

COAL CONCEPTS PROFICIENCY TESTING

GENERAL ANALYSIS SAMPLE

REPORT SEVENTY-NINE

Revision 00

Final report

DATE ISSUED: 31 MAY 2018

PARTICIPANT

LABORATORY CODE:

SCHEME COORDINATOR: K MUNSAMY

SIGNATURE: _____

CHECKED BY: R BABOOLAL (SCHEME MANAGER)

*Disclaimer: Opinions and interpretations expressed herein are outside the scope of SANAS accreditation
*Moisture in the analysis sample is not included in the SANAS schedule of accreditation as robust statistics cannot be applied.
Chlorine, Fluorine, Quick ash, ASTM ash and ASTM Volatiles is not included in the scope of accreditation.*

THINKING QUALITY, QUALITY THINKING

REGISTRATION NUMBER: 2006/149731/23 (RMB INDUSTRIAL STATIONERS cc t/a)

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EXECUTIVE SUMMARY

1. One hundred and seven samples were sent to participants with 103 timeous result submissions
2. The total number of outliers found were as follows (dry base):
 - ISO Volatile Matter x 1
 - Calorific Value x 2
 - Sulphur x 4
 - Carbon x 1
 - Phosphorous x 1
 - AFT (Deformation) x 1
3. Carbon, Hydrogen, Nitrogen, Chlorine, Fluorine, ASTM Ash & ASTM Volatile Matter participants were insufficient to warrant robust statistical calculations. The average result was used as the assigned value.
4. Trending for your laboratory is as follows:

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Dear Participant

RE: PROFICIENCY TESTING RESULTS FOR THE MONTH OF MAY 2018

Thank you for your participation in the Coal Concepts proficiency testing scheme.

Your laboratory code is

All results are totally confidential. Any results in ***Bold, Italics and Underlined*** are outliers. Where applicable, the most extreme outliers have been eliminated from calculations using the Grubbs estimate for outliers. Robust statistics has been applied where possible. Analysis results have been reported on air dry and dry base. The dry base results have been used to calculate the z-scores.

Please take note of the following:

1. Z-scores between -1 and +1 is deemed acceptable
2. Z-scores between -2 and -3 should serve as a warning that the analysis result could get worse
3. Z-scores between +2 and +3 should also serve as a warning that analysis results could get worse.
4. Z- scores lower than -3 and exceeding +3 should warrant an investigation
5. Compare your result to the robust average which will be the assigned value. The measurement of uncertainty (UoM) of the results is also stated.
6. All calculations can be made available upon request

The Coal Concepts scheme adheres to the requirements of ISO/IEC 17043:2010 – Conformity assessment – General requirements for proficiency testing.

Statistical analysis has been carried out using ISO/IEC 13528:2015-Statistical methods for use in proficiency testing by interlaboratory comparisons

Please find results attached together with Z-score trends.

Best Regards

R Baboolal

LIST OF PARTICIPANTS IN ALPHABETICAL ORDER

Arcelor Mittal - Vanderbijl Park	Arcelor Mittal - Newcastle
Anglo SOC - Goedehoop Colliery South Plant	Anglo SOC - Goedehoop Colliery North Plant
Anglo SOC - New Vaal Colliery	Anglo SOC - Greenside Colliery
Anglo SOC - Landau Colliery	Anglo SOC - Kleinkopje Colliery
Anglo SOC - Kriel Colliery	ALS - Witlab
Afrisam - Dudfield	Afrisam - Ulco
ALS - Eastside	ALS -Muhanga
Alfred H Knight -Richards Bay Laboratory	ALS - Phalandwa
AquaSpecto	Bureau Veritas - Nacala
Bureau Veritas Inspectorate Laboratories - Tendele	Bureau Veritas Inspectorate Laboratories - Beira
Bureau Veritas Inspectorate Laboratories - Alton	Bureau Veritas Testing & Inspection SA - Pretoria
Bureau Veritas Inspectorate Laboratories - Middelburg	Castle Peak Power Station – Hong Kong
Bureau Veritas – Moatize, Vale	Coallab Pty Ltd - Uitgevallen
Council for Geoscience	Coallab Pty Ltd - Phola
Coallab Pty Ltd – Tselentis	Coallab Pty Ltd - Kangala
Coallab Pty Ltd - Middelburg	Coallab Pty Ltd - Umlabu
Coallab Pty Ltd - Droogvallei	Coallab Pty Ltd - VDD
Coallab Pty Ltd - AMR	Delmas Coal
Eyethu Coal	Exxaro Resources - Grootegeluk Mine
Eskom Holdings SOC Ltd – Kendal Power station	Eskom Holdings SOC Ltd - Duvha Power Station
Eskom Holdings SOC Ltd – Lethabo Power Station	Eskom Holdings SOC Ltd - Komati Power Station
Eskom Holdings SOC Ltd - Tutuka Power Station	Eskom Holdings SOC Ltd - Grootvlei Power Station
Eskom Holdings SOC Ltd - ERID	Eskom Holdings SOC Ltd - Kriel Power Station
Eskom Holdings SOC Ltd - Hendrina Power Station	Eskom Holdings SOC Ltd - Matimba Power Station
Eskom Holdings SOC Ltd - Arnot Power Station	Exxaro Resources - Matla Mine
Eskom Holdings SOC Ltd - Matla Power Station	Eskom Holdings SOC Ltd – Medupi Power Station
Eskom Holdings SOC Ltd – Majuba Power Station	G&W Base & Industrial Minerals
Glencore Wonderkop	Glencore -Rustenburg Smelter
Glencore Boshoeck Smelter	Glencore -Lydenburg Smelter
Glencore Lion Smelter	GLI Laboratuvar Sube Mudurlugu Komur Denedey Laboratuvari - Turkey
HighVeld Laboratories	Idwala Lime
Intertek Mozambique	Jindal Mining SA (Pty) Ltd - Kiepersol Colliery
Kangra Coal (Pty) Ltd	Lafarge Industries SA (Pty) Ltd - Lichtenburg
Morupule Coal Mine - Botswana	Mafube Colliery Mine pty (ltd)
Martech Marine surveyors - India	Makomo Resources
Msobo Coal Pty Ltd	Mitra SK South Africa (Pty) Ltd
M L Coal	Noko Analytical Services CC - Welgemeend
Mpumamanzi	Noko Analytical Services CC - Twistdraai
Noko Analytical Services CC - Witbank	Noko Analytical Services CC - Hakahno
Richards Bay Minerals	Ronewa Lab
Siza Coal Services - Dundee	Siza Coal Services - Vlakfontein
Siza Coal Services - Botswana	Siza Coal Services - Kinross
Siza Coal Services - Middelburg	Siza Coal Services - NCC
Siza Coal Services - Carolina	Siza Coal Services - Eastside
South 32 – Khutala Colliery	SABS Commercial SOC Ltd Springlake
Sibonisiwe Coal Laboratory Services CC – Rirhandzu Lab	Sibonisiwe Coal Laboratory Services CC - West Coal Processing
Sibonisiwe Coal Laboratory Services CC	SGS South Africa (Pty) Ltd - Chilwavuhusiku Laboratory
SGS South Africa (Pty) Ltd – Richards Bay Coal Terminal Laboratory	SGS South Africa (Pty) Ltd - Leeuwpan Laboratory
SGS South Africa (Pty) Ltd - Trichardt Laboratory	SGS South Africa (Pty) Ltd – Richards Bay Port Laboratory
SGS South Africa (Pty) Ltd – GGV Laboratory	SGS South Africa (Pty) Ltd - Middelburg Laboratory
SGS South Africa (Pty) Ltd - Impunzi Laboratory	SGS South Africa (Pty) Ltd - Wondefontein Laboratory
SABS Commercial SOC Ltd Sudor	SGS Tweefontein
SABS Commercial SOC Ltd CSIR	SABS Commercial SOC Ltd Mimosa
SABS Commercial SOC Ltd Uitkomst	SABS Commercial SOC Ltd Secunda
SPTe Lab - Middelburg	SABS Commercial SOC Ltd Richards bay
Tata Steel – Wales Lab, Europe	Umzamo Analytical Services - Londani
Umzamo Analytical Services - Overlooked Colliery	Umzamo Analytical Services - Witbank
Umzamo Analytical Services - Doornrug	Vitrovian Analytical Services DELMAS
Vitrovian Analytical Services TEGETA	Vitrovian Analytical Services Umlalazi
Vitrovian Analytical Services Pullenshope	Vitrovian Analytical Services Koorfontein
Zululand Anthracite Colliery	Vinca Institute for Nuclear Sciences - Serbia

1. TYPE OF SAMPLE USED

The coal used in this proficiency testing round was bituminous coal from Mpumalanga.

2. PREPARATION OF SAMPLE

Approximately 800kg's of sample with an approximate topline of 50mm was sourced. This was crushed to -4mm using a jaw crusher. The -4mm material was reduced to -212um using a cross beat pulveriser. The 212 material was sieved using a 212um screen. Any +212um material was pulverised and sieved until all material passed through the 212 um sieve.

All the -212um material was then mixed in a 500 litre mixing drum for 4 hours.

3. HOMOGENEITY CHECK

There were 103 participants in this round, 20 portions of sample were randomly extracted from the 800kg sample. These were packaged in their final form i.e. in 200ml sample bottles. The bottles were labelled 1 to 20. The results were as follows:

SAMPLE NO.	TEST PORTION 1	TEST PORTION 2	sample av (Xt)	range (Wt)	range sqd
1	29,97	29,92	29,95	0,05	0,0025
2	30,01	29,86	29,94	0,15	0,0225
3	29,91	29,87	29,89	0,04	0,0016
4	30,05	29,8	29,93	0,25	0,0625
5	30,13	29,93	30,03	0,20	0,0400
6	30,18	29,99	30,09	0,19	0,0361
7	30,14	29,83	29,99	0,31	0,0961
8	29,99	29,9	29,95	0,09	0,0081
9	30,05	30	30,03	0,05	0,0025
10	30,00	30	30,00	0,00	0,0000
11	30,24	30,22	30,23	0,02	0,0004
12	30,16	30,06	30,11	0,10	0,0100
13	30,06	29,76	29,91	0,30	0,0900
14	30,16	30,14	30,15	0,02	0,0004
15	30,05	30,03	30,04	0,02	0,0004
16	30,06	29,95	30,01	0,11	0,0121
17	30,01	30,07	30,04	0,06	0,0036
18	29,89	30,03	29,96	0,14	0,0196
19	30,17	30,16	30,17	0,01	0,0001
20	29,99	30,04	30,02	0,05	0,003
GENERAL AVERAGE			30,02		
STANDARD DEVIATION			0,091		
WITHIN SAMPLE STANDARD DEVIATION			0,101		
BETWEEN SAMPLE STANDARD DEVIATION			0,056		

The between sample standard deviation must be $\leq 0.3 \times \sigma$

(σ = std deviation for the proficiency assessment)

σ = 2% of the mean was used, which is the repeatability for ISO ash (Ash % > 10%)

Hence $0.3 \times 0.600 = 0.180$

Since 0.056 < 0.180 the samples are homogenous

4. STABILITY CHECK

Samples were retained for sales as reference material. Twenty of them were randomly chosen for stability testing.

In order for the proficiency testing samples to be declared stable the general average from the homogeneity check and that of the stability check the difference in the general average should not differ by more than 0.3 X precision

This test has been carried out about a month after the samples were received by the participating laboratories

SAMPLE NO.	TEST PORTION 1	TEST PORTION 2	sample av (Xt)	range (Wt)	range sqd
1	29,9	30,11	30,01	0,21	0,0441
2	29,86	30,04	29,95	0,18	0,0324
3	29,95	29,9	29,93	0,05	0,0025
4	29,86	29,91	29,89	0,05	0,0025
5	29,96	29,95	29,96	0,01	0,0001
6	30,14	29,89	30,02	0,25	0,0625
7	29,98	29,92	29,95	0,06	0,0036
8	29,97	29,95	29,96	0,02	0,0004
9	29,96	29,87	29,92	0,09	0,0081
10	29,97	29,82	29,90	0,15	0,0225
11	30,00	30,07	30,04	0,07	0,0049
12	29,99	30,01	30,00	0,02	0,0004
13	29,90	29,89	29,90	0,01	0,0001
14	30,21	29,82	30,02	0,39	0,1521
15	30,02	29,73	29,88	0,29	0,0841
16	30,15	29,78	29,97	0,37	0,1369
17	29,87	29,82	29,85	0,05	0,0025
18	30,09	30,06	30,08	0,03	0,0009
19	30,02	29,80	29,91	0,22	0,0484
20	29,90	29,89	29,90	0,01	0,0001
GENERAL AVERAGE			29,95		
STANDARD DEVIATION			0,061		
WITHIN SAMPLE STANDARD DEVIATION			0,123		
BETWEEN SAMPLE STANDARD DEVIATION			0,062		

($\sigma = 0.202$ was used)

For this report $0.3 \times 0.599 = 0.180$

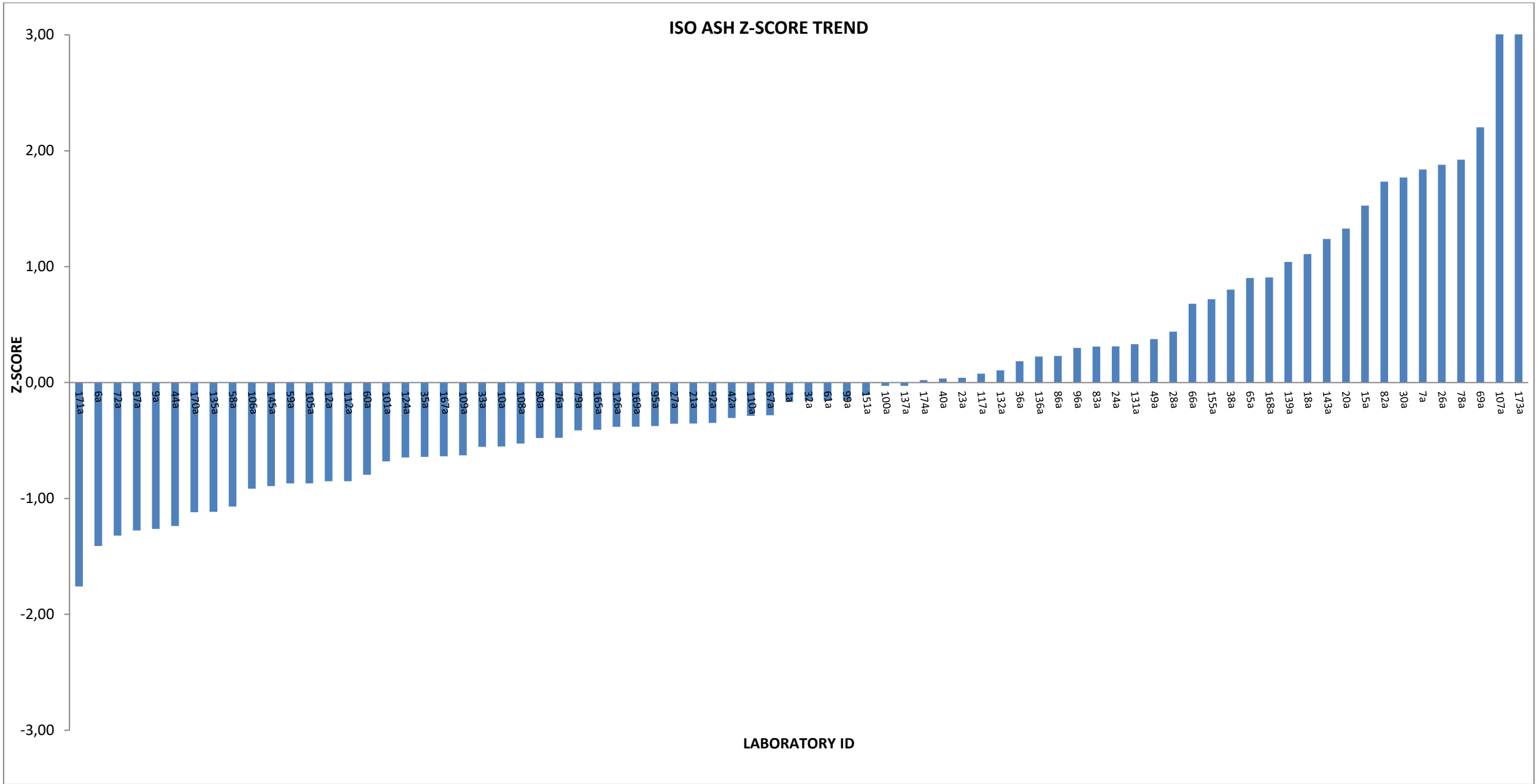
Absolute value of $(30.02 - 29.95) = 0.07$

Since $0.07 < 0.180$ the proficiency testing samples were stable

COAL CONCEPTS - PROFICIENCY TESTING - MAY 2018

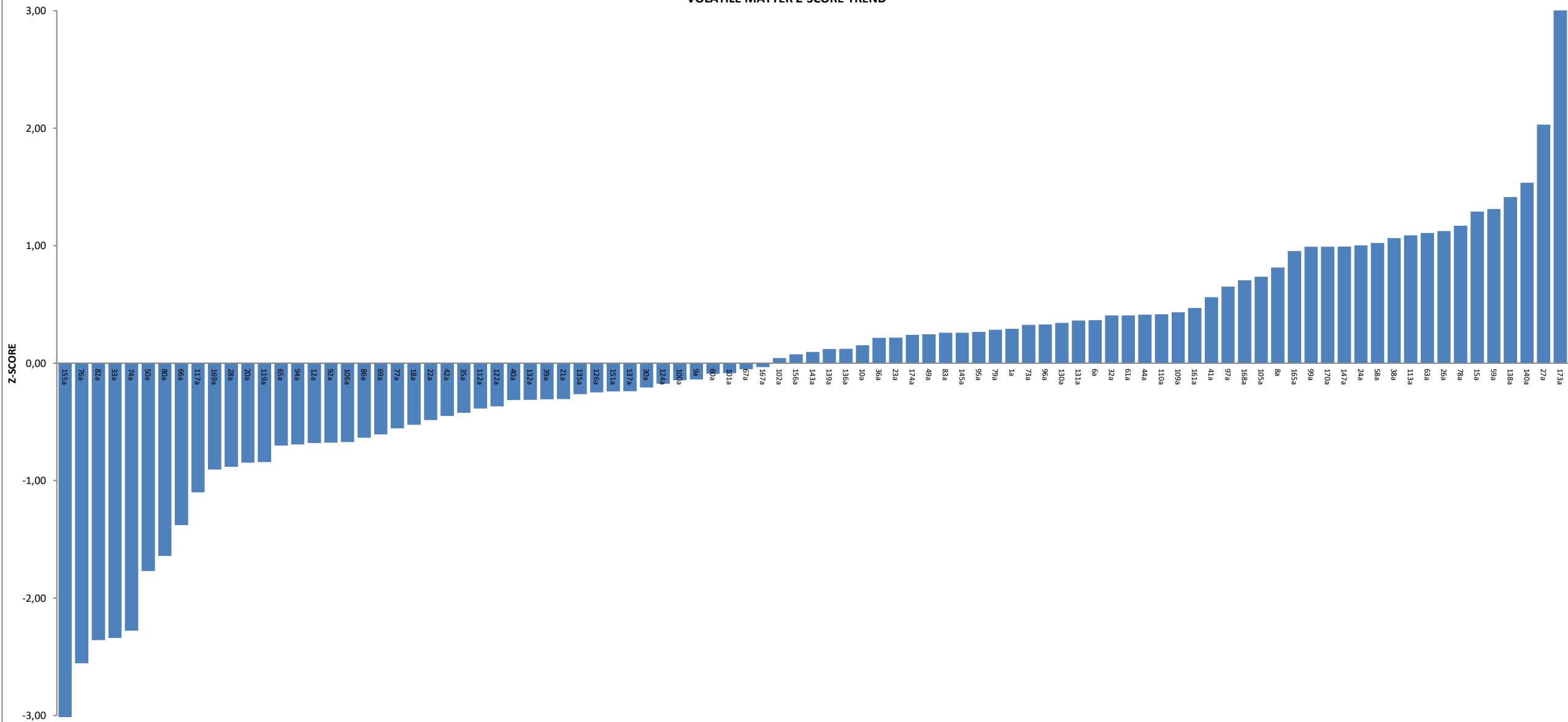
ANALYTICAL PARAMETER : ISO ASH (%)

LAB ID	MOISTURE IN ANALYSIS SAMPLE (%)	AIR DRY (%)	DRY BASE (%)	Z-SCORE (DRY BASE)	
1a	3,21	29,84	30,83	-0,17	
6a	2,50	29,67	30,43	-1,41	
7a	3,03	30,52	31,47	1,84	
9a	2,88	29,60	30,48	-1,26	
10a	2,30	30,00	30,71	-0,55	
12a	3,30	29,60	30,61	-0,85	
15a	2,53	30,58	31,37	1,53	
18a	3,36	30,19	31,24	1,11	
20a	3,13	30,33	31,31	1,33	
21a	2,73	29,93	30,77	-0,35	
23a	3,00	29,97	30,90	0,04	
24a	2,40	30,24	30,98	0,31	
26a	2,34	30,75	31,49	1,88	
27a	2,50	30,00	30,77	-0,36	
28a	2,98	30,10	31,02	0,44	
30a	3,12	30,47	31,45	1,77	
32a	2,70	30,00	30,83	-0,16	
33a	2,85	29,83	30,71	-0,56	
35a	2,73	29,84	30,68	-0,64	
36a	2,40	30,20	30,94	0,18	
38a	2,70	30,30	31,14	0,80	
40a	3,09	29,94	30,89	0,03	
42a	3,20	29,80	30,79	-0,31	
44a	2,48	29,73	30,49	-1,24	
49a	3,69	29,86	31,00	0,38	
58a	2,75	29,70	30,54	-1,07	
59a	2,79	29,75	30,60	-0,87	
60a	2,90	29,74	30,63	-0,79	
61a	2,70	30,00	30,83	-0,16	
65a	2,80	30,30	31,17	0,90	
66a	2,77	30,24	31,10	0,68	
67a	2,90	29,90	30,79	-0,28	
69a	2,25	30,88	31,59	2,20	
72a	1,77	29,92	30,46	-1,32	
76a	2,93	29,83	30,73	-0,48	
78a	1,21	31,12	31,50	1,92	
79a	3,06	29,81	30,75	-0,41	
80a	2,70	29,90	30,73	-0,48	
82a	2,10	30,78	31,44	1,73	
83a	2,56	30,19	30,98	0,31	
86a	2,93	30,05	30,96	0,23	
92a	3,19	29,79	30,77	-0,35	
95a	2,48	30,00	30,76	-0,38	
96a	2,58	30,18	30,98	0,30	
97a	2,90	29,59	30,47	-1,28	
99a	2,70	30,00	30,83	-0,16	
100a	2,80	30,01	30,87	-0,03	
101a	3,31	29,65	30,67	-0,68	
105a	2,30	29,90	30,60	-0,87	
106a	2,94	29,69	30,59	-0,92	
107a	2,83	31,00	31,90	3,17	
108a	3,01	29,79	30,71	-0,53	
109a	3,20	29,70	30,68	-0,63	
110a	2,44	30,04	30,79	-0,29	
112a	3,30	29,60	30,61	-0,85	
117a	3,10	29,95	30,91	0,08	
124a	2,66	29,86	30,68	-0,65	
126a	2,96	29,85	30,76	-0,38	
131a	3,00	30,06	30,99	0,33	
132a	3,00	29,99	30,92	0,11	
135a	3,26	29,53	30,53	-1,12	
136a	2,99	30,03	30,96	0,22	
137a	2,93	29,97	30,87	-0,03	
139a	2,94	30,30	31,22	1,04	
143a	2,21	30,59	31,28	1,24	
145a	2,93	29,70	30,60	-0,89	
151a	2,88	29,96	30,85	-0,11	
155a	3,10	30,15	31,11	0,72	
165a	1,96	30,15	30,75	-0,41	
167a	2,93	29,78	30,68	-0,64	
168a	3,03	30,23	31,17	0,91	
169a	2,80	29,90	30,76	-0,38	
170a	2,70	29,70	30,52	-1,12	
171a	2,70	29,50	30,32	-1,76	
173a	3,74	30,73	31,92	3,24	
174a	3,82	29,71	30,89	0,02	
Number of results	-	76	76	76	-
OUTLIERS	-	-	0	0	-
AVERAGE	-	2,81	30,03	30,88	-
STD DEVIATION	-	-	0,35	0,32	-
MEDIAN	-	-	29,97	30,83	-
ROBUST AVERAGE	-	-	30,02	30,89	-
ROBUST STD DEVIATION	-	-	0,38	0,36	-
UoM	-	-	0,05	0,05	-



COAL CONCEPTS - PROFICIENCY TESTING - MAY 2018					
ANALYTICAL PARAMETER : ISO VOLATILE MATTER (%)					
LAB ID	MOISTURE IN ANALYSIS SAMPLE (%)	AIR DRY	DRY BASE	Z-SCORE (DRY BASE)	
1a	3,21	21,05	21,75	0,29	
6a	2,50	21,23	21,77	0,37	
Za	3,03	18,28	18,85	-7,95	
8a	2,88	21,30	21,93	0,81	
9a	2,88	20,98	21,60	-0,14	
10a	2,30	21,20	21,70	0,15	
12a	3,30	20,70	21,41	-0,68	
15a	2,53	21,54	22,10	1,29	
18a	3,36	20,74	21,46	-0,53	
20a	3,13	20,68	21,35	-0,85	
21a	2,73	20,95	21,54	-0,31	
22a	2,26	20,99	21,48	-0,48	
23a	3,00	21,07	21,72	0,22	
24a	2,40	21,47	22,00	1,00	
26a	2,34	21,53	22,04	1,12	
27a	2,50	21,80	22,36	2,03	
28a	2,98	20,70	21,34	-0,88	
30a	3,12	20,90	21,57	-0,21	
32a	2,70	21,20	21,79	0,41	
33a	2,85	20,23	20,82	-2,34	
35a	2,73	20,91	21,50	-0,42	
36a	2,40	21,20	21,72	0,22	
38a	2,70	21,43	22,02	1,06	
39a	1,80	21,15	21,54	-0,31	
40a	3,09	20,87	21,54	-0,31	
41a	3,40	21,10	21,84	0,56	
42a	3,20	20,80	21,49	-0,45	
44a	2,48	21,25	21,79	0,41	
49a	3,69	20,93	21,73	0,25	
50a	3,11	20,37	21,02	-1,77	
58a	2,75	21,40	22,01	1,02	
59a	2,79	21,49	22,11	1,31	
60a	2,90	20,99	21,61	-0,09	
61a	2,70	21,20	21,79	0,41	
63a	3,20	21,33	22,04	1,11	
65a	2,80	20,80	21,40	-0,70	
66a	2,77	20,58	21,16	-1,38	
67a	2,90	21,00	21,63	-0,05	
69a	2,25	20,95	21,43	-0,61	
73a	2,62	21,19	21,76	0,33	
74a	2,63	20,30	20,85	-2,28	
76a	2,93	20,14	20,75	-2,55	
77a	3,50	20,70	21,45	-0,55	
78a	1,21	21,79	22,06	1,17	
79a	3,06	21,08	21,75	0,28	
80a	2,70	20,50	21,07	-1,64	
82a	2,10	20,38	20,82	-2,36	
83a	2,56	21,18	21,74	0,26	
86a	2,93	20,80	21,42	-0,63	
92a	3,19	20,73	21,41	-0,68	
94a	3,40	20,68	21,40	-0,69	
95a	2,48	21,20	21,74	0,27	
96a	2,58	21,20	21,76	0,33	
97a	2,90	21,24	21,87	0,65	
99a	2,70	21,40	21,99	0,99	
100a	2,80	20,99	21,59	-0,15	
101a	3,31	20,90	21,62	-0,09	
102a	2,59	21,10	21,66	0,04	
105a	2,30	21,40	21,90	0,73	
106a	2,94	20,78	21,41	-0,67	
109a	3,20	21,10	21,80	0,43	
110a	2,44	21,26	21,79	0,42	
112a	3,30	20,80	21,51	-0,39	
113a	2,85	21,40	22,03	1,09	
117a	3,10	20,60	21,26	-1,10	
119a	2,20	20,88	21,35	-0,84	
122a	2,40	21,00	21,52	-0,37	
124a	2,66	21,01	21,58	-0,17	
126a	2,96	20,92	21,56	-0,25	
130a	2,60	21,20	21,77	0,34	
131a	3,00	21,12	21,77	0,36	
132a	3,00	20,89	21,54	-0,31	
135a	3,26	20,85	21,55	-0,26	
136a	2,99	21,04	21,69	0,12	
137a	2,93	20,93	21,56	-0,24	
138a	2,99	21,48	22,14	1,41	
139a	2,94	21,05	21,69	0,12	
140a	3,27	21,46	22,19	1,54	
143a	2,21	21,20	21,68	0,10	
145a	2,93	21,10	21,74	0,26	
147a	2,93	21,35	21,99	0,99	
151a	2,88	20,94	21,56	-0,24	
155a	3,10	19,90	20,54	-3,16	
156a	3,10	21,00	21,67	0,07	
161a	2,80	21,20	21,81	0,47	
165a	1,96	21,55	21,98	0,95	
167a	2,93	21,00	21,63	-0,03	
168a	3,03	21,23	21,89	0,71	
169a	2,80	20,73	21,33	-0,91	
170a	2,70	21,40	21,99	0,99	
173a	3,74	21,97	22,82	3,35	
174a	3,82	20,90	21,73	0,24	
NUMBER OF RESULTS	-	92	92	92	-
OUTLIERS	-	-	1	1	-
AVERAGE	-	2,83	21,03	21,65	-
STD DEVIATION	-	-	0,36	0,35	-
ROBUST AVERAGE	-	-	21,04	21,64	-
ROBUST STD DEVIATION	-	-	0,38	0,36	-
UoM	-	-	0,05	0,05	-

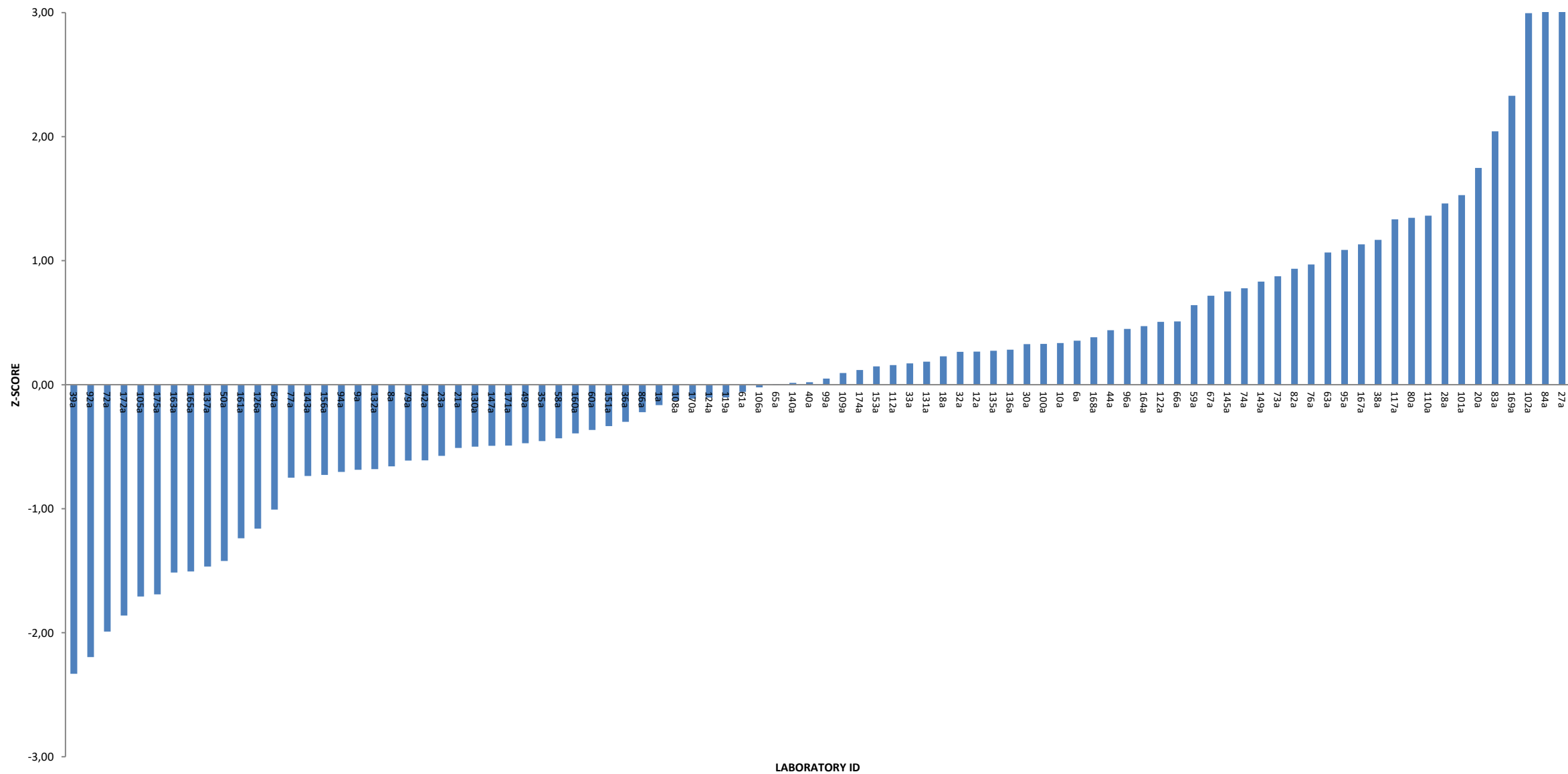
VOLATILE MATTER Z-SCORE TREND



LABORATORY ID

COAL CONCEPTS - PROFICIENCY TESTING - MAY 2018					
ANALYTICAL PARAMETER : CALORIFIC VALUE (MJ/kg)					
LAB ID	MOISTURE IN ANALYSIS SAMPLE (%)	AIR DRY (MJ/kg)	DRY BASE (MJ/kg)	Z-SCORE (DRY BASE)	
1a	3,21	20,93	21,62	-0,16	
6a	2,50	21,18	21,72	0,36	
8a	2,88	20,91	21,53	-0,66	
9a	2,88	20,91	21,52	-0,69	
10a	2,30	21,22	21,72	0,34	
12a	3,30	20,99	21,71	0,27	
18a	3,36	20,97	21,70	0,23	
20a	3,13	21,30	21,99	1,75	
21a	2,73	20,97	21,56	-0,51	
23a	3,00	20,90	21,55	-0,57	
27a	2,50	22,25	22,82	6,12	
28a	2,98	21,28	21,93	1,46	
30a	3,12	21,04	21,72	0,33	
32a	2,70	21,12	21,71	0,27	
33a	2,85	21,07	21,69	0,17	
35a	2,73	20,98	21,57	-0,46	
36a	2,40	21,08	21,60	-0,30	
38a	2,70	21,29	21,88	1,17	
39a	1,80	20,83	21,21	-2,33	
40a	3,09	20,99	21,66	0,0	
42a	3,20	20,85	21,54	-0,61	
44a	2,48	21,20	21,74	0,44	
49a	3,69	20,77	21,57	-0,47	
50a	3,11	20,72	21,39	-1,42	
58a	2,75	20,98	21,57	-0,43	
59a	2,79	21,17	21,78	0,64	
60a	2,90	20,96	21,59	-0,37	
61a	2,70	21,06	21,64	-0,06	
63a	3,20	21,16	21,86	1,07	
64a	3,00	20,82	21,46	-1,01	
65a	2,80	21,05	21,66	0,00	
66a	2,77	21,15	21,75	0,51	
67a	2,90	21,16	21,79	0,72	
72a	1,77	20,90	21,28	-1,99	
73a	2,62	21,25	21,82	0,87	
74a	2,63	21,23	21,80	0,78	
76a	2,93	21,20	21,84	0,97	
77a	3,50	20,76	21,51	-0,75	
79a	3,06	20,88	21,54	-0,61	
80a	2,70	21,32	21,91	1,35	
82a	2,10	21,38	21,83	0,94	
83a	2,56	21,48	22,04	2,04	
84a	3,57	21,85	22,66	5,27	
86a	2,93	20,98	21,61	-0,22	
92a	3,19	20,56	21,24	-2,20	
94a	3,40	20,79	21,52	-0,70	
95a	2,48	21,32	21,86	1,09	
96a	2,58	21,18	21,74	0,45	
99a	2,70	21,08	21,66	0,0	
100a	2,80	21,11	21,72	0,33	
101a	3,31	21,22	21,95	1,53	
102a	2,59	21,65	22,23	3,00	
105a	2,30	20,84	21,33	-1,71	
106a	2,94	21,02	21,65	-0,02	
108a	3,01	20,98	21,63	-0,13	
109a	3,20	20,98	21,67	0,09	
110a	2,44	21,38	21,91	1,36	
112a	3,30	20,97	21,69	0,16	
117a	3,10	21,23	21,91	1,33	
119a	2,20	21,16	21,64	-0,10	
122a	2,40	21,23	21,75	0,51	
124a	2,66	21,06	21,64	-0,11	
126a	2,96	20,80	21,43	-1,16	
130a	2,60	21,00	21,56	-0,50	
131a	3,00	21,04	21,69	0,19	
132a	3,00	20,88	21,53	-0,68	
135a	3,26	21,00	21,71	0,27	
136a	2,99	21,06	21,71	0,28	
137a	2,93	20,75	21,38	-1,47	
140a	3,27	20,95	21,66	0,0	
143a	2,21	21,04	21,52	-0,74	
145a	2,93	21,16	21,80	0,75	
147a	2,93	20,93	21,56	-0,49	
149a	2,40	21,29	21,81	0,83	
151a	2,88	20,97	21,59	-0,33	
153a	2,83	21,07	21,68	0,15	
156a	3,10	20,85	21,52	-0,73	
160a	2,83	20,97	21,58	-0,39	
161a	2,80	20,82	21,42	-1,24	
163a	2,00	20,94	21,37	-1,51	
164a	2,83	21,13	21,75	0,47	
165a	1,96	20,95	21,37	-1,51	
167a	2,93	21,23	21,87	1,13	
168a	3,03	21,07	21,73	0,38	
169a	2,80	21,48	22,10	2,33	
170a	2,70	21,05	21,63	-0,11	
171a	2,70	20,98	21,56	-0,49	
172a	3,01	20,66	21,30	-1,86	
175a	2,83	20,73	21,33	-1,69	
174a	3,82	20,85	21,68	0,12	
NUMBER OF RESULTS	-	90	90	90	-
OUTLIERS	-	-	2	2	-
AVERAGE	-	2,84	21,04	21,66	-
STD DEVIATION	-	-	0,19	0,19	-
ROBUST AVERAGE	-	-	21,04	21,65	-
ROBUST STD DEVIATION	-	-	0,21	0,20	-
UoM	-	-	0,03	0,03	-

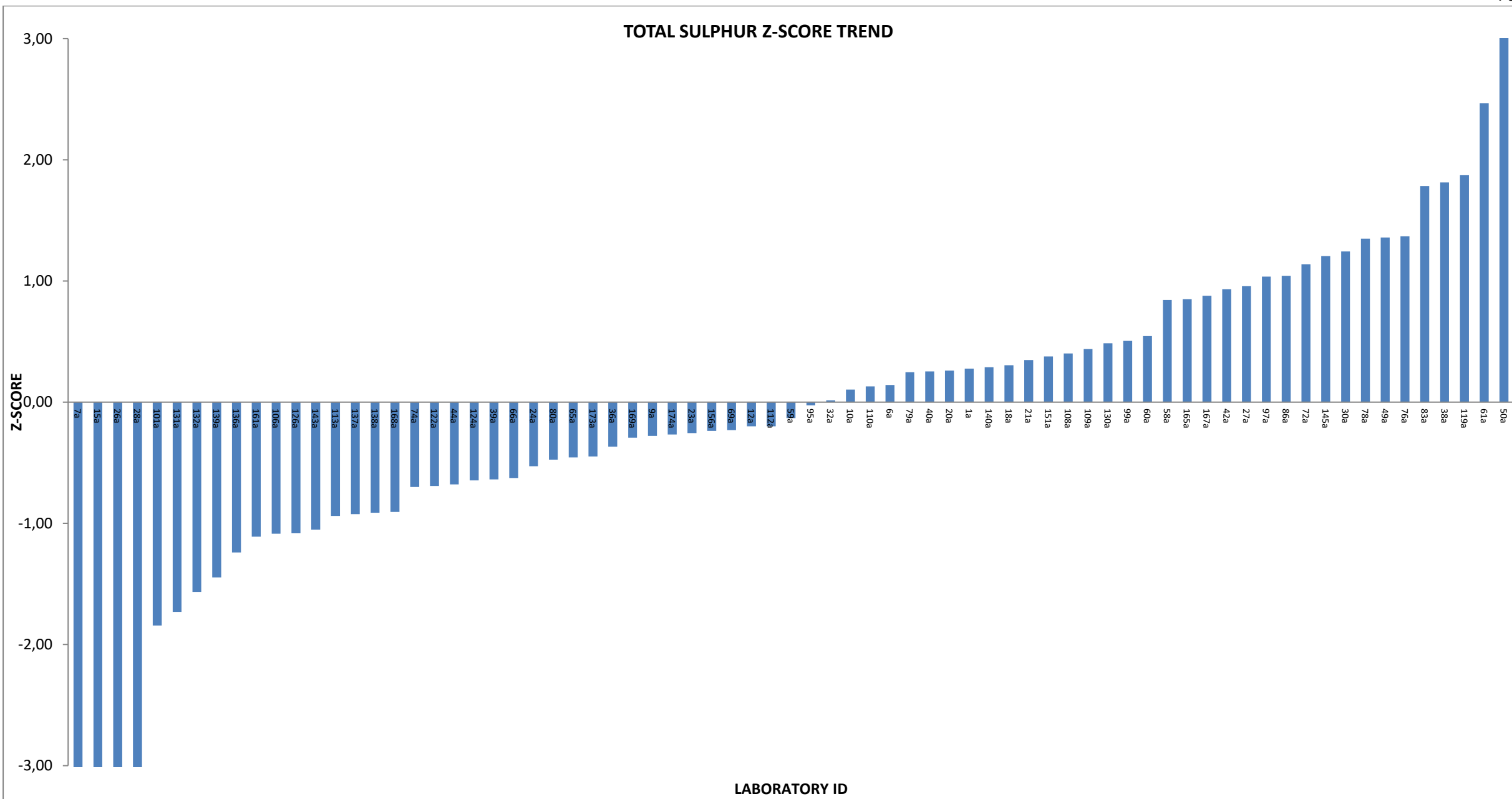
CALORIFIC VALUE Z-SCORE TREND



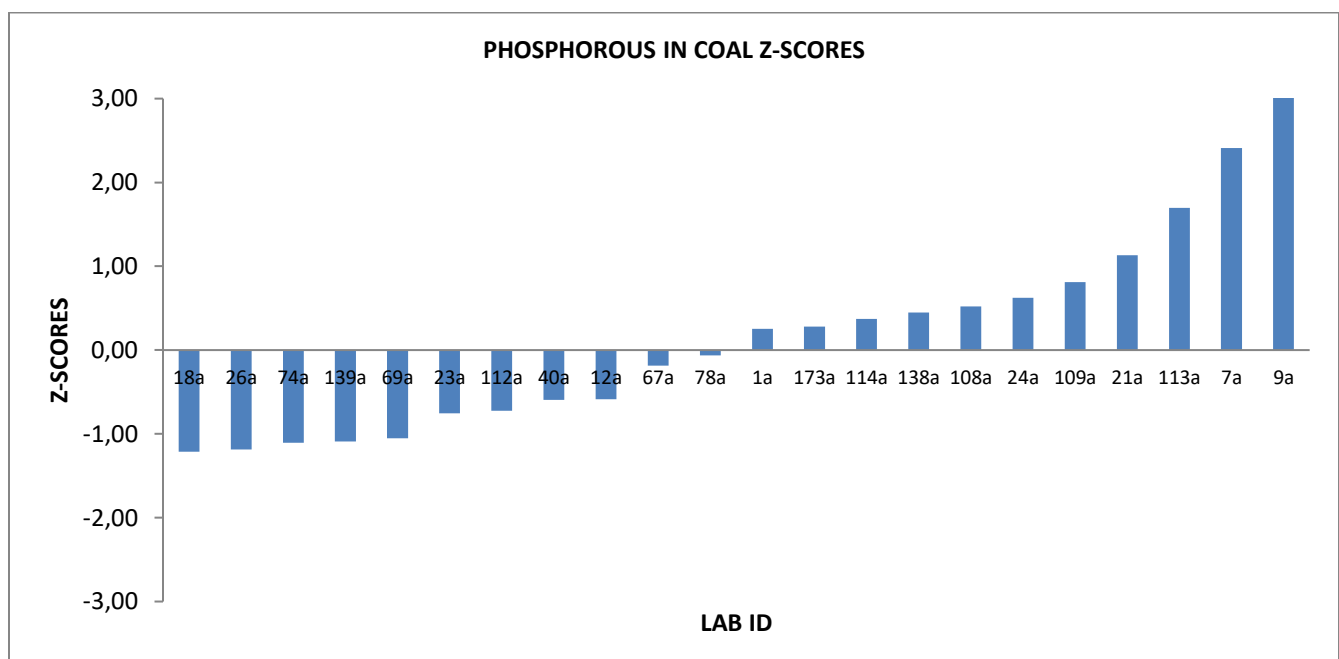
COAL CONCEPTS - PROFICIENCY TESTING - MAY 2018

ANALYTICAL PARAMETER : TOTAL SULPHUR (%)

LAB ID	MOISTURE IN ANALYSIS SAMPLE (%)	AIR DRY	DRY BASE	Z-SCORE (DRY BASE)
1a	3,21	1,13	1,17	0,28
6a	2,50	1,13	1,16	0,14
7a	3,03	0,20	0,21	-15,01
9a	2,88	1,10	1,13	-0,28
10a	2,30	1,13	1,16	0,10
12a	3,30	1,10	1,14	-0,20
15a	2,53	0,82	0,84	-4,91
18a	3,36	1,13	1,17	0,31
20a	3,13	1,13	1,17	0,26
21a	2,73	1,14	1,17	0,35
23a	3,00	1,10	1,13	-0,26
24a	2,40	1,09	1,12	-0,53
26a	2,34	0,85	0,87	-4,45
27a	2,50	1,18	1,21	0,96
28a	2,98	0,93	0,96	-3,05
30a	3,12	1,19	1,23	1,24
32a	2,70	1,12	1,15	0,0
36a	2,40	1,10	1,13	-0,37
38a	2,70	1,23	1,26	1,81
39a	1,80	1,09	1,11	-0,64
40a	3,09	1,13	1,17	0,25
42a	3,20	1,17	1,21	0,93
44a	2,48	1,08	1,11	-0,68
49a	3,69	1,19	1,24	1,36
50a	3,11	1,37	1,41	4,20
58a	2,75	1,17	1,20	0,84
59a	2,79	1,11	1,14	-0,13
60a	2,90	1,15	1,18	0,54
61a	2,70	1,27	1,31	2,47
65a	2,80	1,09	1,12	-0,46
66a	2,77	1,08	1,11	-0,63
69a	2,25	1,11	1,14	-0,23
72a	1,77	1,20	1,22	1,14
74a	2,63	1,08	1,11	-0,70
76a	2,93	1,20	1,24	1,37
78a	1,21	1,22	1,23	1,35
79a	3,06	1,13	1,17	0,25
80a	2,70	1,09	1,12	-0,47
83a	2,56	1,23	1,26	1,78
86a	2,93	1,18	1,22	1,04
95a	2,48	1,12	1,15	0,0
97a	2,90	1,18	1,22	1,04
99a	2,70	1,15	1,18	0,51
101a	3,31	1,00	1,03	-1,84
106a	2,94	1,05	1,08	-1,09
108a	3,01	1,14	1,18	0,40
109a	3,20	1,14	1,18	0,44
110a	2,44	1,13	1,16	0,13
112a	3,30	1,10	1,14	-0,20
113a	2,85	1,06	1,09	-0,94
119a	2,20	1,24	1,27	1,87
122a	2,40	1,08	1,11	-0,69
124a	2,66	1,08	1,11	-0,65
126a	2,96	1,05	1,08	-1,08
130a	2,60	1,15	1,18	0,49
131a	3,00	1,01	1,04	-1,73
132a	3,00	1,02	1,05	-1,57
136a	2,99	1,04	1,07	-1,24
137a	2,93	1,06	1,09	-0,92
138a	2,99	1,06	1,09	-0,91
139a	2,94	1,03	1,06	-1,45
140a	3,27	1,13	1,17	0,29
143a	2,21	1,06	1,08	-1,05
145a	2,93	1,19	1,23	1,21
151a	2,88	1,14	1,17	0,38
156a	3,10	1,10	1,14	-0,24
161a	2,80	1,05	1,08	-1,11
165a	1,96	1,18	1,20	0,85
167a	2,93	1,17	1,21	0,88
168a	3,03	1,06	1,09	-0,91
169a	2,80	1,10	1,13	-0,29
173a	3,74	1,08	1,12	-0,45
174a	3,82	1,09	1,13	-0,27
NUMBER OF RESULTS	73	73	73	-
OUTLIERS	-	4	4	-
AVERAGE	2,76	1,12	1,15	-
MEDIAN	-	1,12	1,15	-
STD DEVIATION	-	0,06	0,06	-
ROBUST AVERAGE	-	1,12	1,15	-
ROBUST STD DEVIATION	-	0,07	0,07	-
UoM	-	0,01	0,01	-



COAL CONCEPTS - PROFICIENCY TESTING -MAY 2018					
ANALYTICAL PARAMETER : PHOSPHOROUS IN COAL (%)					
LAB ID	MOISTURE IN ANALYSIS SAMPLE (%)	AIR DRY	DRY BASE	Z-SCORE (DRY BASE)	
1a	3,21	0,077	0,080	0,25	
7a	3,03	0,108	0,111	2,41	
9a	2,88	0,159	0,164	5,96	
12a	3,30	0,065	0,067	-0,58	
18a	3,36	0,056	0,058	-1,21	
21a	2,73	0,090	0,093	1,13	
23a	3,00	0,063	0,065	-0,75	
24a	2,40	0,083	0,085	0,62	
26a	2,34	0,057	0,058	-1,19	
40a	3,09	0,065	0,067	-0,59	
67a	2,90	0,071	0,073	-0,18	
69a	2,25	0,059	0,060	-1,05	
74a	2,63	0,058	0,060	-1,10	
78a	1,21	0,074	0,075	-0,06	
108a	3,01	0,081	0,084	0,52	
109a	3,20	0,085	0,088	0,81	
112a	3,30	0,063	0,065	-0,73	
113a	2,85	0,098	0,101	1,70	
114a	2,83	0,079	0,081	0,37	
138a	2,99	0,080	0,082	0,45	
139a	2,94	0,058	0,060	-1,09	
173a	3,74	0,077	0,080	0,28	
Number of results	-	22	22	22	-
OUTLIERS	-	-	1	1	-
AVERAGE	-	2,87	0,074	0,076	-
STD DEVIATION	-	-	0,014	0,015	-
MEDIAN	-	-	0,074	0,075	-
ROBUST AVERAGE	-	-	0,073	0,075	-
ROBUST STD DEVIATION	-	-	0,015	0,016	-
UoM	-	-	0,004	0,004	-



COAL CONCEPTS - PROFICIENCY TESTING -MAY 2018					
ANALYTICAL PARAMETER : TOTAL CARBON (%)					
	LAB ID	MOISTURE IN ANALYSIS SAMPLE (%)	AIR DRY	DRY BASE	Z-SCORE (DRY BASE)
	1a	3,21	53,72	55,50	-0,61
	9a**	2,88	55,68	57,33	1,49
	12a	3,30	53,45	55,27	-0,87
	18a**	3,36	55,22	57,14	1,27
	21a**	2,73	55,65	57,21	1,36
	40a	3,09	54,10	55,82	-0,23
	42a	3,20	53,53	55,30	-0,84
	99a**	2,70	53,40	54,88	-1,32
	108a	3,01	54,02	55,70	-0,38
	109a	3,20	54,05	55,84	-0,22
	145a	2,93	55,25	56,92	1,02
	<u>173a**</u>	3,74	<u>58,62</u>	<u>60,89</u>	5,58
	174a	3,82	53,32	55,44	-0,68
Number of results	-	13	13	13	-
OUTLIERS	-	-	1	1	-
AVERAGE	-	3,07	54,28	56,03	-
MEDIAN	-	-	54,04	55,76	-
STD DEVIATION	-	-	0,91	0,87	-
REPRODUCIBILITY					
UPPER LIMIT	-	-	-	57,03	-
LOWER LIMIT	-	-	-	55,03	-

COAL CONCEPTS - PROFICIENCY TESTING -MAY2018					
ANALYTICAL PARAMETER : HYDROGEN (%)					
	LAB ID	MOISTURE IN ANALYSIS SAMPLE (%)	AIR DRY	DRY BASE	Z-SCORE (DRY BASE)
	1a	3,21	2,80	2,89	-0,63
	9a	2,88	2,76	2,84	-0,92
	12a	3,30	3,15	3,26	1,45
	18a	3,36	2,70	2,79	-1,20
	21a	2,73	2,75	2,83	-1,01
	36a	2,40	3,04	3,11	0,64
	42a	3,20	2,81	2,90	-0,57
	99a	2,70	2,95	3,03	0,16
	108a	3,01	3,14	3,24	1,34
	109a	3,20	3,11	3,21	1,20
	174a	3,82	2,81	2,92	-0,47
Number of results		11	11	11	
OUTLIERS	-	-	0	0	-
AVERAGE	-	3,07	2,91	3,00	-
MEDIAN	-	-	2,81	2,92	-
STD DEVIATION	-	-	0,17	0,18	-
REPRODUCIBILITY					
UPPER LIMIT	-	-	-	3,25	-
LOWER LIMIT	-	-	-	2,75	-

COAL CONCEPTS - PROFICIENCY TESTING -MAY 2018					
ANALYTICAL PARAMETER : NITROGEN(%)					
	LAB ID	MOISTURE IN ANALYSIS SAMPLE (%)	AIR DRY	DRY BASE	Z-SCORE (DRY BASE)
	1a	3,21	1,24	1,28	0,26
	9a	2,88	1,23	1,27	0,0
	12a	3,30	1,17	1,21	-1,96
	18a	3,36	1,20	1,24	-0,97
	42a	3,20	1,27	1,31	1,22
	99a	2,70	1,23	1,26	-0,27
	108a	3,01	1,26	1,30	0,82
	109a	3,20	1,26	1,30	0,90
	174a	3,82	1,23	1,28	0,19
Number of results		9	9	9	-
OUTLIERS	-	-	0	0	-
AVERAGE	-	3,23	1,23	1,27	-
MEDIAN	-	-	1,23	1,28	-
STD DEVIATION	-	-	0,03	0,03	-
REPRODUCIBILITY					
UPPER LIMIT	-	-	-	1,42	-
LOWER LIMIT	-	-	-	1,12	-

COAL CONCEPTS - PROFICIENCY TESTING -MAY 2018				
ANALYTICAL PARAMETER : ASH FUSION TEMPERATURES (oC)				
LAB ID	DEFORMATION	SOFTENING	HEMISPHERE	FLOW
1a	1349	1365	1387	1446
9a	1420	1430	1450	1470
10a	1370	1410	1450	1490
18a	1355	1365	1375	1395
21a	1380	1405	1430	1465
23a	1376	1405	1449	1500
40a	1360	1400	1430	1460
42a	1400	1420	1440	1460
49a	1325	1375	1400	1460
60a	1333	1364	1403	1484
80a**	1495	1500	1500	1500
95a	1370	1403	1425	1460
99a	1432	1453	1471	1500
108a	1370	1390	1410	1440
109a	1360	1380	1390	1440
110a	1370	1400	1430	1470
112a**	1430	1490	1500	1500
131a	1390	1400	1430	1450
Number of results	18	18	18	18
Outliers	1	0	0	0
AVERAGE	1376	1409	1432	1466
MEDIAN	1370	1402	1430	1463
STDEV	31	39	35	27
REPRODUCIBILITY				
UPPER LIMIT	1456	1469	1492	1500
LOWER LIMIT	1296	1349	1372	1386

Z-SCORES				
LAB ID	DEFORMATION	SOFTENING	HEMISPHERE	FLOW
1a	-0,88	-1,12	-1,26	-0,73
9a	1,44	0,55	0,52	0,14
10a	-0,19	0,04	0,52	0,87
18a	-0,68	-1,12	-1,60	-2,60
21a	0,13	-0,09	-0,05	-0,04
23a	0,00	-0,09	0,49	1,24
40a	-0,52	-0,22	-0,05	-0,22
42a	0,79	0,29	0,24	-0,22
49a	-1,66	-0,86	-0,90	-0,22
60a	-1,40	-1,14	-0,81	0,65
80a	3,88	2,34	1,93	1,24
95a	-0,19	-0,14	-0,19	-0,22
99a	1,83	1,14	1,11	1,24
108a	-0,19	-0,48	-0,61	-0,95
109a	-0,52	-0,73	-1,18	-0,95
110a	-0,19	-0,22	-0,05	0,14
112a	1,76	2,08	1,93	1,24
131a	0,46	-0,22	-0,05	-0,59

COAL CONCEPTS - PROFICIENCY TESTING -MAY 2018					
ANALYTICAL PARAMETER : ASTM ASH (%)					
	LAB ID	MOISTURE IN ANALYSIS SAMPLE (%)	AIR DRY (%)	DRY BASE (%)	Z-SCORE (DRY BASE)
	1a	3,21	29,90	30,89	-0,45
	109a	3,20	29,80	30,79	-0,69
	172a	3,01	30,66	31,61	1,15
Number of results	-	3	3	3	-
OUTLIERS	-	-	0	0	-
AVERAGE	-	3,21	30,12	31,10	-
STD DEVIATION	-	-	0,47	0,45	-
MEDIAN	-	-	29,90	30,89	-

COAL CONCEPTS - PROFICIENCY TESTING -MAY 2018					
ANALYTICAL PARAMETER : ASTM VOLS (%)					
	LAB ID	MOISTURE IN ANALYSIS SAMPLE (%)	AIR DRY (%)	DRY BASE (%)	Z-SCORE (DRY BASE)
	1a	3,21	21,74	22,46	0,15
	108a	3,01	21,82	22,50	0,27
	109a	3,20	22,00	22,73	0,98
	172a	3,01	21,30	21,96	-1,40
Number of results	-	3	3	3	-
OUTLIERS	-	-	0	0	-
AVERAGE	-	3,14	21,72	22,41	-
STD DEVIATION	-	-	0,30	0,32	-
MEDIAN	-	-	21,78	22,48	-

COAL CONCEPTS - PROFICIENCY TESTING -MAY 2018					
ANALYTICAL PARAMETER : CHLORINE (ppm)					
	LAB ID	MOISTURE IN ANALYSIS SAMPLE (%)	AIR DRY	DRY BASE	Z-SCORE (DRY BASE)
	12a	3,30	60	62	1,15
	108a	3,01	38	39	-0,66
	109a	3,20	40	41	-0,49
Number of results	-	3	3	3	-
OUTLIERS	-	-	0	0	-
AVERAGE	-	3,17	46	48	-
STD DEVIATION	-	-	12	13	-
MEDIAN	-	-	40	41	-

COAL CONCEPTS - PROFICIENCY TESTING -MAY 2018					
ANALYTICAL PARAMETER : FLUORINE (ppm)					
	LAB ID	MOISTURE IN ANALYSIS SAMPLE (%)	AIR DRY	DRY BASE	Z-SCORE (DRY BASE)
	1a	3,21	193	199	-1,48
	12a	3,30	220	228	0,70
	108a	3,01	216	223	0,33
	109a	3,20	217	224	0,45
Number of results	-	4	4	4	-
OUTLIERS	-	-	0	0	-
AVERAGE	-	3,18	212	218	-
STD DEVIATION	-	-	12	13	-
MEDIAN	-	-	217	223	-

CONCLUSION

1. The overall ISO Ash determination trend was negatively biased. No outliers were detected.
2. The overall ISO volatile determination trend indicated an almost even z-score trend. One outlier was detected, which seemed to be due to a calculation error.
3. Calorific value trend indicated an almost even z-score trend. Two outliers were detected on air dry basis and dry base. The average and robust average compared well with each other.
4. Sulphur determination had an almost even trend. Four outliers were detected, this could be due to swapped samples or calibration errors. The median, robust average and mean were the same.
5. Phosphorous results were quite varied with one extreme outlier detected. The median, robust average and mean compared well with each other indicating that the extreme values did not affect the centralized values.
6. Carbon, Hydrogen and Nitrogen were generally well done. The standard deviations for each of the analyses was low. Means and medians compared well. One Outlier was detected on Carbon, this could be due to analytical errors.
7. AFT results: Labs performed generally well. One outlier was detected on Deformation stage only.

8. Assessment criterion for homogeneity check (From ISO 13528, page 45)

8.1 Comparison of the between sample standard deviation with the standard deviation for proficiency testing

Standard deviation for ISO ash = 0.32

Check value = $0.32 \times 0.3 = 0.096$

Between sample standard deviation = 0.056

The between standard deviation is less than the check value for the criterion assessment for homogeneity, therefore homogeneity is established.

COAL CONCEPTS: Terms and ConditionsReturn of results:

Laboratories participate in proficiency testing programs on the understanding that they will be sharing their results and information **anonymously** with other laboratories performing the same analysis. No return of results compromises the spirit of the programs, and reports will not be sent to laboratories unless they return results. Payment in full is required from all laboratories enrolling whether they return results or not.

Errors in Participant Proficiency Testing Results:

Proficiency testing reports should reflect the level of accuracy that a regular testing client would receive.

If a participant finds an error in their proficiency testing results, they may notify us in writing and change their submission **PRIOR** to the due date for return. Changes after this time will not be accepted.

Coal Concepts' reports results *as submitted* by participants.

On occasion, it seems as though participants have mixed up the samples or not processed the samples according to the instructions. Coal Concepts cannot make assumptions of this nature and change results 'to suit'. We also cannot compromise the integrity of the programs by suggesting to some participants that they should review their results prior to the due date. (This is unfair to other participants) It is the responsibility of the participants to check all aspects of the program, including sample identification, preparation, testing instructions, calculations and reporting of the results prior to results submission.

If samples are not in good condition on arrival to the participant laboratory, Coal Concepts must be notified in writing IMMEDIATELY, as often samples can be replaced in good time. Claims about samples received in bad condition will not be accepted after the report has been issued.

Late Enrolments and Late Results:

Late enrolment requests cannot always be accommodated, as sample manufacture must be scheduled well in advance to the shipping date of the program to allow all necessary quality assurance activities to be carried out.

Shipping of PT materials and evaluating test results from PTPs out of cycle with the mainstream programs is considerably time consuming and therefore costly.

In order not to disadvantage participants able to comply with time frames, Coal Concepts may charge a late fee in the following circumstances:

Requests that Coal concepts staff enters results on behalf of participants

Requests to record results after the due date

Requests for PTP participation that is out of cycle with the scheduled dates

Shipping fees and Customs clearance:

Costs incurred for shipping samples and clearance of same through customs are the responsibility of the participating laboratory unless otherwise indicated

Non-payment of fees:

Coal Concepts retains the right to withhold reports and/or test materials and services when invoices are outstanding.

Confidentiality of results:

All data and information received by Coal Concepts from its clients are considered confidential unless the client has given express permission to pass on information.

Definitions:

The dictionary definitions of "collusion" and "falsification" are as follows.

· *Collusion*: A secret agreement or cooperation for a fraudulent or deceitful purpose.

· *Falsification*: Deliberately changing something to be false. In proficiency testing terms, collusion is comparing data (and perhaps changing data) to fit in with a believed "correct" result. This is contrary to the spirit of proficiency testing programs, which are issued with the intention of providing an objective comparison of a laboratory's performance with others. Coal Concepts tries to minimise the occurrence of collusion by being aware that laboratories should be objective when they report their results, and should therefore not know the intended results at the time they are reporting to us.

Answers are not provided to clients until results have been submitted.

To prevent collusion and falsification our advice to clients is:

DON'T confer with others about PT samples or results.

DO accept the fact that everyone makes errors.

DON'T average the results or opinions of every person in the laboratory before selecting the answer to be submitted. Instead, use one of the answers AS SUBMITTED to you and take advantage of the Coal Concepts internal QA services and submit all answers generated by the technicians.

DO have confidence in your own results.

Proficiency Testing (PT) is a compulsory part of laboratory accreditation, but it is also an important tool for giving you confidence in your results. "Enhancing" your PT results with assistance from another participant cannot increase confidence in your laboratory's performance.

Coal concepts' testing staff are not told what the expected results are, nor what we are expecting.

We subject ALL results to analysis, even if they are different.

The staff have the right to check that the results we enter on their behalf are correctly transcribed.

Clients are always welcome to contact Coal Concepts to seek advice or information about collusion or falsification of data.

Policy for Participant Appeal of PT Performance Assessment:

If participants disagree with their performance assessment in a proficiency report, they should inform Coal Concepts in writing.

The response will include Coal Concepts interpretation of the outcome of the reassessment and an explanation of that outcome. (For example, explanation of a calculation, or the rationale for the outcome of the evaluation.)

If a mistake has been made by Coal Concepts, it will be dealt with via Coal Concepts' non-conformance system.

Liability

In no event shall a party's liability to the other party for direct damages exceed an amount equal to the value of the amount for the PT Programme, under that specific month

End of report