



# COAL CONCEPTS PROFICIENCY TESTING

## METALLURGICAL COKE

### REPORT ONE HUNDRED AND THIRTEEN

Revision 00

## Final report

DATE ISSUED: 31<sup>ST</sup> JANUARY 2026

LABORATORY CODE: g

SCHEME COORDINATOR: S MAMABOLO

CHECKED BY: R BABOOLAL (SCHEME MANAGER)

**THINKING QUALITY, QUALITY THINKING**

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## EXECUTIVE SUMMARY

1. Seven samples were sent to participants with 7 timeous result submissions.
2. Outliers were determined using Grubbs estimate.
3. Due to data limitation, iterative calculations could not be applied.

## TABLE OF CONTENTS

<b>ITEM</b>	<b>PAGE NUMBER</b>
Letter to participant	4
List of participants	5
Type of sample used	6
Preparation of sample	6
Homogeneity & Stability check	6
Ash data	7
Volatile matter data	8
Total sulphur data	9
Phosphorous data	10
Conclusions	10
Terms and conditions	11

Dear Participant

**RE: PROFICIENCY TESTING RESULTS FOR THE MONTH OF JANUARY 2026**

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. The z-scores are calculated by subtracting the average from the participant result then dividing by the standard deviation. **Note: All decimals are carried in the z-score calculation and only rounded off at the end of the calculation.**

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 calculation :  $z\ score = \frac{(Lab\ result - Average\ result)}{Standard\ Deviation}$

7. Measurement protocols (SANAS R80, ISO/IEC 17043:2023, clause 7.1.2); Analysis accredited parameters can be carried out using techniques as follows:

ISO Ash – ISO 1171

ISO Volatile matter – ISO 562

Total Sulphur Determination – ISO 19579 / ASTM D4239

Phosphorus in Coal – BS 1016/ISO 622/ XRF (or any internationally recognised method)

8. Five consecutive z-scores above the zero line is considered a positive bias and five consecutive z-scores below the zero line is considered a negative bias. Note that this is guideline/suggestion form Coal Concepts and your quality system requirements may differ.

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

Statistical analysis has been carried out using ISO/IEC 13528-Statistical methods for use in proficiency testing by interlaboratory comparisons, including procedures used to statistically analyse data, establishment of any assigned value, standard deviation and its uncertainty.

Please find results attached together with Z-score trends.

Best Regards

R Baboolal

**LIST OF PARTICIPANTS IN ALPHABETICAL ORDER**

1. AH Knight Richards Bay
2. ArcelorMittal Vanderbijl Park
3. BV Dubai
4. CCIC City Deep
5. Glencore Boshhoek
6. Glencore Lion
7. Glencore Rustenburg
8. Glencore Wonderkop
9. Rafinerija Nafte Beograd AD
10. South 32 – Mamantwan
11. UIS Analytical Services

## 1. PREPARATION OF SAMPLE

Approximately 100kg's of sample 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 210 litre mixing drum for 2 hours.

## 2. HOMOGENEITY CHECK & STABILITY CHECK

There were participants in this round, 10 portions of sample were randomly extracted from the 10Kg sample. These were packaged in their final form i.e., in 100 ml 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	13,47	13,54	13,51	0,07	0,0049
2	13,49	13,45	13,47	0,04	0,0016
3	13,45	13,51	13,48	0,06	0,0036
4	13,42	13,47	13,45	0,05	0,0025
5	13,49	13,50	13,50	0,01	0,0001
6	13,41	13,45	13,43	0,04	0,0016
7	13,50	13,48	13,49	0,02	0,0004
8	13,48	13,56	13,52	0,08	0,0064
9	13,53	13,38	13,46	0,15	0,0225
10	13,37	13,45	13,41	0,08	0,0064
GENERAL AVERAGE			13,47		
STANDARD DEVIATION			0,035		
WITHIN SAMPLE STANDARD DEVIATION			0,050		
BETWEEN SAMPLE STANDARD DEVIATION			0,006		

The samples are homogenous.

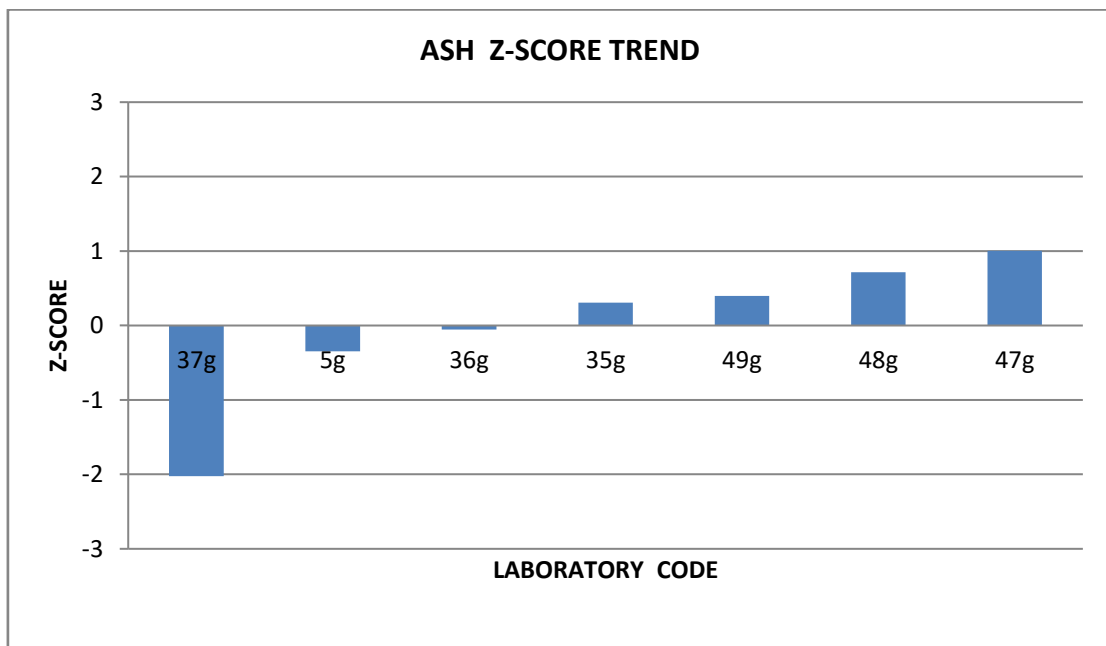
SAMPLE NO.	TEST PORTION 1	TEST PORTION 2	sample av (Xt)	range (Wt)	range sqd
1	13,43	13,43	13,43	0,00	0,0000
2	13,45	13,46	13,46	0,01	0,0001
3	13,40	13,50	13,45	0,10	0,0100
4	13,44	13,43	13,44	0,01	0,0001
5	13,38	13,51	13,45	0,13	0,0169
6	13,44	13,41	13,43	0,03	0,0009
7	13,43	13,47	13,45	0,04	0,0016
8	13,41	13,55	13,48	0,14	0,0196
9	13,52	13,47	13,50	0,05	0,0025
10	13,51	13,51	13,51	0,00	0,0000
GENERAL AVERAGE			13,46		
STANDARD DEVIATION			0,028		
WITHIN SAMPLE STANDARD DEVIATION			0,051		
BETWEEN SAMPLE STANDARD DEVIATION			0,022		

The samples are stable.

<b>COAL CONCEPTS - PROFICIENCY TESTING - JANUARY 2026</b>
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<b>ANALYTICAL PARAMETER: ASH (%)</b>
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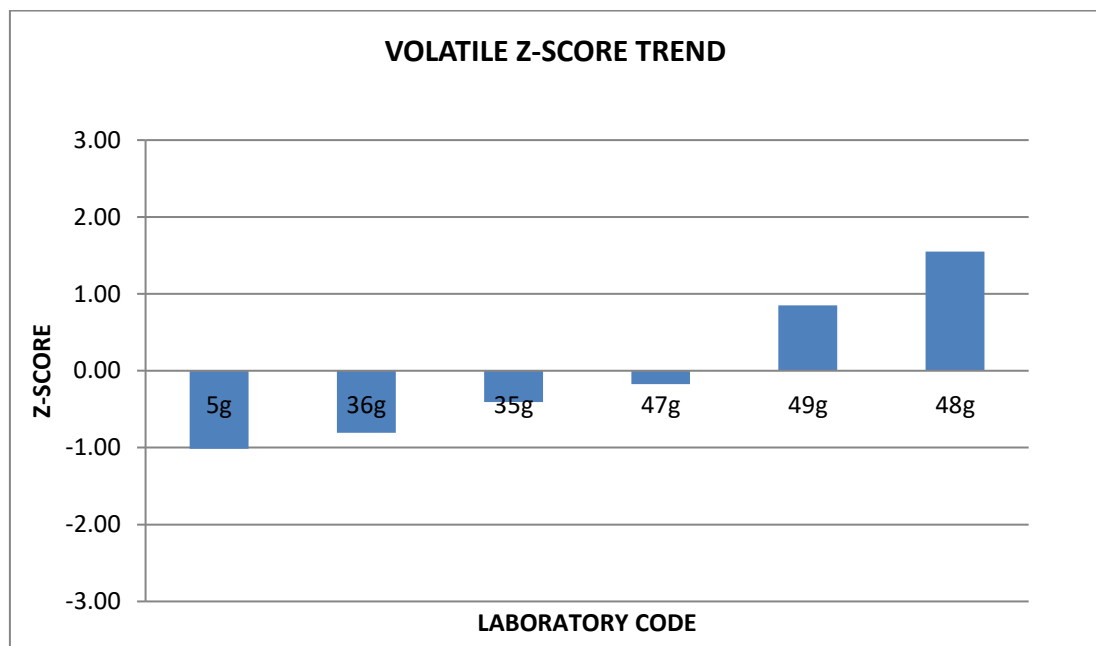
	LAB ID	MOISTURE IN ANALYSIS SAMPLE (%)	AIR DRY (%)	DRY BASE (%)	Z-SCORE (DRY BASE)
	5g	1,20	13,29	13,45	-0,35
	35g	1,41	13,38	13,57	0,31
	36g	1.44	13,31	13,50	-0,06
	37g	1,09	13,00	13,14	-2,03
	47g	1.38	13,51	13,70	1,01
	48g	1.29	13,47	13,65	0,72
	49g	1,38	13,40	13,59	0,40
<b>OUTLIERS</b>	-	-	<b>0</b>	<b>0</b>	-
<b>AVERAGE</b>	-	<b>1,27</b>	<b>13,34</b>	<b>13,51</b>	-
<b>STD DEVIATION</b>	-	-	<b>0,17</b>	<b>0,18</b>	-
<b>MEDIAN</b>	-	-	<b>13,38</b>	<b>13,57</b>	-
<b>%RSD</b>	-	-	<b>1,26</b>	<b>1,36</b>	-



<b>COAL CONCEPTS - PROFICIENCY TESTING - JANUARY 2026</b>
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<b>ANALYTICAL PARAMETER : VOLATILE MATTER (%)</b>
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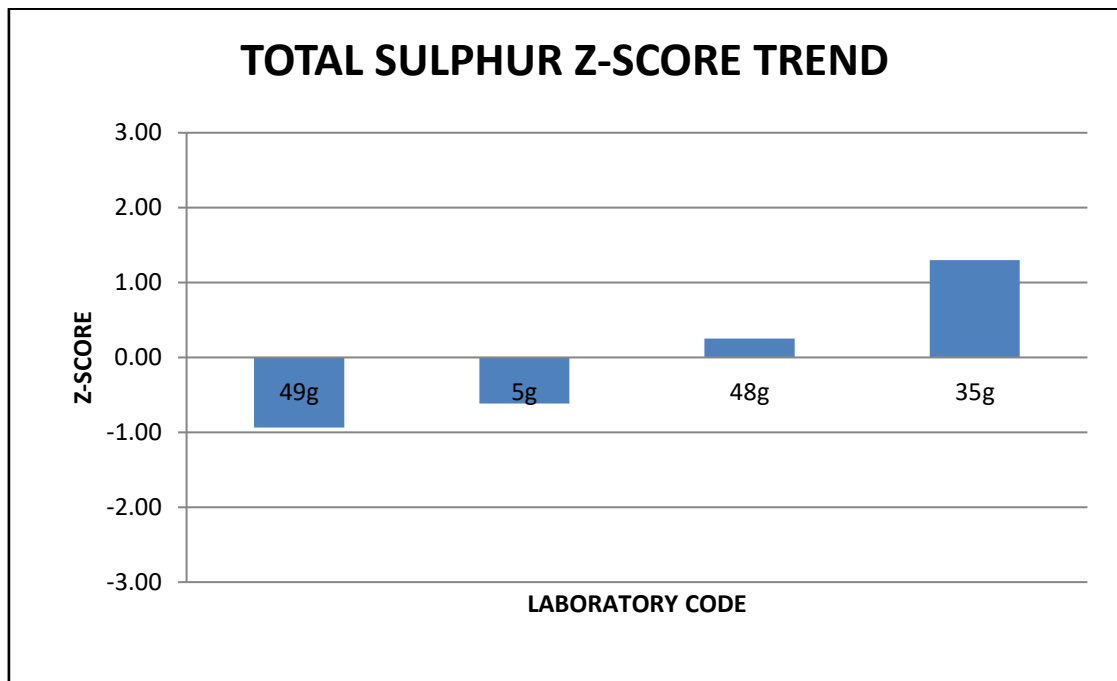
	LAB ID	MOISTURE IN ANALYSIS SAMPLE (%)	AIR DRY	DRY BASE	Z-SCORE (DRY BASE)
	5g	1,20	1,34	1,36	-1,01
	35g	1,41	1,70	1,72	-0,41
	36g	1.44	1,46	1,48	-0,81
	47g	1.38	1,84	1,87	-0,17
	48g	1.29	2,87	2,91	1,55
	49g	1,38	2,45	2,48	0,85
<b>OUTLIERS</b>	-	-	<b>0</b>	<b>0</b>	-
<b>AVERAGE</b>	-	<b>1,33</b>	<b>1,94</b>	<b>1,97</b>	-
<b>STD DEVIATION</b>	-	-	<b>0,60</b>	<b>0,60</b>	-
<b>MEDIAN</b>	-	-	<b>1,77</b>	<b>1,80</b>	-
<b>%RSD</b>	-	-	-	-	-



<b>COAL CONCEPTS - PROFICIENCY TESTING - JANUARY 2026</b>
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<b>ANALYTICAL PARAMETER: TOTAL SULPHUR (%)</b>
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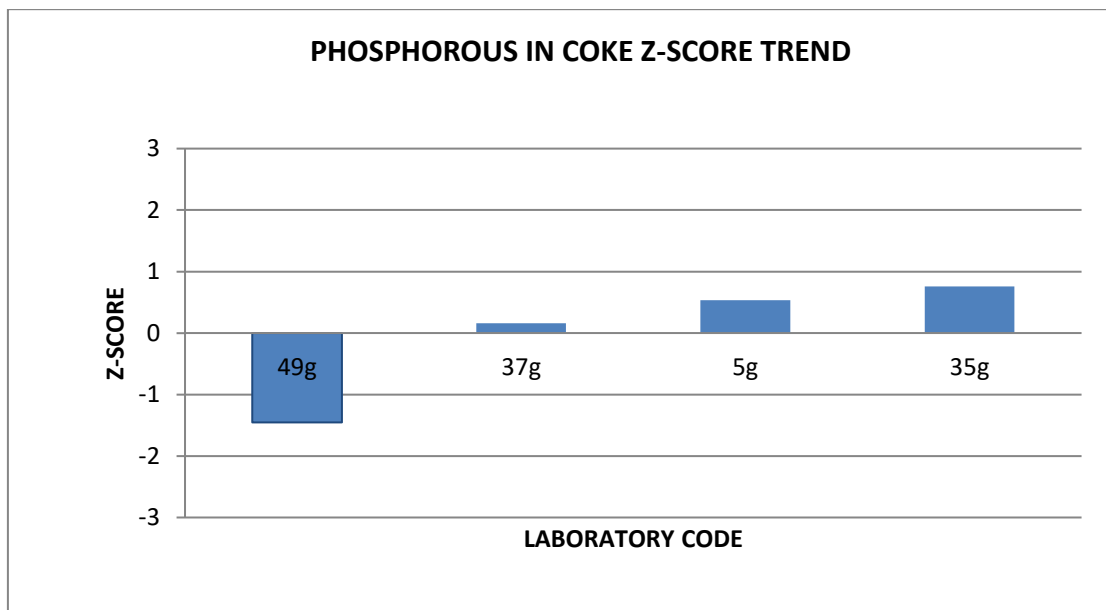
	LAB ID	MOISTURE IN ANALYSIS SAMPLE (%)	AIR DRY	DRY BASE	Z-SCORE (DRY BASE)
	5g	1,2	0,71	0,72	-0,61
	35g	1,41	0,82	0,83	1,30
	48g	1,29	0,76	0,77	0,25
	49g	1,38	0,69	0,70	-0,94
<b>OUTLIERS</b>	-	-	<b>0</b>	<b>0</b>	-
<b>AVERAGE</b>	-	<b>1,32</b>	<b>0,75</b>	<b>0,75</b>	-
<b>STD DEVIATION</b>	-	-	<b>0,06</b>	<b>0,06</b>	-
<b>MEDIAN</b>	-	-	<b>0,74</b>	<b>0,74</b>	-
<b>%RSD</b>	-	-	-	-	-



## COAL CONCEPTS - PROFICIENCY TESTING -JANUARY 2026

## ANALYTICAL PARAMETER: PHOSPHOROUS IN COKE (%)

	LAB ID	MOISTURE IN ANALYSIS SAMPLE (%)	AIR DRY	DRY BASE	Z-SCORE (DRY BASE)
	5g	1,20	0,037	0,037	0,53
	35g	1,41	0,04	0,041	0,76
	37g	1,09	0,032	0,032	0,16
	49g	1,38	0,01	0,010	-1,45
<b>OUTLIERS</b>	-	-	<b>0</b>	<b>0</b>	-
<b>AVERAGE</b>	-	<b>1,27</b>	<b>0,030</b>	<b>0,030</b>	-
<b>STD DEVIATION</b>	-	-	<b>0,014</b>	<b>0,014</b>	-
<b>MEDIAN</b>	-	-	<b>0,035</b>	<b>0,035</b>	-
<b>%RSD</b>	-	-	-	-	-



**COAL CONCEPTS: Terms and Conditions**Return 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 result *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**