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A Division of Set Point Industrial Technology ( Pty ) Ltd. Reg.No. 1989/000201/07.

## ***Certificate of Analysis***

Copper Oxide Ore  
Reference Material from Lonshi  
Democratic Republic of the Congo

**AMIS0050**

**Recommended Concentration and two “Between Laboratory” Standard Deviations**

### ***Certified Concentrations (economic elements)***

Co (M/ICP)	97.4	± 10	ppm
Cu (acidsol)	11.22	± 0.79	%
Cu (F)	11.23	± 0.67	%
Cu (M/ICP)	11.28	± 0.83	%
Cu (P)	11.26	± 0.86	%
U (M/ICP)	12.6	± 0.9	ppm

### ***Provisional Concentration (economic elements)***

Ni (M/ICP)	87	± 14	ppm
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### ***Indicated Means***

Au (PbColl)	0.016	g/t
Cu (XRF)	11.71	%
Zn (M/ICP)	31	ppm

### ***Certified Concentrations (major elements)***

Al <sub>2</sub> O <sub>3</sub>	11.88	±	0.70	%
CaO	0.30	±	0.02	%
Fe <sub>2</sub> O <sub>3</sub>	6.48	±	0.40	%
K <sub>2</sub> O	2.61	±	0.14	%
LOI	11.9	±	1.1	%
MgO	0.67	±	0.06	%
SiO <sub>2</sub>	50.91	±	3.42	%
TiO <sub>2</sub>	0.83	±	0.04	%

### ***Provisional Concentrations (major elements)***

MnO	0.065	±	0.010	%
Na <sub>2</sub> O	0.72	±	0.08	%
P <sub>2</sub> O <sub>5</sub>	0.25	±	0.046	%
S	0.12	±	0.024	%

### ***Indicated Mean (major elements)***

Cr <sub>2</sub> O <sub>3</sub>	0.031	%
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**Intended Use:** AMIS0050 is suitable to monitor the accuracy of a single analysis of oxide copper ore. 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 using oxide ore sourced from the Lonshi Copper Mine which is owned and operated by Compagnie Miniere du Sakania sprl (Comisa), a wholly owned Congolese subsidiary of First Quantum Minerals Ltd (FQM). The mine is situated in the Congo Pedicle region of the Province of Katanga, Democratic Republic of the Congo.

Lonshi belongs to the class of deposits which occur in the lower Kundelungu stratigraphy. Lonshi sulphides are hosted in basal Kundelungu Group conglomerate/diamictite (Grand Conglomerat) while the oxides are contained within the overlying dolomite which has been deeply weathered leaving a dolomite residual. The residual material hosts the oxides which consist of black copper minerals and malachite.

Primary sulphide, where present in the Grand Conglomerat, is mostly bornite with minor chalcopyrite interstitial to clasts, while supergene sulphide is present as chalcocite.

**Chemical composition:** The major element chemistry for this particular oxide orebody has been certified and is presented on p2. The trace element chemistry for this particular product has also been determined (but not certified). That data is presented in the appendix.

**Appearance:** The material is a very fine dark greenish grey powder (Corstor Colour Gauge - 10Y 6/1).

**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 an independent statistician.

#### **Methods of Analysis:**

1. Cu, Fusion AAS or ICP-OES.
2. Multi-acid digest multi-element scan - ICP-OES or ICP-MS.
3. Aqua regia digest - Cu. ICP-OES or ICP-MS.
4. Pressed pellet multi-element scan - XRF.
5. Fusion ( Majors ). XRF.
6. Au. Pb collection ICP-OES or ICP-MS.
7. SG. Gas pycnometer.
8. Cu QBM/AAS Acid Soluble Copper – as per Bwana Mkubwa method supplied.

**Method of Certification:** Twenty two laboratories were each given eight randomly selected packages of sample. Results from the nineteen laboratories that reported back were used for the determinations in the tables below

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  $\pm 2$  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 the 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. Assayers Canada
7. Bwana Mkubwa Mine Laboratory
8. Genalysis Laboratory Services (South Africa) Pty
9. Geoscience Laboratories (GEO LABS) CA
10. Intertek Testing Services Ltd Shanghai (ITS Beijing)
11. Intertek Utama Services (Indonesia)
12. Labtium Inc Finland
13. Nkomati JV Laboratory SA
14. OMAC Laboratories Limited (Ireland)
15. Set Point Laboratories (Isando) SA
16. SGS Australia Pty Ltd (Newburn) WA
17. SGS Lakefield Research Africa Pty Ltd (Booyens) SA
18. SGS Mineral Services Lakefield (Canada)
19. Ultra Trace (Pty) Ltd WA

**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	Au (PbColl) g/t	Co (M/ICP) ppm	Cu (acidsol) ppm	Cu (F) %	Cu (M/ICP) %	Cu (P) %	Cu (XRF) %	Ni (M/ICP) ppm	U (M/ICP) ppm	Zn (M/ICP) ppm	Al2O3 (XRF) %	CaO (XRF) %	Cr2O3 (XRF) %	Fe2O3 (XRF) %	K2O (XRF) %	LOI (XRF) %	MgO (XRF) %	MnO (XRF) %	Na2O (XRF) %	P2O5 (XRF) %	S (XRF) %	SiO2 (XRF) %	TiO2 (XRF) %		
A	106.00			114300	121139	116497		99.00	12.97	34.00													0.13		
A	110.00			114600	124247	116689		94.00	13.02	32.00														0.13	
A	106.00			115200	122518	114291		91.00	12.95	27.00														0.13	
A	106.00			117100	123793	110857		92.00	13.02	30.00														0.13	
A	107.00			117900	123319	114176		94.00	12.97	31.00														0.13	
A	106.00			115900	123890	115398		91.00	13.01	33.00														0.13	
A	106.00			115800	123432	116879		91.00	13.14	31.00														0.13	
A	107.00			118100	124791	115941		93.00	13.13	32.00														0.13	
B	0.02	92.89		109280				80.00	12.93	26.00	10.95	0.38		6.65	2.52	12.63	0.66	0.07	0.46	0.26			47.43	0.81	
B	0.03	94.77		110100				78.00	13.09	24.00	11.07	0.33		6.68	2.51	12.67	0.66	0.07	0.47	0.27			48.07	0.82	
B	0.02	96.34		112230				78.00	13.22	25.00	10.93	0.31		6.61	2.50	12.63	0.64	0.07	0.47	0.27			47.65	0.83	
B	0.03	99.06		110378				81.00	12.80	26.00	10.81	0.31		6.64	2.52	12.58	0.63	0.07	0.45	0.27			47.00	0.81	
B	0.08	92.93		113166				78.00	12.88	25.00	10.96	0.31		6.60	2.40	12.74	0.64	0.07	0.47	0.27			47.80	0.82	
B	0.03	98.78		108353				78.00	13.11	91.00	11.00	0.31		6.66	2.47	12.80	0.65	0.08	0.47	0.27			47.85	0.81	
B	0.03	94.89		105618				81.00	12.72	26.00	11.12	0.31		6.74	2.59	12.74	0.66	0.07	0.48	0.27			48.27	0.80	
B	0.03	101.89		110326				79.00	13.17	26.00	10.95	0.31		6.60	2.40	12.76	0.66	0.07	0.46	0.27			48.09	0.82	
C	0.02		115000	108000	120000			107000	79.00																
C	0.02		110000	103000	120000			107000	82.00																
C	0.02		120000	107000	120000			111000	82.00																
C	0.02		110000	108000	120000			111000	82.00																
C	0.02		130000	108000	120000			110000	80.00																
C	0.02		120000	109000	120000			108000	84.00																
C	0.02		111000	109000	120000			110000	82.00																
C	0.02		114000	109000	120000			111000	80.00																
D	0.02	96.00		111500	110000	113000		85.00	10.00	31.00	12.00	0.32	0.03	6.77	2.55	11.55	0.63	0.07	0.81	0.28	0.12		52.80	0.82	
D	0.02	94.00		111000	109500	111000		81.00	10.00	31.00	11.25	0.29	0.03	6.08	2.34	11.55	0.63	0.06	0.67	0.31	0.12		49.60	0.79	
D	0.02	97.00		109500	111000	111000		86.00	10.00	25.00	11.35	0.30	0.03	6.13	2.37	11.55	0.62	0.06	0.69	0.36	0.12		50.20	0.80	
D	0.02	91.00		111500	109000	112500		81.00	10.00	27.00	11.40	0.30	0.03	6.20	2.37	11.60	0.62	0.06	0.69	0.48	0.13		50.60	0.80	
D	0.02	94.00		110000	110000	112000		79.00	10.00	32.00	11.45	0.30	0.03	6.19	2.36	11.60	0.63	0.06	0.69	0.53	0.12		50.40	0.80	
D	0.02	94.00		111500	109000	112500		84.00	10.00	26.00	11.15	0.30	0.03	6.03	2.33	11.60	0.61	0.06	0.67	0.54	0.13		49.30	0.79	
D	0.02	80.00		110500	110000	102000		82.00	10.00	22.00	11.15	0.29	0.03	6.04	2.34	11.70	0.61	0.06	0.68	0.41	0.13		49.50	0.79	
D	0.02	83.00		111000	111000	114000		73.00	10.00	24.00	11.35	0.31	0.03	6.12	2.37	11.65	0.61	0.06	0.68	0.38	0.12		50.00	0.80	
E	110.26	108916	113110			108100	123706	84.88		33.11	11.06	0.35	0.04		2.70		0.38	0.09	0.76	0.21	0.14		45.43	1.05	
E	108.04	110319	114330			109900	123665	85.70		37.73	10.97	0.34	0.04		2.70		0.35	0.09	0.77	0.21	0.12		44.86	1.05	
E	111.74	109330	114330			113000	123671	89.78		32.00	11.12	0.34	0.04		2.71		0.38	0.09	0.78	0.21	0.13		45.35	1.05	
E	106.92	110437	118770			111200	124283	91.41		39.27	11.04	0.35	0.04		2.71		0.36	0.09	0.76	0.21	0.13		45.07	1.05	
E	114.70	115289	119880			108800	123783	99.58		33.88	11.08	0.35	0.04		2.71		0.38	0.09	0.77	0.21	0.13		45.32	1.06	
E	115.44	119602	119880			108800	123719	86.52		35.00	11.09	0.36	0.04		2.71		0.38	0.09	0.76	0.21	0.13		45.18	1.06	
E	114.70	119699	116550			106888	124508	88.15		42.35	10.99	0.33	0.04		2.69		0.34	0.09	0.76	0.21	0.12		44.98	1.05	
E	106.18	117774	117660			106848	123871	82.44		38.00	11.05	0.35	0.04		2.71		0.36	0.09	0.77	0.21	0.12		45.07	1.05	
G	0.02	119.00		128000	112000	98600		101.00		17.00	12.21	0.32	0.03	6.68	2.75	11.39	0.71	0.07	0.79	0.98			54.54	0.86	
G	0.01	116.00		126000	119000	97700		97.00		17.00	12.05	0.30	0.03	6.62	2.66	10.99	0.70	0.07	0.75	1.14			53.63	0.86	
G	0.01	113.00		126000	115000	99000		95.00		16.00	12.37	0.31	0.03	6.80	2.72	10.93	0.71	0.07	0.76	1.02			54.03	0.86	
G	0.02	118.00		124000	119000	98200		98.00		17.00	12.08	0.31	0.03	6.65	2.65	10.98	0.72	0.07	0.72	1.18			53.28	0.85	
G	0.01	109.00		121000	112000	98300		92.00		15.00	12.29	0.34	0.03	6.90	2.65	11.23	0.80	0.07	0.71	1.05			53.71	0.86	
G	0.02	111.00		122000	119000	98900		93.00		15.00	12.43	0.32	0.03	6.80	2.69	10.94	0.72	0.07	0.73	1.06			53.74	0.86	
G	0.02	116.00		120000	114000	98600		98.00		16.00	12.71	0.32	0.03	6.92	2.80	11.00	0.73	0.07	0.76	0.80			55.81	0.90	
G	0.02	116.00		126000	115000	97700		97.00		17.00	12.06	0.31	0.03	6.63	2.67	10.91	0.70	0.07	0.74	1.18			53.11	0.86	
I			108919																						
I			109475																						
I			109179																						
I			108702																						
I			109290																						
I			109513																						
I			108976																						
I			109182																						

**Assay Data (cont):**

Lab Code	Au (PbColl) g/t	Co (M/ICP) ppm	Cu (acid sol) ppm	Cu (F) %	Cu (M/ICP) %	Cu (P) %	Cu (XRF) %	Ni (M/ICP) ppm	U (M/ICP) ppm	Zn (M/ICP) ppm	Al2O3 (XRF) %	CaO (XRF) %	Cr2O3 (XRF) %	Fe2O3 (XRF) %	K2O (XRF) %	LOI (XRF) %	MgO (XRF) %	MnO (XRF) %	Na2O (XRF) %	P2O5 (XRF) %	S (XRF) %	SiO2 (XRF) %	TiO2 (XRF) %
J	0.02	100.00	109500		107500	112000		80.00		40.00													
J	0.02	90.00	112500		114000	108000		80.00		40.00													
J	0.02	100.00	107500		110500	112000		80.00		40.00													
J	0.03	90.00	104000		110000	104500		80.00		40.00													
J	0.03	100.00	109500		102500	108500		80.00		50.00													
J	0.03	100.00	106000		107500	110000		100.00		70.00													
J	0.03	100.00	104000		111500	104500		90.00		50.00													
J	0.03	100.00	102500		106000	120500		80.00		50.00													
K	0.01	100.00		116000	115000	115000		95.00	13.10	25.00	12.20	0.29		6.44	2.63		0.68	0.06	0.71	0.28	0.12	51.47	0.82
K	0.01	105.00		114000	115000	113000		95.00	12.80	25.00	12.10	0.29		6.46	2.63		0.69	0.06	0.70	0.27	0.13	51.38	0.82
K	0.01	100.00		115000	117000	115000		90.00	14.10	30.00	12.10	0.29		6.49	2.61		0.68	0.06	0.69	0.28	0.13	51.45	0.82
K	0.02	100.00		115000	116000	112000		95.00	12.60	30.00	12.20	0.29		6.46	2.62		0.69	0.06	0.71	0.28	0.13	51.53	0.83
K	0.01	100.00		115000	117000	115000		95.00	12.80	25.00	12.10	0.29		6.49	2.62		0.69	0.06	0.69	0.27	0.13	51.45	0.83
K	0.02	95.00		118000	113000	114000		90.00	12.40	30.00	12.10	0.29		6.47	2.62		0.68	0.06	0.71	0.28	0.13	51.51	0.82
K	0.02	100.00		117000	113000	113000		85.00	13.50	25.00	12.20	0.29		6.48	2.61		0.68	0.06	0.70	0.28	0.12	51.46	0.83
K	0.02	95.00		114000	114000	114000		90.00	12.00	30.00	12.20	0.29		6.48	2.61		0.68	0.06	0.68	0.28	0.12	51.45	0.83
L	0.01	97.00		110000	105900	96550		88.00		137.00													
L	0.02	92.00		108000	109000	97090		79.00		135.00													
L	0.02	88.00		108000	107800	104300		78.00		133.00													
L	0.02	91.00		108000	106000	96920		82.00		134.00													
L	0.02	91.00		110000	108400	97820		80.00		137.00													
L	0.02	92.00		108000	105300	101100		88.00		134.00													
L	0.02	90.00		108000	107800	97670		79.00		132.00													
L	0.02	88.00		108000	104600	99490		77.00		135.00													
M	103.00			114000				97.00		32.00	11.70	0.30	0.02	6.74	2.51		0.69	0.08	0.70	0.26		52.10	0.85
M	103.00			117000				97.00		32.00	11.70	0.31	0.03	6.71	2.52		0.70	0.08	0.75	0.26		52.10	0.85
M	104.00			114000				97.00		33.00													
M	102.00			118000				98.00		31.00	11.80	0.30	0.02	6.64	2.50		0.67	0.08	0.74	0.26		51.80	0.83
M	100.00			118000				94.00		30.00	11.70	0.30	0.04	6.91	2.52		0.67	0.07	0.74	0.26		51.60	0.83
M	100.00			115000				89.00		33.00	11.70	0.30	0.03	6.73	2.52		0.71	0.08	0.68	0.26		52.30	0.85
M	102.00			114000				98.00		33.00	11.70	0.30	0.03	6.59	2.55		0.72	0.07	0.74	0.26		51.90	0.84
M	100.00			113000				100.00		33.00	11.60	0.30	0.03	6.71	2.52		0.70	0.08	0.76	0.25		52.10	0.86
N	0.01	86.40		115000	111000	119000	121800	90.00	12.30	37.30	12.30	0.31		6.73	2.67		0.69	0.07	0.77	0.24	0.12	53.00	0.91
N	0.01	84.70		115000	111000	120000	121500	91.00	12.10	67.90	12.30	0.30		6.73	2.67		0.69	0.07	0.78	0.24	0.12	53.00	0.91
N	0.02	84.50		116000	109000	119000	121600	84.50	12.00	40.40	12.30	0.31		6.73	2.69		0.68	0.07	0.78	0.24	0.12	53.10	0.90
N	0.02	83.40		116000	113000	118000	121000	89.00	12.70	42.00	12.20	0.30		6.71	2.66		0.70	0.07	0.77	0.24	0.12	52.80	0.91
N	0.01	84.60		117000	118000	112000	121500	91.00	12.10	45.20	12.30	0.31		6.71	2.67		0.70	0.07	0.79	0.24	0.13	53.00	0.91
N	0.01	85.80		116000	109000	120000	121000	81.50	12.20	41.50	12.30	0.31		6.69	2.67		0.69	0.07	0.80	0.24	0.12	52.90	0.89
N	0.02	83.90		116000	116000	119000	120400	93.50	12.20	37.50	12.20	0.30		6.66	2.65		0.69	0.07	0.78	0.24	0.12	52.60	0.91
N	0.01	83.70		116000	116000	119000	120400	94.50	12.00	49.50	12.30	0.30		6.65	2.66		0.71	0.07	0.77	0.23	0.13	52.60	0.89
O					117296																		
O					116412																		
O					119219																		
O					119109																		
O					118495																		
O					116533																		
O					119210																		
O					117161																		
P	0.02	98.22		112318	106478			86.60	7.85	24.77	11.84	0.33	0.03	6.25	2.59	11.66	0.68	0.06	0.70	0.22	0.14	50.65	0.81
P	0.02	98.69		110135	107991			83.17	7.16	25.69	11.80	0.31	0.03	6.22	2.59	11.48	0.66	0.06	0.70	0.24	0.15	50.84	0.81
P	0.02	97.66		110524	105954			86.33	8.14	27.48	11.82	0.33	0.03	6.22	2.58	11.51	0.68	0.06	0.70	0.25	0.15	50.25	0.81
P	0.02	97.57		111480	107129			83.80	9.11	25.72	12.02	0.32	0.03	6.32	2.65	11.44	0.68	0.06	0.71	0.29	0.14	50.96	0.82
P	0.02	98.47		110042	106330			85.83	8.06	24.50	12.00	0.33	0.03	6.31	2.67	11.75	0.70	0.06	0.72	0.26	0.15	51.32	0.83
P	0.02	96.70		109929	106851			84.66	8.53	25.61	11.91	0.34	0.03	6.28	2.63	11.89	0.69	0.06	0.71	0.26	0.14	50.72	0.82
P	0.02	98.38		112970	106802			84.30	7.83	25.24	11.87	0.32	0.03	6.32	2.62	11.90	0.69	0.07	0.70	0.28	0.14	50.55	0.82
P	0.02	99.74		109284	108711			88.17		27.13	11.80	0.30	0.03	6.28	2.60	12.13	0.66	0.06	0.70	0.22	0.13	51.40	0.82
Q	0.01	72.50		103500					11.40	33.00	12.35	0.25		6.33	2.61		0.63	0.03	0.63		0.10	51.90	0.87
Q	0.02	67.80		108500				10.40	30.00		12.15	0.26		6.28	2.61		0.64	0.02	0.61		0.09	51.70	0.86
Q	0.01	68.70		108500				10.90	32.00		12.10	0.25		6.28	2.64		0.61	0.03	0.66		0.10	51.90	0.85
Q	0.01	67.90		110000				10.70	30.00		12.30	0.24		6.27	2.63		0.60	0.02	0.61		0.10	52.00	0.85
Q	0.01	88.00		111000				12.90	39.00		12.25	0.25		6.25	2.63		0.60	0.02	0.65		0.12	51.90	0.86
R	0.03	96.00	113000					91.00	12.50	41.00	11.70	0.30		6.61	2.60		0.68	0.07		0.26	0.13	50.20	
R	0.03	99.00	113000					93.00	11.90	43.00	11.50	0.30		6.53	2.50		0.67	0.07		0.21	0.14	49.40	
R	0.02	96.00	117000					93.00	11.80	48.00	11.50	0.30		6.53	2.60		0.66	0.07		0.21	0.13	49.00	
R	0.03	99.00	118000					95.00	12.20	40.00	11.50	0.30		6.51	2.60		0.65	0.07		0.23	0.14	48.70	
R	0.02	97.00	110000					95.00	11.80	38.00	11.40	0.30		6.43	2.60		0.65	0.07		0.22	0.13	48.70	
R	0.03	100.00	114000					95.00	12.40	39.00	11.90	0.30		6.66	2.70		0.68	0.07		0.22	0.14	51.10	
R	0.03	100.00	116000					96.00	12.00	40.00	11.80	0.30		6.59	2.70		0.67	0.07		0.25	0.14	50.20	
R																							

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

**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.

**Version v0.01 replaces the original report of AMIS0050 Certification**

**Date of Version v0.01:** 26 September 2019

**Version:** v0.01

**Reason for Version v0.01:** Addition of Period of validity

**Date of Version 000:** 25 August 2008

**Version:** 000

**Certifying Officers:**



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

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



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

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

## APPENDIX

16 laboratories supplied additional M/ICP trace element data. The iterated but uncertified statistics are presented below.

	unit	mean	2SD	RSD%	n
Al	%	6.28	0.49	3.9	84
As	ppm	2.16	1.22	28.3	31
Ba	ppm	476	58.5	6.2	101
Be	ppm	6.18	0.81	6.6	64
Bi	ppm	0.269	0.11	20.6	55
Ca	%	0.199	0.05	12.1	110
Ce	ppm	48.1	3.50	3.6	53
Cr	ppm	182	34.2	9.4	110
Cs	ppm	1.31	0.17	6.6	48
Dy	ppm	3.90	0.31	3.9	47
Er	ppm	2.39	0.17	3.5	38
Eu	ppm	0.778	0.06	3.8	47
Fe	%	4.55	0.68	7.4	112
Ga	ppm	17.1	1.70	5.0	53
Gd	ppm	4.46	0.56	6.3	46
Hf	ppm	4.05	0.72	8.9	40
Ho	ppm	0.824	0.05	3.2	39
K	ppm	2.12	0.26	6.2	106
La	ppm	27.8	3.01	5.4	71
Li	ppm	32.8	8.31	12.7	76
Lu	ppm	0.390	0.02	2.4	37
Mg	%	0.391	0.06	7.9	112
Mn	ppm	507	71.4	7.0	103
Mo	ppm	5.67	1.34	11.8	84
Na	%	0.524	0.09	8.5	102
Nb	ppm	9.17	9.05	49.4	74
Nd	ppm	26.1	2.20	4.2	47
P	ppm	1130	189	8.4	72
Pr	ppm	6.69	0.68	5.1	46
Rb	ppm	75.5	7.43	4.9	46
Sb	ppm	2.27	0.27	5.9	39
Sc	ppm	17.2	1.60	4.6	55
Sm	ppm	4.79	0.34	3.6	47
Sn	ppm	2.18	0.73	16.8	52
Sr	ppm	107	9.75	4.6	93
Ta	ppm	0.695	0.63	45.3	40
Tb	ppm	0.636	0.07	5.2	40
Te	ppm	0.448	0.22	24.6	39
Th	ppm	9.06	1.02	5.6	54
Ti	%	0.269	0.12	22.9	95
Tl	ppm	0.281	0.06	10.8	38
Tm	ppm	0.377	0.05	6.0	47
V	ppm	197	34.2	8.7	111
W	ppm	1.40	0.50	17.8	45
Y	ppm	25.6	2.93	5.7	87
Yb	ppm	2.44	0.16	3.3	44
Zr	ppm	156	21.2	6.8	63