

# African Mineral Standards

## Certificate of Analysis

### Multi-Element Uranium Standard, Karoo Sandstone, South Africa

**AMIS0097**

Recommended Concentration and two "Between Laboratory"  
Standard Deviations

### Certified Concentrations

#### Uranium

U (M/ICP)	527	+ -	30	ppm
U (XRF)	543	+ -	32	ppm

#### Other Trace Elements

As (M/ICP)	343	+ -	40	ppm
Ba (M/ICP)	528	+ -	36	ppm
Ce (M/ICP)	72	+ -	8	ppm
Co (M/ICP)	26	+ -	2	ppm
Mo (M/ICP)	408	+ -	42	ppm
Rb (M/ICP)	64.5	+ -	7.0	ppm
Sr (M/ICP)	269	+ -	16	ppm
V (M/ICP)	81	+ -	10	ppm

#### Major Elements

Al <sub>2</sub> O <sub>3</sub>	12.32	+ -	0.50	%
CaO	5.57	+ -	0.24	%
Fe <sub>2</sub> O <sub>3</sub>	3.87	+ -	0.18	%
K <sub>2</sub> O	1.77	+ -	0.14	%
MgO	1.03	+ -	0.04	%
Mn (M/ICP)	2480	+ -	262	ppm
MnO	0.32	+ -	0.02	%
Na <sub>2</sub> O	3.78	+ -	0.30	%
P <sub>2</sub> O <sub>5</sub>	0.80	+ -	0.08	%
S	0.28	+ -	0.04	%
SiO <sub>2</sub>	63.77	+ -	2.02	%
TiO <sub>2</sub>	0.56	+ -	0.04	%

#### Other

Specific Gravity	2.73	+ -	0.12	g/cc
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\* Or, by applying a chemical conversion factor of U x 1.1793 = U<sub>3</sub>O<sub>8</sub>  
 U<sub>3</sub>O<sub>8</sub> by multi acid digestion: 621 ± 35 ppm  
 U<sub>3</sub>O<sub>8</sub> by XRF: 640 ± 38 ppm

(cont)

## ***Provisional Concentrations***

### **Major Elements**

Cr <sub>2</sub> O <sub>3</sub>	0.09	+-	0.02	%
LOI	5.82	+-	0.76	%

### **Trace Elements**

Be (M/ICP)	2.30	+-	0.50	ppm
Bi (M/ICP)	0.21	+-	0.02	ppm
Cu (M/ICP)	44	+-	6	ppm
Mo (XRF)	416	+-	64	ppm
Ni (M/ICP)	66	+-	12	ppm
Zn (M/ICP)	670	+-	98	ppm
Zr (M/ICP)	96	+-	16	ppm

## ***Indicated Mean***

Cr (M/ICP)	441	ppm
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**Intended use:** AMIS0097 is suitable for monitoring the accuracy of a single analysis of sandstone rock for the certified elements.

The material can be used for routine quality control by inserting within a batch of samples. It can also be used for method development or 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 Karoo sandstone material supplied by Uramin (Pty) Inc. from their Ryst Kuil project, situated about 60km south-east of Beaufort West, in the Western Cape Province, South Africa.

The Karoo Basin is a Permo-Triassic Gondwanaland basin. It is being explored for uranium, which occurs in basal sandy members of upward fining megacycles in the Adelaide Subgroup of the Beaufort Group. The host rock comprises a fine-grained greywacke to mud pebble conglomerate, containing ore grade, organic rich, pods.

The geology and associated mineralization is described in "Le Roux, J.P., and Toens, P.D.. (1986). A review of the uranium occurrences in the Karoo Sequence, South Africa. Anhauser, C.R., and Maske, S. (Eds) (1986). *Mineral Deposits of Southern Africa. Vol II, 2119-2134.*

**Mineral and chemical composition:** The host greywackes are composed of quartz, feldspar and rock fragments in equal proportions. The principle ore mineral is coffinite, with minor amounts of urano-organic compounds and rare uraninite, occurring with pyrite, arsenopyrite and molybdenum sulphide.

The uncertified major and trace element chemical composition are presented in the appendix to this certificate.

**Appearance:** The material is a very fine Pale Greenish Yellow coloured powder (Corstor 5Y 8/2)

**Radioactivity:** Shipments of this material do not require special marking, labeling or placarding. AMIS0097 does contain U (6.8 Bq/g) and Th (0.05 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. Majors ( Al<sub>2</sub>O<sub>3</sub>, CaO, Cr<sub>2</sub>O<sub>3</sub>, Fe<sub>2</sub>O<sub>3</sub>, K<sub>2</sub>O, MgO, MnO, Na<sub>2</sub>O, SiO<sub>2</sub>, TiO<sub>2</sub>. LOI. ) ICP fusion.
3. U and Mo, 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.

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. Amdel Limited, (Perth, Australia).
7. Anglo Research (Crown Campus, South Africa).
8. Assayers Canada, (Vancouver).
9. Genalysis Laboratory Services ( Pty ) Ltd., (Australia).
10. Geoscience Laboratories, (Geo Labs, Sudbury, Canada).
11. Labtium Inc. ( Finland )
12. Mintek (South Africa)
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 Welshpool (Australia).
18. Ultra Trace ( Pty ) Ltd. (Australia)

**Assay Data:** Data for elements given "Certified Concentrations" as received from the laboratories is set out below. Additional data is available on request. A proficiency report will be sent to the managers of the participating laboratories.

Lab Code	Al2O3 %	As ppm	Ba ppm	CaO %	Ce ppm	Co ppm	Fe2O3 %	K2O %	MgO %	Mn ppm	MnO %	Mo ppm	Na2O %	P2O5 %	Rb ppm	S %	SiO2 %	Sr ppm	TiO2 %	U ppm	U(XRF) ppm	Zn ppm	SG g/cc	
A												312										535	2.70	
A												318											538	2.71
A												324											529	2.74
A												328											527	2.73
A												308											531	2.72
A												320											509	2.71
A												325											518	2.72
A												332											531	2.73
B	12.86	343	541	5.88	76	26	4.06	1.81	1.06	2393	0.34	416	3.90	0.84	64.20	0.26	60.51	273	0.59	552		664		
B	12.42	336	511	5.66	73	26	3.91	1.73	1.02	2322	0.33	397	3.76	0.82	62.50	0.26	62.51	261	0.57	536		650		
B	12.52	336	535	5.69	73	26	3.95	1.76	1.03	2336	0.33	398	3.79	0.82	63.50	0.26	62.14	268	0.57	525		649		
B	12.56	333	528	5.74	72	25	3.97	1.76	1.04	2343	0.34	400	3.79	0.84	62.80	0.26	61.83	266	0.58	531		637		
B	12.53	343	531	5.71	75	26	3.97	1.76	1.04	2448	0.34	407	3.77	0.82	66.30	0.25	61.85	275	0.57	545		660		
B	12.45	319	530	5.67	75	28	3.93	1.76	1.02	2555	0.33	410	3.75	0.82	66.50	0.25	62.16	278	0.57	546		658		
B	12.35	318	531	5.60	74	27	3.89	1.73	1.02	2488	0.33	410	3.72	0.81	64.40	0.26	62.92	274	0.57	548		654		
B	12.41	344	527	5.66	74	26	3.91	1.73	1.02	2444	0.33	403	3.75	0.81	64.30	0.25	62.45	271	0.57	547		643		
C	12.37	346	532	5.63	84	25	3.81	1.79	1.03	2601	0.34	426	3.70	0.83	64.37	0.27	64.71	261	0.56	542	565	707	2.79	
C	12.35	357	539	5.60	84	25	3.80	1.78	1.03	2513	0.33	432	3.69	0.83	64.85	0.27	64.76	267	0.56	543	560	690	2.78	
C	12.37	347	526	5.61	83	25	3.82	1.78	1.03	2493	0.33	424	3.69	0.83	64.13	0.27	64.81	260	0.56	541	569	690	2.78	
C	12.28	340	545	5.59	82	25	3.78	1.78	1.03	2576	0.33	431	3.68	0.83	66.50	0.27	64.49	268	0.55	525	554	704	2.79	
C	12.28	336	546	5.59	83	25	3.78	1.78	1.02	2597	0.33	422	3.69	0.82	63.59	0.27	64.42	261	0.55	517	572	702	2.79	
C	12.35	343	539	5.59	82	25	3.81	1.78	1.03	2580	0.33	429	3.68	0.82	66.21	0.27	64.66	268	0.56	524	556	700	2.77	
C	12.33	349	559	5.60	84	25	3.80	1.79	1.03	2591	0.34	437	3.70	0.82	65.50	0.28	64.61	266	0.56	554	559	695	2.76	
C	12.29	344	533	5.57	85	25	3.77	1.77	1.02	2550	0.33	422	3.66	0.82	64.61	0.27	64.38	261	0.55	540	555	690	2.78	
D																							550	
D																							548	
D																							547	
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D																							542	
D																							545	
D																							552	
E	12.37			5.73	71	24	3.98	1.81	1.01		0.35		3.94	0.86	62.10		64.67		0.55			570	549	
E	11.98			5.67	70	25	3.88	1.79	1.01		0.34		3.95	0.82	63.10		63.31		0.56			569	575	
E	12.26			5.70	71	24	3.98	1.80	1.02		0.34		3.88	0.85	62.60		64.32		0.54			567	566	
E	12.15			5.69	69	23	3.91	1.81	1.01		0.34		3.93	0.84	59.40		63.87		0.56			569	532	
E	12.34			5.72	72	25	3.95	1.82	1.02		0.34		3.86	0.84	62.50		64.45		0.55			569	580	
E	12.18			5.69	70	25	3.95	1.77	1.02		0.34		3.81	0.82	63.00		63.95		0.55			569	553	
E	12.27			5.34	70	25	3.85	1.83	0.97		0.32		3.97	0.77	63.20		64.85		0.53			568	570	
E	12.28			5.70	72	25	3.96	1.82	1.03		0.34		3.86	0.85	63.50		64.50		0.55			572	584	
F	12.60	353	526	5.64		25	3.80	1.78	1.01	2240	0.32	387	3.82	0.84	64.90	0.27	65.70	271	0.59	496	525	643		
F	12.70	352	553	5.66		25	3.95	1.79	1.01	2250	0.32	393	3.80	0.84	63.70	0.27	65.70	266	0.59	524	516	661		
F	12.60	348	521	5.64		25	3.95	1.79	1.02	2240	0.32	383	3.81	0.83	64.40	0.27	65.50	272	0.59	493	551	643		
F	12.60	338	508	5.63		25	3.94	1.77	1.02	2260	0.32	375	3.80	0.83	63.40	0.27	65.50	264	0.59	495	554	618		
F	12.60	356	530	5.65		26	3.94	1.78	1.02	2250	0.32	393	3.79	0.84	64.70	0.27	65.60	274	0.59	511	516	646		
F	12.50	334	522	5.59		25	3.91	1.77	1.01	2280	0.32	384	3.78	0.83	62.50	0.27	65.10	260	0.58	496	512	638		
F	12.70	356	537	5.68		26	3.97	1.80	1.01	2270	0.32	401	3.80	0.83	66.60	0.27	65.80	280	0.60	515	523	661		
F	12.50	355	533	5.61		25	3.93	1.77	1.02	2280	0.32	396	3.80	0.83	66.20	0.27	65.40	278	0.58	520	500	653		
G	12.14	339	529	5.54	69	28	4.04	1.79	1.10	2717	0.31	457	3.45	0.81	72.52	0.31	61.31	277	0.56	540		772		
G	12.10	331	528	5.39	68	29	3.96	1.86	1.06	2695	0.30	440	3.82	0.74	74.93	0.30	61.07	281	0.55	539		740		
G	12.49	342	529	5.60	68	27	3.96	1.83	1.05	2732	0.31	445	3.53	0.80	72.32	0.31	60.90	281	0.57	540		742		
G	12.37	340	527	5.56	68	28	3.82	1.88	1.03	2704	0.31	444	3.88	0.81	72.63	0.30	62.63	278	0.55	536		729		
G	12.66	335	527	5.69	67	28	3.92	1.96	1.07	2712	0.32	438	4.02	0.82	73.42	0.30	62.56	277	0.57	532		747		
G	12.30	332	529	5.58	68	28	3.75	1.97	1.02	2712	0.32	446	3.97	0.82	74.95	0.30	62.50	283	0.56	542		740		
G	12.32	340	532	5.57	68	27	3.75	1.97	1.01	2648	0.31	442	3.95	0.81	71.41	0.30	61.78	278	0.55	538		742		
G	12.10	346	525	5.44	68	27	3.76	1.95	1.01	2683	0.31	447	3.91	0.75	70.93	0.31	64.58	280	0.55	535		736		
H	12.50	366	564	5.59		28	3.84	1.67	0.87	2570	0.31	409	3.91	0.81			64.60	267	0.55			691		
H	12.50	357	556	5.59		28	3.81	1.65	0.86	2420	0.30	405	3.90	0.80			64.30	273	0.55			689		
H	12.50	361	558	5.57		28	3.80	1.65	0.84	2530	0.30	407	3.95	0.80			64.40	262	0.55			682		
H	12.40	363	570	5.54		28	3.77	1.64	0.85	2560	0.30	409	3.81	0.79			63.90	269	0.55			697		
H	12.50	365	559	5.57		28	3.81	1.63	0.88	2550	0.30	410	3.90	0.79			64.20	269	0.53			689		
H	12.50	366	551	5.55		27	3.80	1.64	0.89	2550	0.31	408	3.89	0.79			64.10	268	0.54			697		
H	12.40	370	554	5.61		27	3.83	1.64	0.86	2550	0.30	409	3.90	0.80			64.20	268	0.55			691		
H	12.50	361	557	5.59		27	3.83	1.65	0.88	2570	0.31	410	3.91	0.80			64.20	262	0.54			694		
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J	11.75	279	490	5.40		42	3.98	1.69	0.67	2340	0.29	415	3.50	0.74		0.29	64.59	310	0.54					

**Assay data (cont)**

Lab Code	Al2O3 %	As ppm	Ba ppm	CaO %	Ce ppm	Co ppm	Fe2O3 %	K2O %	MgO %	Mn ppm	MnO %	Mo ppm	Na2O %	P2O5 %	Rb ppm	S %	SiO2 %	Sr ppm	TiO2 %	U ppm	U(XRF) ppm	Zn ppm	SG g/cc	
L	12.10	353	499	5.54	67	24	3.87		1.03	2460	0.33	388			63.20		63.50	267	0.56	514	541	713		
L	12.20	356	506	5.53	61	24	3.88		1.02	2520	0.33	389			61.00		63.70	260	0.55	510	535	723		
L	12.10	349	481	5.55	55	24	3.87		1.02	2390	0.33	393			54.40		63.60	247	0.56	536	539	701		
L	12.10	361	504	5.54	65	24	3.86		1.02	2480	0.33	402			63.60		63.40	274	0.55	515	538	712		
L	12.10	350	504	5.53	62	24	3.87		1.02	2450	0.33	384			61.00		63.50	262	0.55	514	544	699		
L	12.10	360	509	5.55	59	25	3.88		1.01	2460	0.33	395			60.30		63.50	261	0.56	518	547	720		
L	12.20	355	504	5.57	59	24	3.88		1.02	2480	0.33	389			57.80		63.60	254	0.56	525	536	711		
L	12.20	354	481	5.54	52	23	3.87		1.02	2360	0.33	383			59.00		63.60	237	0.55	511	548	692		
M	12.50	349	542	5.61	73	30	3.92	1.76	1.05	2580	0.34		3.68		64.00	0.29	63.87	265	0.56	536		690		
M	12.40	348	547	5.62	74	30	3.92	1.76	1.05	2600	0.33		3.67		71.20	0.29	63.89	273	0.56	535		714	2.75	
M	12.50	346	548	5.61	73	30	3.91	1.76	1.05	2570	0.33		3.66		68.40	0.28	63.86	266	0.55	536		690	2.75	
M	12.40	368	545	5.62	73	30	3.91	1.75	1.04	2650	0.33		3.66		66.80	0.29	63.90	276	0.55	531		692	2.74	
M	12.40	353	545	5.64	73	30	3.92	1.75	1.05	2630	0.33		3.65		69.40	0.30	63.87	268	0.55	524		702	2.73	
M	12.40	344	555	5.61	72	30	3.92	1.77	1.05	2570	0.34		3.69		67.80	0.29	63.92	269	0.56	527		688	2.74	
M	12.40	356	543	5.62	73	25	3.91	1.76	1.05	2600	0.33		3.66		66.80	0.29	63.97	269	0.56	519		702	2.75	
M	12.50	369	540	5.60	75	30	3.90	1.76	1.05	2570	0.33		3.67		68.60	0.28	63.91	283	0.56	523		690	2.74	
N	14.90			4.49	67	21	3.42	2.40	1.08		0.28		4.86	0.79					0.58				738	
N	14.40			4.56	68	21	3.45	2.31	1.08		0.28		4.61	0.80					0.57				738	
N	15.40			4.79	70	22	3.58	2.42	1.11		0.29		5.07	0.80					0.60				747	
N	14.10			4.41	65	21	3.32	2.28	1.05		0.27		4.54	0.77					0.55				717	
N	14.70			4.70	69	21	3.48	2.30	1.09		0.28		4.75	0.81					0.58				751	
N	14.20			4.83	68	24	3.55	2.27	1.08		0.29		4.47	0.81					0.58				740	
N	13.50			5.03	68	24	3.70	2.09	1.06		0.30		4.23	0.82					0.57				745	
N	13.50			5.15	67	23	3.66	1.97	1.04		0.29		4.14	0.83					0.58				769	
O	11.77			5.30			3.76		1.16		0.36			0.85			81.50		0.62				2.81	
O	11.66			5.36			3.67		1.18		0.37			0.85			83.86		0.63				2.85	
O	11.93			5.48			3.87		1.36		0.40			0.92			87.92		0.68				2.88	
O	11.96			5.21			3.75		1.39		0.39			0.85			81.72		0.67				2.89	
O	11.91			5.61			3.96		1.51		0.44			0.94			87.49		0.73				2.81	
O	11.45			5.37			3.93		1.59		0.43			0.92			81.08		0.72				2.84	
O	11.59			5.30			3.77		1.26		0.39			0.89			82.79		0.65				2.85	
O	11.55			5.54			3.85		1.41		0.41			0.94			86.64		0.68				2.85	
P	13.19	432	530	5.40	109	26	3.79	1.87	1.03	2430		424	3.79		94.60	0.31		289	0.56	510		746		
P	13.08	431	520	5.32	110	25	3.75	1.87	1.01	2400		418	3.79		93.10	0.31		288	0.55	500		740		
P	13.68	428	530	5.48	112	25	3.86	1.92	1.04	2480		434	3.99		96.20	0.32		301	0.57	530		761		
P	13.06	428	530	5.43	112	25	3.82	1.82	1.03	2450		428	3.77		93.90	0.31		284	0.56	520		741		
P	13.68	457	560	5.76	119	27	4.00	1.92	1.06	2590		457	3.92		100.50	0.32		298	0.58	530		771		
P	13.34	436	530	5.51	111	25	3.83	1.86	1.03	2460		429	3.80		94.20	0.31		288	0.57	510		757		
P	13.97	459	540	5.60	114	26	3.93	1.93	1.08	2530		441	4.00		96.80	0.32		308	0.59	550		776		
P	14.17	434	560	5.79	115	26	4.03	1.96	1.09	2590		450	4.02		99.00	0.33		307	0.58	530		788		
Q	12.69	366	530	5.39	71	24	3.79	1.71	1.00	2380	0.32	412	3.64	0.74	64.00	0.31	63.74	295	0.58	520	534	662	2.53	
Q	12.68	304	530	5.38	80	27	3.80	1.72	1.00	2550	0.32	410	3.65	0.74	62.40	0.29	63.79	279	0.57	510	533	679	2.54	
Q	12.75	299	510	5.38	77	26	3.78	1.72	0.99	2420	0.32	391	3.63	0.74	59.60	0.28	63.65	268	0.57	480	524	643	2.56	
Q	12.68	286	500	5.36	73	24	3.81	1.72	1.00	2400	0.32	388	3.63	0.74	56.40	0.27	63.71	264	0.57	480	525	650	2.59	
Q	12.73	304	530	5.39	74	25	3.78	1.71	1.00	2390	0.32	382	3.63	0.74	56.00	0.27	63.73	270	0.57	470	522	664	2.56	
Q	12.71	299	550	5.36	74	25	3.78	1.72	1.01	2460	0.32	425	3.63	0.74	71.40	0.30	63.65	302	0.58	540	522	691	2.63	
Q	12.71	295	520	5.37	75	24	3.79	1.72	1.00	2510	0.32	409	3.64	0.74	57.70	0.29	63.67	275	0.58	500	534	642	2.56	
Q	12.73	299	500	5.38	72	26	3.80	1.73	1.00	2350	0.32	398	3.63	0.74	63.90	0.29	63.69	274	0.58	510	522	670	2.63	
R	12.15	367	510	5.55	74	26	3.61	1.77	0.89	2330	0.30	389	4.05		62.40	0.27	64.30	264	0.58	363	500	667	2.52	
R	12.35	359	500	5.69	73	25	3.79	1.80	0.91	2230	0.31	376	4.08		65.50	0.26	63.80	255	0.58	388	490	645	2.54	
R	12.20	395	560	5.57	66	26	3.69	1.78	0.89	2500	0.30	420	4.03		62.20	0.29	64.00	284	0.57	402	490	716	2.53	
R	12.30	370	510	5.68	72	25	3.75	1.82	0.92	2310	0.31	389	4.07		65.80	0.27	64.00	260	0.58	388	490	667	2.55	
R	12.30	387	540	5.67	72	25	3.71	1.82	0.88	2440	0.31	409	4.09		63.10	0.29	64.80	278	0.58	420	490	685	2.54	
R	12.25	367	500	5.62	70	26	3.70	1.79	0.88	2270	0.31	382	4.08		65.20	0.27	64.00	259	0.57	397	490	656	2.53	
R	12.25	381	530	5.51	76	27	3.73	1.76	0.90	2370	0.30	402	4.14		69.10	0.28	63.80	272	0.56	460	510	676	2.53	
R	12.10	369	510	5.54	74	26	4.01	1.74	0.90	2310	0.30	392	3.98		66.90	0.28	63.50	264	0.56	387	510	663	2.52	
S																							527	
S																							539	
S																							537	
S																							539	
S																							534	
S																							539	
S																							540	
S																							541	
T	12.35	323	540	5.69	74	25	3.94	1.77	1.02	2569	0.32	378	3.65	0.79	61.00		63.43	272	0.55	516		751	2.66	
T	12.18	315	530	5.57	72	25	3.99	1.73	1.01	2611	0.31	374	3.59	0.77	60.90		63.78	273	0.54	502		747	2.64	
T	12.26	322	545	5.58	72	24	3.92	1.74	1.01	2620	0.31	378	3.62	0.77	67.20		63.26	281	0.55	527		723	2.71	
T	12.37	327	523	5.57	71	24	3.92	1.76	1.03	2710	0.32	381	3.69	0.74	63.70		63.26	275	0.54	498		712	2.63	
T	12.35	325	519	5.63																				

**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.

31 January 2008

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**Barry W. Smee**  
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## APPENDIX

### Trace element statistics.

This additional AMIS0097 trace element chemistry has been calculated, from data submitted by sixteen of the laboratories, from the eight samples sent to each lab. Uncertified but iterated statistics from this data are:

#### Uncertified trace element statistics

	mean	2SD	RSD%	n
Ag	0.2	0.3	60.4	50
Cd	2.0	1.2	30.0	88
Cs	2.9	0.3	4.6	59
Dy	4.1	0.3	4.1	47
Er	2.4	0.3	6.2	46
Eu	1.2	0.2	7.9	43
Ga	15.4	1.7	5.6	61
Gd	4.8	0.3	2.8	36
Hf	3.1	1.2	18.7	56
Ho	0.8	0.1	5.3	40
In	0.05	0.0	9.3	48
La	36.9	3.7	5.0	78
Li	31.7	3.3	5.1	84
Lu	0.3	0.2	23.9	72
Nb	10.2	1.0	4.8	75
Nd	31.8	3.4	5.3	46
Pb	48.1	7.2	7.5	79
Pr	8.5	1.6	9.3	39
Re	0.2	0.0	6.6	54
Sb	14.4	2.8	9.8	85
Sc	8.8	1.5	8.4	70
Sm	5.7	0.8	7.1	46
Sn	2.9	0.4	6.1	68
Ta	1.0	0.5	24.9	77
Tb	0.7	0.1	4.2	38
Th	12.4	1.6	6.5	70
Tl	2.7	0.5	9.4	76
W	3.1	0.4	6.6	56
Y	22.8	4.1	9.0	93
Yb	2.5	0.2	3.1	47