



**COAL CONCEPTS PROFICIENCY TESTING
GENERAL ANALYSIS SAMPLE**

REPORT – ONE HUNDRED AND THIRTY-FIVE

Revision 00

Final report

DATE ISSUED: 31 JANUARY 2023

PARTICIPANT

LABORATORY CODE: a

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 twenty-one samples were sent to participants with 121 results submitted timeously.
2. The total number of outliers detected were as follows (dry base):
 - ISO Ash x 5
 - Volatile matter x 2
 - Calorific value x 3
 - Total Sulphur x 5
 - Phosphorous x 1
3. Chlorine, ASTM Ash, ASTM Volatile Matter participants were insufficient to warrant robust statistical calculations.
4. Trending for your laboratory is as follows:

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Dear Participant

RE: PROFICIENCY TESTING RESULTS FOR THE MONTH OF JANUARY 2023

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

Your laboratory code is as per the cover page.

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. Z-Score 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

Afisam Dudfield	Idwala Lime
Africoal	Jindal Kiepersol
Afrisam Ulco	Jugoinspekt Belgrade AD Serbia
AH Knight	Kufeziwe Laboratory
Anglo Coal Goedehoop North Plant	Laboratory for solid fuels-Mining Institute Belgrade
Anglo Coal Nyosi Coal (Kriel)	Leon Testing Pakistan
Anglo Greenside	Mafube Coal
Anglo Landau	Ministry of Energy and Mineral Resources - Kingdom of Jordan
Anglo New Vaal	Mitra SK Richards Bay
Aqua Specto	ML Coal
ArcelorMittal VDP	Moruple
Best enough - Rietkuil	Mpumamanzi
Best enough Laboratory -Witbank	Msobo Coal
Bestech Anthra Siding- Ermelo	Nelson Mandela University
Bestech Madini Mining Witbank	Noko Analytical laboratories (Witbank)
Bestech Vlakfontein Mine-Ogies	Noko NCC
Bestech Zomhlaba Resource Mine -Delmas	Noko Welgemeend
Botswana Power Corp - B Power Station	Quality Ensure Eastide Lab - Shift A
Botswana Power Corporation - A Power Station	Quality Ensure Eastide Lab - Shift B
Bureau Veritas Beira	Richards Bay Minerals
Bureau Veritas Inspectorate Laboratories - Alton	Ronewa Lab
Bureau Veritas Inspectorate Laboratories - Middelburg	Ronewa Lab Vele
BV BELFAST	Ronewa Ubuntu
BV Moatize	Ronewa Wescoal
BV Nacala	RSA Kangra
BV Tendele	RSA Khanye
BVTISA -PTA	RSA Phalandwa
Castle Peak Power Station	RSA ZAC
CCIC Richards Bay	Ruvuma Coal LTD
Coal Concepts Richards Bay Lab	SABS CSIR
CoalLab Tselentis	SABS Newcastle (RETAINED SPRINGLAKES LAB CODE)
Cotecna Phola	SABS Richards Bay
Cotecna Foresight Ubumbene	SABS Secunda
Cotecna Klarinet	SABS Uitkomst
Cotecna Lurco	Sappi
Cotecna Mimosa	SB Mining Solutions - Middelburg
Cotecna Nasonti	Seriti New Denmark
Cotecna Richards Bay Lab	Sibonisiwe Clewer
Cotecna Umbumbene DroogVallei	Sibonisiwe Elandsfontein
Cotecna Umlabu	Sibonisiwe Kleinfontein
Cotecna Witbank	Sibonisiwe Middelburg
Ensayos técnicos Labmin SRL-Peru	Sibonisiwe Ritvlei
Eskom Arnot	Sibonisiwe Vlakfontien
Eskom Duvha	Sibonisiwe WCP
Eskom Erid	Sibonisiwe Mzimkhulu
Eskom Erid TGA	Siza Arnotopco
Eskom Grootvlei	Siza Carolina
Eskom Hendrina	Siza Coal Services - Botswana
Eskom Kendal	Siza Coal Services - Kinross
Eskom Komati	Siza Leeuwpan
Eskom Kriel	Siza Middelburg
Eskom Lethabo	Siza Minerals Lab - Gaborone
Eskom Majuba	Siza Mooiplaats
Eskom Matimba	Siza NBC
Eskom Matla	Siza Sasol
Eskom Medupi	Siza Umlalazi
Eskom Tutuka	Siza Vlakfontein
Exxaro Grootegeluk	Siza WestCoal
Exxaro Matla	Siza Wildfontein
Eyethu Coal - Mooifontein	South 32 Khutala
Fauji Fertilizer Bin Qasim Limited	SPT
G & W Minerals	Tata Steel Wales - Europe
General Directorate of Coal Enterprises of Turkey	Turkey ELI
Genet Klipfontein	UAS
Genet Matla	UAS Main Lab
Genet Welgelegen	UAS Overlooked
Geoscience	UAS Sudor
Glencore Boshhoek	UAS Twistdraai
Glencore Lion	UAS VDD
Glencore Rustenburg	UIS
Glencore Wonderkop	Universal Geominerals Sdn Bhd - Malaysia
HighVeld Lab	Vitrovian
Hwange Colliery	Yildiz Labs - Turkey

1. TYPE OF SAMPLE USED

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

2. PREPARATION OF SAMPLE

Approximately 1000kg's of coal with an approximate top size 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 mixing drum for 4 hours.

3. HOMOGENEITY CHECK

There were 121 participants in this round, 10 portions of sample were randomly extracted. These were packaged in their final form i.e. in 200ml sample bottles. The bottles were labelled 1 to 10. The results were as follows:

SAMPLE NO.	TEST PORTION 1	TEST PORTION 2	sample av (Xt)	range (Wt)	range sqd
1	27.81	28.02	27.92	0.21	0.0441
2	28.06	27.87	27.97	0.19	0.0361
3	27.98	28.10	28.04	0.12	0.0144
4	27.90	28.14	28.02	0.24	0.0576
5	28.00	28.01	28.01	0.01	0.0001
6	28.14	27.98	28.06	0.16	0.0256
7	28.07	28.00	28.04	0.07	0.0049
8	28.06	28.17	28.12	0.11	0.0121
9	28.07	28.13	28.10	0.06	0.0036
10	27.90	27.85	27.88	0.05	0.0025
GENERAL AVERAGE			28.01		
STANDARD DEVIATION			0.076		
WITHIN SAMPLE STANDARD DEVIATION			0.100		
BETWEEN SAMPLE STANDARD DEVIATION			0.028		

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 = $0.560 \times 0.3 = 0.168$

Since 0.028 < 0.168, the samples are homogenous.

4. STABILITY CHECK

Samples were retained for sales as reference material. Ten 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	27.96	28.02	27.99	0.06	0.0036
2	27.97	27.89	27.93	0.08	0.0064
3	27.98	27.96	27.97	0.02	0.0004
4	27.99	28.01	28.00	0.02	0.0004
5	27.97	28.07	28.02	0.10	0.0100
6	28.06	27.97	28.02	0.09	0.0081
7	28.13	27.95	28.04	0.18	0.0324
8	28.04	28.00	28.02	0.04	0.0016
9	28.02	28.07	28.05	0.05	0.0025
10	28.10	27.91	28.01	0.19	0.0361
GENERAL AVERAGE			28.00		
STANDARD DEVIATION			0.034		
WITHIN SAMPLE STANDARD DEVIATION			0.071		
BETWEEN SAMPLE STANDARD DEVIATION			0.037		

($\sigma = 0.560$ was used)

For this report $0.3 \times 0.576 = 0.168$

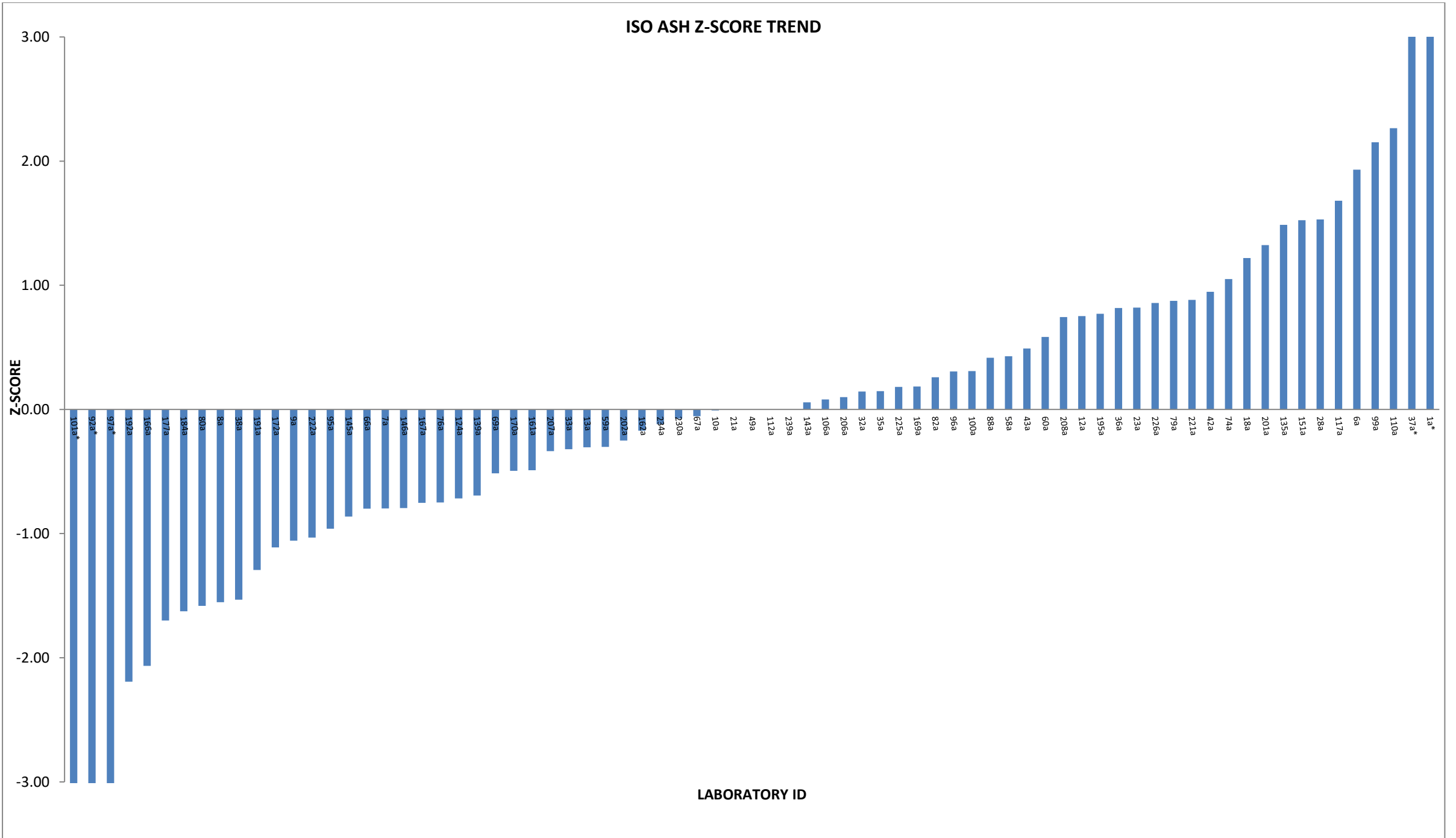
Absolute value of $(28.00 - 28.01) = 0.010$

Since $0.010 < 0.168$ the proficiency testing samples were stable

COAL CONCEPTS - PROFICIENCY TESTING - JANUARY 2023

ANALYTICAL PARAMETER: ISO ASH (%)

LAB ID	MOISTURE IN ANALYSIS SAMPLE (%)	AIR DRY (%)	DRY BASE (%)	Z-SCORE (DRY BASE)	
1a*	4.06	29.54	30.79	7.81	
6a	4.22	28.46	29.71	1.93	
7a	3.06	28.32	29.21	-0.80	
8a	3.70	28.00	29.08	-1.55	
9a	4.00	28.00	29.17	-1.06	
10a	3.81	28.24	29.36	-0.01	
12a	4.23	28.25	29.50	0.75	
13a	4.28	28.05	29.30	-0.31	
18a	3.73	28.48	29.58	1.22	
21a	4.35	28.08	29.36	0.00	
23a	4.00	28.33	29.51	0.82	
28a	3.51	28.60	29.64	1.53	
32a	4.65	28.02	29.39	0.14	
33a	4.10	28.10	29.30	-0.32	
35a	4.04	28.20	29.39	0.15	
36a	4.10	28.30	29.51	0.82	
37a*	4.30	29.10	30.41	5.72	
38a	4.40	27.80	29.08	-1.53	
42a	3.50	28.50	29.53	0.95	
43a	3.26	28.49	29.45	0.49	
49a	3.52	28.33	29.36	0.00	
58a	4.14	28.22	29.44	0.43	
59a	3.77	28.20	29.30	-0.30	
60a	4.30	28.20	29.47	0.58	
66a	3.71	28.13	29.21	-0.80	
67a	4.60	28.00	29.35	-0.05	
69a	3.30	28.30	29.27	-0.52	
74a	3.90	28.40	29.55	1.05	
76a	3.50	28.20	29.22	-0.75	
79a	4.10	28.31	29.52	0.87	
80a	3.51	28.05	29.07	-1.58	
82a	3.80	28.29	29.41	0.26	
88a	4.20	28.20	29.44	0.42	
92a*	3.97	27.25	28.38	-5.37	
95a	4.40	27.90	29.18	-0.96	
96a	4.27	28.16	29.42	0.31	
97a*	4.00	27.40	28.54	-4.47	
99a	4.35	28.46	29.75	2.15	
100a	3.83	28.29	29.42	0.31	
101a*	4.06	21.64	22.56	-37.15	
106a	4.00	28.20	29.38	0.08	
110a	3.98	28.59	29.78	2.27	
112a	4.30	28.10	29.36	0.00	
117a	3.60	28.60	29.67	1.68	
124a	3.52	28.20	29.23	-0.72	
135a	3.99	28.45	29.63	1.49	
139a	4.15	28.02	29.23	-0.69	
143a	4.19	28.14	29.37	0.06	
145a	3.98	28.04	29.20	-0.86	
146a	4.50	27.90	29.21	-0.79	
151a	4.35	28.35	29.64	1.52	
161a	4.34	28.00	29.27	-0.49	
162a	4.36	28.05	29.33	-0.17	
166a	4.39	27.71	28.98	-2.07	
167a	3.19	28.29	29.22	-0.75	
169a	3.79	28.28	29.39	0.19	
170a	3.62	28.21	29.27	-0.49	
172a	4.07	27.97	29.16	-1.11	
177a	4.54	27.73	29.05	-1.70	
184a	4.00	27.90	29.06	-1.62	
191a	4.20	27.90	29.12	-1.29	
192a	4.00	27.80	28.96	-2.19	
195a	4.14	28.28	29.50	0.77	
201a	4.40	28.30	29.60	1.32	
202a	4.04	28.13	29.31	-0.25	
206a	3.67	28.30	29.38	0.10	
207a	3.34	28.32	29.30	-0.34	
208a	4.70	28.11	29.50	0.74	
221a	3.80	28.40	29.52	0.88	
222a	4.70	27.80	29.17	-1.03	
225a	4.40	28.1	29.39	0.18	
226a	3.92	28.36	29.52	0.86	
230a	4.18	28.12	29.35	-0.07	
234a	3.88	28.20	29.34	-0.12	
239a	4.55	28.02	29.36	0.00	
Number of results	-	75	75	-	
OUTLIERS	-	-	5	-	
AVERAGE	-	4.02	28.18	29.36	-
STD DEVIATION	-	-	0.21	0.18	-
MEDIAN	-	-	28.20	29.36	-
%RSD	-	-	0.74	0.62	-
ROBUST AVERAGE	-	-	28.18	29.36	-
ROBUST STD DEVIATION	-	-	0.23	0.20	-
UoM	-	-	0.03	0.03	-

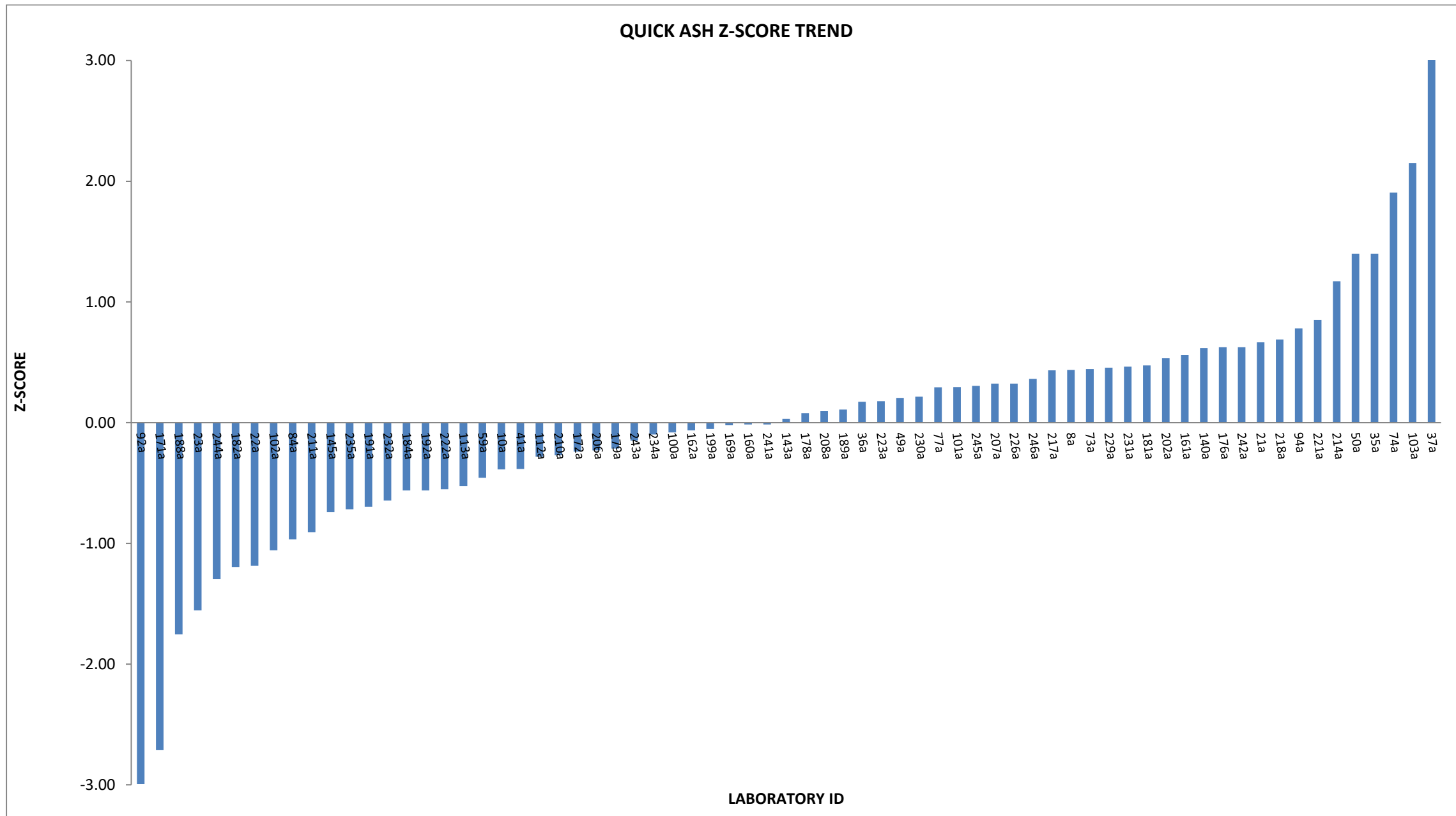


COAL CONCEPTS - PROFICIENCY TESTING - JANUARY 2023

ANALYTICAL PARAMETER: QUICK ASH (%)

LAB ID	MOISTURE IN ANALYSIS SAMPLE (%)	AIR DRY (%)	DRY BASE (%)	Z-SCORE (DRY BASE)
8a	3.70	28.30	29.39	0.44
10a	3.81	28.01	29.12	-0.39
21a	4.35	28.18	29.46	0.67
22a	3.57	27.83	28.86	-1.18
23a	4.00	27.59	28.74	-1.56
35a	4.04	28.50	29.70	1.40
36a	4.10	28.10	29.30	0.17
37a	4.30	29.20	30.51	3.90
41a	3.16	28.20	29.12	-0.38
49a	3.52	28.28	29.31	0.20
50a	3.77	28.58	29.70	1.40
59a	3.77	28.00	29.10	-0.46
73a	5.17	27.87	29.39	0.44
74a	3.90	28.70	29.86	1.91
77a	5.25	27.80	29.34	0.29
84a	5.50	27.34	28.93	-0.97
92a	3.97	27.15	28.27	-2.99
94a	3.73	28.40	29.50	0.78
100a	3.83	28.10	29.22	-0.08
101a	4.06	28.15	29.34	0.30
102a	2.67	28.13	28.90	-1.06
103a	2.82	29.10	29.94	2.15
112a	4.30	27.90	29.15	-0.28
113a	4.04	27.90	29.07	-0.52
140a	4.13	28.23	29.45	0.62
143a	4.19	28.03	29.26	0.03
145a	3.98	27.85	29.00	-0.74
160a	3.90	28.10	29.24	-0.01
161a	4.34	28.15	29.43	0.56
162a	4.36	27.95	29.22	-0.06
169a	3.79	28.13	29.24	-0.02
171a	3.68	27.32	28.36	-2.71
172a	4.07	27.98	29.17	-0.24
176a	3.90	28.30	29.45	0.63
178a	4.00	28.10	29.27	0.08
179a	3.00	28.30	29.18	-0.22
181a	3.40	28.40	29.40	0.48
182a	3.28	27.91	28.86	-1.20
184a	4.00	27.90	29.06	-0.56
188a	4.10	27.50	28.68	-1.75
189a	3.93	28.13	29.28	0.11
191a	4.20	27.80	29.02	-0.70
192a	4.00	27.9	29.06	-0.56
199a	3.45	28.22	29.23	-0.05
202a	4.04	28.23	29.42	0.53
206a	3.67	28.1	29.17	-0.23
207a	3.34	28.37	29.35	0.32
208a	4.70	27.90	29.28	0.09
210a	3.90	28.02	29.16	-0.27
211a	1.97	28.38	28.95	-0.91
214a	3.80	28.50	29.63	1.17
217a	3.90	28.24	29.39	0.43
218a	3.90	28.32	29.47	0.69
221a	3.80	28.40	29.52	0.85
222a	4.70	27.70	29.07	-0.55
223a	3.90	28.16	29.30	0.18
226a	3.92	28.20	29.35	0.32
229a	3.38	28.4	29.39	0.46
230a	4.18	28.09	29.32	0.22
231a	3.49	28.37	29.40	0.46
232a	4.60	27.70	29.04	-0.64
234a	3.88	28.08	29.21	-0.10
235a	2.80	28.20	29.01	-0.72
241a	3.90	28.10	29.24	-0.01
242a	3.90	28.30	29.45	0.63
243a	4.10	28.00	29.20	-0.15
244a	3.90	27.70	28.82	-1.30
245a	3.90	28.20	29.34	0.31
246a	4.37	28.08	29.36	0.36

Number of results	-	69	69	69	-
OUTLIERS	-	-	0	0	-
AVERAGE	-	3.90	28.11	29.25	-
STD DEVIATION	-	-	0.34	0.32	-
MEDIAN	-	-	28.10	29.26	-
%RSD	-	-	1.22	1.11	-
ROBUST AVERAGE	-	-	28.10	29.24	-
ROBUST STD DEVIATION	-	-	0.35	0.31	-
UoM	-	-	0.05	0.05	-

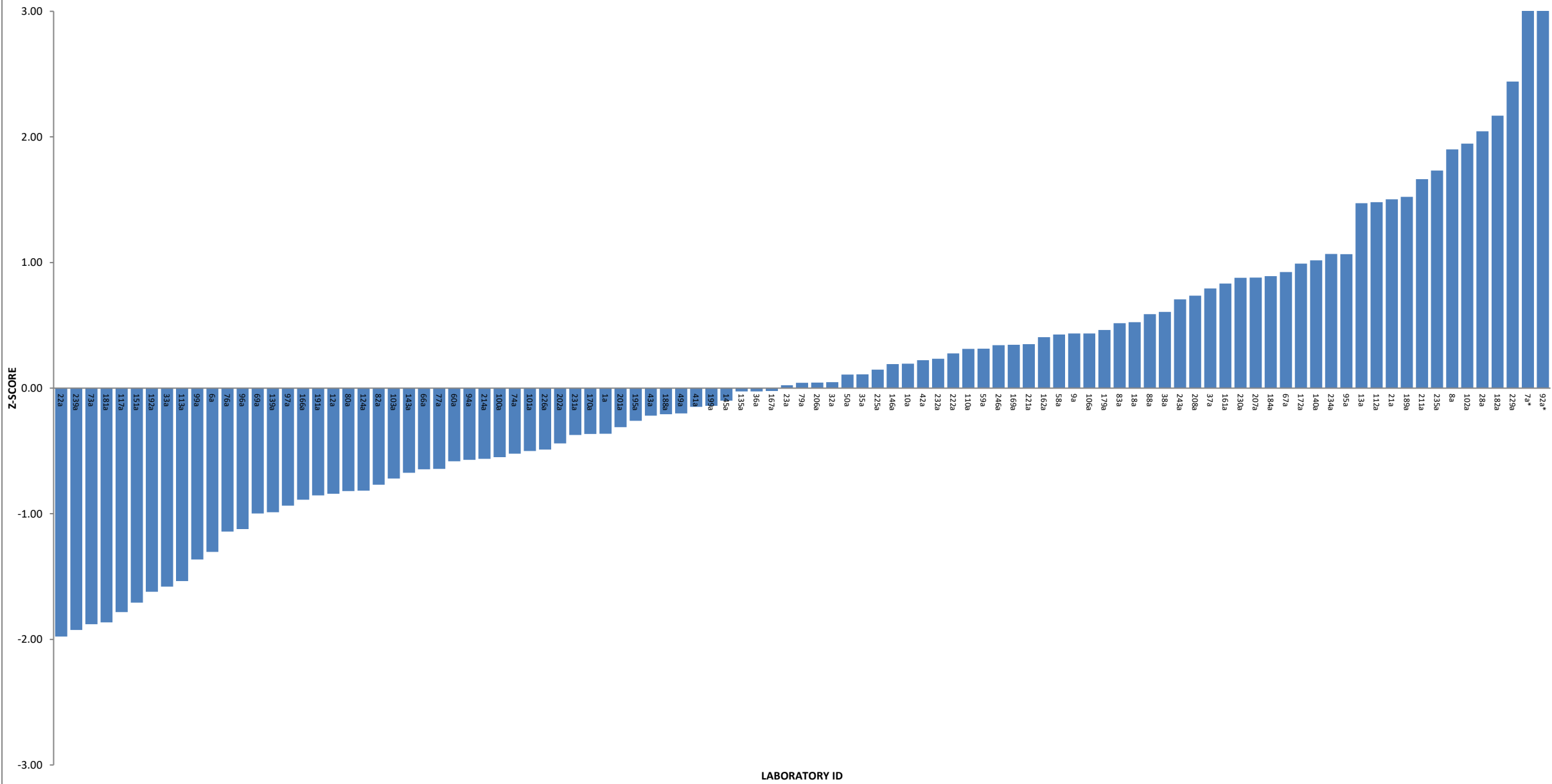


COAL CONCEPTS - PROFICIENCY TESTING - JANUARY 2023

ANALYTICAL PARAMETER: ISO VOLATILE MATTER(%)

LAB ID	MOISTURE IN ANALYSIS SAMPLE (%)	AIR DRY	DRY BASE	Z-SCORE (DRY BASE)
1a	4.06	17.64	18.39	-0.36
6a	4.22	17.20	17.96	-1.30
7a*	3.06	20.23	20.87	5.08
8a	3.70	18.70	19.42	1.90
9a	4.00	18.00	18.75	0.43
10a	3.81	17.93	18.64	0.19
12a	4.23	17.40	18.17	-0.84
13a	4.28	18.40	19.22	1.47
18a	3.73	18.09	18.79	0.52
21a	4.35	18.40	19.24	1.50
22a	3.57	17.02	17.65	-1.98
23a	4.00	17.82	18.56	0.02
28a	3.51	18.80	19.48	2.04
32a	4.65	17.71	18.57	0.05
33a	4.10	17.10	17.83	-1.58
35a	4.04	17.85	18.60	0.11
36a	4.10	17.78	18.54	-0.03
37a	4.30	18.10	18.91	0.79
38a	4.40	18.00	18.83	0.61
41a	3.16	17.90	18.48	-0.15
42a	3.50	18.00	18.65	0.22
43a	3.26	17.85	18.45	-0.22
49a	3.52	17.81	18.46	-0.20
50a	3.77	17.90	18.60	0.11
58a	4.14	17.97	18.75	0.43
59a	3.77	17.99	18.69	0.31
60a	4.30	17.50	18.29	-0.58
66a	3.71	17.58	18.26	-0.65
67a	4.60	18.1	18.97	0.92
69a	3.30	17.5	18.10	-1.00
73a	5.17	16.78	17.69	-1.88
74a	3.90	17.60	18.31	-0.52
76a	3.50	17.40	18.03	-1.14
77a	5.25	17.30	18.26	-0.64
79a	4.10	17.81	18.57	0.04
80a	3.51	17.54	18.18	-0.82
82a	3.80	17.51	18.20	-0.77
83a	3.82	18.07	18.79	0.52
88a	4.20	18.03	18.82	0.59
92a*	3.97	23.20	24.16	12.30
94a	3.73	17.61	18.29	-0.57
95a	4.40	18.20	19.04	1.07
96a	4.27	17.27	18.04	-1.12
97a	4.00	17.40	18.13	-0.94
99a	4.35	17.15	17.93	-1.36
100a	3.83	17.60	18.30	-0.55
101a	4.06	17.58	18.32	-0.50
102a	2.67	18.92	19.44	1.95
103a	2.82	17.71	18.22	-0.72
106a	4.00	18.00	18.75	0.43
110a	3.98	17.95	18.69	0.31
112a	4.30	18.40	19.23	1.48
113a	4.04	17.13	17.85	-1.54
117a	3.60	17.10	17.74	-1.78
124a	3.52	17.54	18.18	-0.82
135a	3.99	17.80	18.54	-0.03
139a	4.15	17.35	18.10	-0.99
140a	4.13	18.23	19.02	1.02
143a	4.19	17.48	18.24	-0.67
145a	3.98	17.77	18.51	-0.10
146a	4.50	17.80	18.64	0.19
151a	4.35	17.00	17.77	-1.71
161a	4.34	18.11	18.93	0.83
162a	4.36	17.92	18.74	0.41
166a	4.39	17.35	18.15	-0.89
167a	3.19	17.95	18.54	-0.02
169a	3.79	18.00	18.71	0.35
170a	3.62	17.72	18.39	-0.36
172a	4.07	18.23	19.00	0.99
179a	3.00	18.20	18.76	0.46
181a	3.40	17.10	17.70	-1.86
182a	3.28	18.90	19.54	2.17
184a	4.00	18.20	18.96	0.89
188a	4.10	17.70	18.46	-0.21
189a	3.93	18.49	19.25	1.52
191a	4.20	17.40	18.16	-0.85
192a	4.00	17.10	17.81	-1.62
195a	4.14	17.67	18.43	-0.26
199a	3.45	17.85	18.49	-0.14
201a	4.40	17.60	18.41	-0.31
202a	4.04	17.61	18.35	-0.44
206a	3.67	17.89	18.57	0.04
207a	3.34	18.32	18.95	0.88
208a	4.70	18.00	18.89	0.74
211a	1.97	18.93	19.31	1.66
214a	3.80	17.60	18.30	-0.56
221a	3.80	18.00	18.71	0.35
222a	4.70	17.80	18.68	0.28
225a	4.40	17.80	18.62	0.15
226a	3.92	17.61	18.33	-0.49
229a	3.38	19.00	19.66	2.44
230a	4.18	18.16	18.95	0.88
231a	3.49	17.74	18.38	-0.37
232a	4.60	17.80	18.66	0.23
234a	3.88	18.30	19.04	1.07
235a	2.80	18.80	19.34	1.73
239a	4.55	16.87	17.67	-1.92
243a	4.10	18.10	18.87	0.71
246a	4.37	17.89	18.71	0.34
NUMBER OF RESULTS	-	99	99	-
OUTLIERS	-	2	2	-
AVERAGE	-	17.82	18.55	-
STD DEVIATION	-	0.47	0.46	-
MEDIAN	-	17.81	18.56	-
%RSD	-	2.62	2.46	-
ROBUST AVERAGE	-	17.82	18.55	-
ROBUST STD DEVIATION	-	0.51	0.51	-
UoM	-	0.07	0.06	-

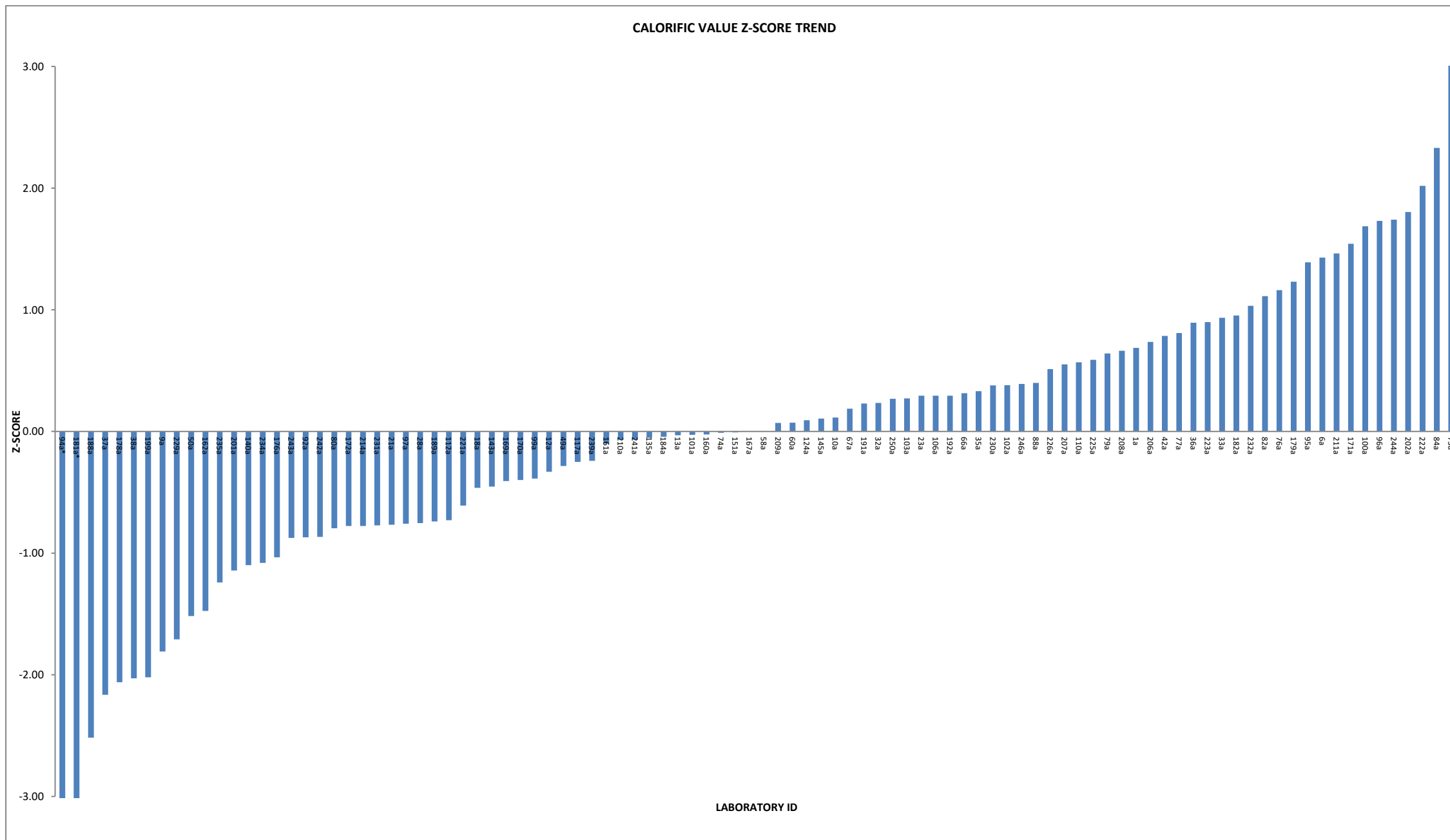
VOLATILE MATTER Z-SCORE TREND



COAL CONCEPTS - PROFICIENCY TESTING - JANUARY 2023

ANALYTICAL PARAMETER: CALORIFIC VALUE (MJ/kg)

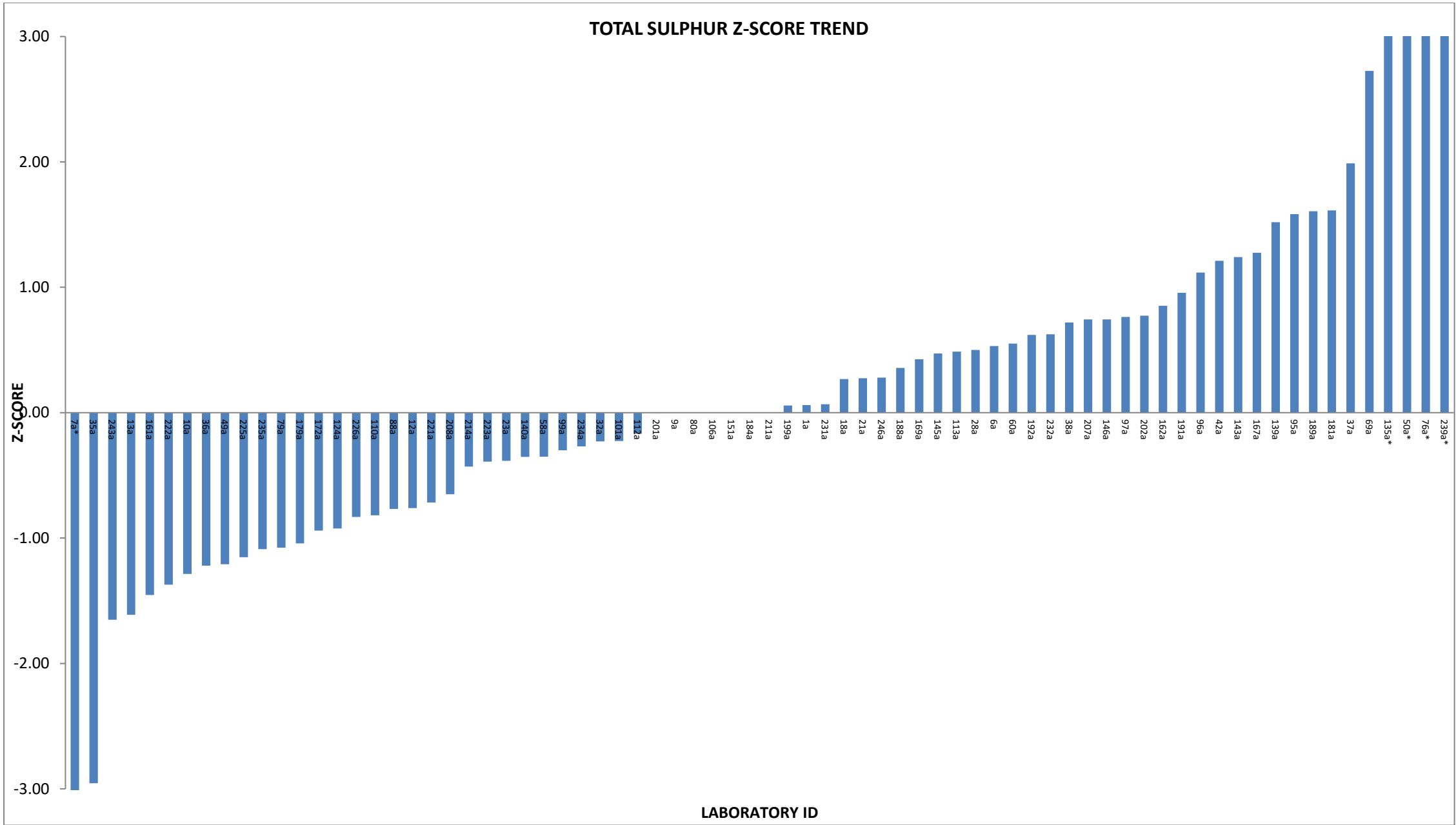
LAB ID	MOISTURE IN ANALYSIS SAMPLE (%)	AIR DRY (MJ/kg)	DRY BASE (MJ/kg)	Z-SCORE (DRY BASE)
1a	4.06	21.65	22.57	0.69
6a	4.22	21.79	22.75	1.43
9a	4.00	21.07	21.95	-1.81
10a	3.81	21.57	22.42	0.11
12a	4.23	21.37	22.31	-0.33
13a	4.28	21.43	22.39	-0.03
18a	3.73	21.45	22.28	-0.46
21a	4.35	21.24	22.21	-0.77
23a	4.00	21.57	22.47	0.29
28a	3.51	21.43	22.21	-0.75
32a	4.65	21.41	22.45	0.23
33a	4.10	21.70	22.63	0.93
35a	4.04	21.57	22.48	0.33
36a	4.10	21.69	22.62	0.89
37a	4.30	20.92	21.86	-2.16
38a	4.40	20.93	21.89	-2.03
42a	3.50	21.80	22.59	0.79
49a	3.52	21.54	22.33	-0.28
50a	3.77	21.19	22.02	-1.52
58a	4.14	21.47	22.40	0.00
60a	4.30	21.45	22.41	0.07
66a	3.71	21.64	22.47	0.31
67a	4.60	21.41	22.44	0.19
73a*	5.17	22.69	23.93	6.18
74a	3.90	21.52	22.39	-0.01
76a	3.50	21.89	22.68	1.16
77a	5.25	21.41	22.60	0.81
79a	4.10	21.63	22.55	0.64
80a	3.51	21.42	22.20	-0.79
82a	3.80	21.81	22.67	1.11
84a	5.50	21.71	22.97	2.33
88a	4.20	21.55	22.49	0.40
92a	3.97	21.30	22.18	-0.87
94a*	3.73	20.46	21.25	-4.62
95a	4.40	21.74	22.74	1.39
96a	4.27	21.85	22.82	1.73
97a	4.00	21.32	22.21	-0.76
99a	4.35	21.33	22.30	-0.39
100a	3.83	21.94	22.81	1.69
101a	4.06	21.48	22.39	-0.03
102a	2.67	21.89	22.49	0.38
103a	2.82	21.83	22.46	0.27
106a	4.00	21.57	22.47	0.29
110a	3.98	21.64	22.54	0.57
112a	4.30	21.26	22.22	-0.73
117a	3.60	21.53	22.33	-0.25
124a	3.52	21.63	22.42	0.09
135a	3.99	21.49	22.38	-0.05
140a	4.13	21.21	22.12	-1.10
143a	4.19	21.35	22.28	-0.45
145a	3.98	21.53	22.42	0.11
151a	4.35	21.42	22.39	-0.01
160a	3.97	21.50	22.39	-0.03
161a	4.34	21.40	22.37	-0.10
162a	4.36	21.07	22.03	-1.48
167a	3.19	21.69	22.40	0.00
169a	3.79	21.45	22.29	-0.41
170a	3.62	21.49	22.30	-0.40
171a	3.68	21.94	22.78	1.54
172a	4.07	21.30	22.20	-0.78
176a	3.97	21.26	22.14	-1.03
178a	4.00	21.01	21.89	-2.06
179a	3.00	22.02	22.70	1.23
181a*	3.40	20.74	21.47	-3.74
182a	3.28	21.89	22.63	0.95
184a	4.00	21.49	22.39	-0.04
188a	4.10	20.88	21.77	-2.52
189a	3.93	21.34	22.21	-0.74
191a	4.20	21.51	22.45	0.23
192a	4.00	21.57	22.47	0.29
199a	3.45	21.14	21.90	-2.02
201a	4.40	21.14	22.11	-1.14
202a	4.04	21.92	22.84	1.80
206a	3.67	21.75	22.58	0.74
207a	3.34	21.78	22.53	0.55
208a	4.70	21.50	22.56	0.66
209a	4.79	21.34	22.41	0.07
210a	3.97	21.49	22.38	-0.07
211a	1.97	22.31	22.76	1.46
214a	3.80	21.36	22.20	-0.78
221a	3.80	21.40	22.25	-0.61
222a	4.70	21.82	22.90	2.02
223a	3.97	21.72	22.62	0.90
225a	4.40	21.55	22.54	0.59
226a	3.92	21.64	22.52	0.51
229a	3.38	21.23	21.97	-1.71
230a	4.18	21.55	22.49	0.38
231a	3.49	21.43	22.20	-0.77
232a	4.60	21.61	22.65	1.03
234a	3.88	21.27	22.13	-1.08
235a	2.80	21.47	22.09	-1.24
239a	4.55	21.32	22.34	-0.24
241a	3.97	21.49	22.38	-0.07
242a	3.97	21.30	22.18	-0.87
243a	4.10	21.27	22.18	-0.87
244a	3.97	21.92	22.83	1.74
246a	4.37	21.51	22.49	0.39
250a	3.97	21.57	22.46	0.27
NUMBER OF RESULTS	-	98	98	-
OUTLIERS	-	-	2	3
AVERAGE	-	3.97	21.50	22.40
STD DEVIATION	-	-	0.27	0.25
MEDIAN	-	-	21.49	22.40
%RSD	-	-	1.24	1.11
ROBUST AVERAGE	-	-	21.50	22.39
ROBUST STD DEVIATION	-	-	0.28	0.27
UoM	-	-	0.04	0.03



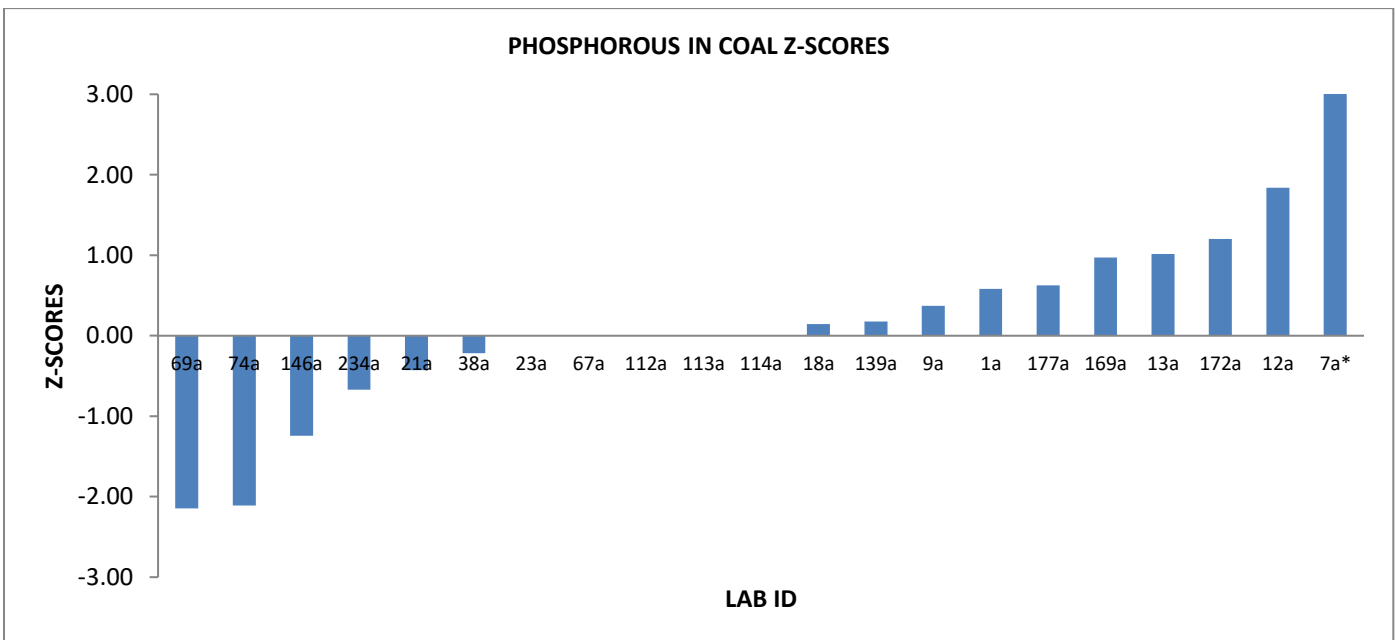
COAL CONCEPTS - PROFICIENCY TESTING - JANUARY 2023

ANALYTICAL PARAMETER: TOTAL SULPHUR (%)

LAB ID	MOISTURE IN ANALYSIS SAMPLE (%)	AIR DRY	DRY BASE	Z-SCORE (DRY BASE)
1a	4.06	1.61	1.68	0.06
6a	4.22	1.64	1.71	0.53
7a*	3.06	0.74	0.76	-12.53
9a	4.00	1.60	1.67	0.00
10a	3.81	1.52	1.58	-1.29
12a	4.23	1.55	1.62	-0.76
13a	4.28	1.49	1.56	-1.61
18a	3.73	1.63	1.69	0.27
21a	4.35	1.62	1.69	0.28
23a	4.00	1.58	1.65	-0.38
28a	3.51	1.65	1.71	0.50
32a	4.65	1.58	1.66	-0.23
35a	4.04	1.40	1.46	-2.96
36a	4.10	1.52	1.58	-1.22
37a	4.30	1.74	1.82	1.99
38a	4.40	1.65	1.73	0.72
42a	3.50	1.70	1.76	1.21
49a	3.52	1.53	1.59	-1.21
50a*	3.77	1.89	1.96	4.00
58a	4.14	1.58	1.65	-0.35
60a	4.30	1.64	1.71	0.55
69a	3.30	1.81	1.87	2.73
76a*	3.50	1.93	2.00	4.49
79a	4.10	1.53	1.60	-1.08
80a	3.51	1.61	1.67	0.00
88a	4.20	1.55	1.62	-0.77
95a	4.40	1.71	1.79	1.58
96a	4.27	1.68	1.75	1.12
97a	4.00	1.66	1.73	0.76
99a	4.35	1.58	1.65	-0.30
101a	4.06	1.59	1.66	-0.23
106a	4.00	1.60	1.67	0.00
110a	3.98	1.55	1.61	-0.82
112a	4.30	1.59	1.66	-0.17
113a	4.04	1.64	1.71	0.49
124a	3.52	1.55	1.61	-0.92
135a*	3.99	1.86	1.94	3.63
139a	4.15	1.71	1.78	1.52
140a	4.13	1.58	1.65	-0.35
143a	4.19	1.69	1.76	1.24
145a	3.98	1.64	1.71	0.47
146a	4.50	1.65	1.73	0.74
151a	4.35	1.60	1.67	0.00
161a	4.34	1.50	1.57	-1.45
162a	4.36	1.66	1.74	0.85
167a	3.19	1.71	1.77	1.28
169a	3.79	1.64	1.70	0.43
172a	4.07	1.54	1.61	-0.94
179a	3.00	1.55	1.60	-1.04
181a	3.40	1.73	1.79	1.61
184a	4.00	1.60	1.67	0.00
188a	4.10	1.63	1.70	0.36
189a	3.93	1.72	1.79	1.61
191a	4.20	1.67	1.74	0.96
192a	4.00	1.65	1.72	0.62
199a	3.45	1.62	1.68	0.06
201a	4.40	1.60	1.67	0.00
202a	4.04	1.66	1.73	0.77
207a	3.34	1.67	1.73	0.74
208a	4.70	1.55	1.63	-0.65
211a	1.97	1.64	1.67	0.00
214a	3.80	1.58	1.64	-0.43
221a	3.80	1.56	1.62	-0.72
222a	4.70	1.50	1.57	-1.37
223a	3.97	1.58	1.65	-0.39
225a	4.40	1.52	1.59	-1.15
226a	3.92	1.55	1.61	-0.83
231a	3.49	1.62	1.68	0.07
232a	4.60	1.64	1.72	0.62
234a	3.88	1.59	1.65	-0.27
235a	2.80	1.55	1.59	-1.09
239a*	4.55	2.30	2.41	10.13
243a	4.10	1.49	1.55	-1.65
246a	4.37	1.62	1.69	0.28
NUMBER OF RESULTS	74	74	74	-
OUTLIERS	-	-	5	5
AVERAGE	3.97	1.61	1.67	-
MEDIAN	-	1.60	1.67	-
STD DEVIATION	-	0.07	0.07	-
%RSD	-	4.39	4.34	-
ROBUST AVERAGE	-	1.61	1.67	-
ROBUST STD DEVIATION	-	0.07	0.08	-
UoM	-	0.01	0.01	-



COAL CONCEPTS - PROFICIENCY TESTING - JANUARY 2023					
ANALYTICAL PARAMETER: PHOSPHOROUS IN COAL (%)					
	LAB ID	MOISTURE IN ANALYSIS SAMPLE (%)	AIR DRY	DRY BASE	Z-SCORE (DRY BASE)
	1a	4.06	0.041	0.043	0.58
	7a*	3.06	0.116	0.120	15.81
	9a	4.00	0.040	0.042	0.37
	12a	4.23	0.047	0.049	1.84
	13a	4.28	0.043	0.045	1.02
	18a	3.73	0.039	0.041	0.14
	21a	4.35	0.036	0.038	-0.43
	23a	4.00	0.038	0.040	0.00
	38a	4.40	0.037	0.039	-0.22
	67a	4.60	0.038	0.040	0.00
	69a	3.30	0.028	0.029	-2.14
	74a	3.90	0.028	0.029	-2.11
	112a	4.30	0.038	0.040	0.00
	113a	4.04	0.038	0.040	0.00
	114a	4.06	0.038	0.040	0.00
	139a	4.15	0.039	0.041	0.18
	146a	4.50	0.032	0.034	-1.24
	169a	3.79	0.043	0.045	0.97
	172a	4.07	0.044	0.046	1.20
	177a	4.54	0.041	0.043	0.63
	234a	3.88	0.035	0.036	-0.67
Number of results	-	21	21	21	-
OUTLIERS	-	-	1	1	-
AVERAGE	-	4.06	0.038	0.040	-
STD DEVIATION	-	-	0.005	0.005	-
MEDIAN	-	-	0.038	0.040	-
ROBUST AVERAGE	-	-	0.038	0.040	-
ROBUST STD DEVIATION	-	-	0.005	0.005	-
UoM	-	-	0.001	0.001	-



COAL CONCEPTS - PROFICIENCY TESTING - JANUARY 2023					
ANALYTICAL PARAMETER: TOTAL CARBON (%)					
	LAB ID	MOISTURE IN ANALYSIS SAMPLE (%)	AIR DRY	DRY BASE	Z-SCORE (DRY BASE)
	1a	4.06	55.53	57.88	-0.62
	9a	4.00	56.65	59.01	0.83
	12a	4.23	55.65	58.11	-0.33
	21a	4.35	56.65	59.23	1.11
	88a	4.20	54.27	56.65	-2.21
	177a	4.54	55.70	58.35	-0.02
	202a	4.04	56.39	58.76	0.51
	234a	3.88	56.60	58.88	0.67
	239a	4.55	55.75	58.41	0.06
Number of results	-	9	9	9	-
OUTLIERS	-	-	0	0	-
AVERAGE	-	4.21	55.91	58.36	-
MEDIAN	-	-	55.75	58.41	-
STD DEVIATION	-	-	0.77	0.78	-
%RSD	-	-	1.38	1.33	-

COAL CONCEPTS - PROFICIENCY TESTING - JANUARY 2023					
ANALYTICAL PARAMETER: HYDROGEN (%)					
	LAB ID	MOISTURE IN ANALYSIS SAMPLE (%)	AIR DRY	DRY BASE	Z-SCORE (DRY BASE)
	1a	4.06	2.74	2.86	-0.16
	9a	4.00	2.74	2.85	-0.17
	12a	4.23	2.73	2.85	-0.19
	21a	4.35	2.89	3.02	0.70
	88a	4.20	2.65	2.77	-0.62
	177a	4.54	2.37	2.48	-2.09
	202a	4.04	3.04	3.17	1.45
	234a	3.88	2.87	2.99	0.51
	239a	4.55	2.86	3.00	0.57
Number of results	-	9	9	9	-
OUTLIERS	-	-	0	0	-
AVERAGE	-	4.21	2.77	2.89	-
MEDIAN	-	-	2.74	2.86	-
STD DEVIATION	-	-	0.19	0.19	-
%RSD	-	-	6.80	6.71	-

COAL CONCEPTS - PROFICIENCY TESTING - JANUARY 2023					
ANALYTICAL PARAMETER: NITROGEN (%)					
	LAB ID	MOISTURE IN ANALYSIS SAMPLE (%)	AIR DRY	DRY BASE	Z-SCORE (DRY BASE)
	1a	4.06	1.45	1.51	-0.21
	9a	4.00	1.73	1.80	2.01
	12a	4.23	1.37	1.43	-0.83
	88a	4.20	1.34	1.40	-1.08
	177a	4.54	1.45	1.52	-0.16
	202a	4.04	1.50	1.56	0.18
	239a	4.55	1.48	1.55	0.09
Number of results	-	7	7	7	-
OUTLIERS	-	-	0	0	-
AVERAGE	-	4.23	1.47	1.54	-
MEDIAN	-	-	1.45	1.52	-
STD DEVIATION	-	-	0.13	0.13	-
%RSD	-	-	8.59	8.50	-

ANALYTICAL PARAMETER: ASH FUSION TEMPERATURES (°C)

LAB ID	DEFORMATION	SOFTENING	HEMISPHERE	FLOW
9a	1320	1340	1370	1400
10a	1280	1310	1330	1370
18a	1290	1310	1340	1390
21a	1330	1350	1400	1450
23a	1260	1300	1360	1410
28a	1370	1400	1430	1460
38a	1340	1350	1400	1420
42a	1380	1400	1420	1430
49a	1280	1310	1345	1380
80a	1290	1320	1340	1370
95a	1390	1420	1450	1480
106a	1240	1300	1350	1483
145a	1300	1340	1370	1400
151a	1230	1270	1350	1390
167a	1320	1350	1380	1410
234a	1340	1370	1390	1440
Number of results	16	16	16	16
Outliers	0	0	0	0
AVERAGE	1310	1340	1377	1418
MEDIAN	1310	1340	1370	1410
STDEV	47	42	36	36

Z-SCORES				
LAB ID	DEFORMATION	SOFTENING	HEMISPHERE	FLOW
9a	0.21	0.00	-0.18	-0.49
10a	-0.63	-0.72	-1.31	-1.31
18a	-0.42	-0.72	-1.03	-0.76
21a	0.42	0.24	0.66	0.89
23a	-1.05	-0.96	-0.46	-0.21
28a	1.26	1.44	1.50	1.16
38a	0.63	0.24	0.66	0.06
42a	1.47	1.44	1.22	0.34
49a	-0.63	-0.72	-0.89	-1.04
80a	-0.42	-0.48	-1.03	-1.31
95a	1.69	1.92	2.06	1.71
106a	-1.47	-0.96	-0.75	1.79
145a	-0.21	0.00	-0.18	-0.49
151a	-1.69	-1.68	-0.75	-0.76
167a	0.21	0.24	0.10	-0.21
234a	0.63	0.72	0.38	0.61

COAL CONCEPTS - PROFICIENCY TESTING - JANUARY 2023					
ANALYTICAL PARAMETER: CHLORINE (ppm)					
	LAB ID	MOISTURE IN ANALYSIS SAMPLE (%)	AIR DRY	DRY BASE	Z-SCORE (DRY BASE)
	12a	4.23	106	111	-
	177a	4.54	138	145	-
Number of results	-	2	2	2	-
OUTLIERS	-	-	-	-	-
AVERAGE	-	4.39	122	128	-
STD DEVIATION	-	-	-	-	-
MEDIAN	-	-	-	-	-

COAL CONCEPTS - PROFICIENCY TESTING - JANUARY 2023					
ANALYTICAL PARAMETER: FLUORINE (ppm)					
	LAB ID	MOISTURE IN ANALYSIS SAMPLE (%)	AIR DRY	DRY BASE	Z-SCORE (DRY BASE)
	169a	3.79	200	208	-
	177a	4.54	148	155	-
Number of results	-	2	2	2	-
OUTLIERS	-	-	-	-	-
AVERAGE	-	4.17	174	181	-
STD DEVIATION	-	-	na	na	-
MEDIAN	-	-	na	na	-

COAL CONCEPTS - PROFICIENCY TESTING - JANUARY 2023					
ANALYTICAL PARAMETER: ASTM ASH (%)					
	LAB ID	MOISTURE IN ANALYSIS SAMPLE (%)	AIR DRY (%)	DRY BASE (%)	Z-SCORE (DRY BASE)
	<u>1a</u>	4.06	<u>29.51</u>	<u>30.76</u>	<u>11.57</u>
	12a	4.23	28.24	29.49	1.05
	92a	3.97	28.27	29.44	0.65
	202a	4.04	28.07	29.25	-0.89
	<u>209a*</u>	4.79	<u>13.22</u>	<u>13.89</u>	<u>-128.01</u>
	239a	4.55	27.93	29.26	-0.81
Number of results	-	6	6	6	-
OUTLIERS	-	-	2	2	-
AVERAGE	-	4.27	28.13	29.36	-
STD DEVIATION	-	-	0.16	0.12	-
MEDIAN	-	-	28.16	29.35	-
%RSD	-	-	0.56	0.41	-

COAL CONCEPTS - PROFICIENCY TESTING - JANUARY 2023					
ANALYTICAL PARAMETER: ASTM VOLS (%)					
	LAB ID	MOISTURE IN ANALYSIS SAMPLE (%)	AIR DRY (%)	DRY BASE (%)	Z-SCORE (DRY BASE)
	1a	4.06	18.41	19.19	0.22
	12a	4.23	18.62	19.44	0.93
	<u>92a*</u>	3.97	<u>23.20</u>	<u>24.16</u>	<u>14.14</u>
	202a	4.04	18.41	19.19	0.20
	209a	4.79	18.32	19.24	0.36
	239a	4.55	17.66	18.50	-1.71
Number of results	-	6	6	6	-
OUTLIERS	-	-	1	1	-
AVERAGE	-	4.27	18.28	19.11	-
STD DEVIATION	-	-	0.37	0.36	-
MEDIAN	-	-	18.41	19.19	-
%RSD	-	-	2.00	1.87	-

CONCLUSIONS

1. The ISO Ash z-score trend is evenly distributed. The Robust average, Average and Median are the same. The low RSD of 0.62 % indicates a high precision of results received. Five outliers were detected.
2. The overall ISO volatile trend is evenly distributed. Two outliers were detected. These were due to analytical errors. An RSD of 2.46 % indicated a high precision of results received.
3. Calorific value trend is evenly distributed. Three outliers detected. The Average and Median are the same at 22.40 MJ/Kg. High precision of results received.
4. The sulphur z-score trend is evenly distributed. Five outliers detected. These were analytical errors.
5. Phosphorous analysis: The z-score trend is evenly distributed. Low standard deviation of results, indicating a low distribution of results received.
6. Generally acceptable results were obtained on Carbon, Hydrogen and Nitrogen.
7. Ash fusion: Generally, well done.

8. Assessment criterion for homogeneity check

- 8.1 Comparison of the between sample standard deviation with the standard deviation for proficiency testing
Standard deviation for ISO ash = 0.18
Check value = $0.18 \times 0.3 = 0.054$

Between sample standard deviation = 0.028

Homogeneity is re-confirmed

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