pt NiS g/t	Pt Pb coll g/t	Pd NiS g/t	Pd Pb coll g/t	Au NiS g/t	Au Pb coll g/t	Rh NiS g/t	Ru NiS g/t	Ir NiS g/t	Co M/ICP ppm	Co Aq Reg ppm	Co XRF ppm	Cr M/ICP ppm	Cr XRF ppm	Cu M/ICP ppm	Cu Aq Reg ppm	Cu XRF ppm	Ni M/ICP ppm	Ni Aq Reg ppm	Ni XRF ppm
M		2.38		1.11		0.20				73.00	39.00	39.00	4260	4800	820	823	800	1710	1540	1700
M		2.29		1.10		0.21				85.00	39.00	39.00	4550	4900	824	814	800	1760	1580	1800
M		2.31		1.12		0.24				69.00	38.00	38.00	4310	4900	818	826	800	1680	1570	1800
M		2.27		1.09		0.21				73.00	43.00	43.00	4180	4800	822	842	800	1790	1570	1800
M		2.49		1.17		0.24				74.00	42.00	42.00	4480	4800	851	823	800	1820	1570	1800
M		2.33		1.13		0.21				79.00	48.00	48.00	4050	4900	835	823	700	1750	1590	1800
M		2.34		1.12		0.22				91.00	48.00	48.00	4370	4900	804	835	700	1800	1560	1800
M		2.56		1.01		0.23				86.00	42.00	42.00	4410	4900	846	836	800	1810	1530	1800
N		2.56		1.26		0.25				73.00	39.00	39.00	3280		830	950		1660	1530	
N		2.53		1.23		0.22				74.00	39.00	39.00	3290		840	929		1670	1510	
N		2.46		1.21		0.23				73.00	40.00	40.00	3300		819	959		1640	1540	
N		2.52		1.20		0.21				71.00	38.00	38.00	3330		817	928		1640	1520	
N		2.61		1.29		0.22				73.00	38.00	38.00	3290		822	934		1640	1520	
N		2.53		1.23		0.24				74.00	38.00	38.00	3380		832	933		1680	1500	
N		2.45		1.21		0.22				73.00	37.00	37.00	3200		832	917		1650	1490	
N		2.47		1.21		0.22				76.00	40.00	40.00	3400		865	961		1730	1520	
O	2.74	2.53	1.30	1.33	0.25	0.23	0.17	0.32	0.06	71.70	35.50	35.50	3230	4676	786	728	826	1530	1350	1761
O	2.66	2.61	1.28	1.27	0.20	0.24	0.16	0.33	0.06	72.30	35.60	35.60	3360	4694	796	733	832	1530	1350	1764
O	2.63	2.48	1.26	1.23	0.20	0.22	0.16	0.32	0.06	71.40	36.00	36.00	3430	4661	800	738	841	1520	1360	1766
O	2.60	2.64	1.27	1.28	0.20	0.21	0.16	0.32	0.06	72.10	36.40	36.40	3430	4694	808	740	847	1530	1360	1774
O	2.61	2.50	1.25	1.26	0.19	0.25	0.16	0.31	0.05	72.70	36.30	36.30	3010	4695	798	742	811	1520	1350	1767
O	2.62	2.62	1.27	1.28	0.18	0.24	0.16	0.32	0.06	71.10	34.40	34.40	3080	4723	801	743	849	1520	1360	1758
O	2.55	2.64	1.25	1.29	0.20	0.22	0.16	0.32	0.06	71.70	36.10	36.10	3090	4653	792	750	815	1520	1330	1731
O	2.62	2.40	1.24	1.23	0.19	0.20	0.16	0.31	0.06	72.00	37.40	37.40	3270	4655	800	739	829	1520	1360	1747
P		2.12		1.03		0.20				93.70	41.00	41.00	2734		799	782		1720	1430	
P		2.19		1.04		0.20				89.80	40.00	40.00	2840		820	810		1690	1410	
P		2.13		1.07		0.21				90.80	41.00	41.00	2943		781	784		1680	1400	
P		2.22		1.09		0.20				86.70	39.00	39.00	3604		832	755		1730	1340	
P		2.16		1.08		0.21				93.10	41.00	41.00	3616		831	763		1700	1370	
P		2.15		1.06		0.20				90.40	41.00	41.00	3442		790	768		1690	1390	
P		2.18		1.09		0.21				94.60	42.00	42.00	4028		823	785		1720	1450	
P		2.16		1.06		0.20				88.30	44.00	44.00	3717		800	795		1790	1470	
Q	2.41		1.19		0.21		0.20	0.34	0.06	56.41					987			1481		
Q	2.44		1.17		0.23		0.18	0.34	0.05	60.56					998			1434		
Q	2.41		1.19		0.22		0.18	0.34	0.05	65.31					995			1420		
Q	2.41		1.16		0.21		0.19	0.34	0.02	78.38					986			1656		
Q	2.50		1.19		0.22		0.19	0.34	0.06	68.50					822			1656		
Q	1.98		0.92		0.17		0.14	0.26	0.04	70.50					820			1541		
Q	2.43		1.16		0.21		0.19	0.33	0.06	63.50					843			1700		
Q																				
R		2.31		1.17		0.23				80.00	40.00	40.00	3101		866	840		1785	1400	
R		2.25		1.12		0.24				79.00	40.00	40.00	3138		782	820		1721	1390	
R		2.49		1.22		0.23				84.00	40.00	40.00	3260		870	820		1794	1390	
R		2.40		1.20		0.23				86.00	40.00	40.00	3306		892	800		1760	1360	
R		2.21		1.09		0.21				75.00	40.00	40.00	3175		845	810		1797	1380	
R		2.32		1.13		0.20				80.00	40.00	40.00	3153		794	810		1770	1370	
R		2.31		1.13		0.20				78.00	40.00	40.00	3320		839	800		1827	1360	
R		2.35		1.17		0.20				80.00	40.00	40.00	3307		865	800		1774	1350	
S	2.57		1.27		0.21		0.18	0.32	0.06	70.00	34.00	34.00			792	796	821	1547	1164	1691
S	2.44		1.23		0.22		0.18	0.31	0.06	72.00	33.00	33.00			804	768	833	1587	1134	1713
S	2.50		1.23		0.19		0.18	0.31	0.06	71.00	32.00	32.00			798	747	840	1561	1103	1737
S	2.51		1.23		0.21		0.18	0.32	0.06	71.00	32.00	32.00			809	758	822	1582	1123	1733
S	2.55		1.23		0.20		0.18	0.31	0.06	71.00	32.00	32.00			800	766	835	1578	1134	1736
S	2.50		1.22		0.20		0.18	0.31	0.06	69.00	32.00	32.00			774	759	835	1523	1130	1757
S	2.56		1.25		0.17		0.18	0.32	0.06	70.00	32.00	32.00			787	778	829	1566	1147	1728
S	2.59		1.27		0.20		0.18	0.32	0.06	71.00	33.00	33.00			791	780	823	1565	1158	1722
T		1.82		1.00		0.23				73.00	34.00	34.00	3490	4925	799	799		1720	1190	1900
T		1.82		1.00		0.22				71.00	34.00	34.00	3400	4788	834	795		1760	1180	1800
T		1.71		0.92		0.23				70.00	33.00	33.00	3430	4925	819	799		1730	1180	1800
T		1.83		0.96		0.22				71.00	33.00	33.00	3400	4993	816	762		1730	1140	1800
T		1.85		1.02		0.22				69.00	34.00	34.00	3430	4925	796	805		1720	1190	1800
T		1.71		1.02		0.23				69.00	34.00	34.00	3470	4856	803	799		1710	1200	1700
T		1.77		1.04		0.22				70.00	34.00	34.00	3410	4925	814	807		1730	1200	1800
T		1.84		1.00		0.22				69.00	35.00	35.00	3410	4925	810	795		1710	1190	1800
U		2.47		1.26		0.22				75.38	39.67	39.67	4038		834	821		1625	1344	
U		2.56		1.26		0.23				73.64	40.45	40.45	3703		833	831		1625	1351	
U		2.55		1.19		0.21				75.27	38.77	38.77	3567		841	828		1636	1331	
U		2.41		1.21		0.21				74.11	40.27	40.27	3897		835	826		1635	1340	
U		2.52		1.26		0.23				75.76	38.81	38.81	3859		836	833		1632	1341	
U		2.43		1.21		0.21				73.14	39.25	39.25	3543		831	827		1614	1342	
U		2.47		1.19		0.25				74.86	40.44	40.44	3683		839	826		1633	1340	
U		2.41		1.21		0.23				77.15	38.48	38.48	3836		846	828		1657	1339	
V	2.39	2.43	1.18	1.26	0.24	0.25	0.16	0.28	0.07	82.00	36.00	36.00	3530	4931	834	763	791	1595	1232	1635
V	2.23	2.38	1.16	1.22	0.22	0.23	0.17	0.30	0.06	71.00	42.00	42.00	2109	4920	819	818	799	1567	1303	1644
V	2.53	2.39	1.19	1.22	0.22	0.22	0.17	0.31	0.07	72.00	39.00	39.00	2928	4951	767	794	793	1458	1230	1656
V	2.30	2.31	1.19	1.25	0.23	0.25	0.16	0.32	0.07	78.00	38.00	38.00	3220	4925	798	821	792	1513	1292	1657
V	2.33	2.51	1.13	1.25	0.21	0.25	0.15	0.31	0.07	72.00	37.00	37.00	3048	4946	781	783	804	1496	1223	1675
V	2.40	2.51	1.20	1.27	0.24	0.23	0.18	0.33	0.07	73.00	37.00	37.00	3588	4936	799	796	810	1517	1264	1670
V	2.40	2.40	1.23	1.23	0.23	0.24	0.18	0.33	0.07	74.00	36.00	36.00	2381	4937	794	791	810	1507	1256	1671
V	2.44	2.40	1.19	1.25	0.21	0.29	0.18	0.33	0.07	73.00	38.00	38.00	3653	4940	759	758	806	1452	1198	1668
W		2.64		1.29			0.17										840			1710
W		2.43		1.19			0.17										807			1698
W		2.46		1.22			0.18										807			1697
W		2.45		1.23			0.16										810			1694
W		2.61		1.25			0.17										830			1720
W		2.62		1.25			0.17										810			1700
W		2.69		1.25			0.16										808			1696
W		2.36		1.24			0.17										820			1710
X	2.55		1.23		0.23		0.18	0.36	0.08					6322			940			2250
X	2.55		1.24		0.21		0.18	0.35	0.10					6219			950			2240
X	2.54		1.22		0.20		0.18	0.35	0.09					6240			960			2260
X	2.55		1.22		0.20		0.18	0.35	0.09					6206			940			2240
X	2.53		1.23		0.21		0.18	0.34	0.08					6240			940			2250
X	2.57		1.25		0.24		0.18	0.34	0.08					6206			960			2250
X	2.58		1.23		0.22		0.18	0.34	0.09					6199			930			2220
X	2.62		1.26		0.23		0.19	0.35	0.11					6206			1130			2480
Y		2.40		1.13		0.21									840			1720		
Y		2.26		1.10		0.18									840			1670		
Y		2.24		1.04		0.19									840			1620		
Y		2.27		1.06		0.18									810			1620		
Y		2.47		1.16		0.19									850			1670		
Y		2.27		1.09		0.18									810			1630		
Y		2.10		1.00		0.18									860			1780		
Y		2.22		1.02		0.18									780			1630		
Z		2.59		1.22		0.22				70.90	35.00	35.00	3500	4911	830	802		1565	1310	
Z		2.39		1.08		0.20				70.60	35.00	35.00	3380	4802	808	803		1525	1310	
Z		2.53		1.16		0.21				71.30	34.00	34.00	3460	4829	804	806		1515	1340	
Z		2.45		1.10		0.21				75.60	36.00	36.00	3570	4938	828	806		1610	1340	
Z		2.13		1.01		0.19				73.40	36.00	36.00	3620	4897	820	815		1555	1360	
Z		2.41		1.09		0.20				75.30	35.00	35.00	3570	4815	848	809		1595	1320	
Z		2.29		1.04		0.18				75.30	34.00	34.00	3720	4808	857	803		1660	1320	
Z		2.48		1.16		0.22				73.40	35.00	35.00	3650	4938	835	809		1600	1340	

Assay Data (cont):

Lab Code	Pt NiS g/t	Pt Pb coll g/t	Pd NiS g/t	Pd Pb coll g/t	Au NiS g/t	Au Pb coll g/t	Rh NiS g/t	Ru NiS g/t	Ir NiS g/t	Co M/ICP ppm	Co Aq Reg ppm	Co XRF ppm	Cr M/ICP ppm	Cr XRF ppm	Cu M/ICP ppm	Cu Aq Reg ppm	Cu XRF ppm	Ni M/ICP ppm	Ni Aq Reg ppm	Ni XRF ppm
ZA	2.53	2.53	1.21	1.18	0.23	0.23	0.19	0.33	0.06	75.00	35.00	35.00		4815	794	787		1700	1320	
ZA	2.51	2.50	1.28	1.25	0.22	0.22	0.18	0.33	0.06	75.00	36.00	36.00		4822	810	795		1740	1320	
ZA	2.38	2.52	1.19	1.24	0.22	0.21	0.17	0.32	0.06	80.00	35.00	35.00		4815	816	785		1730	1300	
ZA	2.58	2.37	1.21	1.21	0.22	0.22	0.19	0.34	0.06	80.00	36.00	36.00		4808	818	784		1770	1300	
ZA	2.32	2.47	1.18	1.25	0.25	0.25	0.17	0.33	0.06	75.00	35.00	35.00		4802	786	792		1680	1290	
ZA	2.39	2.48	1.22	1.25	0.22	0.22	0.18	0.32	0.06	75.00	34.00	34.00		4802	784	796		1690	1300	
ZA	2.40	2.37	1.21	1.22	0.22	0.23	0.18	0.33	0.06	80.00	36.00	36.00		4822	806	797		1720	1310	
ZA	2.33	2.48	1.19	1.18	0.22	0.20	0.18	0.32	0.06	75.00	36.00	36.00		4822	780	785		1680	1320	
ZC	2.51	2.59	1.22	1.28	0.23	0.25	0.15	0.45		72.00	40.00	40.00		5139	830	780	824	1700	1310	1664
ZC	2.52	2.52	1.26	1.24	0.24	0.24	0.16	0.45		71.00	40.00	40.00		5053	830	840	814	1700	1340	1641
ZC	2.42	2.41	1.29	1.21	0.25	0.26	0.16	0.48		73.00	40.00	40.00		5079	830	850	820	1700	1320	1656
ZC	2.55	2.57	1.29	1.27	0.24	0.24	0.15	0.43		72.00	40.00	40.00		5065	840	880	810	1600	1340	1629
ZC	2.45	2.50	1.25	1.20	0.26	0.26	0.16	0.46		71.00	40.00	40.00		5064	800	890	814	1600	1320	1642
ZC	2.59	2.49	1.21	1.22	0.23	0.26	0.15	0.42		74.00	40.00	40.00		4977	860	870	811	1600	1320	1633
ZC	2.54	2.60	1.26	1.23	0.24	0.24	0.16	0.43		73.00	40.00	40.00		5077	830	830	813	1700	1310	1638
ZC	2.52	2.57	1.24	1.27	0.25	0.23	0.15	0.43		74.00	40.00	40.00		5067	850	870	815	1600	1320	1646

Availability: This product is available in Laboratory Packs containing 1kg of material and Explorer Packs containing custom weights (of <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.

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.

5 February 2009

Certifying Officers:

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Geochemist:_____

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

APPENDIX

Additional useful data collected during the round robin exercise includes these iterated but uncertified certified trace element statistics:

AMIS0053 Trace

Element	Method	Unit	Mean	2SD	RSD %	n
Ag	M/ICP	ppm	0.43	0.35	41.0	37
Al	M/ICP	%	5.65	0.49	4.3	91
As	M/ICP	ppm	9.08	21.54	118.6	31
Ba	M/ICP	ppm	58.6	4.9	4.2	91
Be	M/ICP	ppm	0.17	0.09	27.1	29
Bi	M/ICP	ppm	0.34	0.09	12.8	42
Ca	M/ICP	%	4.22	0.29	3.4	102
Cd	M/ICP	ppm	0.22	0.34	78.3	31
Ce	M/ICP	ppm	7.27	1.05	7.2	47
Cs	M/ICP	ppm	0.23	0.07	14.9	40
Dy	M/ICP	ppm	0.79	0.10	6.1	24
Er	M/ICP	ppm	0.52	0.04	4.2	23
Eu	M/ICP	ppm	0.28	0.04	6.9	24
Fe	M/ICP	%	5.85	0.62	5.3	111
Ga	M/ICP	ppm	9.48	0.94	5.0	52
Gd	M/ICP	ppm	0.76	0.09	6.0	23
Ge	M/ICP	ppm	0.14	0.08	27.7	16
Hf	M/ICP	ppm	0.59	0.19	16.1	42
Ho	M/ICP	ppm	0.17	0.01	3.8	22
In	M/ICP	ppm	0.03	0.008	16.2	28
K	M/ICP	ppm	0.14	0.02	7.0	99
La	M/ICP	ppm	3.69	0.60	8.1	56
Li	M/ICP	ppm	3.63	0.81	11.2	47
Lu	M/ICP	ppm	0.09	0.015	8.5	16
Mg	M/ICP	%	7.74	0.55	3.6	77
Mn	M/ICP	ppm	1137	112	4.9	93
Mo	M/ICP	ppm	1.81	0.98	27.0	92
Na	M/ICP	%	0.66	0.05	3.8	91
Nb	M/ICP	ppm	2.21	5.28	119.3	48
Nd	M/ICP	ppm	3.71	0.36	4.9	24
P	M/ICP	%	0.01	0.002	9.5	90
Pb	M/ICP	ppm	14.9	3.6	12.0	82
Pr	M/ICP	ppm	0.92	0.10	5.5	24
Rb	M/ICP	ppm	5.07	1.10	10.9	55
Re	M/ICP	ppm	0.007	0.004	30.8	23
Sb	M/ICP	ppm	2.82	1.22	21.6	57
Sc	M/ICP	ppm	16.0	2.1	6.5	77
Se	M/ICP	ppm	3.73	1.77	23.7	22
Sm	M/ICP	ppm	0.77	0.08	4.9	24
Sn	M/ICP	ppm	1.17	0.30	12.9	47
Sr	M/ICP	ppm	156	16	5.1	98
Ta	M/ICP	ppm	5.26	12.24	116.3	31
Tb	M/ICP	ppm	0.12	0.01	3.2	22
Te	M/ICP	ppm	0.61	0.23	18.5	40
Th	M/ICP	ppm	0.98	0.20	10.3	55
Ti	M/ICP	%	0.12	0.02	6.6	102
Tl	M/ICP	ppm	0.08	0.036	22.2	27
Tm	M/ICP	ppm	0.08	0.008	5.4	23
U	M/ICP	ppm	0.71	0.13	9.4	60
V	M/ICP	ppm	104	10	4.7	84
W	M/ICP	ppm	0.59	0.53	45.1	25
Y	M/ICP	ppm	4.23	0.60	7.1	67
Yb	M/ICP	ppm	0.56	0.09	8.3	24
Zn	M/ICP	ppm	73.1	19.2	13.1	103
Zr	M/ICP	ppm	21.4	5.8	13.6	63