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African Mineral Standards

Certificate of Analysis

Uranium standard made from
calcretized fluvial sediment,
Langer Heinrich, Namibia

AMIS0090

Recommended Concentration and two “Between Laboratory”
Standard Deviations

Certified Concentrations*

U M/ICP	890	±	59	ppm
U XRF	903	±	42	ppm
Ba M/ICP	298	±	22	ppm
Sr M/ICP	199	±	20	ppm
V M/ICP	229	±	16.5	ppm
Zn M/ICP	49	±	5.1	ppm
Specific Gravity	2.67	±	0.18	no units

Provisional Concentrations*

Co M/ICP	6.9	±	1.2	ppm
Cr M/ICP	115	±	29	ppm
Cu M/ICP	21.6	±	5.0	ppm
Mn M/ICP	358	±	59	ppm
Ni M/ICP	70	±	9	ppm
P M/ICP	416	±	66	ppm
Zr M/ICP	46.7	±	13.6	ppm

***This material has had additional major elements certified. This data is presented on p2.
Uncertified trace element data is available as an appendix.**

**** Or, by applying a chemical conversion factor of U x 1.1793 = U₃O₈
U₃O₈ by multi acid digestion: 1050 ± 70 ppm
U₃O₈ by XRF: 1065 ± 50 ppm**

Intended use: AMIS0090 is suitable for monitoring the accuracy of a single analysis of uraniferous calcareous grit. The material can be used for routine quality control by inserting within a batch of samples.

Additional geochemical data is presented for this material that will enable its use for 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 material was supplied by Paladin Energy from their Langer Heinrich Mine, 80km east of Swakopmund in Namibia. This deposit is a "calcrete deposit"; one of the surficial uranium occurrences discovered in Southern Africa during the 1970's.

Uranium mineralization is associated with calcretization of valley-fill fluvial sediments in an extensive tertiary palaeo-channel drainage system. These sediments, also known as the Langer Heinrich Formation, comprise mainly grits and conglomerates. Detrital components include quartz- and feldspar granules, minor mica flakes as well as rock fragments derived from surrounding Proterozoic country rock.

Uranium mineralization occurs in the form of carnotite, which is a secondary uranium and vanadium mineral and has been precipitated from groundwater. Uranium as well as vanadium originates from the Proterozoic country rock, the former was most likely sourced from granites, whereas the latter was probably sourced from mafic schists.

Mineral and chemical composition:

The major element chemistry for this material has also been certified and is set out below.

Recommended Concentrations and two "Between Laboratory" Standard Deviations for the major elements are:

Al ₂ O ₃	Certified at	8.65% ± 0.12%
CaO	Certified at	13.83% ± 0.22%
Cr ₂ O ₃	Indicated mean of	0.02%
Fe ₂ O ₃	Certified at	2.24% ± 0.10%
K ₂ O	Certified at	2.68% ± 0.12%
LOI	Certified at	12.52% ± 1.04%
MgO	Certified at	1.21% ± 0.06%
MnO	Provisional mean of	0.047% ± 0.008%
Na ₂ O	Certified at	1.68% ± 0.09%
P ₂ O ₅	Certified at	0.096% ± 0.01%
S	Provisional mean of	0.065% ± 0.008%
SiO ₂	Certified at	56.50% ± 1.1%
TiO ₂	Certified at	0.26% ± 0.016%

Iterated but uncertified data for an additional 43 trace elements is set out in the Appendix.

Appearance: The material is a very fine powder. It is coloured a Very Light Grey (Corstor 5Y 8/1).

Radioactivity: Shipments of this material do not require special marking, labeling or placarding. AMIS0091 does contain U (3.3 Bq/g) and Th (0.03 Bq/g), but due to low activity concentrations it is classified as EXEMPT MATERIAL in terms of "Safety Standards Series No. TS-R-1: Regulations for the Safe Transport of Radioactive Material, International Atomic Energy Agency, 2005, para 403, Table 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. 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. Multi-acid digest, including HF, ICP- OES or ICP-MS. Multi element scan (to include U).
2. U XRF.
3. Majors (Al₂O₃, CaO, Cr₂O₃, Fe₂O₃, K₂O, MgO, MnO, Na₂O, SiO₂, TiO₂. LOI.) XRF fusion.
4. SG (gas pycnometer).

Method of certification: Twenty laboratories were each given eight randomly selected packages of sample. The results from the eighteen 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 CA
2. Activation Laboratories Pty Ltd (ActLabs) CA
3. ALS Chemex Laboratory Group Perth WA
4. ALS Chemex Laboratory Group Johannesburg SA
5. ALS Chemex Laboratory Group Vancouver CA
6. Ammtec Limited WA
7. Anglo Gold Ashanti - Vaal River Laboratory SA
8. Assayers Canada
9. Genalysis Laboratory Services WA
10. Intertek Utama Services (Indonesia)
11. Labtium Inc Finland
12. OMAC Laboratories Limited (Ireland)
13. Performance Laboratories SA
14. Set Point Laboratories (Isando) SA
15. SGS Australia Pty Ltd (Newburn) WA
16. SGS Lakefield Research Africa Pty Ltd (Booyens) SA
17. SGS Mineral Services Lakefield (Canada)
18. 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	U	U	Ba	Co	Cr	Cu	Mn	Ni	P	SG	Sr	V	Zn	Zr	Al2O3	CaO	Cr2O3	Fe2O3	K2O	LOI	MgO	MnO	Na2O	P2O5	S	SiO2	TiO2	
	M/ICP	XRF	M/ICP	M/ICP	M/ICP	M/ICP	M/ICP	M/ICP	M/ICP		M/ICP	M/ICP	M/ICP	M/ICP	XRF	XRF	XRF	XRF	XRF	%	XRF	XRF	XRF	XRF	XRF	XRF	XRF	
	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm		ppm	ppm	ppm	ppm	%	%	%	%	%	%	%	%	%	%	%	%	%	
A		886																										
A		895																										
A		891																										
A		899																										
A		895																										
A		899																										
A		896																										
A		898																										
B	877	884	301	8.0	150	36	358	73	381	2.75	189	245	49	51	8.68	13.97			2.71	11.89	1.25		1.74		0.06	57.52	0.26	
B	889	888	300	9.0	155	23	355	75	395	2.80	187	246	49	47	8.60	13.84			2.69	11.98	1.24		1.72		0.07	56.91	0.26	
B	883	892	298	9.0	148	32	357	75	390	2.79	192	245	49	49	8.63	13.83			2.69	11.96	1.24		1.72		0.07	57.18	0.25	
B	890	891	300	9.0	153	27	354	75	393	2.80	190	244	49	49	8.66	13.86			2.71	11.94	1.25		1.72		0.07	57.18	0.25	
B	881	892	294	8.0	149	26	352	74	390	2.77	195	244	50	50	8.66	13.88			2.70	11.97	1.26		1.72		0.07	57.07	0.26	
B	873	894	298	8.0	154	28	346	76	385	2.77	188	240	52	49	8.67	13.88			2.70	11.95	1.25		1.72		0.07	57.57	0.26	
B	875	893	299	8.0	149	48	352	73	392	2.78	195	243	48	50	8.73	13.95			2.72	11.91	1.28		1.74		0.07	57.53	0.26	
B	868	889	302	9.0	154	43	356	76	400	2.78	199	245	51	50	8.62	13.73			2.68	11.87	1.24		1.72		0.07	57.21	0.25	
D	904	864	307	6.1	116	21	346	74	555	2.76	191	231	49	39	8.71	13.81		2.21	2.67	12.90	1.23	0.04	1.70	0.10	0.08	57.90	0.26	
D	920	861	300	6.1	132	20	336	69	477	2.75	195	236	52	41	8.71	13.76		2.19	2.66	13.00	1.22	0.04	1.72	0.10	0.07	57.90	0.27	
D	878	863	301	5.9	131	19	337	69	515	2.76	188	225	52	39	8.74	13.83		2.21	2.67	13.00	1.24	0.04	1.71	0.10	0.06	58.00	0.27	
D	882	862	303	6.0	111	20	333	72	426	2.75	190	223	51	37	8.68	13.77		2.19	2.66	12.90	1.22	0.05	1.72	0.10	0.06	57.80	0.27	
D	899	859	307	5.9	124	23	344	70	495	2.74	191	227	49	39	8.72	13.78		2.21	2.67	13.00	1.23	0.04	1.73	0.10	0.06	57.90	0.27	
D	873	862	307	6.0	109	18	341	68	674	2.75	188	227	47	38	8.69	13.69		2.20	2.65	12.80	1.22	0.05	1.73	0.10	0.07	57.80	0.27	
D	889	854	301	6.1	106	18	332	70	570	2.75	189	228	49	39	8.72	13.76		2.20	2.67	12.70	1.23	0.04	1.71	0.10	0.06	58.00	0.27	
D	876	852	307	6.4	123	17	336	64	636	2.75	188	226	49	44	8.65	13.74		2.18	2.66	12.90	1.22	0.04	1.71	0.10	0.06	57.90	0.27	
E	928	903	413	7.1	103	34	423	94		2.60	253	238	51	34	8.58	13.67	0.02	2.25	2.51	12.82	1.15	0.05	1.60	0.09		55.76	0.25	
E	925	897	396	6.8	127	31	399	84		2.63	247	225	49	47	8.54	13.59	0.03	2.32	2.45	12.98	1.15	0.05	1.62	0.09		56.17	0.25	
E	963	900	414	7.1	112	31	404	95		2.61	262	233	51	44	8.52	13.69	0.02	2.24	2.43	12.87	1.14	0.05	1.65	0.09		55.63	0.25	
E	918	905	391	6.8	111	30	394	89		2.62	242	225	48	15	8.62	13.76	0.02	2.28	2.52	12.79	1.11	0.05	1.63	0.09		56.04	0.25	
E	938	895	411	7.2	109	35	401	86		2.59	255	229	51	45	8.63	13.69	0.03	2.27	2.47	13.17	1.14	0.05	1.64	0.09		55.98	0.25	
E	894	899	397	6.9	106	33	377	82		2.63	243	216	46	41	8.57	13.75	0.02	2.28	2.48	12.78	1.13	0.05	1.66	0.09		56.03	0.25	
E	906	904	411	6.9	100	35	401	93		2.62	252	217	50	35	8.56	13.66	0.02	2.25	2.48	12.88	1.12	0.05	1.64	0.09		55.41	0.24	
E	883	901	390	6.6	111	34	385	84		2.62	243	220	48	40	8.56	13.76	0.02	2.27	2.54	12.78	1.12	0.05	1.64	0.09		55.73	0.25	
F	870	912	258	7.0	130	26	320		370		198	218		58	8.66	13.80	0.02	2.23	2.69	12.30	1.18	0.05	1.66		0.11	56.70	0.27	
F	875	917	261	7.0	130	26	330		350		199	218		60	8.62	13.80	0.02	2.22	2.68	12.20	1.18	0.05	1.66			56.80	0.28	
F	857	915	256	7.0	130	26	320		390		196	216		59	8.64	13.80	0.02	2.22	2.69	12.20	1.19	0.05	1.68		0.11	56.70	0.27	
F	862	913	253	6.0	120	25	320		350		195	216		59	8.66	13.90	0.02	2.23	2.70	12.20	1.18	0.05	1.68		0.11	56.70	0.28	
F	849	913	263	6.0	130	24	330		320		201	221		60	8.64	13.80	0.02	2.22	2.69	12.30	1.19	0.04	1.67		0.11	56.80	0.27	
F	853	933	259	6.0	130	23	330		390		196	219		60	8.64	13.80	0.02	2.23	2.69	12.20	1.19	0.05	1.67		0.11	56.70	0.28	
F	868	905	261	7.0	130	24	330		390		199	219		59	8.61	13.90	0.03	2.23	2.68	12.30	1.18	0.04	1.66		0.11	56.70	0.26	
F	836	904	262	6.0	130	24	330		420		200	221		59	8.64	13.80	0.02	2.22	2.69	12.20	1.20	0.05	1.68		0.11	56.70	0.27	
G	870	970	310			22		61		2.64	200				8.54	13.80	0.02	2.21	2.68	13.00	1.20	0.05	1.72	0.10		55.60	0.25	
G	870	1030	300			21		60		2.64	190				8.58	13.90	0.03	2.22	2.67	12.90	1.21	0.04	1.71	0.10		55.90	0.27	
G	860	970	300			21		58		2.65	190				8.59	14.00	0.02	2.24	2.69	12.90	1.21	0.05	1.73	0.10		56.10	0.26	
G	850	990	300			21		60		2.64	190				8.61	14.00	0.02	2.26	2.70	12.90	1.21	0.04	1.73	0.10		56.50	0.27	
G	900	980	310			22		62		2.64	200				8.59	13.90	0.02	2.22	2.67	12.90	1.19	0.05	1.70	0.10		56.00	0.26	
G	860	980	300			22		57		2.64	190				8.60	14.00	0.02	2.25	2.69	12.90	1.22	0.05	1.74	0.10		56.30	0.27	
G	900	980	310			22		63		2.64	200				8.60	13.80	0.02	2.20	2.68	12.90	1.22	0.04	1.71	0.10		55.60	0.26	
G	850	1030	300			22		61		2.63	190				8.59	13.90	0.02	2.22	2.71	12.80	1.21	0.04	1.71	0.09		55.90	0.26	
H	911	941	300			20	404	67	470	2.68		231	51		13.60			2.14	2.55	12.95	1.17	0.05	1.63	0.09		55.80	0.25	
H	917	939	305			20	417	67	400	2.66		231	51		13.80			2.27	2.58	13.00	1.16	0.06	1.53	0.08		56.40	0.26	
H	917	925	304			20	407	70	530	2.68		230	50		13.80			2.28	2.58	12.98	1.18	0.06	1.63	0.09		56.80	0.26	
H	915	932	302			19	406	67	410	2.66		229	51		13.50			2.22	2.53	13.04	1.16	0.04	1.57	0.09		55.50	0.24	
H	916	935	296			20	401	68	430	2.67		229	51		13.80			2.23	2.59	13.00	1.19	0.06	1.60	0.09		56.80	0.25	
H	915	935	307			20	403	67	440	2.68		231	51		13.70			2.19	2.58	13.02	1.19	0.05	1.56	0.10		56.10	0.25	
H	916	940	302			21	403	67	500	2.67		229	51		13.80			2.22	2.59	12.84	1.17	0.04	1.65	0.09		56.60	0.25	
H	913	939	313			21	412	68	400	2.68		229	50		13.60			2.17	2.53	12.62	1.20	0.04	1.56	0.09		56.20	0.25	
I	907																											

Assay Data (cont):

Lab Code	U MICP ppm	U XRF ppm	Ba MICP ppm	Co MICP ppm	Cr MICP ppm	Cu MICP ppm	Mn MICP ppm	Ni MICP ppm	P MICP ppm	SG	Sr MICP ppm	V MICP ppm	Zn MICP ppm	Zr MICP ppm	Al2O3 XRF %	CaO XRF %	Cr2O3 XRF %	Fe2O3 XRF %	K2O XRF %	LOI %	MgO XRF %	MnO XRF %	Na2O XRF %	P2O5 XRF %	S XRF %	SiO2 XRF %	TiO2 XRF %	
N 852			309	4.0	130	29	416	71	455	2.65	198	225		41	8.60	13.91	0.02	2.64	2.57	12.90	0.97	0.05	1.50	0.07	0.06	57.40	0.24	
N 855			315	5.0	140	29	413	76	450	2.68	218	225		40	8.70	13.91	0.02	2.65	2.55	12.91	0.97	0.05	1.49	0.07	0.07	57.10	0.23	
N 841			310	9.0	124	26	411	77	460	2.68	211	225		40	8.60	13.71	0.02	2.60	2.57	12.91	0.92	0.05	1.48	0.07	0.07	56.00	0.23	
N 832			294	5.0	148	27	396	57	459	2.67	213	223		40	8.60	13.91	0.02	2.64	2.56	12.90	0.88	0.05	1.48	0.07	0.06	56.80	0.23	
N 891			320	3.0	133	28	367	63	461	2.65	214	231		46	8.70	13.91	0.02	2.63	2.56	12.84	0.90	0.05	1.50	0.07	0.06	57.00	0.23	
N 893			311	9.4	157	26	395	64	463	2.69	211	237		43	8.60	14.11	0.02	2.66	2.59	12.86	0.95	0.05	1.48	0.07	0.06	57.40	0.24	
N 851			308	5.9	113	25	391	57	481	2.68	214	221		44	8.60	13.91	0.02	2.64	2.56	12.86	0.91	0.05	1.47	0.07	0.07	56.90	0.24	
N 887			306	5.4	144	26	396	70	488	2.68	217	233		46	8.60	13.71	0.02	2.61	2.54	12.85	0.95	0.05	1.48	0.07	0.07	55.90	0.23	
O			322	6.0	97	20	348	72			185	241	53	38	8.73	14.00	0.03	2.29	2.73	12.10	1.21	0.05	1.59	0.10		57.20	0.26	
O			313	8.0	98	20	346	73			187	243	54	40	8.72	14.00	0.03	2.28	2.74	12.00	1.20	0.05	1.62	0.10		57.10	0.27	
O			316	7.0	105	22	346	72			189	240	53	37	8.67	14.00	0.05	2.29	2.69	12.10	1.20	0.05	1.61	0.10		57.00	0.27	
O			310	8.0	98	20	337	73			189	234	52	39	8.66	14.00	0.03	2.29	2.71	12.30	1.20	0.05	1.59	0.10		56.90	0.26	
O			328	8.0	103	21	341	72			188	243	50	41	8.72	14.00	0.01	2.27	2.72	12.10	1.20	0.05	1.60	0.10		57.20	0.26	
O			323	8.0	100	21	335	72			183	233	51	38	8.75	14.00	0.02	2.30	2.75	12.10	1.20	0.05	1.63	0.10		57.20	0.27	
O			300	7.0	98	21	332	67			184	231	53	40	8.62	13.90	0.03	2.27	2.71	12.20	1.18	0.05	1.55	0.10		56.60	0.27	
O			315	8.0	105	21	340	70			186	239	53	39	8.65	13.90	0.04	2.29	2.69	12.10	1.19	0.05	1.60	0.10		56.70	0.26	
P 931	920		296	10.0	200	20	362	76	500	2.80	188	230	48	48	8.68	14.00	0.02	2.24	2.69	11.70	1.21	0.05	1.64		0.07	56.75	0.26	
P 929	900	300	5.0	250	20	360	76	450	2.81	192	230	48	51	8.67	13.90	0.02	2.24	2.68	11.80	1.21	0.05	1.63		0.06	56.71	0.26		
P 934	910	287	10.0	200	22	356	74	450	2.79	191	225	52	46	8.68	14.00	0.02	2.25	2.69	11.80	1.21	0.05	1.64		0.06	56.72	0.26		
P 923	900	291	10.0	200	20	356	74	450	2.76	192	225	50	45	8.66	13.90	0.02	2.24	2.67	11.80	1.20	0.05	1.63		0.07	56.72	0.26		
P 955	900	287	10.0	250	20	356	72	450	2.75	186	230	50	44	8.67	14.00	0.02	2.24	2.68	11.70	1.21	0.05	1.63		0.07	56.69	0.26		
P 944	920	297	10.0	200	20	360	76	400	2.79	190	230	52	47	8.68	14.00	0.02	2.25	2.70	11.80	1.22	0.05	1.65		0.07	56.79	0.26		
P 934	900	290	5.0	200	22	360	74	450	2.78	191	235	50	52	8.66	14.00	0.02	2.24	2.68	11.80	1.21	0.05	1.64		0.07	56.78	0.26		
P 940	900	296	10.0	250	22	354	74	400	2.77	186	230	48	47	8.66	14.00	0.02	2.24	2.68	11.80	1.21	0.05	1.65		0.06	56.79	0.26		
Q			892	292	7.0	111	23	380	66	400	204	164	54	181	8.78	13.88	0.03	2.43	2.72	13.20	1.21	0.04	1.68	0.09		55.54	0.26	
Q			910	291	6.0	108	24	382	76	400	201	161	50	165	8.62	13.78	0.03	2.40	2.70	13.20	1.19	0.04	1.65	0.10		55.81	0.25	
Q			873	292	8.0	98	25	374	58	400	201	170	48	176	8.71	13.83	0.02	2.31	2.70	13.30	1.22	0.04	1.67	0.09		55.54	0.25	
Q			927	285	6.0	96	21	378	67	400	204	166	49	184	8.77	13.57	0.02	2.40	2.68	13.00	1.20	0.04	1.67	0.10		56.10	0.26	
Q			860	291	7.0	91	27	377	55	400	200	162	47	163	8.56	13.72	0.02	2.35	2.65	13.20	1.19	0.04	1.63	0.09		56.01	0.25	
Q			908	292	7.0	87	25	371	61	400	202	165	49	166	8.59	13.76	0.02	2.40	2.63	13.30	1.18	0.04	1.63	0.10		55.86	0.25	
Q			868	289	7.0	83	28	382	60	400	203	163	51	163	8.63	13.75	0.02	2.37	2.67	13.20	1.18	0.04	1.64	0.11		55.87	0.25	
Q			902	291	8.0	86	21	368	65	400	204	165	46	166	8.66	13.71	0.02	2.41	2.68	13.40	1.20	0.04	1.67	0.09		55.62	0.25	
R 950	927	320	6.7	136	23	369	71	440	2.55	232	249	50	56	8.66	14.20	0.02	2.17	2.79	11.65	1.10		1.73		0.07	57.00	0.26		
R 910	909	300	6.8	124	19	350	71	420	2.56	221	236	47	57	8.66	14.25	0.03	2.15	2.81	11.60	1.08		1.73		0.07	57.00	0.24		
R 870	920	290	6.9	118	21	340	69	410	2.57	210	226	45	57	8.72	14.15	0.02	2.17	2.78	11.70	1.06		1.72		0.06	56.90	0.25		
R 840	915	280	6.6	114	17	330	65	390	2.54	203	222	44	54	8.57	14.10	0.02	2.12	2.78	11.60	1.08		1.74		0.06	57.20	0.25		
R 890	917	300	6.8	121	18	348	67	410	2.56	212	230	45	55	8.62	13.90	0.02	2.09	2.77	11.75	1.08		1.71		0.07	57.20	0.25		
R 920	920	310	7.0	124	18	355	70	430	2.58	221	238	48	56	8.66	14.20	0.02	2.17	2.78	11.60	1.06		1.73		0.07	56.80	0.26		
R 850	916	280	7.0	116	19	331	66	390	2.56	206	223	44	54	8.60	14.15	0.01	2.14	2.76	11.65	1.06		1.72		0.06	56.70	0.24		
R 820	919	270	6.3	108	17	322	65	390	2.55	199	212	42	52	8.52	14.10	0.02	2.15	2.77	11.10	1.08		1.72		0.06	56.90	0.25		
S 840			290	7.0	130	21	340	73	400	2.54	209	228	47	61	8.79	13.73	0.03	2.16	2.52	12.75	1.21	0.05	1.66	0.10	0.06	56.10	0.26	
S 810			280	6.8	129	22	321	70	420	2.56	204	220	45	58	8.80	13.75	0.03	2.19	2.51	12.75	1.22	0.05	1.66	0.10	0.07	56.32	0.26	
S 850			300	6.9	115	43	342	72	430	2.55	215	239	50	56	8.70	13.77	0.03	2.17	2.50	12.70	1.23	0.05	1.65	0.10	0.07	56.22	0.25	
S 850			290	7.0	116	49	338	69	420	2.52	210	234	49	58	8.76	13.71	0.03	2.17	2.51	12.70	1.21	0.05	1.66	0.10	0.07	56.59	0.26	
S 840			300	6.9	118	55	344	78	420	2.52	211	233	48	57	8.75	13.78	0.03	2.17	2.53	12.70	1.20	0.05	1.66	0.10	0.07	56.07	0.25	
S 840			300	7.1	119	47	343	75	430	2.53	213	237	52	57	8.81	13.79	0.03	2.17	2.55	12.80	1.22	0.05	1.64	0.10	0.07	56.15	0.25	
S 820			280	7.0	125	21	322	70	410	2.56	207	220	46	60	8.77	13.74	0.03	2.17	2.53	12.75	1.22	0.05	1.65	0.10	0.06	56.31	0.26	
S 850			290	7.0	114	39	340	73	430	2.56	212	236	49	57	8.73	13.72	0.03	2.18	2.55	12.75	1.23	0.05	1.64	0.10	0.07	56.31	0.25	
T 860			300	7.1	106	26	342	70	430	2.35	205	222	40	54											0.07			
T 900			310	7.3	105	24	354	105	450	2.19	213	227	42	54											0.07			
T 900			310	7.3	104	25	354	70	450	1.86	214	235	42	53											0.07			
T 950			320	7.4	101	24	365	72	460	1.75	223	230	42	54											0.07			
T 900			300	7.3	106	23	347	69	450	2.59	212	233	43	54											0.07			
T 920			310	7.5	105	24	353	74	470	2.65	215	236	43	55											0.07			
T 9																												

11 October 2008

Certifying officers:



African Mineral Standards: _____

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



Geochemist: _____

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

APPENDIX - Uncertified trace element data from 16 laboratories

	method	unit	Mean	2SD	RSD%	n
Ag	M/ICP	ppm	0.192	0.14	5.2	77
Al	M/ICP	%	4.64	0.42	4.5	93
As	M/ICP	ppm	8.65	2.12	4.3	32
Be	M/ICP	ppm	2.01	0.34	8.2	39
Bi	M/ICP	ppm	0.367	0.079	26.3	24
Ca	M/ICP	%	9.77	0.54	2.8	99
Cd	M/ICP	ppm	0.062	0.048	8.4	77
Ce	M/ICP	ppm	30.6	3.16	7.1	71
Cl	XRF	ppm	0.046	0.024	12.3	91
Cs	M/ICP	ppm	4.53	0.42	7.8	40
Dy	M/ICP	ppm	2.26	0.69	16.3	46
Er	M/ICP	ppm	1.08	0.14	10.3	38
Eu	M/ICP	ppm	0.659	0.12	8.9	39
Fe	M/ICP	%	1.59	0.11	3.4	104
Ga	M/ICP	ppm	10.2	1.30	13.8	85
Gd	M/ICP	ppm	2.76	0.57	13.2	32
Hf	M/ICP	ppm	1.60	0.42	13.2	72
Ho	M/ICP	ppm	0.391	0.064	4.6	63
In	M/ICP	ppm	0.024	0.008	36.2	46
K	M/ICP	%	2.20	0.19	4.3	75
La	M/ICP	ppm	16.1	1.43	6.8	62
Li	M/ICP	ppm	40.8	4.84	7.0	76
Lu	M/ICP	ppm	0.143	0.038	10.7	69
Mg	M/ICP	%	0.71	0.07	5.2	108
Mo	M/ICP	ppm	2.74	0.42	5.9	92
Na	M/ICP	%	1.21	0.12	4.9	94
Nb	M/ICP	ppm	5.94	1.26	14.2	90
Nd	M/ICP	ppm	13.4	0.89	3.5	69
Pb	M/ICP	ppm	28.4	4.99	15.0	47
Pr	M/ICP	ppm	3.68	0.57	8.8	101
Rb	M/ICP	ppm	102	8.17	11.1	48
Sb	M/ICP	ppm	3.32	0.95	3.3	38
Sc	M/ICP	ppm	4.84	0.62	4.0	80
Sm	M/ICP	ppm	2.77	0.24	7.6	75
Sn	M/ICP	ppm	2.40	0.66	4.4	78
Tb	M/ICP	ppm	0.401	0.036	15.4	39
Th	M/ICP	ppm	7.45	0.52	6.4	66
Ti	M/ICP	%	0.15	0.02	6.1	99
Tl	M/ICP	ppm	0.538	0.073	6.7	39
Tm	M/ICP	ppm	0.163	0.049	38.1	37
W	M/ICP	ppm	3.25	0.46	10.6	69
Y	M/ICP	ppm	10.4	1.45	4.5	40
Yb	M/ICP	ppm	1.05	0.23	6.4	94