



Tel: +2711 923 7000 Fax: +2711 923 7027 e-mail: info@amis.co.za web: www.amis.co.za
30 Electron Avenue, Isando, 1600. P.O. Box 856, Isando, 1600, South Africa.
A Division of Set Point Industrial Technology (Pty) Ltd. Reg.No. 1989/000201/07.

African Mineral Standards

Nickel-Copper Sulphide Standard Phoenix Deposit Botswana

AMIS0061

Certificate of Analysis

Recommended Concentration and two “Between
Laboratory” Standard Deviations

Certified Concentrations

| | | | | |
|--------------------|-------|---|--------|------|
| Ni (M/ICP) | 3.549 | ± | 0.307 | % |
| Ni (P) | 3.495 | ± | 0.246 | % |
| Ni (XRF) | 3.585 | ± | 0.163 | % |
| Cu (M/ICP)* | 1.306 | ± | 0.063 | % |
| Cu (P) | 1.278 | ± | 0.0865 | % |
| Cu (XRF) | 1.33 | ± | 0.092 | % |
| Pt (Pb Collection) | 0.46 | ± | 0.06 | g/t |
| Pd (Pb Collection) | 3.53 | ± | 0.32 | g/t |
| Co (M/ICP) | 972 | ± | 96 | ppm |
| Co (P) | 968 | ± | 102 | ppm |
| Co (XRF) | 960 | ± | 117 | ppm |
| Specific Gravity | 3.55 | ± | 0.12 | g/cc |

Indicated Mean

Au (Pb Collection) 0.09 g/t

* Addendum. This correct multi acid copper value is a correction from the 1.206% published in error on the original certificate.

Intended use: AMIS0061 is suitable for monitoring the accuracy of a single analysis of nickel-copper sulphide ores hosted by amphibolitic rocks. The material can be used for routine quality control by inserting within a batch of samples.

The recommended mean and "Between Lab" standard deviations for this standard reflect the average 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 and this is acceptable. Good laboratories however will report results within the two standard deviation levels with a failure of <10 %.

Origin of material: The material for this standard was provided by the Tati Nickel Mining Company, a subsidiary of Norilsk Nickel Africa (Pty) Ltd., from the Phoenix open pit mine in Eastern Botswana. The mine is situated approximately 25 km southwest of Francistown. The deposit occurs in mafic intrusive rocks in the Tati Greenstone Belt of the Rhodesian Craton.

Mineral and chemical composition: Nickel-copper mineralization occurs in metasomatised feldspathic amphibolites intruded by pegmatites and granites. Mineralisation is in the form of massive sulphide lenses with secondary thin mineralized fractures into the country rock. The primary sulphide is pyrrhotite with lesser pentlandite, chalcopyrite and minor spalerite.

The major element chemistry has been calculated, from predominantly XRF data submitted by fourteen of the laboratories, from the eight samples sent each lab. Uncertified statistics from this data are:

| | mean | 2SD | RSD% | n | unit |
|--------------------------------|-------|------|------|----|------|
| Al ₂ O ₃ | 8.84 | 0.37 | 2.1 | 78 | % |
| CaO | 5.16 | 0.35 | 3.4 | 86 | % |
| Cr ₂ O ₃ | 0.06 | 0.01 | 9.6 | 72 | % |
| Fe ₂ O ₃ | 39.37 | 2.21 | 2.8 | 96 | % |
| K ₂ O | 0.18 | 0.03 | 8.6 | 90 | % |
| MgO | 5.06 | 0.24 | 2.3 | 85 | % |
| MnO | 0.07 | 0.01 | 6.3 | 85 | % |
| Na ₂ O | 0.82 | 0.09 | 5.3 | 62 | % |
| P ₂ O ₅ | 0.05 | 0.11 | 118 | 31 | % |
| S | 17.53 | 1.03 | 3.0 | 52 | % |
| SiO ₂ | 25.19 | 1.33 | 2.6 | 95 | % |
| TiO ₂ | 0.13 | 0.01 | 4.6 | 84 | % |
| V ₂ O ₅ | 0.01 | 0.00 | 21.7 | 8 | % |
| LOI | 9.04 | 0.65 | 3.6 | 77 | % |

Additional trace element data is available on request for this material.

Appearance: The material is a very fine powder coloured Dark Blueish Grey (Corstor 5PB 4/1).

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. Au, Pt, Pd – Pb collection ICP-OES or ICP-MS.
2. Multi-acid digest multi-element scan - (to include Co, Cu, Ni.). ICP-OES or ICP-MS.
3. Aqua regia digest - Co, Cu, Ni. ICP-OES or ICP-MS.
4. Co, Cu, Ni. XRF.
5. Majors (Al₂O₃, CaO, Cr₂O₃, Fe₂O₃, K₂O, MgO, MnO, Na₂O, SiO₂, TiO₂. LOI.) XRF fusion.
6. SG (gas pycnometer)

Method of certification: Twenty one laboratories were each given eight randomly selected packages of sample. The results from the nineteen laboratories that issued results timeously were used for the certification.

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 and a new mean and standard deviation was determined.

Standards with an RSD of near or less than 5 % are then certified, RSD's of between near 5 % and 15 % are given Provisional Concentrations and limits, those with RSD's over 15 % are given Indicated Concentrations.

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)

1. ACME Analytical Laboratories Ltd., (Canada).
2. Activation Laboratories Ltd., (ActLabs, Ancaster, ON, Canada).
3. ALS Chemex South Africa (Pty) Ltd.
4. ALS Chemex, (Perth, Australia).
5. ALS Chemex, (Vancouver, Canada).
6. Ammtec Ltd., (Western Australia).
7. Assayers Canada, (Vancouver).
8. Genalysis Laboratory Services (Pty) Ltd., (Australia).
9. Geoscience Laboratories, (Geo Labs, Sudbury, Canada).
10. Intertek Testing Services (China)
11. Labtium Inc. (Finland)
12. Nkomati JV Laboratory
13. OMAC Laboratories (Ireland).
14. Pt Intertek Utama Services (Intertek, Indonesia)
15. Set Point Laboratories (Pty) Ltd (South Africa)
16. SGS Lakefield Research (Canada)
17. SGS Lakefield Research Africa (Pty) Ltd. (Joburg, South Africa)
18. SGS Welshpool (Australia).
19. Ultra Trace (Pty) Ltd. (Australia).

Assay Data: Data as received from the laboratories is set out below. A proficiency report has been sent to the managers of the participating laboratories.

| Lab Code | Au Pb coll g/t | Pt Pb coll g/t | Pd Pb coll g/t | Co (M/ICP) ppm | Co (P) ppm | Co (XRF) ppm | Cu (M/ICP) ppm | Cu (P) ppm | Cu (XRF) ppm | Ni (M/ICP) ppm | Ni (P) ppm | Ni (XRF) ppm | Specific Gravity g/cc |
|----------|----------------|----------------|----------------|----------------|------------|--------------|----------------|------------|--------------|----------------|------------|--------------|-----------------------|
| A | 0.11 | 0.46 | 3.39 | 1000 | 726 | 900 | 13200 | | | 33800 | | 32900 | |
| A | 0.10 | 0.45 | 3.33 | 1020 | 724 | 1000 | 13400 | | | 34100 | | 34000 | |
| A | 0.11 | 0.48 | 3.39 | 993 | 746 | 900 | 13100 | | | 33300 | | 34400 | |
| A | 0.12 | 0.44 | 3.31 | 1000 | 768 | 900 | 13200 | | | 33600 | | 33500 | |
| A | 0.10 | 0.48 | 3.25 | 987 | 762 | 1000 | 12900 | | | 33100 | | 33900 | |
| A | 0.11 | 0.47 | 3.25 | 1010 | 746 | 1000 | 13300 | | | 33800 | | 33300 | |
| A | 0.11 | 0.47 | 3.26 | 1010 | 736 | 1000 | 13300 | | | 33800 | | 34100 | |
| A | 0.10 | 0.46 | 3.26 | 998 | 750 | 1000 | 13200 | | | 33500 | | 34600 | |
| B | | 0.49 | 3.84 | 976 | 1010 | | 12500 | 12900 | 12930 | 33800 | 35200 | 35700 | |
| B | | 0.27 | | 976 | 1000 | | 12500 | 12800 | 12840 | 33800 | 34900 | 35600 | |
| B | | 0.49 | 3.86 | 978 | 988 | | 12200 | 12700 | 12820 | 33700 | 34500 | 35270 | |
| B | | 0.49 | 3.83 | 982 | 998 | | 12600 | 12800 | 12670 | 34000 | 34700 | 35270 | |
| B | | 0.45 | 3.53 | 984 | 1000 | | 12700 | 12900 | 13150 | 34000 | 34800 | 36030 | |
| B | | 0.40 | 3.21 | 985 | 1010 | | 12200 | 13000 | 12880 | 34100 | 35100 | 35520 | |
| B | | 0.50 | 3.94 | 975 | 989 | | 12600 | 12800 | 12830 | 33600 | 34600 | 35440 | |
| B | | 0.49 | 3.85 | 993 | 990 | | 12500 | 12700 | 12960 | 34100 | 34400 | 35910 | |
| C | 0.09 | 0.45 | 3.63 | | | | | | | | | | |
| C | 0.08 | 0.45 | 3.57 | | | | | | | | | | |
| C | 0.09 | 0.44 | 3.47 | | | | | | | | | | |
| C | 0.08 | 0.42 | 3.32 | | | | | | | | | | |
| C | 0.08 | 0.47 | 3.58 | | | | | | | | | | |
| C | 0.08 | 0.43 | 3.43 | | | | | | | | | | |
| C | 0.07 | 0.46 | 3.62 | | | | | | | | | | |
| C | 0.07 | 0.45 | 3.60 | | | | | | | | | | |
| D | | | | 1170 | | | 13256 | | | 37317 | | | |
| D | | | | 1178 | | | 13278 | | | 37451 | | | |
| D | | | | 1175 | | | 12680 | | | 34911 | | | |
| D | | | | 1150 | | | 13188 | | | 37603 | | | |
| D | | | | 1166 | | | 13338 | | | 37597 | | | |
| D | | | | 1180 | | | 13363 | | | 37728 | | | |
| D | | | | 1088 | | | 13035 | | | 36722 | | | |
| D | | | | 1218 | | | 12991 | | | 36611 | | | |
| E | | | | 990 | | | 13414 | | | 34702 | | | |
| E | | | | 994 | | | 13296 | | | 35215 | | | |
| E | | | | 1000 | | | 13162 | | | 35357 | | | |
| E | | | | 1001 | | | 13118 | | | 35566 | | | |
| E | | | | 999 | | | 13131 | | | 35218 | | | |
| E | | | | 999 | | | 13656 | | | 34520 | | | |
| E | | | | 1011 | | | 13501 | | | 35244 | | | |
| E | | | | 999 | | | 13306 | | | 34830 | | | |
| F | 0.11 | 0.43 | 3.50 | 994 | 980 | 1291 | 13157 | 13207 | 13304 | 37400 | 37738 | 37442 | 3.56 |
| F | 0.08 | 0.48 | 3.54 | 1029 | 963 | 1200 | 13335 | 13000 | 13190 | 37673 | 36471 | 37030 | 3.56 |
| F | 0.12 | 0.42 | 3.42 | 1005 | 981 | 1194 | 13018 | 13280 | 13119 | 36987 | 37278 | 36966 | 3.58 |
| F | 0.08 | 0.43 | 3.26 | 1026 | 964 | 1223 | 13136 | 13162 | 13191 | 37286 | 36799 | 37270 | 3.55 |
| F | 0.10 | 0.39 | 3.19 | 1019 | 969 | 1261 | 13183 | 13120 | 13311 | 36039 | 36765 | 37087 | 3.60 |
| F | 0.08 | 0.39 | 3.14 | 1028 | 966 | 1256 | 13190 | 13160 | 13132 | 37719 | 36680 | 36688 | 3.56 |
| F | 0.10 | 0.45 | 3.45 | 1022 | 963 | 1186 | 13122 | 13140 | 13158 | 37336 | 36670 | 36957 | 3.58 |
| F | 0.12 | 0.46 | 3.37 | 1019 | 972 | 1222 | 13064 | 13280 | 13019 | 37086 | 37022 | 37317 | 3.58 |
| G | | | | | | | | | | | | | |
| G | | | | | | | | | | | | | |
| G | | | | | | | | | | | | | |
| G | | | | | | | | | | | | | |
| G | | | | | | | | | | | | | |
| G | | | | | | | | | | | | | |
| G | | | | | | | | | | | | | |
| G | | | | | | | | | | | | | |
| H | 0.08 | 0.48 | | 1040 | 922 | | 12500 | | | 35600 | | | |
| H | 0.09 | 0.46 | | 1010 | 951 | | 12700 | | | 35500 | | | |
| H | 0.08 | 0.35 | | 997 | 943 | | 12800 | | | 36000 | | | |
| H | 0.10 | 0.50 | | 995 | 994 | | 12700 | | | 35700 | | | |
| H | 0.09 | 0.49 | | 992 | 994 | | 12600 | | | 35300 | | | |
| H | 0.09 | 0.47 | | 982 | 957 | | 12700 | | | 36100 | | | |
| H | 0.09 | 0.49 | | 980 | 955 | | 12500 | | | 35600 | | | |
| H | 0.09 | 0.49 | | 991 | 956 | | 12500 | | | 35100 | | | |
| I | 0.14 | 0.50 | 3.71 | 930 | 910 | 1030 | 12000 | 13000 | 13260 | | 34000 | 36400 | 3.53 |
| I | 0.10 | 0.50 | 3.72 | 930 | 900 | 980 | 12000 | 13000 | 13120 | | 34000 | 35650 | 3.50 |
| I | 0.13 | 0.54 | 3.80 | 910 | 930 | 1010 | 12000 | 13000 | 13270 | | 34000 | 36350 | 3.52 |
| I | 0.12 | 0.54 | 3.81 | 920 | 920 | 990 | 12000 | 13000 | 12880 | | 34000 | 35330 | 3.55 |
| I | 0.07 | 0.54 | 3.82 | 910 | 910 | 940 | 12000 | 12000 | 12380 | | 33000 | 33850 | 3.51 |
| I | 0.10 | 0.52 | 3.69 | 940 | 920 | 970 | 12000 | 13000 | 12840 | | 33000 | 35380 | 3.51 |
| I | 0.15 | 0.50 | 3.62 | 920 | 920 | 940 | 12000 | 13000 | 12410 | | 32000 | 34170 | 3.53 |
| I | 0.11 | 0.50 | 3.64 | 900 | 930 | 940 | 12000 | 12000 | 12410 | | 32000 | 33450 | 3.50 |

| Lab Code | Au Pb coll g/t | Pt Pb coll g/t | Pd Pb coll g/t | Co (M/ICP) ppm | Co (P) ppm | Co (XRF) ppm | Cu (M/ICP) ppm | Cu (P) ppm | Cu (XRF) ppm | Ni (M/ICP) ppm | Ni (P) ppm | Ni (XRF) ppm | Specific Gravity g/cc |
|----------|----------------|----------------|----------------|----------------|------------|--------------|----------------|------------|--------------|----------------|------------|--------------|-----------------------|
| S | 0.10 | 0.44 | 3.48 | 897 | 918 | | 11800 | 11250 | | 33500 | | | |
| S | 0.09 | 0.45 | 3.47 | 900 | 909 | | 11500 | 10620 | | 32300 | | | |
| S | 0.08 | 0.43 | 3.35 | 919 | 972 | | 12000 | 11160 | | 33600 | | | |
| S | 0.12 | 0.46 | 3.46 | 909 | 936 | | 11900 | 10800 | | 33800 | | | |
| S | 0.09 | 0.44 | 3.43 | 953 | 954 | | 12100 | 11070 | | 33800 | | | |
| S | 0.09 | 0.44 | 3.43 | 891 | 963 | | 11000 | 11070 | | 31900 | | | |
| S | 0.11 | 0.45 | 3.47 | 916 | 954 | | 11600 | 10980 | | 32700 | | | |
| S | 0.11 | 0.45 | 3.40 | 886 | 972 | | 11600 | 11250 | | 32900 | | | |
| T | 0.10 | 0.51 | 3.88 | 980 | 960 | | 12824 | 11921 | 11709 | 34005 | 35037 | 33103 | 3.59 |
| T | 0.10 | 0.55 | 3.96 | 1012 | 937 | | 12917 | 11809 | 11612 | 34331 | 33863 | 32953 | 3.59 |
| T | 0.08 | 0.45 | 3.43 | 993 | 1133 | | 12819 | 13757 | 11722 | 33534 | 35267 | 33117 | 3.57 |
| T | 0.10 | 0.54 | 4.12 | 966 | 1132 | | 12776 | 14000 | 11571 | 33237 | 34104 | 32971 | 3.59 |
| T | 0.10 | 0.53 | 3.77 | 963 | 1021 | | 12785 | 12518 | 11690 | 33130 | 35493 | 33013 | 3.65 |
| T | 0.09 | 0.46 | 3.43 | 974 | 888 | | 12831 | 11127 | 11654 | 33284 | 35283 | 33014 | 3.64 |
| T | 0.09 | 0.45 | 3.40 | 984 | 1081 | | 12882 | 13682 | 11709 | 33116 | 34209 | 33144 | 3.62 |
| T | 0.08 | 0.46 | 3.74 | 971 | 1063 | | 12815 | 13058 | 11703 | 33531 | 35239 | 33130 | 3.64 |
| U | 0.09 | 0.46 | 3.44 | | | 896 | | | | | | | |
| U | 0.11 | 0.48 | 3.42 | | | 895 | | | | | | | |
| U | 0.10 | 0.48 | 3.43 | | | 896 | | | | | | | |
| U | 0.09 | 0.47 | 3.43 | | | 894 | | | | | | | |
| U | 0.08 | 0.48 | 3.42 | | | 899 | | | | | | | |
| U | 0.09 | 0.48 | 3.32 | | | 897 | | | | | | | |
| U | 0.10 | 0.46 | 3.46 | | | 896 | | | | | | | |
| U | 0.11 | 0.50 | 3.39 | | | 895 | | | | | | | |

Availability: This product is available in Laboratory Packs containing 1kg of material or in Explorer Packs containing client specified weights of material from 50g up to 250g. Laboratory Packs are sealed bottles delivered in sealed foil pouches. Explorer Packs contain material in standard geochem envelopes placed into foil pouches that are nitrogen flushed and vacuum sealed.

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 Smees and Smees and Associates Ltd; accept no liability for any decisions or actions taken following the use of the reference material.

5 May 2008

Certifying officers:



African Mineral Standards: _____

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



Geochemist: _____

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