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

African Mineral Standards

Vanadium bearing Titaniferous Iron Ore Standard
Rooiwater Complex
South Africa

AMIS0129

Certificate of Analysis

Recommended Concentration and two "Between Laboratory" Standard Deviations

Certified Concentrations

Al_2O_3	2.75	±	0.10	%
CaO	0.80	±	0.02	%
Fe_2O_3	62.31	±	0.50	%
MgO	2.07	±	0.18	%
MnO	0.36	±	0.02	%
SiO_2	9.57	±	0.24	%
TiO_2	22.94	±	0.70	%
V_2O_5	0.48	±	0.04	%

Provisional Concentration

LOI*	-1.51	±	0.24	%

Indicated Means

Cr_2O_3	0.03	%
K_2O	0.02	%
Na_2O	0.03	%

*(*note this is a "Gain On Ignition", see addendum p5)*

Intended use: AMIS0129 is suitable for monitoring the accuracy of a single analysis of vanadium bearing titaniferous iron ores. 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 Tivani (Pty) Ltd. from an exploration project in the late-Archean Rooiwater Complex situated in the eastern sector of the Murchison Range 10km north of Gravelotte in the Limpopo Province of South Africa. The material was collected off stockpiles resulting from exploration development into vanadium-bearing, Ti-magnetite rich layers that are present within the upper portion of the mafic Novengilla Gabbro Suite.

Mineral and chemical composition: The two major titaniferous magnetite layers are relatively pure, containing minor chlorite towards the edges. The upper layer contains minor appetite. The ore comprises smaller ilmenite crystals located interstitially between larger Ti-magnetite crystals.

Ref; Reynolds, I.M. (1986). Vanadium-bearing titaniferous iron ores of the Rooiwater Complex, NorthEastern Transvaal. In Anhauser, C.R., and Maske, S. (eds) (1986), Mineral Deposits of Southern Africa, 451-460.

Appearance: The material is a very fine powder coloured Dark Grey (Corstor Colour Guage).

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. LOI 1000C.
2. Majors (Al_2O_3, CaO, Cr_2O_3, Fe_2O_3, K2O, MgO, MnO, Na_2O, SiO_2, TiO_2, V_2O_5.) XRF fusion.

Method of certification: Twelve laboratories were each given eight randomly selected packages of sample. The results from the ten 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. Activation Laboratories Ltd., (ActLabs, Ancaster, ON, Canada).
2. ALS Chemex, (Perth, Australia).
3. ALS Chemex, (Vancouver, Canada).
4. Genalysis Laboratory Services (Pty) Ltd., (Australia).
5. Geoservice Centre, Geolaboratory, (GTK. Finland).
6. Pt Intertek Utama Services (Intertek, Indonesia)
7. Set Point Laboratories (Pty) Ltd (South Africa)
8. SGS Lakefield Research (Canada)
9. SGS Welshpool (Australia).
10. 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	Al2O3 XRF %	CaO XRF %	Cr2O3 XRF %	Fe2O3 XRF %	K2O XRF %	LOI %	MgO XRF %	MnO XRF %	Na2O XRF %	SiO2 XRF %	TiO2 XRF %	V2O5 XRF %
A	2.75	0.80	0.04	62.40	0.02	-1.68	2.07	0.35	0.05	9.53	22.90	0.46
A	2.76	0.80	0.04	62.30	0.02	-1.62	2.07	0.35	0.05	9.53	22.80	0.46
A	2.76	0.80	0.04	62.40	0.02	-1.65	2.06	0.35	0.06	9.56	22.80	0.45
A	2.75	0.79	0.04	62.30	0.02	-1.66	2.08	0.35	0.05	9.54	22.80	0.46
A	2.77	0.80	0.03	62.20	0.02	-1.64	2.07	0.35	0.05	9.60	22.90	0.45
A	2.74	0.79	0.03	62.40	0.02	-1.66	2.07	0.35	0.04	9.53	22.90	0.46
A	2.75	0.80	0.04	62.40	0.02	-1.64	2.07	0.35	0.05	9.54	22.80	0.46
A	2.73	0.80	0.04	62.40	0.02	-1.66	2.07	0.35	0.06	9.55	22.80	0.46
B												
B												
B												
B												
B												
B												
B												
B												
C	2.86	0.79	0.03	62.77	0.05		2.14	0.36	0.08	9.44	22.49	0.24
C	2.83	0.80	0.03	62.65	0.09		2.17	0.36	0.11	9.36	22.47	0.27
C	2.87	0.80	0.03	62.73	0.05		2.15	0.36	0.09	9.47	22.58	0.23
C	2.86	0.81	0.03	62.50	0.04		2.15	0.36	0.06	9.44	22.57	0.28
C	2.80	0.78	0.03	62.39	0.05		2.13	0.36	0.06	9.40	22.52	0.20
C	2.78	0.81	0.03	62.82	0.04		2.14	0.36	0.05	9.78	22.72	0.18
C	2.83	0.79	0.03	62.34	0.05		2.14	0.36	0.12	9.44	22.42	0.21
C	2.81	0.79	0.03	62.47	0.03		2.16	0.36	0.07	9.41	22.51	0.18
D	2.75	0.83	0.07	62.10	0.02	-1.65	1.88	0.29	0.04	9.60	23.00	0.57
D	2.73	0.83	0.01	62.20	0.02	-1.39	1.89	0.32	0.04	9.49	23.10	0.57
D	2.74	0.83	0.01	62.10	0.02	-1.93	1.91	0.32	0.03	9.61	23.10	0.57
D	2.75	0.84	0.00	62.20	0.02	-1.78	1.90	0.32	0.03	9.60	23.00	0.57
D	2.78	0.83	0.02	62.20	0.02	-2.56	1.91	0.31	0.02	9.61	23.00	0.57
D	2.78	0.85	0.00	62.20	0.02	-1.93	1.90	0.32	0.03	9.53	23.00	0.57
D	2.74	0.84	0.01	62.10	0.02	-1.68	1.92	0.32	0.03	9.68	23.00	0.57
D	2.76	0.84	0.01	62.30	0.02	-1.62	1.91	0.32	0.03	9.60	22.90	0.57
E	2.82	0.81		62.25	0.03	-1.46	2.01	0.36	0.12	9.63	22.62	0.07
E	2.82	0.80		62.08	0.03	-1.46	2.01	0.36	0.13	9.66	22.54	0.07
E	2.82	0.80		61.94	0.03	-1.46	2.00	0.36	0.13	9.62	22.73	0.09
E	2.83	0.80		62.04	0.03	-1.47	2.01	0.36	0.12	9.69	22.68	0.07
E	2.83	0.81		61.93	0.03	-1.48	2.01	0.36	0.13	9.63	22.81	0.07
E	2.82	0.81		62.19	0.03	-1.48	2.01	0.36	0.12	9.66	23.15	0.09
E	2.80	0.81		61.98	0.03	-1.47	2.01	0.36	0.12	9.68	23.01	0.09
E	2.81	0.81		62.23	0.03	-1.47	2.00	0.36	0.12	9.65	22.88	0.09

Assay Data (cont):

Lab Code	Al2O3 XRF %	CaO XRF %	Cr2O3 XRF %	Fe2O3 XRF %	K2O XRF %	LOI %	MgO XRF %	MnO XRF %	Na2O XRF %	SiO2 XRF %	TiO2 XRF %	V2O5 XRF %
F	2.73	0.81	0.03	61.91	0.02	-1.49	2.10	0.36	0.02	9.62	23.46	0.49
F	2.71	0.80	0.03	61.65	0.02	-1.48	2.10	0.35	0.03	9.76	23.37	0.49
F	2.71	0.80	0.03	61.50	0.02	-1.50	2.09	0.35	0.02	9.61	23.31	0.49
F	2.73	0.81	0.03	61.91	0.02	-1.49	2.10	0.36	0.02	9.58	23.47	0.49
F	2.71	0.80	0.03	61.81	0.02	-1.49	2.10	0.36	0.02	9.50	23.44	0.49
F	2.73	0.80	0.03	62.04	0.02	-1.48	2.11	0.36	0.02	9.54	23.48	0.49
F	2.74	0.84	0.03	61.98	0.03	-1.48	2.10	0.36	0.03	9.75	23.48	0.49
F	2.72	0.80	0.03	61.95	0.02	-1.48	2.10	0.36	0.02	9.56	23.48	0.49
G	2.68	0.79	0.03	63.00	0.01		1.97	0.38		9.37	23.10	0.51
G	2.65	0.80	0.03	62.80	0.01		1.98	0.38		9.41	23.10	0.50
G	2.71	0.80	0.04	62.40	0.02		1.99	0.37		9.24	23.00	0.50
G	2.64	0.79	0.03	62.30	0.02		1.95	0.37		9.24	22.90	0.50
G	2.66	0.79	0.04	62.60	0.02		1.97	0.38		9.33	23.00	0.50
G	2.72	0.80	0.03	62.90	0.02		1.99	0.38		9.44	23.20	0.50
G	2.65	0.80	0.05	62.70	0.03		2.02	0.39		9.38	23.10	0.50
G	2.69	0.81	0.05	60.83	0.03		1.97	0.38		9.38	23.10	0.50
H	2.71	0.73	0.02	60.83	0.02		2.20	0.30		9.95	22.26	0.51
H	2.71	0.73	0.02	60.82	0.02		2.22	0.31		9.94	22.25	0.51
H	2.69	0.74	0.02	60.80	0.01		2.19	0.31		9.93	22.29	0.50
H	2.70	0.73	0.02	60.76	0.02		2.21	0.31		9.92	22.30	0.50
H	2.69	0.74	0.02	60.98	0.02		2.23	0.31		9.93	22.32	0.50
H	2.67	0.74	0.02	60.87	0.01		2.18	0.31		9.84	22.27	0.50
H	2.70	0.73	0.02	60.93	0.02		2.20	0.30		9.90	22.29	0.51
H	2.68	0.73	0.02	63.59	0.02		2.20	0.31		9.89	22.27	0.50
I	2.40	0.84		63.70		-1.42		0.36	0.11	7.94	22.76	0.48
I	2.40	0.86		64.89		-1.42		0.35	0.11	8.61	22.88	0.48
I	2.40	0.83		64.55		-1.40		0.35	0.10	8.24	23.20	0.50
I	2.40	0.82		65.30		-1.43		0.35	0.11	8.03	23.12	0.49
I	2.40	0.90		65.26		-1.44		0.36	0.11	8.59	23.37	0.51
I	2.45	0.84		64.69		-1.43		0.35	0.12	8.20	23.30	0.51
I	2.39	0.88		64.37		-1.43		0.35	0.11	9.34	23.19	0.50
I	2.42	0.89				-1.42		0.35	0.11	9.09	23.07	0.49
J	2.72	0.80	0.03	62.30	0.02	-1.70	2.07	0.35	0.04	9.59	23.00	0.48
J	2.74	0.80	0.03	62.30	0.02	-1.67	2.07	0.35	0.03	9.58	22.90	0.47
J	2.73	0.80	0.03	62.40	0.02	-1.70	2.07	0.35	0.04	9.60	22.90	0.48
J	2.71	0.80	0.03	62.30	0.02	-1.75	2.07	0.35	0.04	9.60	22.90	0.48
J	2.71	0.80	0.03	62.30	0.02	-1.71	2.07	0.35	0.03	9.60	22.90	0.48
J	2.74	0.79	0.03	62.40	0.02	-1.82	2.08	0.35	0.04	9.60	23.00	0.48
J	2.74	0.79	0.03	62.30	0.02	-1.83	2.08	0.35	0.03	9.63	23.00	0.47
J	2.71	0.80	0.04	62.40	0.02	-1.71	2.08	0.35	0.03	9.59	22.90	0.48
K												
K												
K												
K												
K												
K												
K												
K												
L	2.76	0.81	0.04	62.00	0.02	-1.31	2.09	0.35	0.05	9.39	23.10	0.45
L	2.78	0.79	0.03	62.30	0.02	-1.36	2.14	0.37	0.03	9.39	23.30	0.45
L	2.79	0.79	0.03	62.50	0.02	-1.31	2.15	0.35	0.04	9.52	23.30	0.45
L	2.76	0.79	0.04	62.60	0.02	-1.36	2.16	0.37	0.04	9.54	23.40	0.45
L	2.84	0.79	0.04	62.60	0.01	-1.39	2.17	0.36	0.04	9.63	23.30	0.44
L	2.72	0.81	0.04	62.60	0.02	-1.42	2.15	0.36	0.04	9.51	23.40	0.46
L	2.86	0.83	0.05	62.50	0.02	-1.39	2.17	0.36	0.04	9.74	23.50	0.46
L	2.78	0.81	0.04	62.60	0.01	-1.49	2.16	0.36	0.04	9.54	23.40	0.44

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.

29 January 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.)

ADDENDUM: This is a corrected version of the original certificate where Loss on Ignition (LOI) was incorrectly stated as 1.51%. This should have been written -1.51%. We appologise for the mistake and thank the alert lab manager that pointed the error out to us.

Mike McWha
3 September 2008