

African Mineral Standards

Certificate of Analysis

Tin Ore Reference Material AMIS0021

Recommended Concentrations and two "Between Laboratory" Standard Deviations

Certified Concentrations

| | | |
|------------------|-------------------|--------------------|
| Tin | 0.27 ± 0.026 % | Sn (XRF) |
| Zinc | 352 ± 42 ppm | Zn (other methods) |
| Specific Gravity | 2.74 ± 0.22 gm/cc | Gas pycnometer |

Provisional Concentrations

| | | |
|--------|----------------|--------------------|
| Tin | 0.29 ± 0.043 % | Sn (other methods) |
| Copper | 54 ± 7.9 ppm | Cu (other methods) |

Indicated Mean

| | | |
|--------|--------|--------------------|
| Silver | 11 ppm | Ag (other methods) |
|--------|--------|--------------------|

Intended Use: AMIS0021 is suitable for monitoring the accuracy of a single analysis of Sn ores hosted by felsic or similar rocks. The material can be used for routine quality control by inserting within a batch of samples, method development and for the calibration of equipment.

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: This standard was made from material supplied from porphyry tin exploration projects in Bolivia. Tin is hosted in high-level to subvolcanic felsic intrusives that have been subjected to pervasive sericitic alteration.

Approximate Mineral and Chemical Composition: The AMIS0021 ore comprises fine-grained cassiterite in veinlet and fracture stockwork zones that also contain stannite, chalcopyrite, sphalerite, galena, pyrite and arsenopyrite.

| | | | | | | | |
|------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-----------------------|------------------------------------|-----------------------|-------------|
| SiO ₂ % | Al ₂ O ₃ % | Fe ₂ O ₃ % | LOI % | K ₂ O % | MgO % | TiO ₂ % | S (SQ) % |
| 70.3 | 14.3 | 4.4 | 4.4 | 2.4 | 0.9 | 0.8 | 0.7 |
| P ₂ O ₅ % | Na ₂ O % | MnO % | Cr ₂ O ₃ % | CaO % | V ₂ O ₅ % | CL (SQ) % | |
| 0.4 | 0.3 | 0.02 | 0.02 | 0.02 | 0.01 | <0.01 | |

Method of Preparation: The material was crushed, dry-milled and air-classified to 100% <54µ. 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 from the entire batch were selected for homogeneity testing and third party analysis. Statistical analysis of both homogeneity and the consensus test results were carried out by an independent statistician.

Method of Analysis:

Analytical methods requested:

1. Sn, Cu, Zn, Ag. - XRF
2. Sn, Cu, Zn, Ag. - ICP-MS
3. 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: Eighteen laboratories were each given eight samples. Various results from the seventeen laboratories that reported back in a reasonable time were used for the determinations. The following round robin results are displayed:

6. Sn, Cu, Zn, Ag by glass bead, pressed pellet or lithium borate fusion - XRF.
7. Sn, Cu, Zn, Ag by multi acid digest or lithium borate fusion; ICP-MS or AAS
8. SG gas pycnometer

The mean and standard deviation for all data was calculated. Outliers were defined as samples beyond the mean ± 2 Standard Deviations from all data. These outliers were removed from the data 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.

The tables below represent raw data received from the laboratories.

| Lab Code | Sn XRF % | Sn (T) % | Cu XRF ppm | Cu (T) ppm | Zn XRF ppm | Zn (T) ppm | Ag XRF ppm | Ag (T) ppm | SG gm/cc |
|----------|----------|----------|------------|------------|------------|------------|------------|------------|----------|
| A | 0.300 | 2990 | 30 | 60 | 340 | | | 10 | 2.67 |
| A | 0.295 | 2820 | 60 | 60 | 340 | | | 10 | 2.69 |
| A | 0.299 | 2860 | 40 | 60 | 335 | | | 10 | 2.66 |
| A | 0.300 | 2880 | 40 | 60 | 345 | | | 10 | 2.71 |
| A | 0.298 | 3010 | 40 | 60 | 350 | | | 15 | 2.67 |
| A | 0.306 | 3000 | 30 | 60 | 335 | | | 10 | 2.69 |
| A | 0.298 | 2960 | 40 | 60 | 335 | | | 10 | 2.70 |
| A | 0.310 | 2940 | 50 | 60 | 340 | | | 10 | 2.67 |
| B | 0.280 | 3152 | 40 | 51 | | 307 | | 10 | 2.93 |
| B | 0.280 | 3152 | 40 | 48 | | 316 | | 10 | 2.94 |
| B | 0.280 | 3030 | 50 | 47 | | 323 | | 10 | 2.89 |
| B | 0.290 | 3075 | 40 | 50 | 360 | 333 | | 9 | 2.86 |
| B | 0.280 | 3045 | 40 | 50 | 340 | 336 | | 10 | 2.90 |
| B | 0.280 | 3072 | 50 | 49 | 340 | 333 | | 9 | 2.91 |
| B | 0.280 | 3137 | 40 | 49 | 350 | 344 | | 10 | 2.87 |
| B | 0.290 | 3057 | | 50 | 350 | 331 | | 9 | 2.89 |
| C | | 2600 | | 42 | | 330 | | | 2.76 |
| C | | 2400 | | 52 | | 320 | | | 2.74 |
| C | | 2300 | | 49 | | 310 | | | 2.71 |
| C | | 2200 | | 49 | | 300 | | | 2.73 |
| C | | 2200 | | 49 | | 300 | | | 2.71 |
| C | | 2500 | | 51 | | 320 | | | 2.75 |
| C | | 2400 | | 52 | | 310 | | | 2.78 |
| C | | 2500 | | 58 | | 310 | | | 2.75 |
| D | 0.291 | | | 54 | 400 | 377 | | 11 | 2.99 |
| D | 0.291 | | | 55 | 400 | 380 | | 12 | 3.00 |
| D | 0.284 | | | 54 | 400 | 378 | | 11 | 2.97 |
| D | 0.291 | | | 54 | 400 | 381 | | 11 | 2.99 |
| D | 0.291 | | | 54 | 400 | 377 | | 11 | 3.02 |
| D | 0.291 | | | 54 | 400 | 379 | | 11 | 2.97 |
| D | 0.291 | | | 56 | 400 | 379 | | 32 | 2.99 |
| D | 0.284 | | | 53 | 400 | 382 | | 11 | 3.00 |

| Lab Code | Sn XRF % | Sn (T) % | Cu XRF ppm | Cu (T) ppm | Zn XRF ppm | Zn (T) ppm | Ag XRF ppm | Ag (T) ppm | SG gm/cc |
|----------|----------|----------|------------|------------|------------|------------|------------|------------|----------|
| E | | 2830 | | 62 | | 326 | | 14 | |
| E | | 2980 | | 58 | | 321 | | 13 | |
| E | | 2930 | | 57 | | 318 | | 13 | |
| E | | 2930 | | 54 | | 319 | | 12 | |
| E | | 3320 | | 53 | | 352 | | 12 | |
| E | | 3030 | | 55 | | 332 | | 13 | |
| E | | 2810 | | 56 | | 300 | | 13 | |
| E | | 3540 | | 55 | | 374 | | 13 | |
| F | 0.280 | 2797 | 44 | | 315 | | | 73 | 2.70 |
| F | 0.280 | 2836 | 46 | | 316 | | | 84 | 2.69 |
| F | 0.290 | 2881 | 44 | | 314 | | | 75 | 2.69 |
| F | 0.290 | 2897 | 45 | | 315 | | | 77 | 2.70 |
| F | 0.290 | 2871 | 46 | | 318 | | | 81 | 2.72 |
| F | 0.280 | 2755 | 46 | | 316 | | | 74 | 2.71 |
| F | 0.290 | 2869 | 46 | | 316 | | | 67 | 2.72 |
| F | 0.280 | 2839 | 47 | | 314 | | | 78 | 2.73 |
| G | 0.280 | | 49 | | 335 | | 21 | | |
| G | 0.277 | | 46 | | 331 | | 20 | | |
| G | 0.280 | | 51 | | 331 | | 20 | | |
| G | 0.282 | | 45 | | 334 | | 22 | | |
| G | 0.282 | | 51 | | 328 | | 22 | | |
| G | 0.281 | | 48 | | 328 | | 22 | | |
| G | 0.281 | | 49 | | 333 | | 20 | | |
| G | 0.282 | | 49 | | 338 | | 25 | | |
| H | | 3162 | | 52 | | 360 | | 12 | 2.60 |
| H | | 3062 | | 54 | | 364 | | 12 | 2.62 |
| H | | 3025 | | 52 | | 340 | | 12 | 2.60 |
| H | | 3041 | | 53 | | 380 | | 12 | 2.58 |
| H | | 3065 | | 52 | | 373 | | 12 | 2.62 |
| H | | 2995 | | 53 | | 357 | | 12 | 2.64 |
| H | | 3098 | | 53 | | 384 | | 12 | 2.62 |
| H | | 3194 | | 53 | | 360 | | 12 | 2.63 |
| I | | 2720 | | 45 | | 342 | | 10 | 2.64 |
| I | | 2410 | | 45 | | 348 | | 7 | 2.72 |
| I | | 2570 | | 45 | | 364 | | 5 | 2.59 |
| I | | 2560 | | 46 | | 361 | | 10 | 2.54 |
| I | | 2620 | | 47 | | 365 | | 10 | 2.59 |
| I | | 2600 | | 48 | | 361 | | 10 | 2.58 |
| I | | 2590 | | 48 | | 365 | | 10 | 2.59 |
| I | | 2580 | | 46 | | 355 | | 10 | 2.68 |

| Lab Code | Sn XRF % | Sn (T) % | Cu XRF ppm | Cu (T) ppm | Zn XRF ppm | Zn (T) ppm | Ag XRF ppm | Ag (T) ppm | SG gm/cc |
|----------|----------|----------|------------|------------|------------|------------|------------|------------|----------|
| J | | | | 63 | | 331 | | 11 | |
| J | | | | 61 | | 336 | | 11 | |
| J | | | | 58 | | 322 | | 10 | |
| J | | | | 71 | | 336 | | 12 | |
| J | | | | 52 | | 300 | | 10 | |
| J | | | | 56 | | 300 | | 10 | |
| J | | | | 61 | | 305 | | 12 | |
| J | | | | 65 | | 351 | | 13 | |
| K | | 2605 | | 55 | | 347 | | 11 | |
| K | | 2590 | | 54 | | 351 | | 11 | |
| K | | 2496 | | 52 | | 349 | | 11 | |
| K | | 2541 | | 53 | | 342 | | 11 | |
| K | | 2475 | | 55 | | 369 | | 11 | |
| K | | 2586 | | 53 | | 353 | | 11 | |
| K | | 2486 | | 52 | | 379 | | 11 | |
| K | | 2436 | | 51 | | 338 | | 11 | |
| L | 0.300 | 2810 | | 59 | 200 | 345 | | 11 | 2.88 |
| L | 0.300 | 3110 | | 156 | 300 | 380 | | 13 | 2.98 |
| L | 0.290 | 3060 | | 80 | 300 | 365 | | 12 | 2.96 |
| L | 0.300 | 3360 | | 166 | 300 | 385 | | 12 | 2.89 |
| L | 0.300 | 3230 | | 60 | 400 | 375 | | 13 | 2.86 |
| L | 0.310 | 3270 | | 64 | 300 | 380 | | 12 | 2.84 |
| L | 0.300 | 3080 | | 112 | 200 | 355 | | 9 | 2.96 |
| L | 0.290 | 3130 | | 144 | 300 | 405 | | 10 | 2.96 |
| M | | | | 53 | 300 | 342 | | 5 | |
| M | | | | 54 | 300 | 345 | | 5 | |
| M | | | | 55 | 300 | 353 | | 5 | |
| M | | | | 55 | 310 | 359 | | 5 | |
| M | | | | 54 | 310 | 350 | | 5 | |
| M | | | | 53 | 300 | 352 | | 5 | |
| M | | | | 54 | 320 | 348 | | 5 | |
| M | | | | 52 | 310 | 339 | | 5 | |
| N | | | | 47 | | | | 11 | 2.81 |
| N | | | | 50 | | | | 11 | 2.81 |
| N | | | | 45 | | | | 11 | 2.82 |
| N | | | | 50 | | | | 11 | 2.80 |
| N | | | | 49 | | | | 11 | 2.81 |
| N | | | | 51 | | | | 11 | 2.82 |
| N | | | | 46 | | | | 11 | 2.81 |
| N | | | | 51 | | | | 11 | 2.81 |
| O | | | | 52 | | 371 | | 12 | |

| Lab Code | Sn XRF % | Sn (T) % | Cu XRF ppm | Cu (T) ppm | Zn XRF ppm | Zn (T) ppm | Ag XRF ppm | Ag (T) ppm | SG gm/cc |
|----------|----------|----------|------------|------------|------------|------------|------------|------------|----------|
| O | | | | 51 | | 376 | | 11 | |
| O | | | | 52 | | 369 | | 11 | |
| O | | | | 54 | | 366 | | 12 | |
| O | | | | 51 | | 380 | | 12 | |
| O | | | | 48 | | 349 | | 12 | |
| O | | | | 55 | | 405 | | 11 | |
| O | | | | 53 | | 364 | | 11 | |
| P | | 3675 | | 60 | | 350 | | 12 | |
| P | | 3450 | | 58 | | 383 | | 12 | |
| P | | 3550 | | 55 | | 350 | | 12 | |
| P | | 3525 | | 53 | | 370 | | 12 | |
| P | | 3575 | | 55 | | 375 | | 12 | |
| P | | 3525 | | 55 | | 353 | | 12 | |
| P | | 3425 | | 55 | | 355 | | 12 | |
| P | | 3525 | | 55 | | 375 | | 12 | |
| Q | 0.256 | 2940 | 41 | 58 | 352 | 390 | | 8 | |
| Q | 0.254 | 3000 | 43 | 57 | 353 | 340 | | 8 | |
| Q | 0.256 | 2950 | 43 | 57 | 356 | 340 | | 8 | |
| Q | 0.256 | 2920 | 40 | 58 | 355 | 341 | | 8 | |
| Q | 0.255 | 2950 | 42 | 56 | 357 | 342 | | 7 | |
| Q | 0.258 | 2920 | 40 | 61 | 354 | 348 | | 8 | |
| Q | 0.254 | 2940 | 42 | 56 | 353 | 336 | | 8 | |
| Q | 0.256 | 2910 | 43 | 57 | 350 | 348 | | 5 | |

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

1. Activation Laboratories Ltd., (ActLabs, Ancaster, ON, Canada).
2. Activation Laboratories Ltd (Perth, Australia).
3. ALS Chemex, (Brisbane, Australia).
4. ALS Chemex (, Vancouver, Canada).
5. ALS Chemex South Africa (Pty) Ltd.
6. Amdel Limited, (Perth, Australia).
7. Genalysis Laboratory Services (Pty) Ltd. (Australia).
8. Geoscience Laboratories (Geo Labs, Canada).
9. Mintek (South Africa).
10. OMAC Laboratories (Ireland).
11. Pt Intertek Utama Services (Intertek, Indonesia)
12. Set Point Laboratories (Pty) Ltd (South Africa).
13. SGS Lakefield Research Africa (Pty) Ltd. (South Africa).
14. SGS Welshpool Minerals (Australia).
15. SGS Lakefield Research (Canada).
16. SGS Lakefield Research (Peru).
17. Ultra Trace (Pty) Ltd. (Australia).

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.

20 December, 2006

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