



Report No. 814

Coal Proficiency Testing

Round 29

July 2013

Acknowledgments

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CONTENTS

1. FOREWORD	1
2. FEATURES OF THE PROGRAM	1
3. FORMAT OF THE APPENDICES	3
4. STATISTICAL DESIGN OF THE PROGRAM.....	3
Table A: Summary Statistics Sample PTA 1.....	5
Table A: Summary Statistics Sample PTA 2.....	6
5. PTA AND TECHNICAL ADVISOR'S COMMENTS	7
Table C: Previous Outlier Results	7
Table D: Comparison of Robust CV's.....	8
Table E: Analysis of Results by Method Groups.....	9
6. OUTLIER RESULTS.....	10
Table F: Summary of Statistical Outliers	10
7. REFERENCE.....	11
Table G: Standards Australia Precision Data.....	11

APPENDIX A – Results and Data Analysis

Moisture (air-dry basis) (0.01%).....	A1
Ash (0.01%).....	A5
Volatile Matter (0.01%).....	A9
Gross Calorific Value (0.001 MJ/kg).....	A13
Total Sulfur (0.001%).....	A17
Pyritic Sulfur (0.001%).....	A21
Sulphate Sulfur (0.001%).....	A22
Chlorine (0.001%).....	A23
Carbon (Total) (0.01%).....	A27
Hydrogen (0.01%).....	A31
Nitrogen (0.01%).....	A35
Carbonate Carbon (0.001%).....	A39

Phosphorus in Coal (0.001%).....	A43
Relative Density (0.001%).....	A47
Fluorine (1mg/kg).....	A51
Mercury (0.01mg/kg).....	A52
Selenium (0.1mg/kg).....	A53
Arsenic (0.1mg/kg).....	A54
Boron (0.1mg/kg).....	A55

APPENDIX B – Homogeneity Testing

Homogeneity Testing.....	B1
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APPENDIX C – Documentation

Instructions to Participants.....	C1
Results Sheets.....	C2

1. FOREWORD

This report summarises the results of a proficiency testing program on the chemical analysis of coal. It constitutes the 29th round of an ongoing series of programs.

The program was conducted in April 2013 by Proficiency Testing Australia (PTA). The aim of the program was to assess laboratories' abilities to competently perform the prescribed analyses.

The Program Coordinator was Ms Y Christie and the Technical Advisors were Mr J Kelly of BHP Billiton Mitsubishi Alliance, QLD and Mr M Preston of ALS-ACTest Gladstone, QLD. This report was authorised by Ms W Fajloun, PTA Quality Coordinator.

2. FEATURES OF THE PROGRAM

- (a) Participants were provided with two 125g samples labelled Sample PTA 1 and Sample PTA 2 containing coal.
- (b) A total of 52 laboratories received samples, comprising:
 - 34 Australian participants; and
 - 18 overseas participants, including:
 - 1 laboratory from El Salvador
 - 1 laboratory from Hong Kong
 - 8 laboratories from Korea
 - 3 laboratories from Malaysia
 - 1 laboratory from Mozambique
 - 1 laboratory from Peru
 - 1 laboratory from Philippines
 - 1 laboratory from Portugal
 - 1 laboratory from Republic of South Africa

Of these 52 laboratories, two were unable to submit results by the due date.

- (c) Laboratories were provided with the *Instructions to Participants* and *Results Sheets* (see Appendix C). Laboratories were requested to perform the tests according to their routine methods and to record their results on the *Results Sheets*.

The following tests were performed on each sample in duplicate:

- Moisture (air-dry basis)
- Ash

- Volatile Matter
 - Gross Calorific Value
 - Total Sulfur
 - Pyritic Sulfur
 - Sulphate Sulfur
 - Chlorine
 - Carbon (Total)
 - Hydrogen
 - Nitrogen
 - Carbonate Carbon
 - Phosphorus in Coal
 - Relative Density
 - Fluorine
 - Mercury
 - Selenium
 - Arsenic
 - Boron
- (d) Prior to sample distribution, a number of randomly selected samples were analysed for homogeneity. Based on the results of this testing (see Appendix B), the homogeneity of the samples was established.
- (e) Each laboratory was randomly allocated a unique code number for the program to ensure confidentiality of results. Reference to each laboratory in this report is by code number only.
- (f) Results (as reported by participants) with corresponding summary statistics (i.e. number of results, median, uncertainty of the median, normalised interquartile range, robust coefficient of variation, minimum, maximum and range) are presented in Appendix A (for each sample and for each of the analyses performed). Measurement Uncertainty (MU) is also presented where supplied by participants. Please note that this information is presented for information purposes only and has not been used for the formal evaluation of results.
- (g) A robust statistical approach, using z-scores, was utilised to assess laboratories' testing performance (see Section 4). Robust z-scores and z-score charts relevant to each test are presented in Appendix A.
- (h) The document entitled *Guide to Proficiency Testing Australia, 2012* (reference [1]) defines the statistical terms and details the statistical procedures referred to in this report.
- (i) A tabulated listing of laboratories (by code number) identified as having outlier results can be found on page 10.

3. FORMAT OF THE APPENDICES

- (a) Appendix A contains the analysis of results reported by laboratories for the samples. This section contains the following for each determinant, where appropriate:
- the duplicate results reported by laboratories and the calculated average result for each test on each sample.
 - calculated z-scores;
 - a list of summary statistics; and
 - ordered z-score charts.
- (b) Appendix B contains details of the homogeneity testing.
- (c) Appendix C contains copies of the *Instructions to Participants* and *Results Sheets* as supplied to participants.

4. STATISTICAL DESIGN OF THE PROGRAM

- (a) Outlier Results and Z-scores

In order to assess laboratories' testing performance, a robust statistical approach, using z-scores, was utilised. Z-scores give a measure of how far a result is from the consensus value (i.e. the median), and gives a "score" to each result relative to the other results in the group.

A z-score close to zero indicates that the result agrees well with those from other laboratories. Whereas, a z-score with an absolute value greater than or equal to 3.0 is considered to be an outlier and is marked by the symbol "§".

The table on page 10 summarises the outlier results detected.

- (b) Results Tables and Summary Statistics

Each of these tables contains the results returned by each laboratory, including the method/technique used and (where appropriate) the robust z-score calculated for each result.

Results have been entered exactly as reported by participants. That is, laboratories which did not report results to the precision (i.e. number of significant figures) requested on the Results Sheets have **not** been rounded to the requested precision before being included in the statistical analysis.

A list of summary statistics appears at the bottom of each of the tables of results and where appropriate, consists of:

- the number of results for that test/sample (*No. of Results*);
- the median of these results, i.e. the middle value (*Median*);

- the uncertainty of the median;
- the normalised interquartile range of the results (*Normalised IQR*);
- the robust coefficient of variation, expressed as a percentage (*Robust CV*) - i.e. $100 \times \text{Normalised IQR} / \text{Median}$;
- the minimum and maximum laboratory results; and
- the range (*Maximum - Minimum*).

The median is a measure of the centre of the data.

The normalised IQR is a measure of the spread of the results. It is calculated by multiplying the interquartile range (IQR) by a correction factor which converts the IQR to an estimate of the standard deviation. The IQR is the difference between the upper and lower quartiles (i.e. the values above and below which a quarter of the results lie, respectively).

Please see reference [1] for further details on these robust summary statistics.

(c) Ordered Z-Score Charts

On these charts each laboratory's robust z-score is shown, in order of magnitude, and is marked with its code number. From these charts, each laboratory can readily compare its performance relative to the other laboratories.

These charts contain solid lines at +3.0 and -3.0, so that outliers are clearly identifiable as those laboratories whose "bar" extends beyond these "cut-off" lines. The y-axis of these charts has been limited, so very large z-scores appear to extend beyond the chart boundary.

The following tables summarise the results submitted by participants for the program.

TABLE A: SUMMARY STATISTICS SAMPLE PTA 1

Analyte	No. of Results	Median	Normalised IQR
Moisture (air-dry basis) (0.01%)	43	1.495	0.176
Ash (0.01%)	43	10.685	0.096
Volatile Matter (0.01%)	41	20.010	0.196
Gross Calorific Value (0.001 MJ/kg)	42	32.1818	0.1068
Total Sulfur (0.001%)	38	0.5648	0.0217
Pyritic Sulfur (0.001%)	5	na	na
Sulphate Sulfur (0.001%)	5	na	na
Chlorine (0.001%)	14	0.0445	0.0053
Carbon (Total) (0.01%)	14	79.345	0.697
Hydrogen (0.01%)	14	4.298	0.133
Nitrogen (0.01%)	12	1.753	0.068
Carbonate Carbon (0.001%)	10	0.0395	0.0065
Phosphorus in Coal (0.001%)	11	0.0190	0.0015
Relative Density (0.001%)	22	1.3850	0.0121
Fluorine (1mg/kg)	3	na	na
Mercury (0.01mg/kg)	5	na	na
Selenium (0.1mg/kg)	3	na	na
Arsenic (0.1mg/kg)	3	na	na
Boron (0.1mg/kg)	2	na	na

Note: Statistics for each test are based on the average of the duplicate results reported for the sample. Some statistical analysis could not be achieved due to the low number of results submitted; these are shown as 'na'.
Unless specified, all other results are to a dry basis.

TABLE B: SUMMARY STATISTICS SAMPLE PTA 2

Analyte	No. of Results	Median	Normalised IQR
Moisture (air-dry basis) (0.01%)	42	1.483	0.208
Ash (0.01%)	42	10.678	0.102
Volatile Matter (0.01%)	40	20.073	0.120
Gross Calorific Value (0.001 MJ/kg)	41	32.2055	0.0849
Total Sulfur (0.001%)	37	0.5700	0.0263
Pyritic Sulfur (0.001%)	5	na	na
Sulphate Sulfur (0.001%)	5	na	na
Chlorine (0.001%)	14	0.0468	0.0091
Carbon (Total) (0.01%)	14	79.330	0.779
Hydrogen (0.01%)	14	4.338	0.083
Nitrogen (0.01%)	11	1.765	0.056
Carbonate Carbon (0.001%)	10	0.0340	0.0067
Phosphorus in Coal (0.001%)	11	0.0200	0.0022
Relative Density (0.001%)	22	1.3828	0.0111
Fluorine (1mg/kg)	3	na	na
Mercury (0.01mg/kg)	5	na	na
Selenium (0.1mg/kg)	3	na	na
Arsenic (0.1mg/kg)	3	na	na
Boron (0.1mg/kg)	2	na	na

Note: Statistics for each test are based on the average of the duplicate results reported for the sample. Some statistical analysis could not be achieved due to the low number of results submitted; these are shown as 'na'. Unless specified, all other results are to a dry basis.

5. PTA AND TECHNICAL ADVISOR'S COMMENTS

Of the 52 participating laboratories, 50 laboratories submitted results to be included in the final report. Of these 50 laboratories, 15 laboratories have been identified as having reported one or more outlier results. Of the 654 submitted results, 23 outliers were reported; therefore 3.52% of the total results have been identified as outlier results.

Table C shows a comparison of past program outlier results.

TABLE C: PREVIOUS OUTLIER RESULTS

Test	Round 25	Round 26	Round 27	Round 28	Round 29
Total Results	328	257	276	414	654
No. of Outlier Results	6	11	20	11	23
% of Total	1.83%	4.28%	7.25%	2.66%	3.52%

Overall performance against prior expectations was good. The number of laboratories reporting MU for round 29 is similar to round 28. Refer to Table G for Standards Australia Precision Data.

Statistical evaluation of tests Pyritic Sulfur, Sulphate Sulfur, Fluorine, Mercury, Selenium, Arsenic and Boron could not be performed due to the low number of results returned.

Table D shows a comparison of past program Robust CV (%) results.

TABLE D: COMPARISON OF ROBUST CV'S (%)

Test	Round 22	Round 24	Round 26	Round 27	Round 29	
* Moisture	23.42	18.16	14.6	13.9	PTA 1 PTA 2	11.8 14.1
Ash	0.99	1.13	0.9	1.0	PTA 1 PTA 2	0.9 1.0
Volatile Matter	0.93	0.82	1.0	1.1	PTA 1 PTA 2	1.0 0.6
Gross Calorific Value	0.34	0.27	0.4	0.3	PTA 1 PTA 2	0.3 0.3
Total Sulfur	3.91	3.72	2.9	4.2	PTA 1 PTA 2	3.8 4.6
Pyritic Sulfur	N/A	N/A	N/A	N/A	PTA 1 PTA 2	N/A N/A
Sulphate Sulfur	N/A	N/A	N/A	N/A	PTA 1 PTA 2	N/A N/A
Chlorine	17.61	11.52	6.2	6.2	PTA 1 PTA 2	11.9 19.4
Carbon (total)	0.79	0.36	0.5	0.6	PTA 1 PTA 2	0.9 1.0
Hydrogen	3.7	2.42	1.6	1.9	PTA 1 PTA 2	3.1 1.9
Nitrogen	3.44	2.54	2.0	4.0	PTA 1 PTA 2	3.9 3.2
Carbonate Carbon	14.83	25.14	13.1	24.7	PTA 1 PTA 2	16.5 19.8
Phosphorus in Coal	7.82	8.58	5.4	3.7	PTA 1 PTA 2	7.8 11.1
Relative Density	1.9	1.23	1.2	1.3	PTA 1 PTA 2	0.9 0.8
Fluorine	N/A	N/A	N/A	N/A	PTA 1 PTA 2	N/A N/A
Mercury	N/A	N/A	N/A	N/A	PTA 1 PTA 2	N/A N/A
Selenium	N/A	N/A	N/A	N/A	PTA 1 PTA 2	N/A N/A
Arsenic	N/A	N/A	N/A	N/A	PTA 1 PTA 2	N/A N/A
Boron	N/A	N/A	N/A	N/A	PTA 1 PTA 2	N/A N/A

* Moisture analysis is required purely as a correctional value, to enable calculation of other results to dry basis. Any statistical analysis is for information purposes only.

Table D indicates that in general, the CVs for round 29 compare well to previous programs.

Metrological Traceability and Measurement Uncertainty of Assigned Values

Consensus values (median) derived from participants' results are used in this program. These values are not metrologically traceable to an external reference.

Samples are selected which are of a coal type that is relatively stable and available. Samples are within a range of test parameters that are suitable for the program. Coal samples were prepared according to AS4264.1. No certified reference materials were used.

As the assigned value for this program is the median of the results submitted by the participants, the uncertainty of the median has been calculated and is presented in the summary statistics table of Appendix A.

Analysis of Results by Method Groups

Grouped analysis was performed for methods appearing greater than or equal to 11 times in each test. The results are tabulated below.

TABLE E: ANALYSIS OF RESULTS BY METHOD GROUPS

Test	Method Group	Sample	No. of Results	Median	Uncertainty of the Median
Moisture (air-dry basis) (0.01%)	AS1038.3	PTA 1	22	1.548	0.037
	AS1038.3	PTA 2	22	1.550	0.050
Ash (0.01%)	AS1038.3	PTA 1	22	10.700	0.023
	AS1038.3	PTA 2	22	10.675	0.027
Volatile Matter (0.01%)	AS1038.3	PTA 1	21	20.010	0.045
	AS1038.3	PTA 2	21	20.030	0.030
Gross Calorific Value (0.001 MJ/kg)	AS1038.5	PTA 1	21	32.1935	0.0249
	AS1038.5	PTA 2	20	32.2128	0.0397
Total Sulfur (0.001%)	AS1038.6.3.3	PTA 1	20	0.5738	0.0042
	AS1038.6.3.3	PTA 2	20	0.5823	0.0046
Relative Density (0.001%)	AS1038.21.1.1	PTA 1	16	1.3800	0.0032
	AS1038.21.1.1	PTA 2	16	1.3808	0.0028

6. OUTLIER RESULTS

Laboratories reporting outlier results are listed in the following table:

TABLE F: SUMMARY OF STATISTICAL OUTLIERS

Test	Sample	Laboratory Code No.
Moisture (air-dry basis) (0.01%)	PTA 1	24, 34
	PTA 2	34
Ash (0.01%)	PTA 1	25, 60
	PTA 2	-
Volatile Matter (0.01%)	PTA 1	-
	PTA 2	24, 34, 46
Gross Calorific Value (0.001 MJ/kg)	PTA 1	37
	PTA 2	37
Total Sulfur (0.001%)	PTA 1	29
	PTA 2	26
Pyritic Sulfur (0.001%)	PTA 1	-
	PTA 2	-
Sulphate Sulfur (0.001%)	PTA 1	-
	PTA 2	-
Chlorine (0.001%)	PTA 1	48
	PTA 2	-
Carbon (Total) (0.01%)	PTA 1	22, 49
	PTA 2	22, 49
Hydrogen (0.01%)	PTA 1	-
	PTA 2	-
Nitrogen (0.01%)	PTA 1	46
	PTA 2	-
Carbonate Carbon (0.001%)	PTA 1	-
	PTA 2	13
Phosphorus in Coal (0.001%)	PTA 1	-
	PTA 2	-
Relative Density (0.001%)	PTA 1	9, 61
	PTA 2	17, 61
Fluorine (1mg/kg)	PTA 1	-
	PTA 2	-
Mercury (0.01mg/kg)	PTA 1	-
	PTA 2	-
Selenium (0.1mg/kg)	PTA 1	-
	PTA 2	-
Arsenic (0.1mg/kg)	PTA 1	-
	PTA 2	-
Boron (0.1mg/kg)	PTA 1	-
	PTA 2	-

Statistical analysis of the results indicated that no notable sample variability existed. Therefore, it was concluded that any outlier results subsequently identified could not be attributed to sample variability.

7. REFERENCE

- [1] *Guide to Proficiency Testing Australia*, 2012 (This document can be found on the PTA website, www.pta.asn.au).

TABLE G: STANDARDS AUSTRALIA PRECISION DATA

Standard	Test	Repeatability	Reproducibility
AS1038.3	Moisture	0.10%	N/A
AS1038.3	Ash	0.15%	0.25%
AS1038.3	Volatile Matter	0.2%	1.0%
AS1038.5	Gross Calorific Value	0.13 MJ/kg	0.30 MJ/kg
AS1038.6.3.2	Total Sulfur	0.03%	0.08%
AS1038.6.3.3	Total Sulfur	0.03%	0.05%
AS1038.8.1	Chlorine	0.01%	0.02%
AS1038.8.2	Chlorine	0.01%	0.02%
AS1038.9.1	Phosphorus	10% of mean	15% of mean
AS1038.9.2	Phosphorus	10% of mean	15% of mean
AS1038.9.3	Phosphorus	10% of mean	15% of mean
AS1038.15	AFT (IDT)	30°C	80°C
AS1038.15	AFT (ST)	30°C	60°C
AS1038.15	AFT (HT)	30°C	60°C
AS1038.15	AFT (Flow)	40°C	80°C
AS1038.6.1	Carbon	0.3%	0.6%
AS1038.6.1	Hydrogen	0.1%	0.2%
AS1038.6.2	Nitrogen	0.03%	0.08%
AS1038.6.4	Carbon	0.3%	0.6%
AS1038.6.4	Hydrogen	0.1%	0.2%
AS1038.6.4	Nitrogen	0.03%	0.08%
AS1038.23	Carbonate Carbon	0.04%	0.08%
AS1038.21.1	Relative Density	0.03	0.08
AS1038.21.2	Relative Density	0.03	0.10
AS1038.11	Pyritic Sulfur	0.05%	0.1%
AS1038.11	Sulfate Sulfur	0.02%	0.03%
AS1038.10.4	Fluorine	10 mg/kg	20% of mean
AS1038.10.5	Mercury	10% of mean	15% of mean
AS1038.10.2	Selenium	0.1 mg/kg	0.2 mg/kg
AS1038.10.2	Arsenic	0.1mg/kg	0.2mg/kg
AS1038.10.3	Boron (<50mg/kg)	5mg/kg	10mg/kg

APPENDIX A

Results and Data Analysis

Moisture (air-dry basis) (0.01%).....	A1
Ash (0.01%).....	A5
Volatile Matter (0.01%).....	A9
Gross Calorific Value (0.001 MJ/kg).....	A13
Total Sulfur (0.001%).....	A17
Pyritic Sulfur (0.001%).....	A21
Sulphate Sulfur (0.001%).....	A22
Chlorine (0.001%).....	A23
Carbon (Total) (0.01%).....	A27
Hydrogen (0.01%).....	A31
Nitrogen (0.01%).....	A35
Carbonate Carbon (0.001%).....	A39
Phosphorus in Coal (0.001%).....	A43
Relative Density (0.001%).....	A47
Fluorine (1mg/kg).....	A51
Mercury (0.01mg/kg).....	A52
Selenium (0.1mg/kg).....	A53
Arsenic (0.1mg/kg).....	A54
Boron (0.1mg/kg).....	A55

A1

Moisture (air-dry basis) (0.01%)

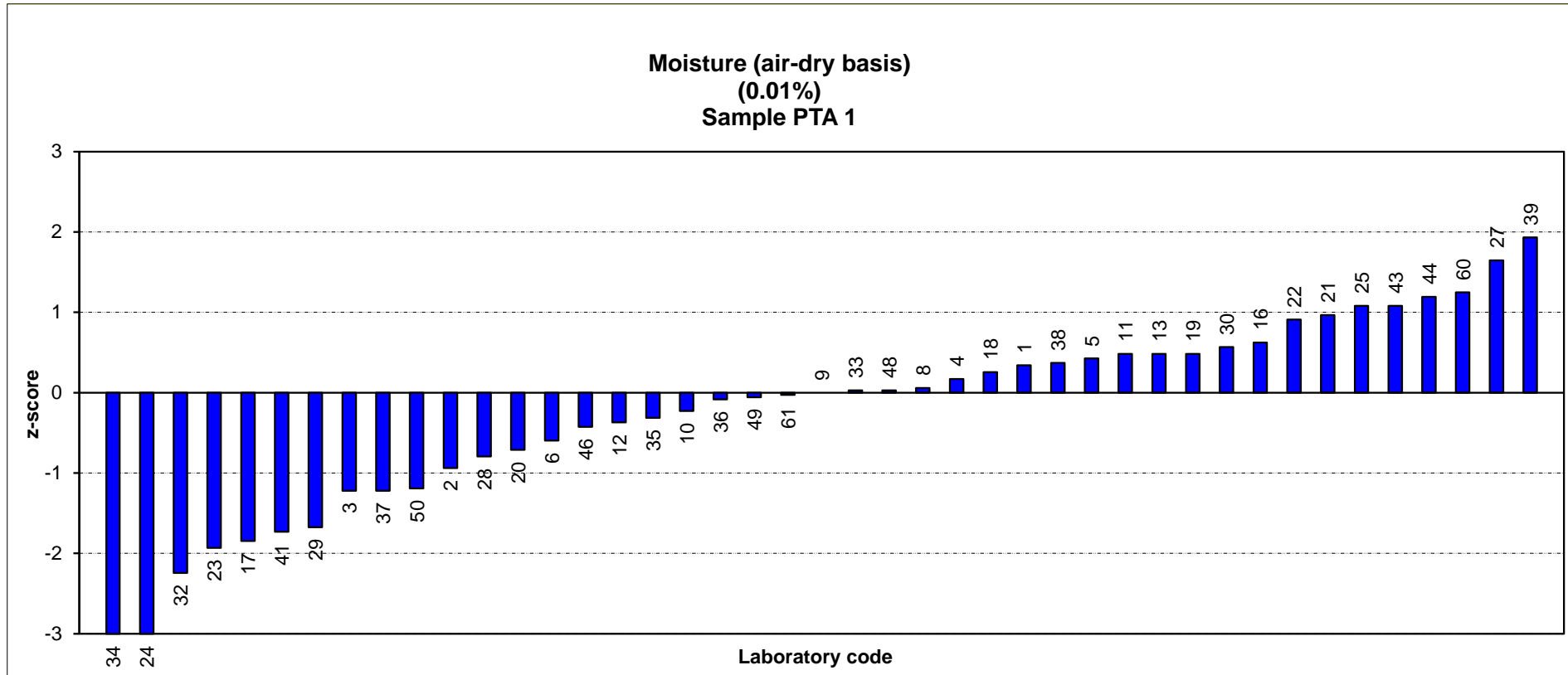
Results by Laboratory Code - Sample PTA 1

Lab Code	Result 1	Result 2	Average Result		MU ¹	Robust z-score ²	Method/Technique
1	1.57	1.54	1.56	±	0.10	0.34	AS 1038-3
2	1.30	1.36	1.33	±	0.10	-0.94	AS 1038-3-2
3	1.29	1.27	1.28	±	0.20	-1.22	ISO 11722:1999
4	1.53	1.52	1.53	±	0.10	0.17	AS
5	1.60	1.54	1.57		#	0.43	AS 1038-3
6	1.38	1.40	1.39		#	-0.60	AS 1038-3
8	1.50	1.51	1.51		#	0.06	AS 1038-3-2
9	1.49	1.50	1.50	±	3.72	0.00	AS 1038-3-2000
10	1.47	1.44	1.46		#	-0.23	AS 1038-3
11	1.61	1.55	1.58		#	0.48	AS 1038-3
12	1.43	1.43	1.43	±	0.05	-0.37	ASTM D 5142-04
13	1.59	1.57	1.58	±	0.10	0.48	AS 1038-4
16	1.56	1.65	1.61		#	0.62	AS 1038-3
17	1.17	1.17	1.17	±	0.1	-1.85	AS1038.3
18	1.56	1.52	1.54		#	0.26	AS1038.3
19	1.53	1.63	1.58	±	0.18	0.48	ASTM D3173-11
20	1.38	1.36	1.37		#	-0.71	CBM217
21	1.67	1.66	1.67	±	0.10	0.97	AS1038.3
22	1.68	1.63	1.66	±	0.06	0.91	In-house test method based on ASTM D3173-03
23	1.17	1.14	1.16		#	-1.93	AS1038.3
24	0.90	0.92	0.91	±	0.02	-3.32 §	ASTM D7582-10
25	1.70	1.67	1.69		#	1.08	ASTM D7582
27	1.82	1.75	1.79	±	0.1	1.65	AS1038.3
28	1.34	1.37	1.36		#	-0.80	#
29	1.2	1.2	1.20		#	-1.68	Noko Method-0317
30	1.60	1.59	1.60	±	0.15	0.57	AS1038.3-2000
32	1.1	1.1	1.10		#	-2.24	Noko Method-0317
33	1.55	1.45	1.50	±	0.15	0.03	AS1038.3
34	0.79	0.83	0.81	±	0.03	-3.89 §	ASTM D7582
35	1.39	1.49	1.44		#	-0.31	AS 1038.3
36	1.48	1.48	1.48		#	-0.09	AS 1038-3
37	1.26	1.3	1.28		#	-1.22	ASTM D5142-04
38	1.57	1.55	1.56	±	0.28	0.37	AS 1038-3-2
39	1.87	1.80	1.84		#	1.93	AS 1038-3
41	1.19	1.19	1.19		#	-1.73	AS 1038-3
43	1.68	1.69	1.69	±	0.1	1.08	AS 1038-3
44	1.74	1.67	1.71	±	0.2	1.19	AS 1038-3
46	1.42	1.42	1.42	±	0.10	-0.43	ASTM D 3173-11
48	1.50	1.50	1.50		#	0.03	AS 1038-4
49	1.50	1.47	1.49	±	0.04	-0.06	ASTM D7582-10
50	1.30	1.270	1.29		#	-1.19	#
60	1.68	1.75	1.72	±	0.10	1.25	AS 1038-3
61	1.51	1.47	1.49	±	0.10	-0.03	AS 1038-3

No of Results: 43
 Median: 1.495
 Uncertainty (median): 0.034
 Normalised IQR: 0.176
 Robust CV: 11.8%
 Minimum: 0.81
 Maximum: 1.84
 Range: 1.03

¹ Where reported, results are shown with their corresponding measurement uncertainty (MU).

² §'s denote outliers (i.e. those results for which |z-score| ≥ 3.0). Robust z-scores are calculated as: $z = (A - \text{median}) \div \text{normalised IQR}$, where A is the participant laboratory's result.



Moisture (air-dry basis)
(0.01%)

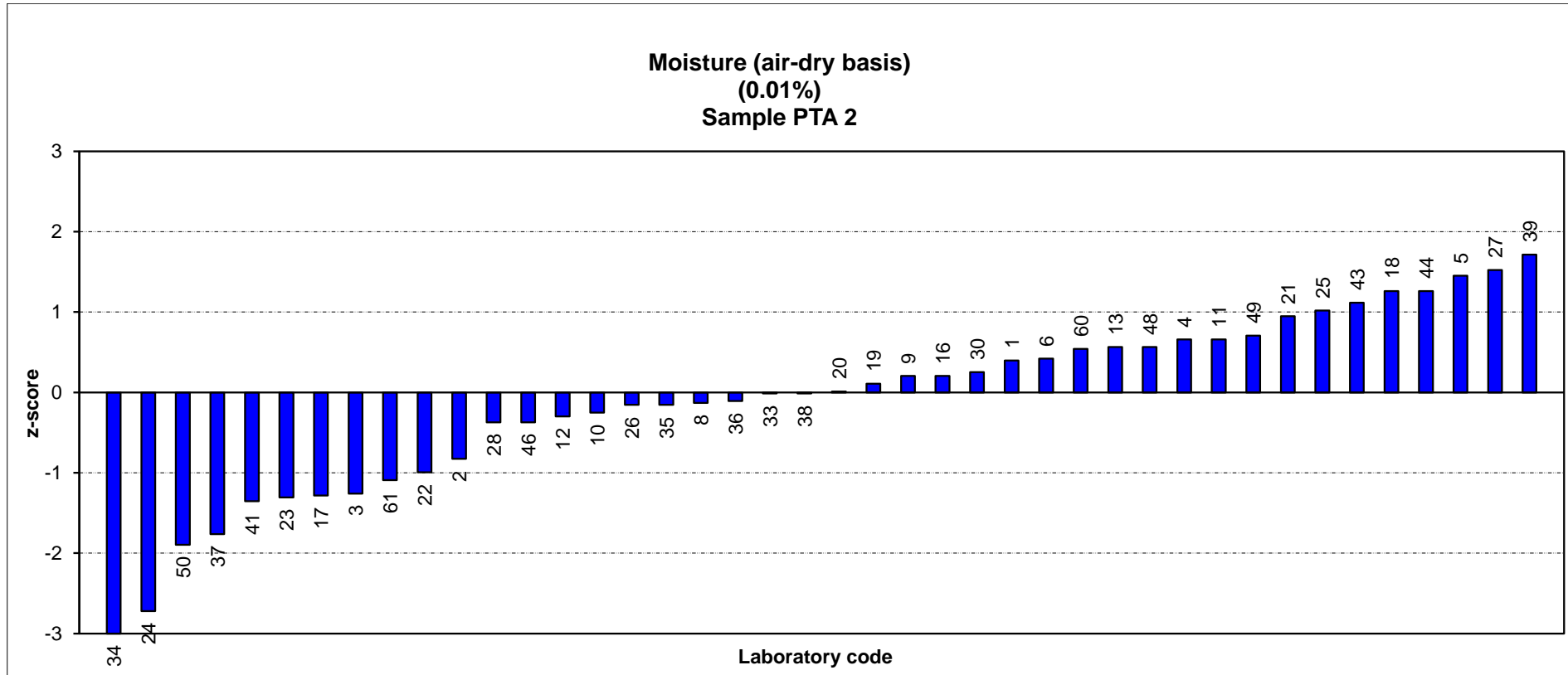
Results by Laboratory Code - Sample PTA 2

Lab Code	Result 1	Result 2	Average Result		MU ¹	Robust z-score ²	Method/Technique
1	1.53	1.60	1.57	±	0.10	0.40	AS 1038-3
2	1.28	1.34	1.31	±	0.10	-0.83	AS 1038-3-2
3	1.22	1.22	1.22	±	0.20	-1.26	ISO 11722:1999
4	1.62	1.62	1.62	±	0.10	0.66	AS
5	1.80	1.77	1.79		#	1.45	AS 1038-3
6	1.56	1.58	1.57		#	0.42	AS 1038-3
8	1.41	1.50	1.46		#	-0.13	AS 1038-3-2
9	1.54	1.51	1.53	±	3.72	0.20	AS 1038-3-2000
10	1.46	1.40	1.43		#	-0.25	AS 1038-3
11	1.61	1.63	1.62		#	0.66	AS 1038-3
12	1.42	1.42	1.42	±	0.05	-0.30	ASTM D5142-04
13	1.60	1.60	1.60	±	0.10	0.56	AS 1038-4
16	1.52	1.53	1.53		#	0.20	AS 1038-3
17	1.21	1.22	1.22	±	0.1	-1.28	AS1038-3
18	1.76	1.73	1.75		#	1.26	AS1038-3
19	1.47	1.54	1.51	±	0.18	0.11	ASTM D3173-11
20	1.51	1.46	1.49		0.5±0.05	0.01	CBM217
21	1.69	1.67	1.68	±	0.10	0.95	AS1038-3
22	1.32	1.23	1.28	±	0.06	-1.00	In-house test method based on ASTM D3173-03
23	1.18	1.24	1.21		#	-1.31	AS1038-3
24	0.90	0.93	0.92	±	0.02	-2.72	ASTM D 7582-10
25	1.70	1.69	1.70		#	1.02	ASTM D7582
26	1.4	1.5	1.45		#	-0.16	Noko Method-0317
27	1.79	1.81	1.80	±	0.1	1.52	AS1038-3
28	1.39	1.42	1.41		#	-0.37	#
30	1.57	1.50	1.54	±	0.15	0.25	AS1038.3-2000
33	1.44	1.52	1.48	±	0.15	-0.01	AS1038-3
34	0.84	0.82	0.83	±	0.03	-3.13 \$	ASTM D7582
35	1.40	1.50	1.45		#	-0.16	AS 1038-3
36	1.44	1.48	1.46		#	-0.11	AS 1038-3
37	1.11	1.12	1.12		#	-1.76	ASTM D5142-04
38	1.50	1.46	1.48	±	0.27	-0.01	AS 1038-3-2
39	1.85	1.83	1.84		#	1.71	AS 1038-3
41	1.21	1.19	1.20		#	-1.35	AS 1038-3
43	1.75	1.68	1.72	±	0.1	1.12	AS 1038-3
44	1.84	1.65	1.75	±	0.2	1.26	AS 1038-3
46	1.39	1.42	1.41	±	0.10	-0.37	ASTM D 3173-11
48	1.60	1.60	1.60		#	0.56	AS 1038-4
49	1.64	1.62	1.63	±	0.01	0.71	ASTM D7582-10
50	1.128	1.047	1.09		#	-1.89	#
60	1.60	1.59	1.60	±	0.10	0.54	AS 1038-3
61	1.23	1.28	1.26	±	0.10	-1.09	AS 1038-3

No of Results: 42
 Median: 1.483
 Uncertainty (median): 0.040
 Normalised IQR: 0.208
 Robust CV: 14.1%
 Minimum: 0.83
 Maximum: 1.84
 Range: 1.01

¹ Where reported, results are shown with their corresponding measurement uncertainty (MU).

² "\$"s denote outliers (i.e. those results for which |z-score| ≥ 3.0). Robust z-scores are calculated as: $z = (A - \text{median}) \div \text{normalised IQR}$, where A is the participant laboratory's result.



A5

Ash (0.01%)

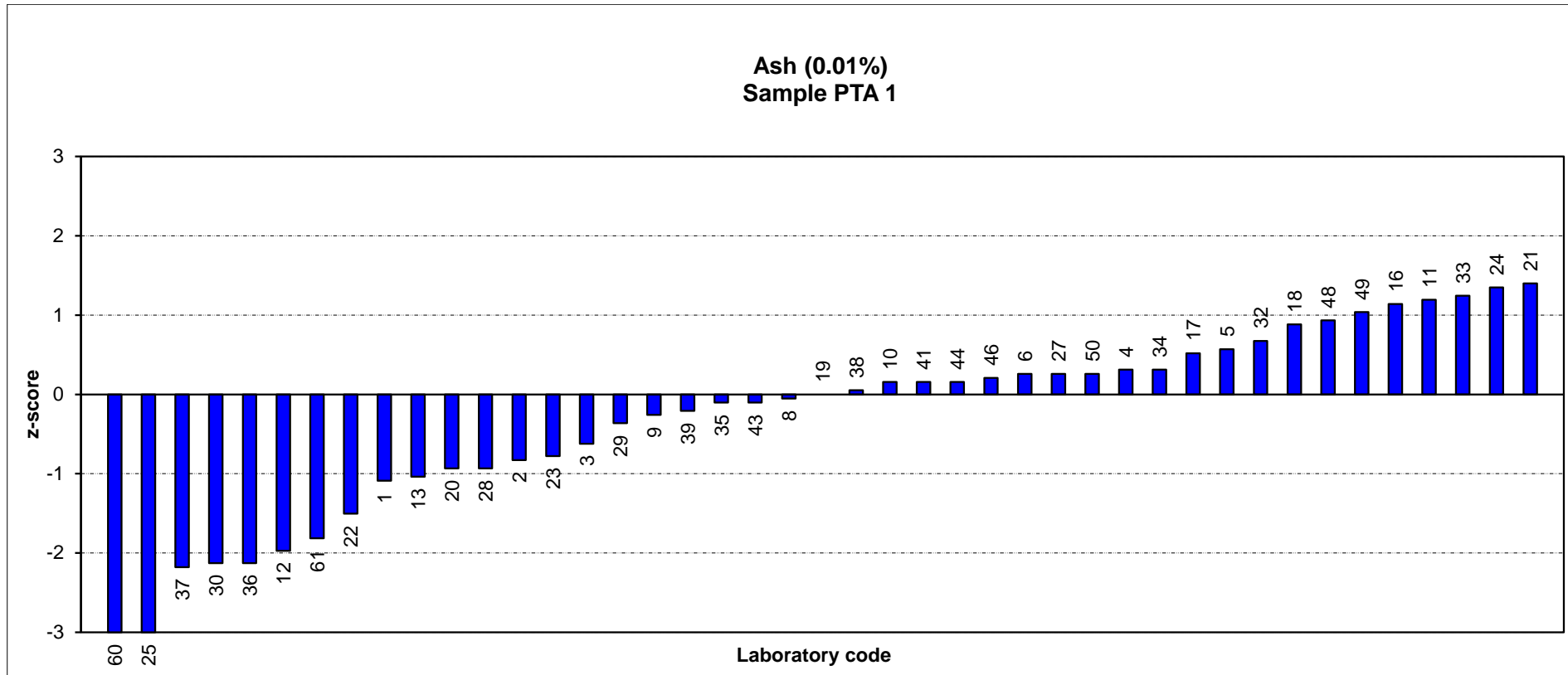
Results by Laboratory Code - Sample PTA 1

Lab Code	Result 1	Result 2	Average result		MU ¹	Robust z-score ²	Method/Technique
1	10.65	10.51	10.58	±	0.25	-1.09	AS 1038-3
2	10.57	10.64	10.61	±	0.15	-0.83	AS 1038-3-3
3	10.62	10.63	10.63	±	0.21	-0.62	ISO 1171:2010
4	10.68	10.75	10.72	±	0.15	0.31	AS
5	10.74	10.74	10.74	±	0.6	0.57	AS 1038-3
6	10.70	10.72	10.71	#	#	0.26	1038.3
8	10.70	10.66	10.68	#	#	-0.05	AS 1038-3-3
9	10.71	10.61	10.66	±	1.86	-0.26	AS-1038-3-2000
10	10.70	10.70	10.70	±	0.6	0.16	AS 1038-3
11	10.81	10.79	10.80	#	#	1.19	AS 1038-3
12	10.44	10.55	10.50	±	0.10	-1.97	ASTM D-5142-04
13	10.58	10.59	10.59	±	0.15	-1.04	AS 1038-4
16	10.78	10.81	10.80	#	#	1.14	AS 1038-3
17	10.73	10.74	10.74	±	0.1	0.52	AS1038.3
18	10.75	10.79	10.77	#	#	0.88	AS1038.3
19	10.68	10.69	10.69	±	0.19	0.00	Inhouse method based on ASTM D3174-04
20	10.60	10.59	10.60	#	#	-0.93	CBM218a
21	10.83	10.81	10.82	±	0.15	1.40	AS1038.3
22	10.51	10.57	10.54	±	0.23	-1.50	Inhouse method based on ASTM D3174-04
23	10.61	10.61	10.61	#	#	-0.78	AS1038.3
24	10.70	10.93	10.82	±	0.05	1.35	ASTM D7582-10
25	10.38	10.29	10.34	#	#	-3.63 §	ASTM D7582
27	10.69	10.73	10.71	±	0.1	0.26	AS1038.3
28	10.59	10.60	10.60	#	#	-0.93	#
29	10.6	10.7	10.65	#	#	-0.36	Noko Method-05
30	10.49	10.47	10.48	±	0.25	-2.13	AS1038.3-2000
32	10.7	10.8	10.75	#	#	0.67	Noko Method-05
33	10.79	10.82	10.81	±	0.30	1.25	AS1038.3
34	10.77	10.66	10.72	±	0.10	0.31	ASTM D7582
35	10.69	10.66	10.68	#	#	-0.10	AS 1038.3
36	10.51	10.45	10.48	#	#	-2.13	AS 1038-3
37	10.53	10.42	10.48	#	#	-2.18	ASTM D5142-04
38	10.71	10.67	10.69	±	0.25	0.05	AS 1038-3-3
39	10.67	10.66	10.67	#	#	-0.21	AS 1038-3
41	10.7	10.7	10.70	±	0.6	0.16	AS 1038-3
43	10.72	10.63	10.68	±	0.15	-0.10	AS 1038-3
44	10.68	10.72	10.70	±	0.12	0.16	AS 1038-3
46	10.71	10.70	10.71	±	0.04	0.21	ASTM D 3174-11
48	10.74	10.81	10.78	±	0.15	0.93	AS 1038-4
49	10.82	10.75	10.79	±	0.34	1.04	ASTM D7582-10
50	10.71	10.71	10.71	#	#	0.26	#
60	10.27	10.25	10.26	±	0.10	-4.41 §	AS 1038-3
61	10.53	10.49	10.51	±	0.15	-1.82	AS 1038-3

No of Results: 43
Median: 10.685
Uncertainty (median): 0.018
Normalised IQR: 0.096
Robust CV: 0.9%
Minimum: 10.26
Maximum: 10.82
Range: 0.56

¹ Where reported, results are shown with their corresponding measurement uncertainty (MU).

² "§"s denote outliers (i.e. those results for which |z-score| ≥ 3.0). Robust z-scores are calculated as: $z = (A - \text{median}) \div \text{normalised IQR}$, where A is the participant laboratory's result.



A7

Ash (0.01%)

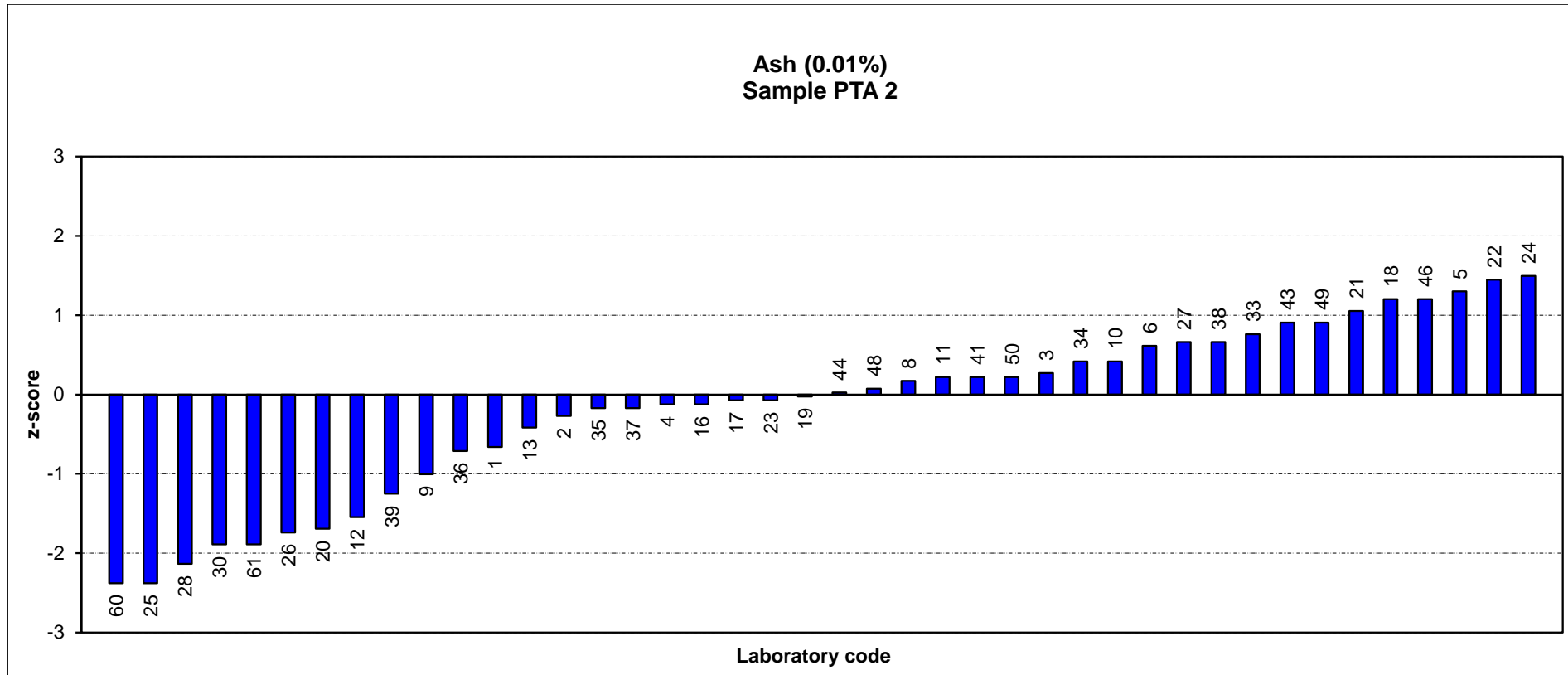
Results by Laboratory Code - Sample PTA 2

Lab Code	Result 1	Result 2	Average result		MU ¹	Robust z-score ²	Method/Technique
1	10.64	10.58	10.61	±	0.25	-0.66	AS 1038-3
2	10.67	10.63	10.65	±	0.15	-0.27	AS 1038-3-3
3	10.71	10.70	10.71	±	0.21	0.27	ISO 1171:2010
4	10.62	10.71	10.67	±	0.15	-0.12	AS
5	10.73	10.89	10.81	±	0.6	1.30	AS 1038-3
6	10.75	10.73	10.74		#	0.61	AS 1038-3
8	10.67	10.72	10.70		#	0.17	AS 1038-3-3
9	10.55	10.60	10.58	±	1.86	-1.01	AS 1038-3-2000
10	10.71	10.73	10.72	±	0.6	0.42	AS 1038-3
11	10.72	10.68	10.70		#	0.22	AS 1038-3
12	10.47	10.57	10.52	±	0.10	-1.55	ASTM D5142-04
13	10.63	10.64	10.64	±	0.15	-0.42	#
16	10.62	10.71	10.67		#	-0.12	AS 1038-3
17	10.67	10.67	10.67	±	0.1	-0.07	AS1038-3
18	10.80	10.80	10.80		#	1.20	AS1038-3
19	10.66	10.69	10.68	±	0.19	-0.02	Inhouse method based on ASTM D3174-04
20	10.50	10.51	10.51		#	-1.69	CBM218a
21	10.78	10.79	10.79	±	0.15	1.05	AS1038-3
22	10.78	10.87	10.83	±	0.23	1.45	Inhouse method based on ASTM D3174-04
23	10.66	10.68	10.67		#	-0.07	AS1038-3
24	10.73	10.93	10.83	±	0.05	1.50	ASTM D 7582-10
25	10.48	10.39	10.44		#	-2.38	ASTM D7582
26	10.6	10.4	10.50		#	-1.74	Noko Method-05
27	10.72	10.77	10.75	±	0.1	0.66	AS1038-3
28	10.47	10.45	10.46		#	-2.13	#
30	10.45	10.52	10.49	±	0.25	-1.89	AS1038.3-2000
33	10.77	10.74	10.76	±	0.30	0.76	AS1038-3
34	10.68	10.76	10.72	±	0.09	0.42	ASTM D7582
35	10.67	10.65	10.66		#	-0.17	AS 1038-3
36	10.61	10.60	10.61		#	-0.71	AS 1038-3
37	10.67	10.65	10.66		#	-0.17	ASTM D5142-04
38	10.73	10.76	10.75	±	0.25	0.66	AS 1038-3-3
39	10.56	10.54	10.55		#	-1.25	AS 1038-3
41	10.7	10.7	10.70	±	0.6	0.22	AS 1038-3
43	10.74	10.80	10.77	±	0.15	0.91	AS 1038-3
44	10.67	10.69	10.68	±	0.12	0.02	AS 1038-3
46	10.80	10.80	10.80	±	0.04	1.20	ASTM D 3174-11
48	10.65	10.72	10.69	±	0.15	0.07	AS 1038-4
49	10.80	10.74	10.77	±	0.34	0.91	ASTM D7582-10
50	10.72	10.68	10.70		#	0.22	#
60	10.45	10.42	10.44	±	0.10	-2.38	AS 1038-3
61	10.48	10.49	10.49	±	0.15	-1.89	AS 1038-3

No of Results: 42
 Median: 10.678
 Uncertainty (median): 0.020
 Normalised IQR: 0.102
 Robust CV: 1.0%
 Minimum: 10.44
 Maximum: 10.83
 Range: 0.40

¹ Where reported, results are shown with their corresponding measurement uncertainty (MU).

² "#s" denote outliers (i.e. those results for which $|z\text{-score}| \geq 3.0$). Robust z-scores are calculated as: $z = (A - \text{median}) \div \text{normalised IQR}$, where A is the participant laboratory's result.



Volatile Matter
(0.01%)

Results by Laboratory Code - Sample PTA 1

Lab Code	Result 1	Result 2	Average Result		MU ¹	Robust z-score ²	Method/Technique
1	20.19	20.05	20.12	±	1.00	0.56	AS 1038-3
2	20.16	20.09	20.13	±	0.2	0.59	AS 1038-3-4
3	20.21	20.22	20.22	±	3.44	1.04	ISO 562:2010
4	19.71	19.79	19.75	±	0.20	-1.32	AS
5	20.24	20.06	20.15	±	1.0	0.71	AS 1038-3
6	20.21	20.14	20.18		#	0.84	AS 1038-14-3
8	19.65	19.72	19.69		#	-1.65	AS 1038-3-4
9	20.17	20.19	20.18	±	3.89	0.87	AS 1038-3-2000
10	19.97	20.05	20.01	±	1.0	0.00	AS 1038-3
11	19.87	19.78	19.83		#	-0.94	AS 1038-3
12	20.34	20.21	20.28	±	0.18	1.35	ASTM-5142-04
13	19.90	19.89	19.90	±	0.20	-0.59	AS 1038.4
16	19.89	19.84	19.87		#	-0.74	AS 1038-3
17	19.77	19.64	19.71	±	0.2	-1.55	AS1038.3
18	20.06	20.00	20.03		#	0.10	AS1038.3
19	20.25	20.29	20.27	±	0.56	1.32	Inhouse method based on ASTM D3175-07
20	20.00	20.04	20.02		#	0.05	CBM219a
21	19.72	19.69	19.71	±	0.2	-1.55	AS1038.3
22	19.29	19.85	19.57	±	1.67	-2.24	Inhouse method based on ASTM D3175-07
23	20.02	20.02	20.02		#	0.05	AS1038.3
24	20.67	20.49	20.58	±	0.13	2.90	ASTM D7582-10
25	19.98	19.86	19.92		#	-0.46	ASTM D7582
27	19.92	19.94	19.93	±	0.2	-0.41	AS1038.3
28	19.96	20.02	19.99		#	-0.10	#
29	19.9	19.9	19.90		#	-0.56	Noko method-04
30	20.24	20.20	20.22	±	0.5	1.07	AS1038.3-2000
32	20.0	19.9	19.95		#	-0.31	Noko method-04
33	20.18	20.29	20.24	±	0.50	1.15	AS1038.3
34	20.45	20.60	20.53	±	0.35	2.62	ASTM D7582
35	19.93	20.04	19.99		#	-0.13	AS 1038.3
36	20.07	20.03	20.05		#	0.20	AS 1038-3
39	20.02	19.93	19.98		#	-0.18	AS 1038-3
41	20.10	20.05	20.08	±	1.0	0.33	AS 1038-3
43	20.14	20.07	20.11	±	0.2	0.48	AS 1038-3
44	19.85	19.92	19.89	±	0.17	-0.64	AS 1038-3
46	19.53	19.59	19.56	±	0.06	-2.29	ASTM D 3175-11
48	20.15	20.26	20.21	±	0.50	0.99	AS 1038-4
49	19.74	19.73	19.74	±	0.84	-1.40	ASTM D7582-10
50	19.98	20.14	20.06		#	0.25	#
60	19.95	19.84	19.90	±	0.20	-0.59	AS 1038-3
61	19.79	19.82	19.81	±	0.20	-1.04	AS 1038-3

No of Results: 41

Median: 20.010

Uncertainty (median): 0.038

Normalised IQR: 0.196

Robust CV: 1.0%

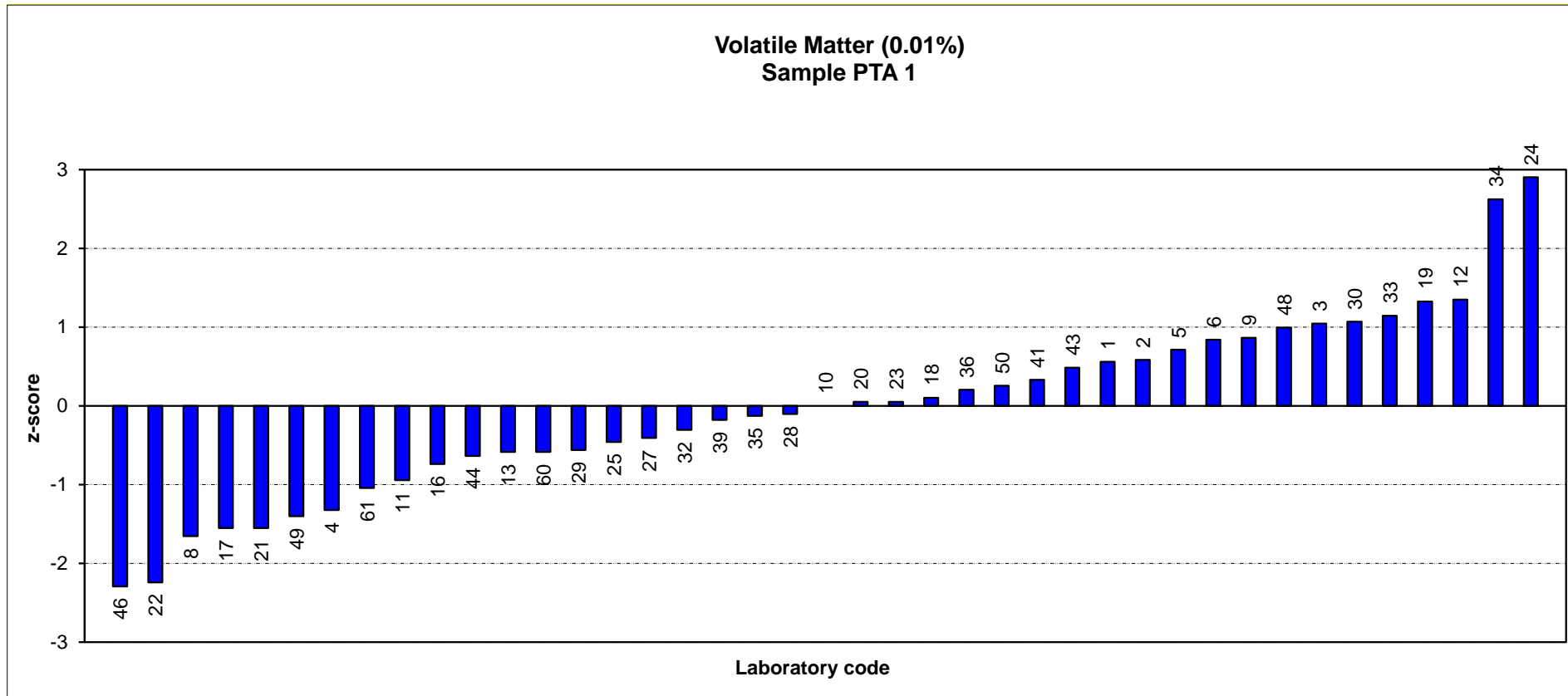
Minimum: 19.56

Maximum: 20.58

Range: 1.02

¹ Where reported, results are shown with their corresponding measurement uncertainty (MU).

² "\$"s denote outliers (i.e. those results for which $|z\text{-score}| \geq 3.0$). Robust z-scores are calculated as: $z = (A - \text{median}) \div \text{normalised IQR}$, where A is the participant laboratory's result.



A11

Volatile Matter
(0.01%)

Results by Laboratory Code - Sample PTA 2

Lab Code	Result 1	Result 2	Average Result		MU ¹	Robust z-score ²	Method/Technique
1	20.13	19.92	20.03	±	1.00	-0.40	AS 1038-3
2	20.13	20.16	20.15	±	0.2	0.61	AS 1038-3-4
3	20.15	20.15	20.15	±	3.44	0.65	ISO 562:2010
4	19.73	19.81	19.77	±	0.20	-2.53	AS
5	19.95	20.05	20.00	±	1.0	-0.61	AS 1038-3
6	20.10	20.15	20.13		#	0.44	AS 1038-3
8	19.96	19.86	19.91		#	-1.36	AS 1038-3-4
9	19.98	20.17	20.08	±	3.89	0.02	AS 1038-2000
10	20.05	20.09	20.07	±	1.0	-0.02	AS 1038-3
11	20.06	19.99	20.03		#	-0.40	AS 1038-3
12	20.24	20.23	20.24	±	0.78	1.36	ASTM D5142-04
13	20.06	20.07	20.07	±	0.20	-0.06	#
16	20.14	20.21	20.18		#	0.86	AS 1038-3
17	19.77	19.70	19.74	±	0.2	-2.82	AS1038-3
18	20.03	20.03	20.03		#	-0.36	AS1038-3
19	20.42	20.35	20.39	±	0.56	2.61	Inhouse method based on ASTM D3175-07
20	20.12	20.08	20.10		#	0.23	CBM219c
21	20.02	20.04	20.03	±	0.2	-0.36	AS1038-3
22	19.66	19.86	19.76	±	1.67	-2.61	Inhouse method based on ASTM D3175-07
23	20.06	20.08	20.07		#	-0.02	AS1038-3
24	20.77	20.51	20.64	±	0.13	4.75 §	ASTM D 7582-10
25	19.81	19.95	19.88		#	-1.61	ASTM D7582
26	20.1	20.1	20.10		#	0.23	Noko Method-04
27	20.06	19.93	20.00	±	0.2	-0.65	AS1038-3
28	20.08	20.21	20.15		#	0.61	#
30	20.32	20.20	20.26	±	0.5	1.57	AS1038-3-2000
33	20.23	20.21	20.22	±	0.50	1.23	AS1038-3
34	20.52	20.63	20.58	±	0.34	4.20 §	ASTM D7582
35	19.99	19.98	19.99		#	-0.73	AS 1038-3
36	20.25	20.05	20.15		#	0.65	AS 1038-3
39	20.13	20.16	20.15		#	0.61	AS 1038-3
41	19.99	19.99	19.99	±	1.0	-0.69	AS 1038-3
43	20.16	20.13	20.15	±	0.2	0.61	AS 1038-3
44	19.73	19.95	19.84	±	0.17	-1.95	AS 1038-3
46	19.43	19.51	19.47	±	0.06	-5.04 §	ASTM D 3175-11
48	20.35	20.37	20.36	±	0.50	2.41	AS 1038-4
49	19.78	19.78	19.78	±	0.83	-2.45	ASTM D7582-10
50	20.17	20.07	20.12		#	0.40	#
60	19.88	19.96	19.92	±	0.20	-1.28	AS 1038-3
61	20.10	20.25	20.18	±	0.20	0.86	AS 1038-3

No of Results: 40

Median: 20.073

Uncertainty (median): 0.024

Normalised IQR: 0.120

Robust CV: 0.6%

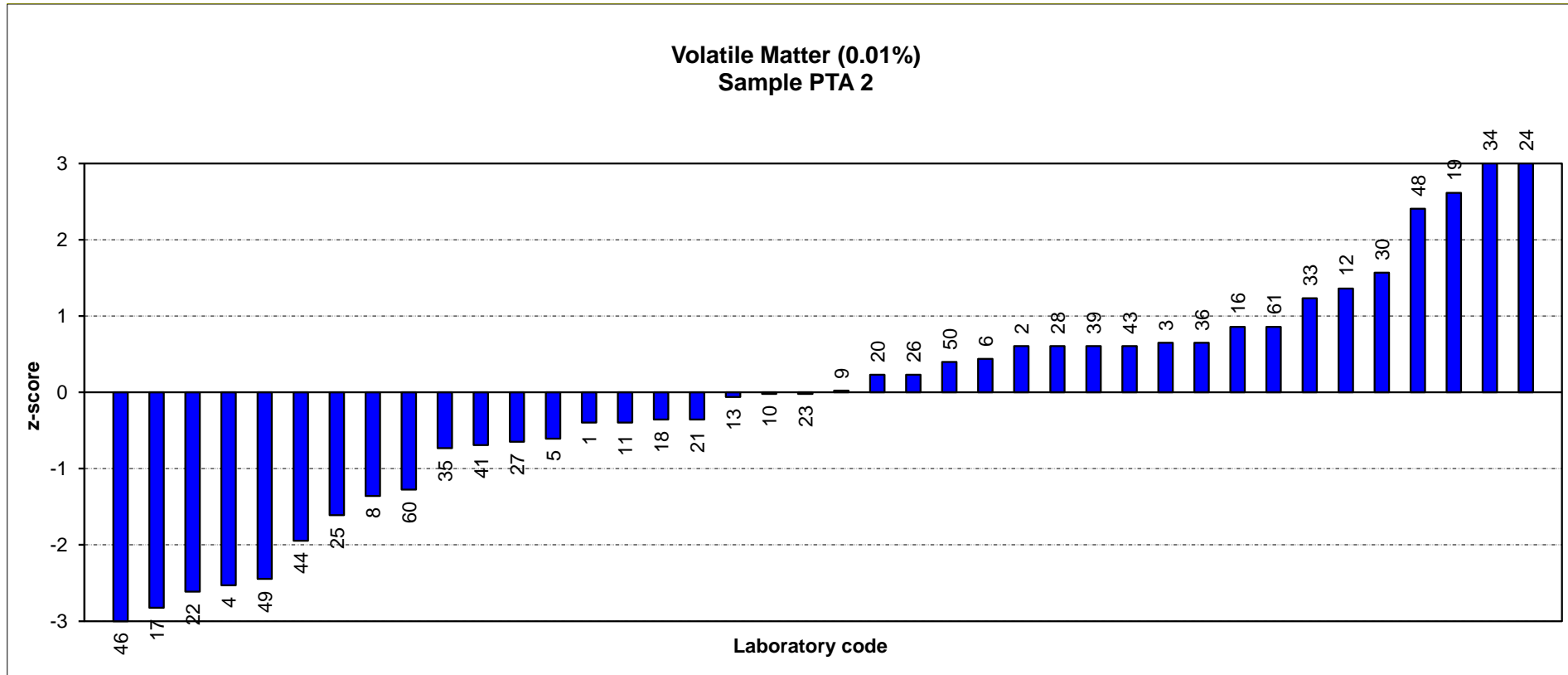
Minimum: 19.47

Maximum: 20.64

Range: 1.17

¹ Where reported, results are shown with their corresponding measurement uncertainty (MU).

² "§"s denote outliers (i.e. those results for which $|z\text{-score}| \geq 3.0$). Robust z-scores are calculated as: $z = (A - \text{median}) \div \text{normalised IQR}$, where A is the participant laboratory's result.



Gross Calorific Value
(0.001 MJ/kg)

Results by Laboratory Code - Sample PTA 1

Lab Code	Result 1	Result 2	Average Result		MU ¹	Robust z-score ²	Method/Technique
1	32.12	32.10	32.110	±	0.30	-0.67	AS 1038-5
2	32.234	32.230	32.232	±	0.13	0.47	AS 1038-5
4	32.352	32.341	32.347	±	0.13	1.54	AS
5	32.067	32.107	32.087	±	0.30	-0.89	AS 1038-5
8	32.30	32.33	32.315		#	1.25	AS 1038-5
10	32.224	32.163	32.194	±	0.3	0.11	AS 1038-5
11	32.08	32.06	32.070		#	-1.05	AS 1038-5
12	32.080	32.083	32.082	±	0.09	-0.94	ASTM D 5685-07a
13	32.344	32.317	32.331	±	0.13	1.39	AS 1038-5 ISOPERIBOL
14	32.226	32.170	32.198	±	0.251	0.15	ASTM D 5865-10-4
15	32.218	32.216	32.217	±	0.303	0.33	ASTM D585-12
16	32.226	32.266	32.246		#	0.60	AS 1038-6-3-3
17	32.19	32.08	32.135	±	0.13	-0.44	AS1038.5
19	32.152	32.182	32.167	±	0.285	-0.14	ASTM D 5865-10a
21	32.158	32.116	32.137	±	0.13	-0.42	AS1038.5
22	32.066	32.039	32.053	±	0.149	-1.21	ASTM D5865-07 (By the Iso-peribol Bomb Automated Calorimeter)
23	32.168	32.216	32.192		#	0.10	AS1038.5
24	32.260	32.277	32.269	±	0.084	0.81	KS E 3707:2001-5-7-2-6
25	32.207	32.170	32.189		#	0.06	ASTM D5865
27	32.214	32.267	32.241	±	0.13	0.55	AS1038.5
28	32.215	32.135	32.175		#	-0.06	#
29	31.89	31.88	31.885		#	-2.78	Noko Method-02
30	32.079	32.087	32.083	±	0.30	-0.92	AS1038.5-1998
32	32.10	32.08	32.090		#	-0.86	Noko Method-02
33	32.324	32.259	32.292	±	0.30	1.03	AS1038.5
34	32.161	32.200	32.181	±	0.206	-0.01	KS E 3707-5-7-2-6
35	32.229	32.241	32.235		#	0.50	AS 1038.5
37	31.90	31.80	31.850		#	-3.11 §	ASTM
38	32.060	32.025	32.043	±	0.3	-1.30	AS 1038-5
39	32.257	32.324	32.291		#	1.02	AS 1038-5
41	32.13	32.23	32.180	±	0.30	-0.02	AS 1038-5
42	32.187	32.179	32.183	±	0.206	0.01	KS E 3707 5.7.2.6
43	32.107	32.209	32.158	±	0.13	-0.22	AS 1038-5
44	32.259	32.257	32.258	±	0.09	0.71	AS 1038-5
45	32.096	32.078	32.087	±	0.117	-0.89	ASTM D 5865-10-4
46	32.132	32.208	32.170	±	0.01	-0.11	ASTM D 5865-11A
47	32.059	32.020	32.040	±	0.071	-1.33	ASTM D5865-12
48	32.276	32.392	32.334	±	0.30	1.43	AS 1038-5
49	32.171	32.096	32.134	±	0.082	-0.45	KS E 3707
50	32.204	32.244	32.224		#	0.40	#
60	32.176	32.305	32.241	±	0.13	0.55	AS 1038-5
61	32.234	32.228	32.231	±	0.13	0.46	AS 1038-5-1

No of Results: 42

Median: 32.1818

Uncertainty (median): 0.0207

Normalised IQR: 0.1068

Robust CV: 0.3%

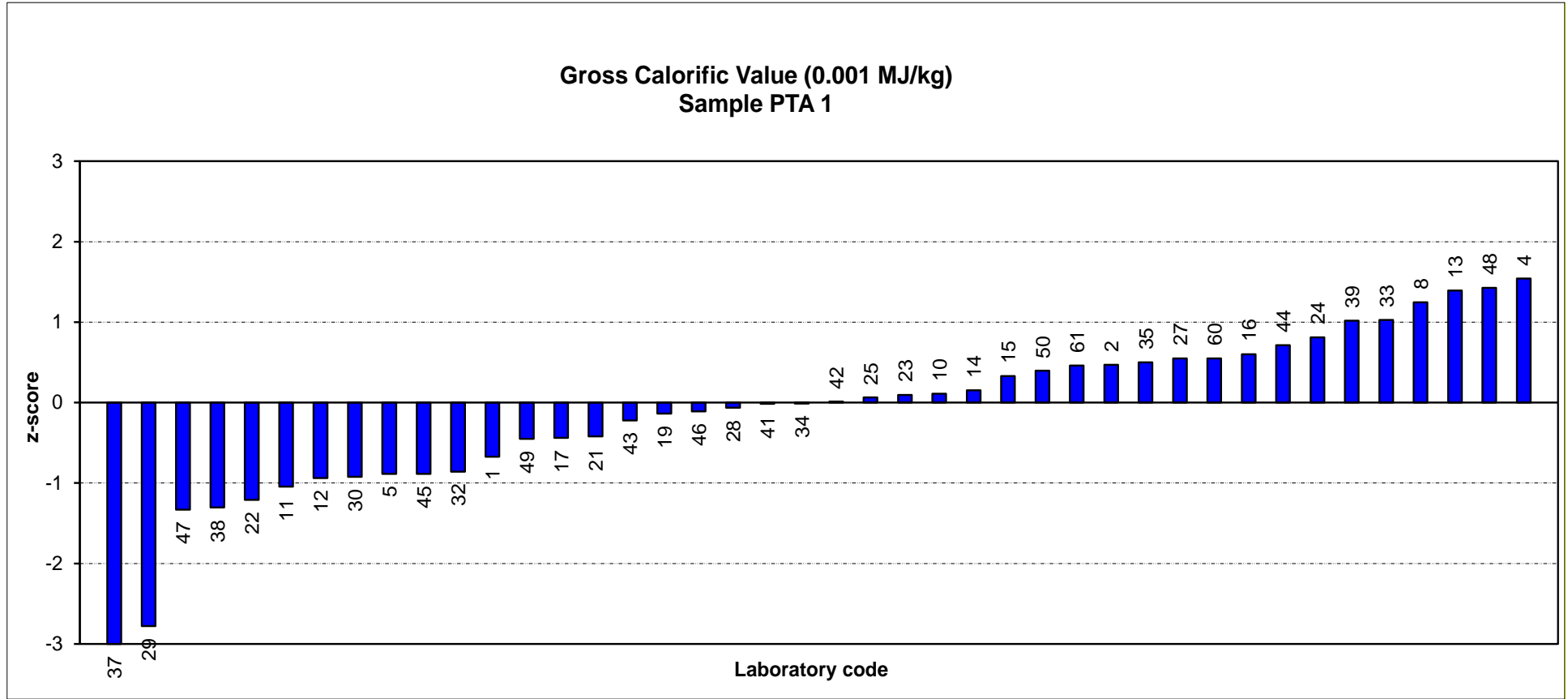
Minimum: 31.850

Maximum: 32.347

Range: 0.496

¹ Where reported, results are shown with their corresponding measurement uncertainty (MU).

² "§"s denote outliers (i.e. those results for which $|z\text{-score}| \geq 3.0$). Robust z-scores are calculated as: $z = (A - \text{median}) \div \text{normalised IQR}$, where A is the participant laboratory's result.



A15

**Gross Calorific Value
(0.001 MJ/kg)**

Results by Laboratory Code - Sample PTA 2

Lab Code	Result 1	Result 2	Average Result		MU ¹	Robust z-score ²	Method/Technique
1	32.22	32.26	32.240	±	0.30	0.41	AS 1038-5
2	32.156	32.226	32.191	±	0.13	-0.17	AS 1038-5
4	32.267	32.335	32.301	±	0.13	1.13	AS
5	32.207	32.218	32.213	±	0.30	0.08	AS 1038-5
8	32.49	32.43	32.460		#	3.00	AS 1038-5
10	32.165	32.173	32.169	±	0.3	-0.43	As 1038-5
11	32.15	32.09	32.120		#	-1.01	AS 1038-5
12	32.137	32.135	32.136	±	0.090	-0.82	ASTM D 5685-07a
13	32.206	32.220	32.213	±	0.13	0.09	AS 1038-5
14	32.163	32.225	32.194	±	0.254	-0.14	ASTM D5865-10-4
15	32.207	32.204	32.206	±	0.325	0.00	ASTM D5865-12
16	32.171	32.250	32.211		#	0.06	AS 1038-6-3-3
17	32.09	32.12	32.105	±	0.13	-1.18	AS1038-5
19	32.141	32.139	32.140	±	0.285	-0.77	ASTM D5865-10a
21	32.051	32.032	32.042	±	0.13	-1.93	AS1038-5
22	32.064	32.072	32.068	±	0.149	-1.62	ASTM D5865-07 (By the Iso-peribol Bomb Automated Calorimeter)
23	32.161	32.163	32.162		#	-0.51	AS1038-5
24	32.288	32.287	32.288	±	0.084	0.97	KS E 3707:2001-5-7-2-6
25	32.144	32.159	32.152		#	-0.64	ASTM D5865
26	32.25	32.24	32.245		#	0.47	Noko Method 02
27	32.204	32.297	32.251	±	0.13	0.53	AS1038-5
28	32.227	32.257	32.242		#	0.43	#
30	32.063	32.073	32.068	±	0.30	-1.62	AS1038-5-1998
33	32.331	32.318	32.325	±	0.30	1.40	AS1038-5
34	32.168	32.153	32.161	±	0.206	-0.53	KSE 3707-5-7-2-6
35	32.203	32.222	32.213		#	0.08	AS 1038-5-2
37	31.80	31.90	31.850		#	-4.19 §	#
38	31.957	32.009	31.983	±	0.3	-2.62	AS 1038-5
39	32.334	32.387	32.361		#	1.83	AS 1038-5
41	32.24	32.29	32.265	±	0.30	0.70	AS 1038-5
42	32.135	32.160	32.148	±	0.206	-0.68	KS E 3707 5-7-2-6
43	31.987	32.099	32.043	±	0.13	-1.91	AS 1038-5
44	32.279	32.324	32.302	±	0.09	1.13	AS 1038-5
45	32.241	32.230	32.236	±	0.046	0.35	ASTM D5865-10-4
46	32.046	32.065	32.056	±	0.01	-1.77	ASTM D5865-11A
47	32.063	32.061	32.062	±	0.034	-1.69	ASTM D5865-12
48	32.291	32.361	32.326	±	0.30	1.42	AS 1038-5
49	32.189	32.252	32.221	±	0.064	0.18	KS E 3707
50	32.204	32.324	32.264		#	0.69	#
60	32.405	32.278	32.342	±	0.13	1.60	AS 1038-5
61	32.157	32.142	32.150	±	0.13	-0.66	AS 1038-5-1

No of Results: 41

Median: 32.2055

Uncertainty (median): 0.0166

Normalised IQR: 0.0849

Robust CV: 0.3%

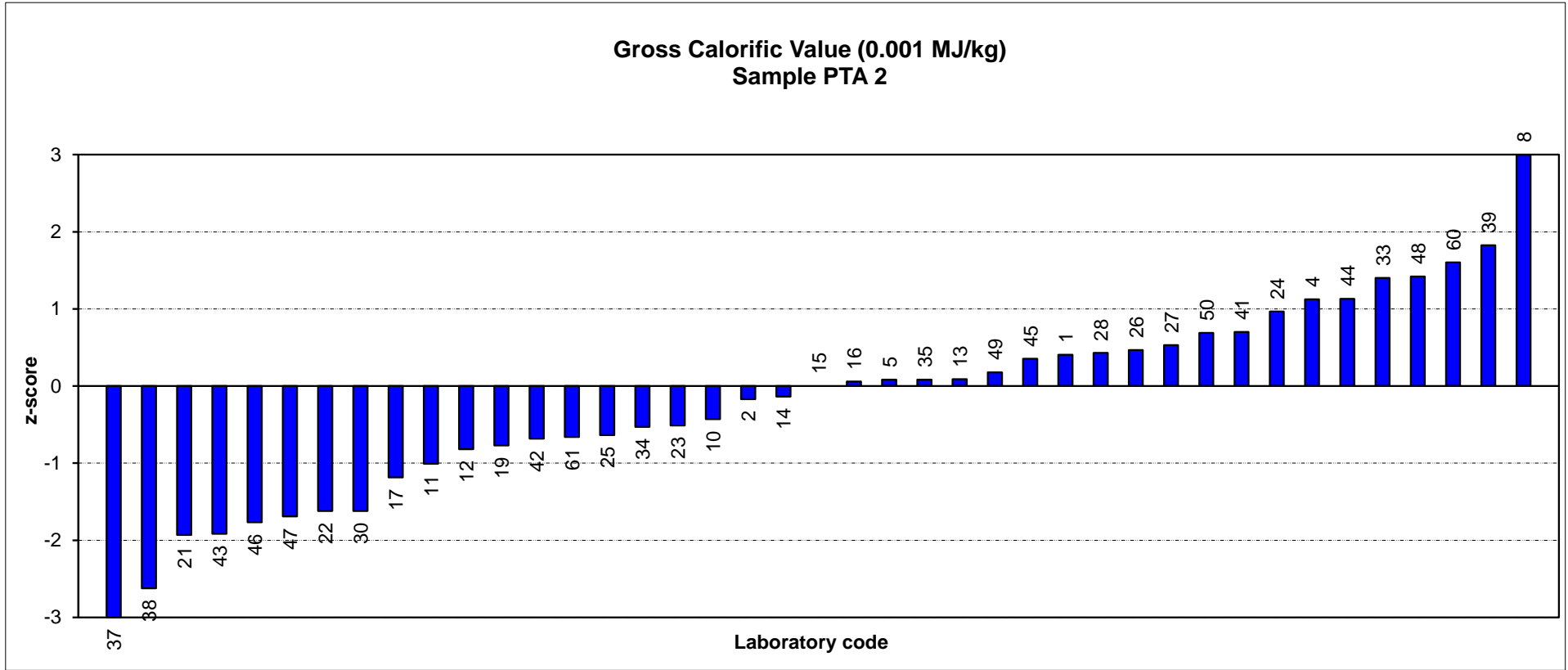
Minimum: 31.850

Maximum: 32.460

Range: 0.610

¹ Where reported, results are shown with their corresponding measurement uncertainty (MU).

² "§"s denote outliers (i.e. those results for which $|z\text{-score}| \geq 3.0$). Robust z-scores are calculated as: $z = (A - \text{median}) \div \text{normalised IQR}$, where A is the participant laboratory's result.



A17

Total Sulfur
(0.001%)

Results by Laboratory Code - Sample PTA 1

Lab Code	Result 1	Result 2	Average Result	MU ¹	Robust z-score ²	Method/Technique
1	0.549	0.555	0.552 ±	0.050	-0.59	AS 1038-6.3.3
2	0.562	0.559	0.561 ±	0.03	-0.20	AS 1038-6.3.3
3	0.540	0.539	0.540 ±	0.032	-1.16	ASTM D4239-12
4	0.560	0.560	0.560 ±	0.03	-0.22	AS
5	0.585	0.542	0.564 ±	8.0	-0.06	AS 1038-6-3-3
6	0.600	0.600	0.600	#	1.63	AS 1038-14-3
8	0.554	0.552	0.553	#	-0.54	AS 1038-6-3-1
10	0.582	0.581	0.582 ±	8	0.77	AS 1038-6-3-3
11	0.584	0.580	0.582	#	0.80	AS 1038-6-3-3
12	0.595	0.596	0.596 ±	0.050	1.42	ASTM D 4239-08
13	0.561	0.562	0.562 ±	0.03	-0.15	AS 1038-6-3-3 INFRARED
16	0.561	0.559	0.560	#	-0.22	AS 1038-5
17	0.583	0.583	0.583 ±	0.03	0.84	AS1038.6.3.3
19	0.566	0.561	0.564 ±	0.07	-0.06	ASTM D 3177 - 02/2007 Method A: Eschka Method
21	0.565	0.565	0.565 ±	0.03	0.01	AS1038.6.3.3
22	0.561	0.557	0.559 ±	0.04	-0.27	ASTM D4239-05 Method C High Temperature Combustion Method with Infrared Absorption Procedure
23	0.596	0.601	0.599	#	1.56	AS1038.6.3.3
24	0.554	0.548	0.551 ±	0.010	-0.63	ASTM D4239-11
25	0.542	0.540	0.541	#	-1.10	ASTM D4239
27	0.574	0.576	0.575 ±	0.03	0.47	AS1038.6.3.3
28	0.630	0.550	0.590	#	1.16	#
29	0.66	0.65	0.655	#	4.16	§ Noko Method-07
30	0.582	0.582	0.582 ±	0.05	0.80	AS1038.6.3.3-1997
32	0.59	0.60	0.595	#	1.40	Noko Method-07
33	0.600	0.593	0.597 ±	0.05	1.46	AS1038.6.3.3
34	0.566	0.563	0.565 ±	0.034	-0.01	ASTM D4239 3.1 Method A
35	0.588	0.579	0.584	#	0.86	AS 1038.6.3.3
37	0.554	0.561	0.558	#	-0.33	ASTM D4239-11
39	0.554	0.546	0.550	#	-0.68	AS 1038-6-3-3
41	0.61	0.61	0.610 ±	8	2.09	AS 1038-6-3-3
43	0.571	0.573	0.572 ±	0.03	0.33	AS 1038-6-3-3
44	0.564	0.569	0.567 ±	0.02	0.08	AS 1038-6-3-3
46	0.538	0.518	0.528 ±	0.04	-1.69	ASTM D 3177-07B
48	0.571	0.574	0.573 ±	0.05	0.36	AS 1038-6-3-3
49	0.554	0.551	0.553 ±	0.020	-0.56	ASTM D4239-12
50	0.544	0.551	0.548	#	-0.80	#
60	0.589	0.599	0.594 ±	0.03	1.35	AS 1038-6-3-3
61	0.540	0.535	0.538 ±	0.03	-1.26	AS 1038-6-3-3

No of Results: 38

Median: 0.5648

Uncertainty (median): 0.0044

Normalised IQR: 0.0217

Robust CV: 3.8%

Minimum: 0.528

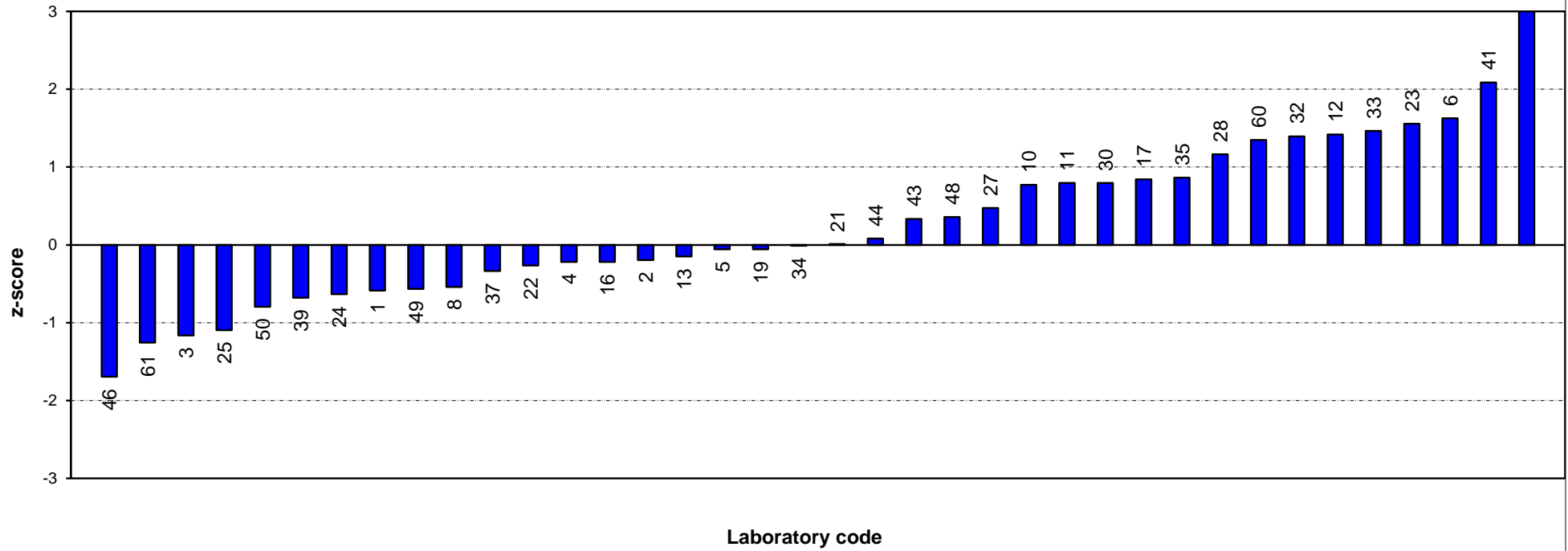
Maximum: 0.655

Range: 0.127

¹ Where reported, results are shown with their corresponding measurement uncertainty (MU).

² "§"s denote outliers (i.e. those results for which |z-score| ≥ 3.0). Robust z-scores are calculated as: $z = (A - \text{median}) \div \text{normalised IQR}$, where A is the participant laboratory's result.

**Total Sulfur (0.001%)
Sample PTA 1**



A19

**Total Sulfur
(0.001%)**

Results by Laboratory Code - Sample PTA 2

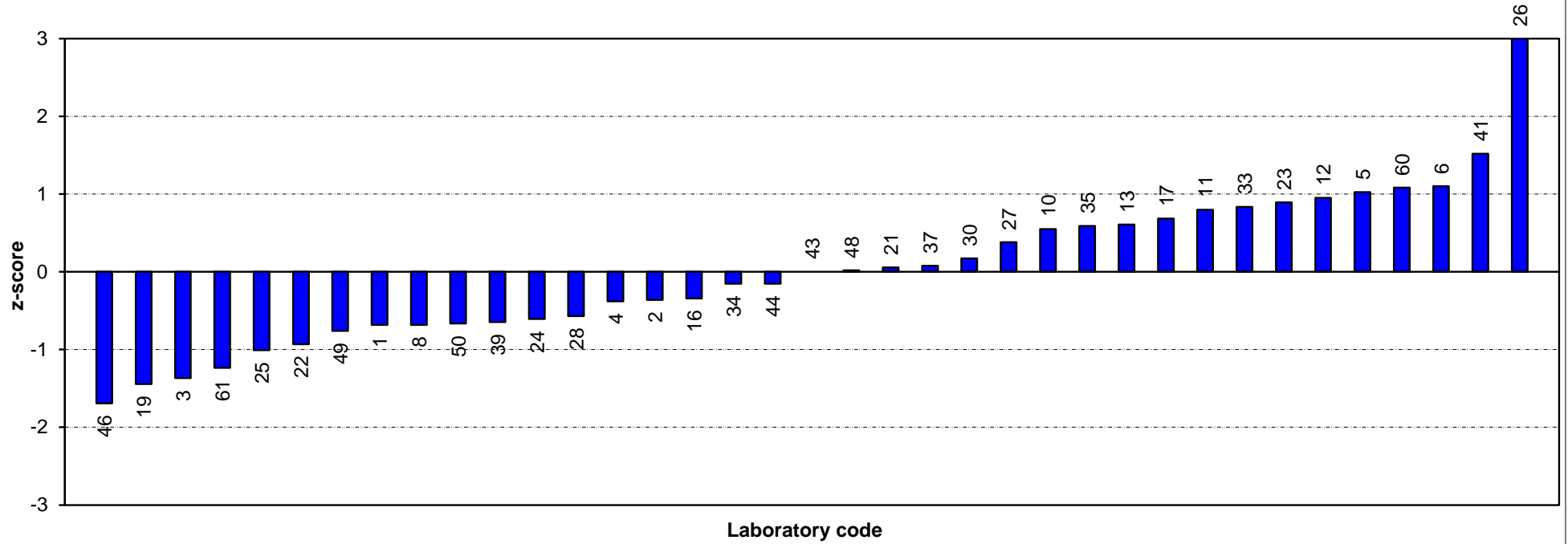
Lab Code	Result 1	Result 2	Average Result	MU ¹	Robust z-score ²	Method/Technique
1	0.553	0.551	0.552 ±	0.050	-0.68	AS 1038-6-3-3
2	0.560	0.561	0.561 ±	0.03	-0.36	AS 1038-6-3-3
3	0.534	0.534	0.534 ±	0.032	-1.37	ASTM D4239-12
4	0.560	0.560	0.560 ±	0.03	-0.38	AS
5	0.596	0.598	0.597 ±	8.0	1.03	AS 1038-6-3-3
6	0.600	0.598	0.599	#	1.10	AS 1038-14-3
8	0.553	0.551	0.552	#	-0.68	AS 1038-6-3-1
10	0.585	0.584	0.585 ±	8	0.55	AS 1038-6-3-3
11	0.590	0.592	0.591	#	0.80	AS 1038-6-3-3
12	0.595	0.595	0.595 ±	0.050	0.95	ASTM D 4239-08
13	0.583	0.589	0.586 ±	0.03	0.61	AS 1038-6-3-3
16	0.558	0.564	0.561	#	-0.34	AS 1038-5
17	0.589	0.587	0.588 ±	0.03	0.68	AS10383-6-3-3
19	0.531	0.533	0.532 ±	0.07	-1.44	ASTM D3177-02/2007 Method A: Eschka Method
21	0.575	0.568	0.572 ±	0.03	0.06	AS10383-6-3-3
22	0.546	0.545	0.546 ±	0.037	-0.93	ASTM D4239-05 Method C High Temperature Combustion Method with Infrared Absorption Procedure
23	0.594	0.593	0.594	#	0.89	AS10383-6-3-3
24	0.554	0.554	0.554 ±	0.010	-0.61	ASTM D 4279-11
25	0.544	0.543	0.544	#	-1.01	ASTM D4239
26	0.70	0.66	0.680	#	4.18 §	Noko Method 07
27	0.581	0.579	0.580 ±	0.03	0.38	AS10383-6-3-3
28	0.550	0.560	0.555	#	-0.57	#
30	0.574	0.575	0.575 ±	0.05	0.17	AS1038-6-3-3-1997
33	0.590	0.594	0.592 ±	0.050	0.84	AS1038-6-3-3
34	0.568	0.564	0.566 ±	0.034	-0.15	ASTM D4239 3-1 Method A
35	0.592	0.579	0.586	#	0.59	AS 1038-6-3-3
37	0.570	0.574	0.572	#	0.08	ASTM 4239-11
39	0.554	0.552	0.553	#	-0.65	AS 1038-6-3-3
41	0.61	0.61	0.610 ±	8	1.52	AS 1038-6-3-3
43	0.568	0.572	0.570 ±	0.03	0.00	AS 1038-6-3-3
44	0.567	0.565	0.566 ±	0.02	-0.15	AS 1038-6-3-3
46	0.533	0.518	0.526 ±	0.04	-1.69	ASTM D 3177-07B
48	0.571	0.570	0.571 ±	0.05	0.02	AS 1038-6-3-3
49	0.553	0.547	0.550 ±	0.019	-0.76	ASTM D4239-12
50	0.553	0.552	0.553	#	-0.66	#
60	0.598	0.599	0.599 ±	0.03	1.08	AS 1038-6-3-3
61	0.537	0.538	0.538 ±	0.03	-1.23	AS 1038-6-3-3

No of Results: 37
 Median: 0.5700
 Uncertainty (median): 0.0054
 Normalised IQR: 0.0263
 Robust CV: 4.6%
 Minimum: 0.526
 Maximum: 0.680
 Range: 0.155

¹ Where reported, results are shown with their corresponding measurement uncertainty (MU).

² "§"s denote outliers (i.e. those results for which $|z\text{-score}| \geq 3.0$). Robust z-scores are calculated as: $z = (A - \text{median}) \div \text{normalised IQR}$, where A is the participant laboratory's result.

Total Sulfur (0.001%)
Sample PTA 2



Pyritic Sulfur
(0.001%)

Results by Laboratory Code - Sample PTA 1

Lab Code	Result 1	Result 2	Average Result	MU ¹	Robust z-score ²	Method/Technique
5	0.042	0.034	0.038 ±	0.10		AS1038-11
8	0.038	0.034	0.036	#		AS 1038-11
40	0.096	0.096	0.096 ±	0.06		Acid Digest ICP
44	0.043	0.041	0.042 ±	0.05		ICP-AES (b) Microwave Digestion
48	0.032	0.034	0.033 ±	0.10		AS 1038-11

No of Results: 5
Minimum: 0.033
Maximum: 0.096
Range: 0.063

¹ Where reported, results are shown with their corresponding measurement uncertainty (MU).

² Robust z-scores were unable to be calculated due to the low number of results received.

Pyritic Sulfur
(0.001%)

Results by Laboratory Code - Sample PTA 2

Lab Code	Result 1	Result 2	Average Result	MU ¹	Robust z-score ²	Method/Technique
5	0.036	0.038	0.037 ±	0.10		AS 1038-11
8	0.038	0.032	0.035	#		AS 1038-11
40	0.094	0.091	0.093 ±	0.06		Acid Digest ICP
44	0.041	0.045	0.043 ±	0.05		ICP AES (b) Microwave Digestion
48	0.034	0.030	0.032 ±	0.10		AS 1038-11

No of Results: 5
Minimum: 0.032
Maximum: 0.093
Range: 0.061

¹ Where reported, results are shown with their corresponding measurement uncertainty (MU).

² Robust z-scores were unable to be calculated due to the low number of results received.

Sulphate Sulfur
(0.001%)

Results by Laboratory Code - Sample PTA 1

Lab Code	Result 1	Result 2	Average Result	MU ¹	Robust z-score ²	Method/Technique
5	0.008	0.008	0.008 ±	0.03		AS 1038-8-1
8	0.020	0.007	0.014	#		AS 1038-11
40	0.004	0.004	0.004 ±	0.003		Acid Digest ICP
44	0.014	0.015	0.015 ±	0.02		ICP-AES (b) Microwave Digestion
48	0.015	0.013	0.014 ±	0.03		AS 1038-11

No of Results: 5
Minimum: 0.004
Maximum: 0.015
Range: 0.011

¹ Where reported, results are shown with their corresponding measurement uncertainty (MU).

² Robust z-scores were unable to be calculated due to the low number of results received.

Sulphate Sulfur
(0.001%)

Results by Laboratory Code - Sample PTA 2

Lab Code	Result 1	Result 2	Average Result	MU ¹	Robust z-score ²	Method/Technique
5	0.008	0.007	0.008 ±	0.03		AS 1038-11
8	0.014	0.008	0.011	#		AS 1038-11
40	0.005	0.005	0.005 ±	0.003		Acid Digest ICP
44	0.013	0.016	0.015 ±	0.02		ICP AES (b) Microwave Digestion
48	0.007	0.010	0.009 ±	0.03		AS 1038-11

No of Results: 5
Minimum: 0.005
Maximum: 0.015
Range: 0.010

¹ Where reported, results are shown with their corresponding measurement uncertainty (MU).

² Robust z-scores were unable to be calculated due to the low number of results received.

Chlorine
(0.001%)

Results by Laboratory Code - Sample PTA 1

Lab Code	Result 1	Result 2	Average Result	MU ¹	Robust z-score ²	Method/Technique
5	0.034	0.029	0.032	± 0.02	-2.46	#
10	0.041	0.041	0.041	± 0.02	-0.66	AS 1038-8-1
12	0.055	0.055	0.055	± 0.005	1.99	ASTM D 6721-01(2006)
21	0.041	0.041	0.041	± 0.01	-0.66	AS1038.8.1
27	0.041	0.045	0.043	± 0.01	-0.28	AS1038.8.1
30	0.061	0.053	0.057	± 0.06	2.37	ASTM D2361-2001
33	0.044	0.044	0.044	± 0.02	-0.09	Inhouse XRF
37	0.05	0.05	0.050	#	1.04	OIL M17 chloride in water
39	0.045	0.045	0.045	#	0.09	AS 1038-8-1
40	0.045	0.046	0.046	± 0.001	0.19	Eschka fusion OVVIS
43	0.044	0.044	0.044	± 0.01	-0.09	AS 1038-8-1
44	0.046	0.046	0.046	± 0.02	0.28	AS 1038-10-0
48	0.026	0.026	0.026	± 0.10	-3.50 §	AS 1038-8
50	0.045	0.054	0.050	#	0.95	#

No of Results: 14

Median: 0.0445

Uncertainty (median): 0.0018

Normalised IQR: 0.0053

Robust CV: 11.9%

Minimum: 0.026

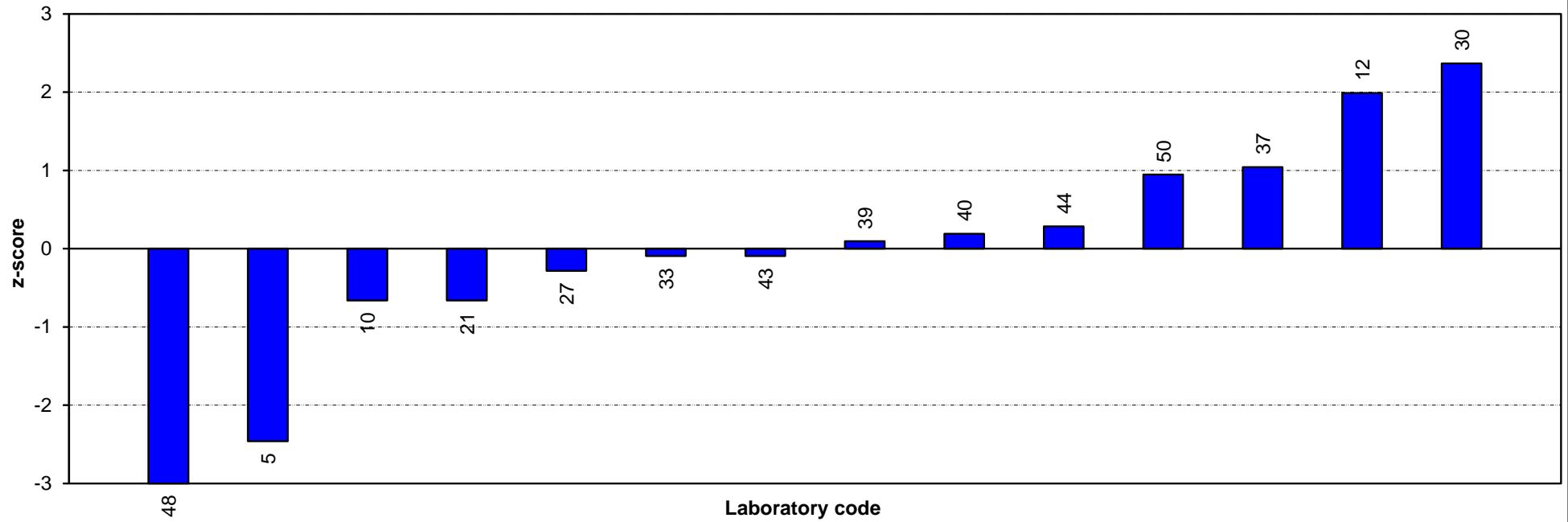
Maximum: 0.057

Range: 0.031

¹ Where reported, results are shown with their corresponding measurement uncertainty (MU).

² "§"s denote outliers (i.e. those results for which $|z\text{-score}| \geq 3.0$). Robust z-scores are calculated as: $z = (A - \text{median}) \div \text{normalised IQR}$, where A is the participant laboratory's result.

**Chlorine (0.001%)
Sample PTA 1**



Chlorine
(0.001%)

Results by Laboratory Code - Sample PTA 2

Lab Code	Result 1	Result 2	Average Result	MU ¹	Robust z-score ²	Method/Technique
5	0.040	0.036	0.038	± 0.02	-0.96	AS 1038-8-1
10	0.040	0.040	0.040	± 0.02	-0.74	AS 1038-8-1
12	0.054	0.054	0.054	± 0.005	0.80	ASTM D 6721-01(2006)
21	0.045	0.045	0.045	± 0.01	-0.19	AS1038-8-1
27	0.050	0.059	0.055	± 0.01	0.85	AS1038-8-1
30	0.064	0.054	0.059	± 0.06	1.35	ASTM D2361-2001
33	0.043	0.043	0.043	± 0.020	-0.41	Inhouse XRF
37	0.04	0.04	0.040	#	-0.74	Oil M17 chloride in water
39	0.045	0.049	0.047	#	0.03	AS 1038-8-1
40	0.047	0.046	0.047	± 0.001	-0.03	Eschka fusion UVVIS
43	0.049	0.045	0.047	± 0.01	0.03	AS 1038-8-1
44	0.053	0.058	0.056	± 0.02	0.96	AS 1038-10-0
48	0.032	0.032	0.032	± 0.10	-1.62	AS 1038-8-1
50	0.050	0.050	0.050	#	0.36	#

No of Results: 14

Median: 0.0468

Uncertainty (median): 0.0030

Normalised IQR: 0.0091

Robust CV: 19.4%

Minimum: 0.032

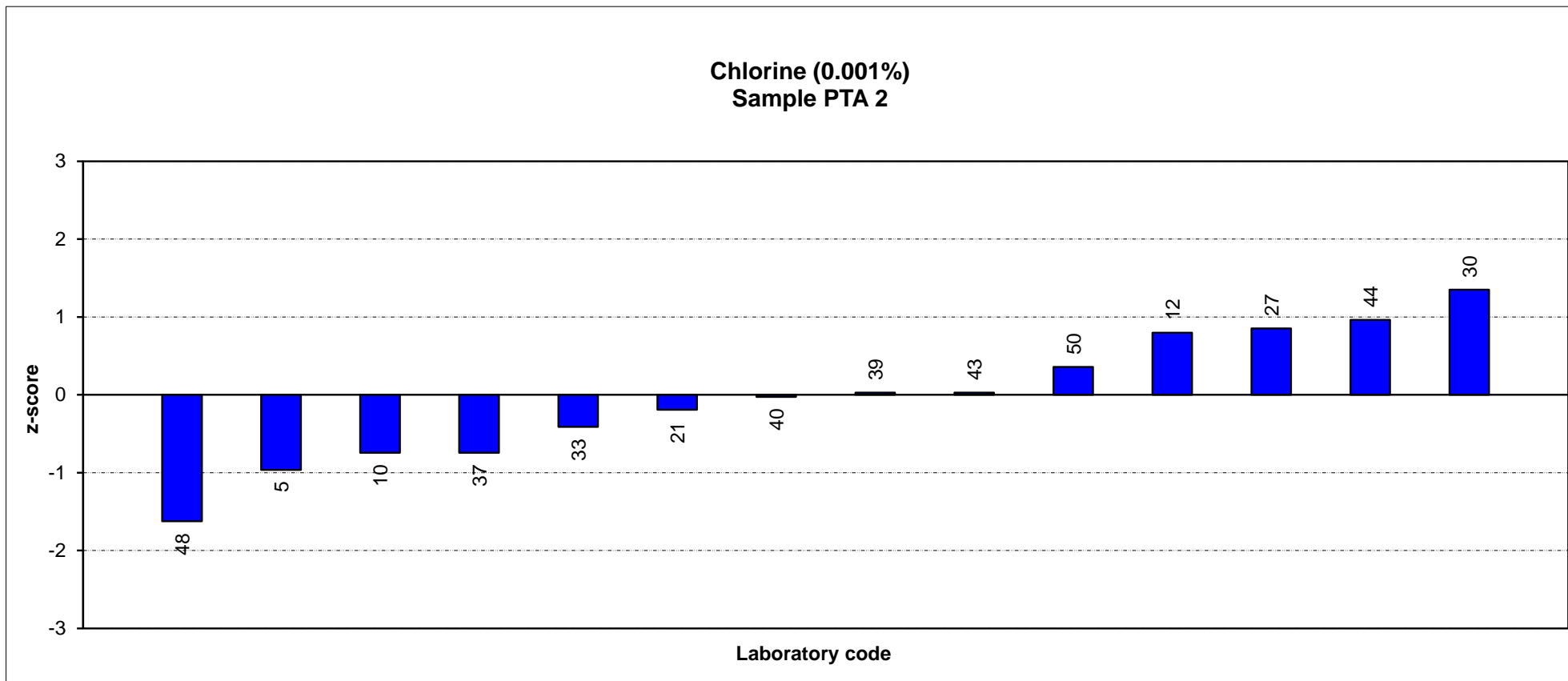
Maximum: 0.059

Range: 0.027

¹ Where reported, results are shown with their corresponding measurement uncertainty (MU).

² "S"s denote outliers (i.e. those results for which $|z\text{-score}| \geq 3.0$). Robust z-scores are calculated as: $z = (A - \text{median}) \div \text{normalised IQR}$, where A is the participant laboratory's result.

**Chlorine (0.001%)
Sample PTA 2**



A27

**Carbon (total)
(0.01%)**

Results by Laboratory Code - Sample PTA 1

Lab Code	Result 1	Result 2	Average result	MU ¹	Robust z-score ²	Method/Technique
8	78.82	79.07	78.95	#	-0.57	AS 2434-6
10	78.820	78.840	78.83	± 0.6	-0.74	AS 1038-6-4
13	80.09	80.08	80.09	± 0.30	1.06	TRUSPEC
21	79.22	79.32	79.27	± 0.3	-0.11	AS1038.6.4
22	85.04	84.71	84.88	± 0.64	7.94 §	ASTM D5373-02
25	78.94	78.71	78.83	#	-0.75	ASTM D5373
27	79.42	79.62	79.52	± 0.3	0.25	AS1038.6.4
34	80.50	80.10	80.30	± 0.66	1.37	ASTM D5373
39	79.14	79.23	79.19	#	-0.23	AS 1038-6-4
43	79.43	79.32	79.38	± 0.3	0.04	AS 1038-6-4
44	78.92	79.02	78.97	± 0.28	-0.54	AS 1038-6-4
46	79.52	79.68	79.60	± 0.02	0.37	ASTM D 3178-02
48	79.24	79.39	79.32	± 0.60	-0.04	AS 1038-6-4
49	82.65	82.96	82.81	± 3.47	4.97 §	ASTM D 5373-08

No of Results: 14

Median: 79.345

Uncertainty (median): 0.233

Normalised IQR: 0.697

Robust CV: 0.9%

Minimum: 78.83

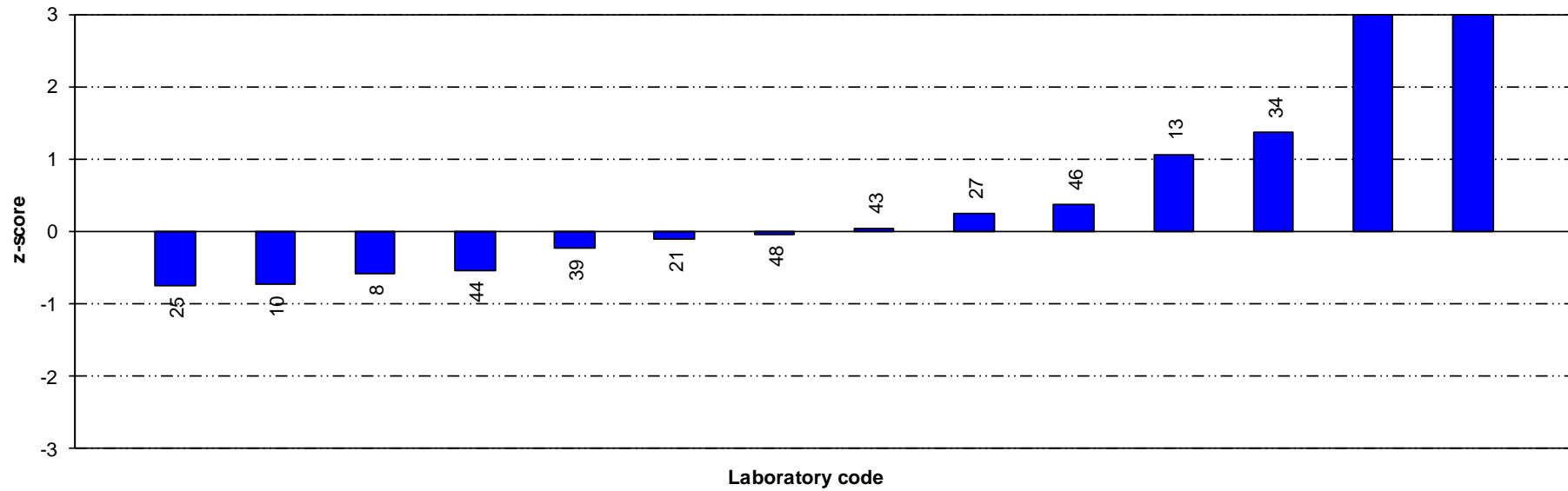
Maximum: 84.88

Range: 6.05

¹ Where reported, results are shown with their corresponding measurement uncertainty (MU).

² "§"s denote outliers (i.e. those results for which $|z\text{-score}| \geq 3.0$). Robust z-scores are calculated as: $z = (A - \text{median}) \div \text{normalised IQR}$, where A is the participant laboratory's result.

**Carbon (total) (0.01%)
Sample PTA 1**



Carbon (total)
(0.01%)

Results by Laboratory Code - Sample PTA 2

Lab Code	Result 1	Result 2	Average result	MU ¹	Robust z-score ²	Method/Technique
8	79.47	79.21	79.34	#	0.01	AS 2434-6
10	78.69	78.67	78.68	± 0.6	-0.83	AS 1038-6-4
13	80.10	80.00	80.05	± 0.30	0.92	TRUSPEC
21	79.02	79.04	79.03	± 0.3	-0.38	AS1038-6-4
22	83.15	83.28	83.22	± 0.64	4.99 §	ASTM D5373-02
25	78.96	78.75	78.86	#	-0.61	ASTM D5373
27	79.33	79.53	79.43	± 0.3	0.13	AS1038-6-4
34	80.40	79.90	80.15	± 0.66	1.05	ASTM D5373
39	79.15	79.03	79.09	#	-0.31	AS 1038-6-4
43	78.62	78.86	78.74	± 0.3	-0.76	AS 1038-6-4
44	78.88	78.61	78.75	± 0.28	-0.75	AS 1038-6-4
46	79.61	79.69	79.65	± 0.02	0.41	ASTM D 3178-02
48	79.33	79.31	79.32	± 0.60	-0.01	AS 1038-6-4
49	83.02	82.56	82.79	± 3.59	4.44 §	ASTM D5373-08

No of Results: 14

Median: 79.330

Uncertainty (median): 0.261

Normalised IQR: 0.779

Robust CV: 1.0%

Minimum: 78.68

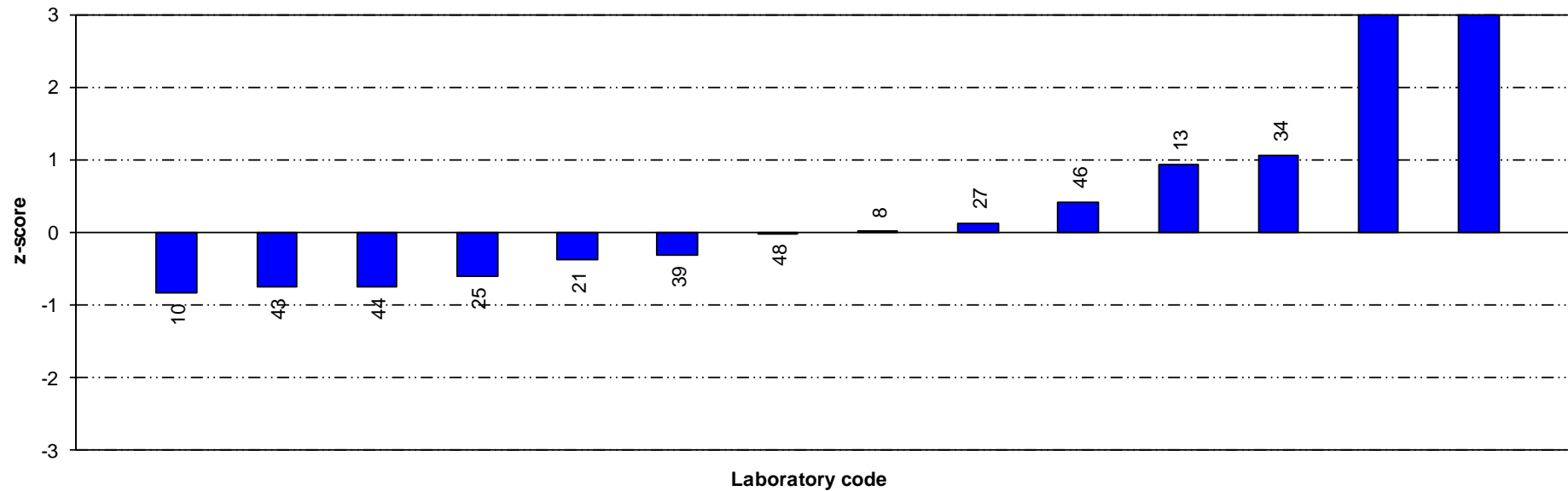
Maximum: 83.22

Range: 4.54

¹ Where reported, results are shown with their corresponding measurement uncertainty (MU).

² "§"s denote outliers (i.e. those results for which $|z\text{-score}| \geq 3.0$). Robust z-scores are calculated as: $z = (A - \text{median}) \div \text{normalised IQR}$, where A is the participant laboratory's result.

**Carbon (total) (0.01%)
Sample PTA 2**



Hydrogen (0.01%)

Results by Laboratory Code - Sample PTA 1

Lab Code	Result 1	Result 2	Average result		MU ¹	Robust z-score ²	Method/Technique
8	4.44	4.46	4.45		#	1.15	AS 2434-6
10	4.24	4.24	4.24	±	0.2	-0.43	AS 1038-6-4
13	4.50	4.42	4.46	±	0.10	1.23	#
21	4.39	4.39	4.39	±	0.1	0.70	AS1038.6.4
22	4.29	4.26	4.28	±	0.16	-0.17	ASTM D5373-02
25	4.25	4.24	4.25		#	-0.40	ASTM D5373
27	4.45	4.44	4.45	±	0.1	1.11	AS1038.6.4
34	4.34	4.42	4.38	±	0.07	0.62	ASTM D5373
39	4.27	4.31	4.29		#	-0.06	AS 1038-6-4
43	4.25	4.23	4.24	±	0.1	-0.43	AS 1038-6-4
44	4.29	4.32	4.31	±	0.09	0.06	AS 1038-6-4
46	4.48	4.50	4.49	±	0.03	1.45	ASTM D 3178-02
48	4.27	4.29	4.28	±	0.20	-0.13	AS 1038-6-4
49	4.17	4.21	4.19	±	0.49	-0.81	ASTM D 5373-08

No of Results: 14

Median: 4.298

Uncertainty (median): 0.044

Normalised IQR: 0.133

Robust CV: 3.1%

Minimum: 4.19

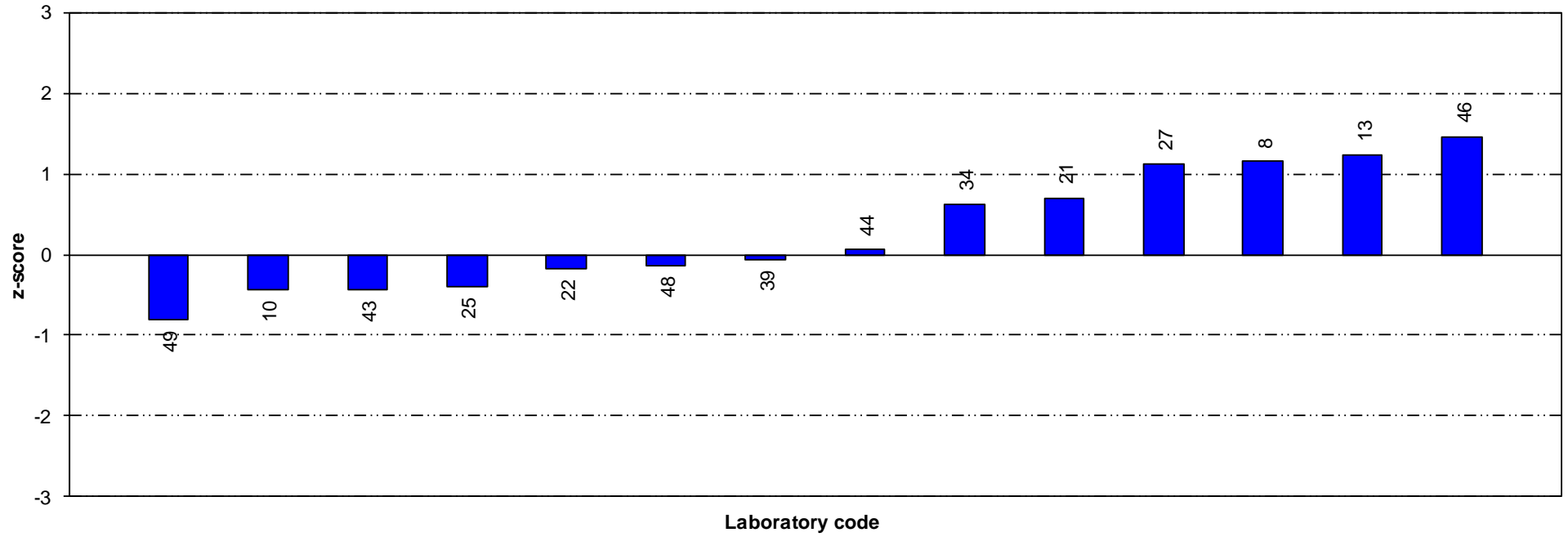
Maximum: 4.49

Range: 0.30

¹ Where reported, results are shown with their corresponding measurement uncertainty (MU).

² "§"s denote outliers (i.e. those results for which $|z\text{-score}| \geq 3.0$). Robust z-scores are calculated as: $z = (A - \text{median}) \div \text{normalised IQR}$, where A is the participant laboratory's result.

Hydrogen (0.01%)
Sample PTA 1



Hydrogen
(0.01%)

Results by Laboratory Code - Sample PTA 2

Lab Code	Result 1	Result 2	Average result		MU ¹	Robust z-score ²	Method/Technique
8	4.43	4.48	4.46		#	1.41	AS 2434-6
10	4.23	4.23	4.23	±	0.2	-1.29	AS 1038-6-4
13	4.39	4.42	4.41	±	0.10	0.81	#
21	4.40	4.40	4.40	±	0.1	0.75	AS1038-6-4
22	4.36	4.35	4.36	±	0.16	0.21	ASTM D5373-02
25	4.29	4.29	4.29		#	-0.57	ASTM D5373
27	4.43	4.44	4.44	±	0.1	1.17	AS1038-6-4
34	4.37	4.41	4.39	±	0.07	0.63	ASTM D5373
39	4.30	4.33	4.32		#	-0.27	AS 1038-6-4
43	4.22	4.23	4.23	±	0.1	-1.35	AS 1038-6-4
44	4.28	4.36	4.32	±	0.09	-0.21	AS 1038-6-4
46	4.44	4.45	4.45	±	0.03	1.29	ASTM D 3178-02
48	4.30	4.29	4.30	±	0.20	-0.51	AS 1038-6-4
49	4.26	4.25	4.26	±	0.50	-0.99	ASTM D 5373-08

No of Results: 14

Median: 4.338

Uncertainty (median): 0.028

Normalised IQR: 0.083

Robust CV: 1.9%

Minimum: 4.23

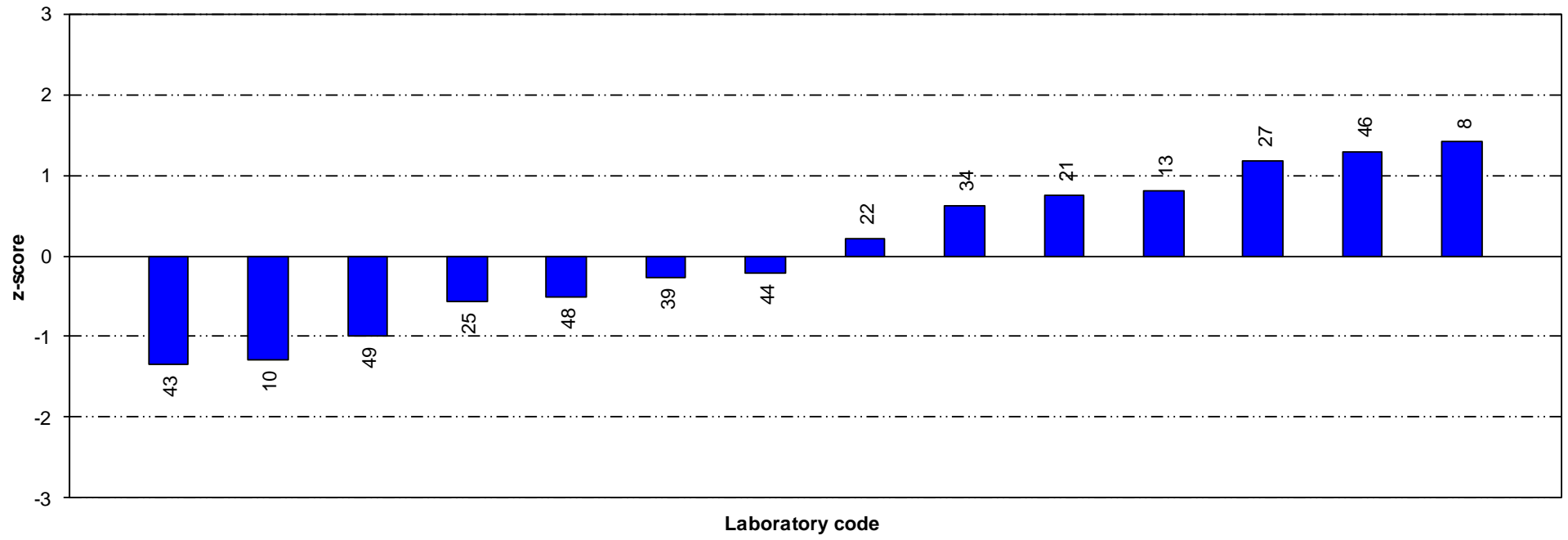
Maximum: 4.46

Range: 0.23

¹ Where reported, results are shown with their corresponding measurement uncertainty (MU).

² "§"s denote outliers (i.e. those results for which $|z\text{-score}| \geq 3.0$). Robust z-scores are calculated as: $z = (A - \text{median}) \div \text{normalised IQR}$, where A is the participant laboratory's result.

Hydrogen (0.01%)
Sample PTA 2



Nitrogen
(0.01%)

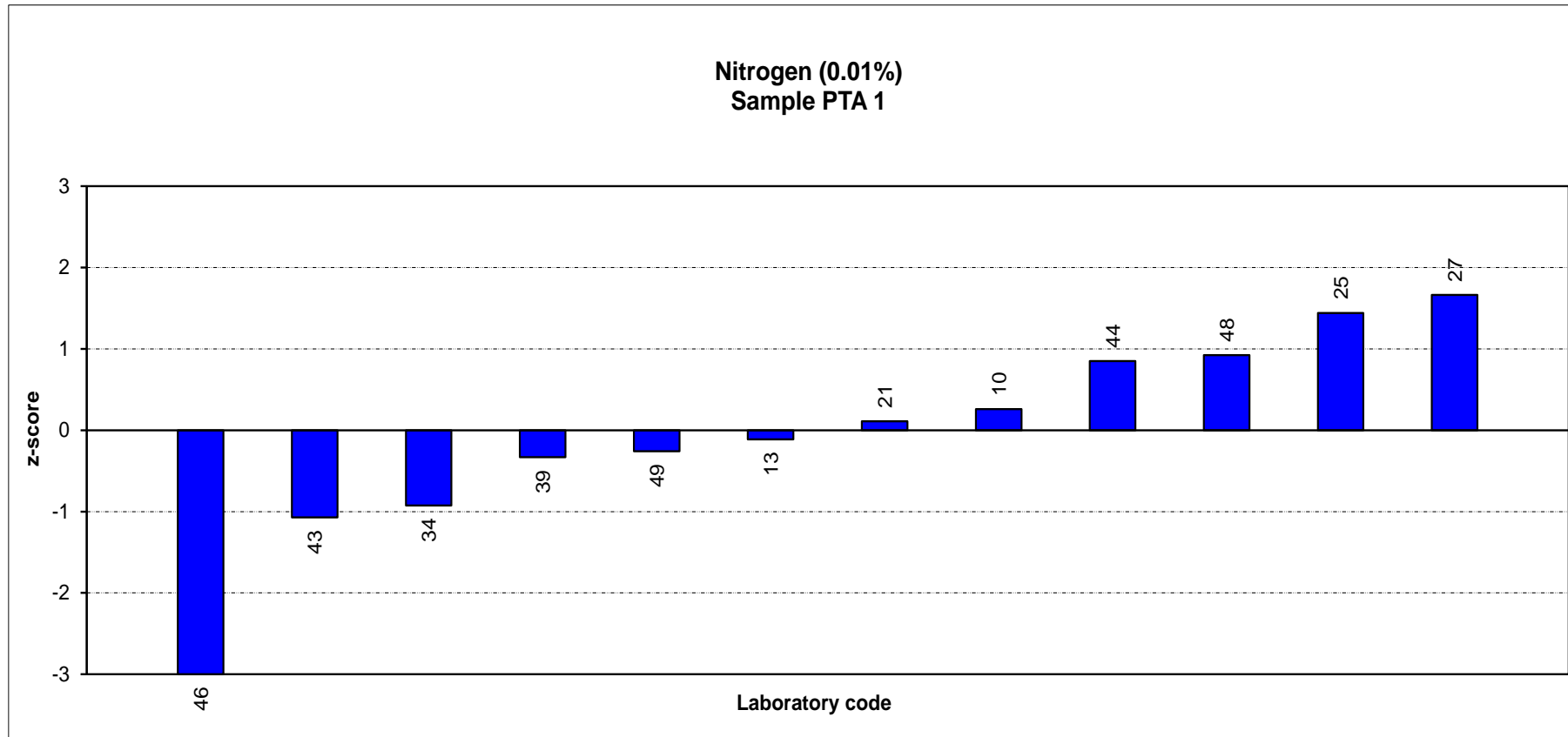
Results by Laboratory Code - Sample PTA 1

Lab Code	Result 1	Result 2	Average result	MU ¹	Robust z-score ²	Method/Technique
10	1.77	1.77	1.77 ±	0.08	0.26	AS 1038-6-4
13	1.76	1.73	1.75 ±	0.03	-0.11	#
21	1.76	1.76	1.76 ±	0.03	0.11	AS1038.6.4
25	1.86	1.84	1.85	#	1.44	ASTM D5373
27	1.86	1.87	1.87 ±	0.03	1.66	AS1038.6.4
34	1.67	1.71	1.69 ±	0.05	-0.92	ASTM D5373
39	1.74	1.72	1.73	#	-0.33	AS 1038-6-4
43	1.68	1.68	1.68 ±	0.03	-1.07	AS 1038-6-4
44	1.81	1.81	1.81 ±	0.17	0.85	AS 1038-6-4
46	1.51	1.54	1.53 ±	0.03	-3.36 §	ASTM D 3179-97
48	1.81	1.82	1.82 ±	0.08	0.92	AS 1038-6-4
49	1.77	1.70	1.74 ±	0.22	-0.26	ASTM D 5373-08

No of Results: 12
Median: 1.753
Uncertainty (median): 0.024
Normalised IQR: 0.068
Robust CV: 3.9%
Minimum: 1.53
Maximum: 1.87
Range: 0.34

¹ Where reported, results are shown with their corresponding measurement uncertainty (MU).

² "§"s denote outliers (i.e. those results for which $|z\text{-score}| \geq 3.0$). Robust z-scores are calculated as: $z = (A - \text{median}) \div \text{normalised IQR}$, where A is the participant laboratory's result.



Nitrogen
(0.01%)

Results by Laboratory Code - Sample PTA 2

Lab Code	Result 1	Result 2	Average result		MU ¹	Robust z-score ²	Method/Technique
10	1.76	1.76	1.76	±	0.08	-0.09	AS 1038-6-4
13	1.78	1.75	1.77	±	0.03	0.00	#
21	1.76	1.75	1.76	±	0.03	-0.18	AS1038-6-4
25	1.86	1.85	1.86		#	1.62	ASTM D5373
27	1.86	1.87	1.87	±	0.03	1.80	AS1038-6-4
34	1.68	1.71	1.70	±	0.05	-1.26	ASTM D5373
39	1.72	1.72	1.72		#	-0.81	AS 1038-6-4
43	1.71	1.69	1.70	±	0.03	-1.17	AS 1038-6-4
44	1.80	1.81	1.81	±	0.17	0.72	AS 1038-6-4
48	1.82	1.82	1.82	±	0.08	0.99	AS 1038-6-4
49	1.79	1.80	1.80	±	0.23	0.54	ASTM D5373-08

No of Results: 11

Median: 1.765

Uncertainty (median): 0.021

Normalised IQR: 0.056

Robust CV: 3.2%

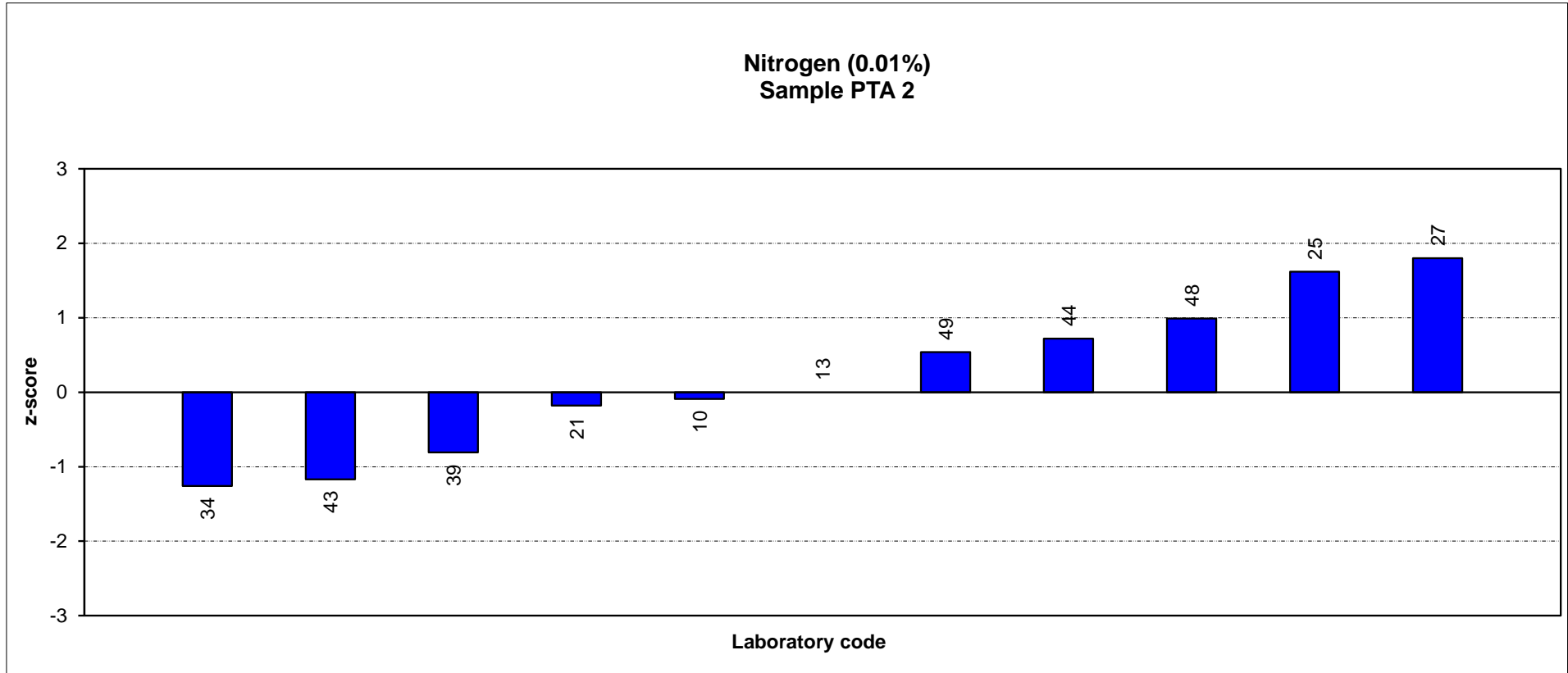
Minimum: 1.70

Maximum: 1.87

Range: 0.17

¹ Where reported, results are shown with their corresponding measurement uncertainty (MU).

² "S"s denote outliers (i.e. those results for which $|z\text{-score}| \geq 3.0$). Robust z-scores are calculated as: $z = (A - \text{median}) \div \text{normalised IQR}$, where A is the participant laboratory's result.



Carbonate Carbon
(0.001%)

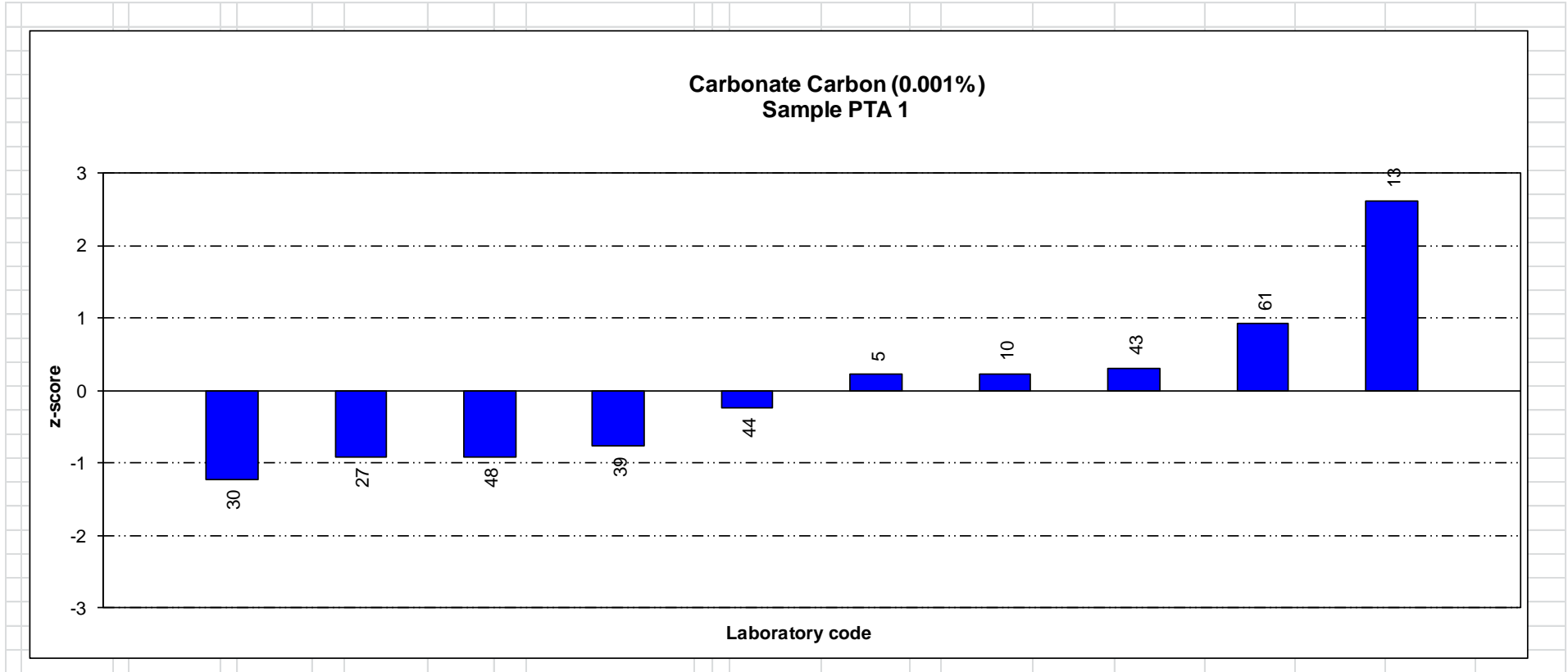
Results by Laboratory Code - Sample PTA 1

Lab Code	Result 1	Result 2	Average result	MU ¹	Robust z-score ²	Method/Technique
5	0.042	0.040	0.041 ±	0.02	0.23	AS 1038-23
10	0.041	0.041	0.041 ±	0.02	0.23	AS 1038-23
13	0.053	0.060	0.057 ±	0.01	2.61	AS 1038-23
27	0.033	0.034	0.034 ±	0.01	-0.92	AS 1038-23
30	0.035	0.028	0.032 ±	0.07	-1.23	AS1038.23-2002
39	0.038	0.031	0.035	#	-0.77	AS 1038-2-3
43	0.041	0.042	0.042 ±	0.01	0.31	AS 1038-2-3
44	0.037	0.039	0.038	#	-0.23	2 stage Gravimetric (b).
48	0.034	0.033	0.034 ±	0.02	-0.92	AS 1038-23
61	0.041	0.050	0.046 ±	0.07	0.92	AS 1038-23

No of Results: 10
Median: 0.0395
Uncertainty (median): 0.0026
Normalised IQR: 0.0065
Robust CV: 16.5%
Minimum: 0.032
Maximum: 0.057
Range: 0.025

¹ Where reported, results are shown with their corresponding measurement uncertainty (MU).

² "S"s denote outliers (i.e. those results for which $|z\text{-score}| \geq 3.0$). Robust z-scores are calculated as: $z = (A - \text{median}) \div \text{normalised IQR}$, where A is the participant laboratory's result.



Carbonate Carbon
(0.001%)

Results by Laboratory Code - Sample PTA 2

Lab Code	Result 1	Result 2	Average result		MU ¹	Robust z-score ²	Method/Technique
5	0.029	0.033	0.031	±	0.02	-0.45	AS 1038-23
10	0.041	0.041	0.041	±	0.02	1.04	AS 1038-23
13	0.058	0.060	0.059	±	0.01	3.72 §	AS 1038-23
27	0.030	0.036	0.033	±	0.01	-0.15	AS1038-23
30	0.029	0.034	0.032	±	0.07	-0.37	AS1038-23-2002
39	0.038	0.031	0.035		#	0.07	AS 1038-23
43	0.043	0.047	0.045	±	0.01	1.64	AS 1038-23
44	0.034	0.038	0.036		#	0.30	2 stage Gravimetric (b)
48	0.031	0.032	0.032	±	0.02	-0.37	AS 1038-23
61	0.031	0.036	0.034	±	0.07	-0.07	AS 1038-23

No of Results: 10

Median: 0.0340

Uncertainty (median): 0.0027

Normalised IQR: 0.0067

Robust CV: 19.8%

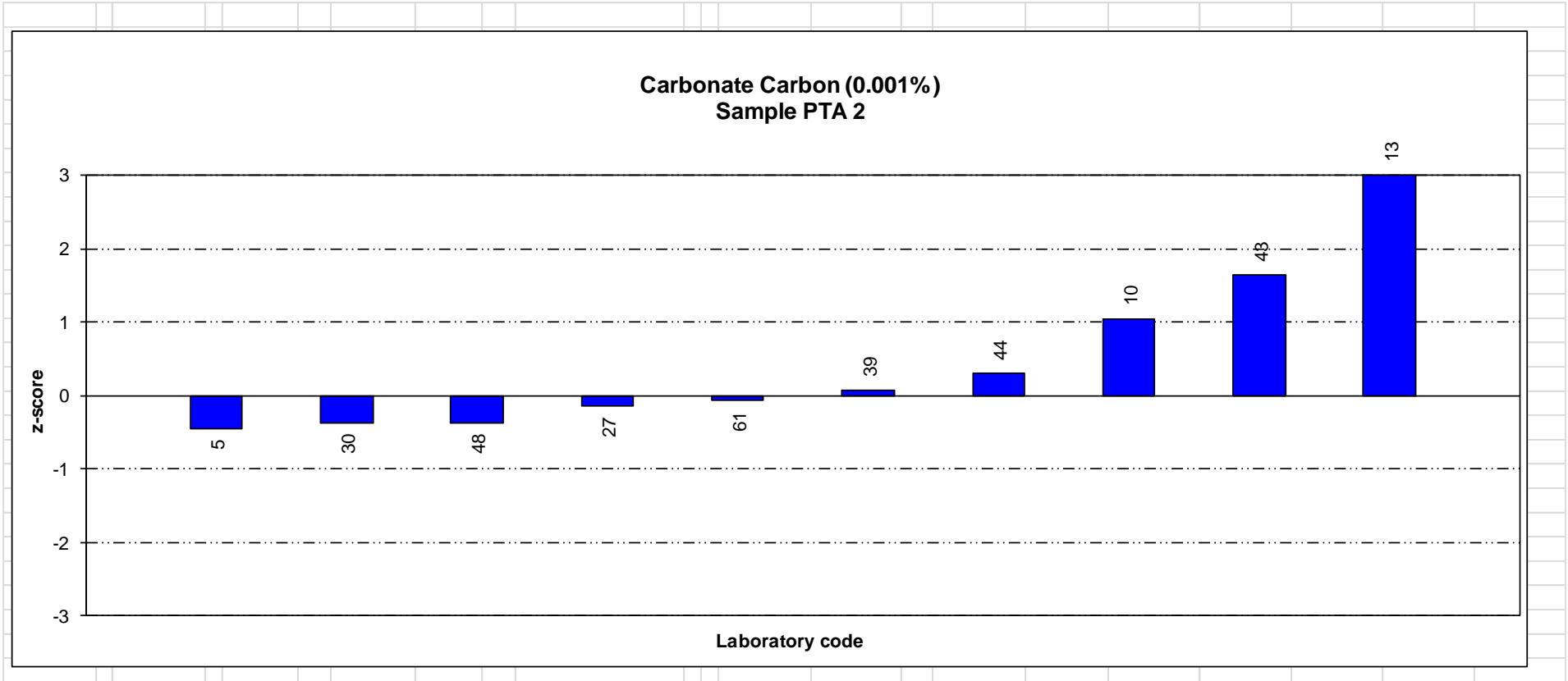
Minimum: 0.031

Maximum: 0.059

Range: 0.028

¹ Where reported, results are shown with their corresponding measurement uncertainty (MU).

² "§"s denote outliers (i.e. those results for which |z-score| ≥ 3.0). Robust z-scores are calculated as: $z = (A - \text{median}) \div \text{normalised IQR}$, where A is the participant laboratory's result.



Phosphorus in Coal
(0.001%)

Results by Laboratory Code - Sample PTA 1

Lab Code	Result 1	Result 2	Average result		MU ¹	Robust z-score ²	Method/Technique
1	0.020	0.020	0.020		#	0.67	AS 1038.9.2
5	0.019	0.018	0.019	±	15	-0.34	CMB 236a
6	0.019	0.019	0.019		#	0.00	AS 1038-14-3
10	0.019	0.019	0.019		#	0.00	AS 1038-9
11	0.018	0.019	0.019		#	-0.34	AS 1038-9-2
21	0.017	0.017	0.017	±	0.002	-1.35	AS1038.9.2
27	0.022	0.022	0.022	±	0.002	2.02	AS1038.9.2
33	0.021	0.021	0.021	±	0.003	1.35	Inhouse XRF
40	0.020	0.019	0.020	±	0.002	0.34	XRF
43	0.019	0.018	0.019	±	0.002	-0.34	AS 1038-9-1
44	0.022	0.021	0.022	±	0.002	1.69	AS 1038-14-3

No of Results: 11

Median: 0.0190

Uncertainty (median): 0.0006

Normalised IQR: 0.0015

Robust CV: 7.8%

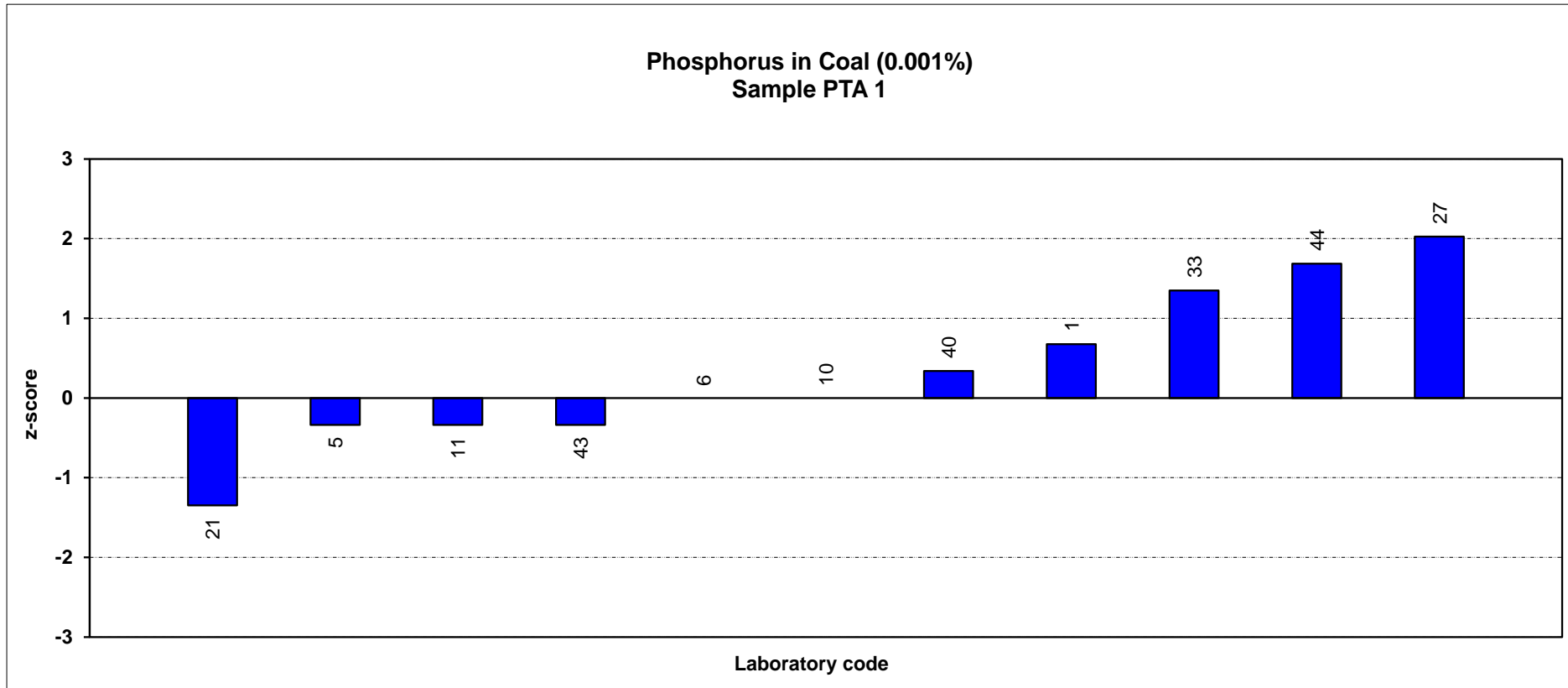
Minimum: 0.017

Maximum: 0.022

Range: 0.005

¹ Where reported, results are shown with their corresponding measurement uncertainty (MU).

² "\$"s denote outliers (i.e. those results for which $|z\text{-score}| \geq 3.0$). Robust z-scores are calculated as: $z = (A - \text{median}) \div \text{normalised IQR}$, where A is the participant laboratory's result.



Phosphorus in Coal
(0.001%)

Results by Laboratory Code - Sample PTA 2

Lab Code	Result 1	Result 2	Average result	MU ¹	Robust z-score ²	Method/Technique
1	0.022	0.019	0.021	#	0.22	AS 1038-9-2
5	0.020	0.020	0.020 ±	15	0.00	CMB 236a
6	0.021	0.021	0.021	#	0.45	AS 1038-14-3
10	0.019	0.019	0.019	#	-0.45	AS 1038-9
11	0.017	0.017	0.017	#	-1.35	AS 1038-9-2
21	0.017	0.017	0.017 ±	0.002	-1.35	AS1038-9-2
27	0.023	0.022	0.023 ±	0.002	1.12	AS1038-9-2
33	0.021	0.021	0.021 ±	0.003	0.45	Inhouse XRF
40	0.019	0.020	0.020 ±	0.002	-0.22	XRF
43	0.017	0.017	0.017 ±	0.002	-1.35	AS1038-9-2
44	0.021	0.022	0.022	#	0.67	AS 1038-14-3

No of Results: 11

Median: 0.0200

Uncertainty (median): 0.0008

Normalised IQR: 0.0022

Robust CV: 11.1%

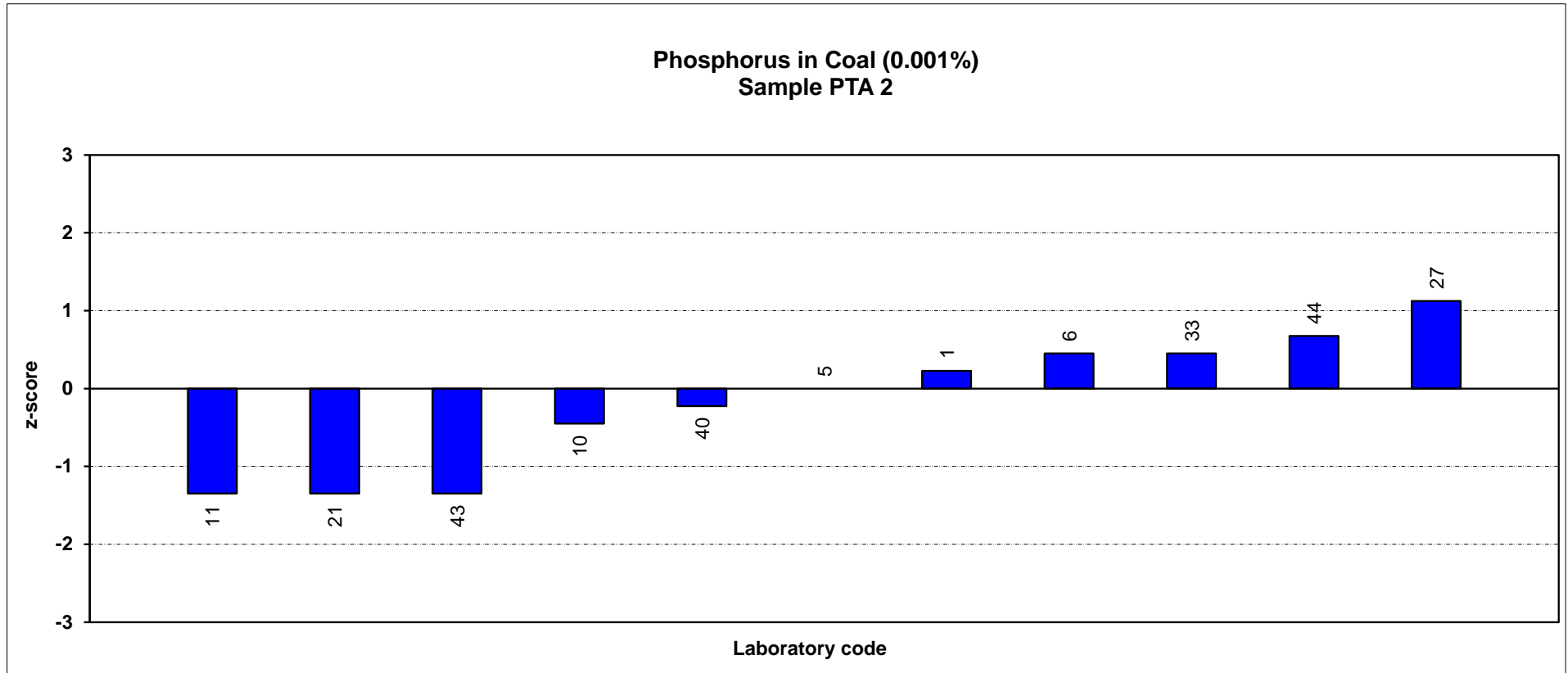
Minimum: 0.017

Maximum: 0.023

Range: 0.006

¹ Where reported, results are shown with their corresponding measurement uncertainty (MU).

² "S"s denote outliers (i.e. those results for which $|z\text{-score}| \geq 3.0$). Robust z-scores are calculated as: $z = (A - \text{median}) \div \text{normalised IQR}$, where A is the participant laboratory's result.



Relative density
(0.001%)

Results by Laboratory Code - Sample PTA 1

Lab Code	Result 1	Result 2	Average result	MU ¹	Robust z-score ²	Method/Technique
2	1.381	1.389	1.385 ±	0.03	0.00	AS 1038-21-1-1
5	1.400	1.386	1.393 ±	0.08	0.66	AS 1038-21-1-1
8	1.381	1.379	1.380	#	-0.41	AS 1038-21-1-1
9	1.424	1.424	1.424 ±	0.46	3.21 §	In house method RD-01 Helium Pycnometer
10	1.360	1.360	1.360 ±	0.08	-2.06	AS 1038-21-1-1
11	1.39	1.38	1.385	#	0.00	AS 1038-21-1
13	1.369	1.370	1.370 ±	0.03	-1.28	AS 1038-21-1-1 BOTTLE
16	1.379	1.378	1.379	#	-0.54	AS 1038-21-1-1
17	1.413	1.415	1.414 ±	0.03	2.39	AS1038.21.2.2
21	1.389	1.399	1.394 ±	0.03	0.74	AS1038.21.1.1
27	1.388	1.389	1.389 ±	0.03	0.29	AS1038.21.1.2
30	1.377	1.374	1.376 ±	0.08	-0.78	AS1038321.1.1-2002
33	1.398	1.385	1.392 ±	0.08	0.54	AS1038.21.1.1
35	1.367	1.378	1.373	#	-1.03	AS 1038.21.1.1
39	1.380	1.369	1.375	#	-0.86	AS 1038-21-1-1
41	1.39	1.37	1.380 ±	0.08	-0.41	AS 1038-21-1-1
43	1.390	1.383	1.387 ±	0.03	0.12	AS 1038-21-1-1
44	1.379	1.356	1.368 ±	0.03	-1.44	AS 1038-21-1-1
48	1.387	1.384	1.386 ±	0.08	0.04	AS 1038-21-1-1
50	1.379	1.380	1.380	#	-0.45	#
60	1.398	1.399	1.399 ±	0.03	1.11	AS 1038-21-1-2
61	1.421	1.434	1.428 ±	0.03	3.50 §	AS 1038-21-1-1

No of Results: 22

Median: 1.3850

Uncertainty (median): 0.0032

Normalised IQR: 0.0121

Robust CV: 0.9%

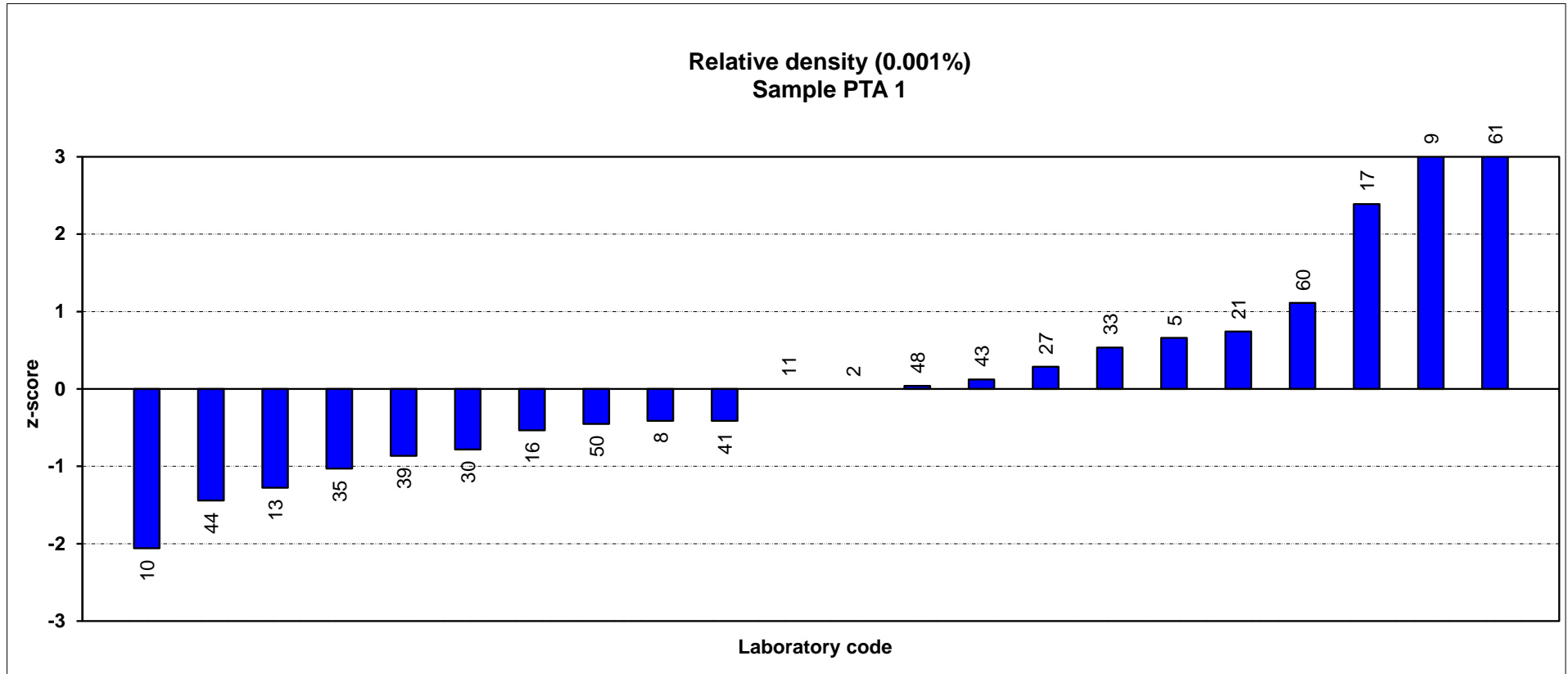
Minimum: 1.360

Maximum: 1.428

Range: 0.067

¹ Where reported, results are shown with their corresponding measurement uncertainty (MU).

² "§"s denote outliers (i.e. those results for which $|z\text{-score}| \geq 3.0$). Robust z-scores are calculated as: $z = (A - \text{median}) \div \text{normalised IQR}$, where A is the participant laboratory's result.



**Relative density
(0.001%)**

Results by Laboratory Code - Sample PTA 2

Lab Code	Result 1	Result 2	Average result	MU ¹	Robust z-score ²	Method/Technique
2	1.366	1.371	1.369 ±	0.03	-1.28	AS 1038-21-1-1
5	1.400	1.396	1.398 ±	0.08	1.37	AS 1038-26-1-1
8	1.382	1.382	1.382	#	-0.07	AS 1038-21-1-1
9	1.409	1.409	1.409 ±	0.46	2.36	In house method RD-01 Helium Pycnometer
10	1.36	1.36	1.360 ±	0.08	-2.05	AS 1038-21-1-1
11	1.39	1.39	1.390	#	0.65	AS 1038-21-1-1
13	1.381	1.380	1.381 ±	0.03	-0.20	AS 1038-21-1-1
16	1.377	1.379	1.378	#	-0.43	AS 1038-21-1-1
17	1.419	1.418	1.419 ±	0.03	3.22 §	AS1038-21-1-2
21	1.399	1.389	1.394 ±	0.03	1.01	AS1038-21-1-1
27	1.386	1.385	1.386 ±	0.03	0.25	AS1038-21-1-2
30	1.387	1.383	1.385 ±	0.08	0.20	AS1038-21-1-1-2002
33	1.376	1.380	1.378 ±	0.08	-0.43	AS1038-21-1-1
35	1.367	1.368	1.368	#	-1.37	AS 1038-21-1-1
39	1.378	1.384	1.381	#	-0.16	AS 1038-21-1-1
41	1.38	1.37	1.375 ±	0.08	-0.70	AS 1038-21-1-1
43	1.388	1.387	1.388 ±	0.03	0.43	AS 1038-21-1-1
44	1.383	1.356	1.370 ±	0.03	-1.19	AS 1038-21-1-1
48	1.385	1.380	1.383 ±	0.08	-0.02	AS 1038-21-1-1
50	1.381	1.385	1.383	#	0.02	#
60	1.398	1.398	1.398 ±	0.03	1.37	AS 1038-21-1-2
61	1.43	1.43	1.430 ±	0.03	4.25 §	AS 1038-21-1-1

No of Results: 22

Median: 1.3828

Uncertainty (median): 0.0030

Normalised IQR: 0.0111

Robust CV: 0.8%

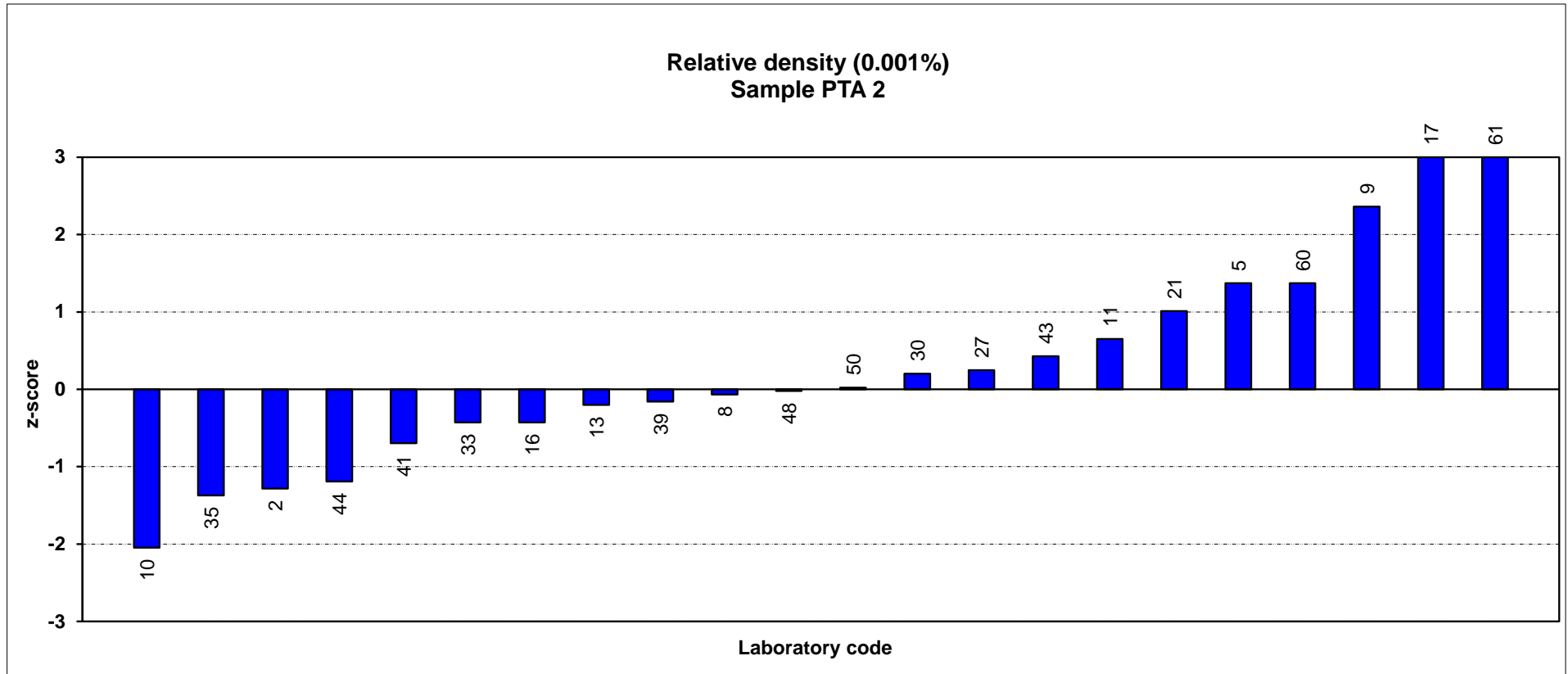
Minimum: 1.360

Maximum: 1.430

Range: 0.070

¹ Where reported, results are shown with their corresponding measurement uncertainty (MU).

² "§"s denote outliers (i.e. those results for which $|z\text{-score}| \geq 3.0$). Robust z-scores are calculated as: $z = (A - \text{median}) \div \text{normalised IQR}$, where A is the participant laboratory's result.



A51

**Fluorine
(1 mg/kg)**

Results by Laboratory Code - Sample PTA 1

Lab Code	Result 1	Result 2	Average result		MU ¹	Robust z-score ²	Method/Technique
5	47	42	45	±	20%		AS 1038-10-4
40	66	67	67	±	7		Pyrohydrolysis ISE
44	49	56	53	±	15		ASTM D 3761-96 (2002)

No of Results: 3
Minimum: 45
Maximum: 67
Range: 22

¹ Where reported, results are shown with their corresponding measurement uncertainty (MU).

² Robust z-scores were unable to be calculated due to the low number of results received.

**Fluorine
(1 mg/kg)**

Results by Laboratory Code - Sample PTA 2

Lab Code	Result 1	Result 2	Average result		MU ¹	Robust z-score ²	Method/Technique
5	49	49	49	±	20%		AS 1038-10-4
40	66	69	68	±	7		Pyrohydrolysis ISE
44	60	55	58	±	15		ASTM D 3761-96 (2002)

No of Results: 3
Minimum: 49
Maximum: 68
Range: 19

¹ Where reported, results are shown with their corresponding measurement uncertainty (MU).

² Robust z-scores were unable to be calculated due to the low number of results received.

A52

Mercury
(0.01 mg/kg)

Results by Laboratory Code - Sample PTA 1

Lab Code	Result 1	Result 2	Average result	MU ¹	Robust z-score ²	Method/Technique
5	0.03	0.04	0.04	± 0.02%		CMB 2418
33	0.03	0.03	0.03	± 0.02		ASTM D6722-11
37	0.03	0.02	0.03		#	Method 7473
40	0.02	0.02	0.02	± 0.004		Acid Digest CVAAS
44	0.028	0.030	0.03	± 0.01		USEPA 3052 Microwave Digestion ICP AES

No of Results: 5
Minimum: 0.02
Maximum: 0.04
Range: 0.02

¹ Where reported, results are shown with their corresponding measurement uncertainty (MU).

² Robust z-scores were unable to be calculated due to the low number of results received.

Mercury
(0.01 mg/kg)

Results by Laboratory Code - Sample PTA 2

Lab Code	Result 1	Result 2	Average result	MU ¹	Robust z-score ²	Method/Technique
5	0.04	0.03	0.04	± 0.02		CBM 241B
33	0.03	0.03	0.03	± 0.02		ASTM D6722-11
37	0.03	0.03	0.03		#	Method 7473
40	0.02	0.02	0.02	± 0.00		Acid Digest CVAAS
44	0.029	0.029	0.03	± 0.01		US EPA 3082 Microwave Digestion ICP AES

No of Results: 5
Minimum: 0.02
Maximum: 0.04
Range: 0.02

¹ Where reported, results are shown with their corresponding measurement uncertainty (MU).

² Robust z-scores were unable to be calculated due to the low number of results received.

Selenium
(0.1 mg/kg)

Results by Laboratory Code - Sample PTA 1

Lab Code	Result 1	Result 2	Average result	MU ¹	Robust z-score ²	Method/Technique
33	0.5	0.5	0.5 ± 0.2			AS1038.10.2
40	0.8	0.8	0.8 ± 0.01			Eschka fusion Hydride ICP
44	0.4	0.4	0.4 ± 0.1			USEPA 3052 Microwave Digestion ICP AES

No of Results: 3
Minimum: 0.4
Maximum: 0.8
Range: 0.4

¹ Where reported, results are shown with their corresponding measurement uncertainty (MU).

² Robust z-scores were unable to be calculated due to the low number of results received.

Selenium
(0.1 mg/kg)

Results by Laboratory Code - Sample PTA 2

Lab Code	Result 1	Result 2	Average result	MU ¹	Robust z-score ²	Method/Technique
33	0.4	0.4	0.4 ± 0.2			AS1038-10-2
40	0.8	0.8	0.8 ± 0.01			Eschka fusion hydride ICP
44	0.4	0.3	0.4 ± 0.1			US EPA 3082 Microwave Digestion ICP AES

No of Results: 3
Minimum: 0.4
Maximum: 0.8
Range: 0.5

¹ Where reported, results are shown with their corresponding measurement uncertainty (MU).

² Robust z-scores were unable to be calculated due to the low number of results received.

Arsenic
(0.1 mg/kg)

Results by Laboratory Code - Sample PTA 1

Lab Code	Result 1	Result 2	Average result	MU ¹	Robust z-score ²	Method/Technique
33	0.4	0.4	0.4 ±	0.2		AS1038.10.2
40	0.3	0.3	0.3 ±	0.02		Eschka fusion Hydride ICP
44	0.3	0.4	0.4 ±	0.1		USEPA 3052 Microwave Digestion ICP AES

No of Results: 3
Minimum: 0.3
Maximum: 0.4
Range: 0.1

¹ Where reported, results are shown with their corresponding measurement uncertainty (MU).

² Robust z-scores were unable to be calculated due to the low number of results received.

Arsenic
(0.1 mg/kg)

Results by Laboratory Code - Sample PTA 2

Lab Code	Result 1	Result 2	Average result	MU ¹	Robust z-score ²	Method/Technique
33	0.4	0.4	0.4 ±	0.2		AS1038-10-2
40	0.3	0.3	0.3 ±	0.02		Eschka fusion hydride ICP
44	0.3	0.2	0.3 ±	0.1		US EPA 3082 Microwave Digestion ICP AES

No of Results: 3
Minimum: 0.25
Maximum: 0.40
Range: 0.15

¹ Where reported, results are shown with their corresponding measurement uncertainty (MU).

² Robust z-scores are unable to be calculated due to the low number of results received.

Boron
(0.1 mg/kg)

Results by Laboratory Code - Sample PTA 1

Lab Code	Result 1	Result 2	Average result	MU ¹	Robust z-score ²	Method/Technique
40	7.1	7.0	7.1 ±	0.4		Eschka fusion ICP
44	46.3	43.3	44.8 ±	1		USEPA 3052 Microwave Digestion ICP AES

No of Results: 2
Minimum: 7.1
Maximum: 44.8
Range: 37.8

¹ Where reported, results are shown with their corresponding measurement uncertainty (MU).

² Robust z-scores are unable to be calculated due to the low number of results received.

Boron
(0.1 mg/kg)

Results by Laboratory Code - Sample PTA 2

Lab Code	Result 1	Result 2	Average result	MU ¹	Robust z-score ²	Method/Technique
40	7.1	7.1	7.1 ±	0.4		Eschka fusion ICP
44	42.6	46.7	44.7 ±	1		US EPA 3082 Microwave Digestion ICP AES

No of Results: 2
Minimum: 7.1
Maximum: 44.7
Range: 37.6

¹ Where reported, results are shown with their corresponding measurement uncertainty (MU).

² Robust z-scores are unable to be calculated due to the low number of results received.

APPENDIX B

Homogeneity Testing

Homogeneity Testing

Ten samples were selected at random and analysed in duplicate for moisture (air-dry basis) and ash (dry basis) content by ALS-ACTest Gladstone.

Statistical analysis of the results indicated that no significant sample variability existed. Therefore, it was concluded that any outlier results subsequently identified could not be attributed to sample variability.

Bottle No:	Moisture % adb	Ash % adb	Ash % db
1	1.66	10.34	10.51
11	1.92	10.38	10.58
12	2.00	10.39	10.60
39	1.63	10.49	10.66
47	1.63	10.53	10.70
67	1.45	10.55	10.71
79	1.57	10.34	10.50
88	1.55	10.36	10.52
114	1.71	10.50	10.68
129	1.56	10.56	10.73
Average			10.62
Minimum			10.50
Maximum			10.73
Std Deviation			0.088
Median			10.63
CV			0.8%

APPENDIX C

Documentation

Instructions to Participants	C1
Results Sheets.....	C2

COAL PROFICIENCY TESTING PROGRAM (ROUND 29)

INSTRUCTIONS TO PARTICIPANTS

To ensure that results from this program can be analysed properly, participants are asked to adhere carefully to the following instructions.

1. Two 125 gram coal samples labelled PTA Sample 1 and PTA Sample 2 have been supplied to each laboratory.
2. For the samples the following determinations are required in duplicate:

*Moisture, Ash, Volatile Matter, Gross Calorific Value, Total Sulfur, Relative Density, Chlorine, Carbon (total), Hydrogen, Nitrogen, Carbonate Carbon, Phosphorus in Coal, Pyritic Sulfur, Sulphate Sulfur.

Trace Elements – Fluorine, Mercury, Selenium, Arsenic and Boron.

Results for Moisture are to be reported to air-dry basis.

All other tests are to be reported to DRY basis.

(*Results obtained from proximate analysis)

3. These tests are to be conducted preferentially in accordance to AS or ISO standard methods (relevant sections). However laboratories may perform their tests to other methods and note this on the attached result sheet.

Please note: where possible, proficiency testing samples should be treated as a routine laboratory sample.

PTA requests (where possible) that the analysis of samples PTA 1 and PTA 2 be conducted on different days by different analysts.

4. For each test on the samples, two replicate results are to be reported to the accuracy and reporting basis indicated on the result sheet.
5. The following additional information is required for each test:
 - a) Method - relevant AS, ISO or in-house method number (include part numbers, e.g. AS 1038 Part 6.3.2.)
 - b) Technique - if there are alternative options in a particular method, state which option is used.

6. Laboratories are also requested to calculate and report an estimate of measurement uncertainty (MU) for each reported replicated measurement result. All estimates of measurement uncertainty must be given as a 95% confidence interval (coverage factor $k \approx 2$).

7. Testing may commence as soon as the samples are received. All laboratories must return the results sheet no later than **19 April 2013** to:

Yvette Christie
Proficiency Testing Australia
PO Box 7507, Silverwater NSW 2128 Australia
Phone: +61 2 9739 8397,
Fax: +61 2 9743 6664
Email: yvette.christie@pta.asn.au

PROFICIENCY TESTING AUSTRALIA
COAL PROFICIENCY TESTING PROGRAM (ROUND 29)



RESULTS SHEET

The reporting basis for all tests is dry except for Moisture (air-dry).

Lab Code «Code»

PTA requests (where possible) that the analysis of samples PTA 1 and PTA 2 is conducted on different days by different analysts.

TEST (report to)	PTA 1		MU (\pm)	a. Method b. Technique	ISO 17025 Accreditation Y/N
	Result 1	Result 2			
MOISTURE (air-dry basis) (0.01%)					
ASH (0.01%)					
VOLATILE MATTER (0.01%)					
GROSS CALORIFIC VALUE (0.001 MJ/kg)					
TOTAL SULFUR (0.001%)					
PYRITIC SULFUR (0.001%)					
SULPHATE SULFUR (0.001%)					
CHLORINE (0.001%)					
CARBON (total) (0.01%)					
HYDROGEN (0.01%)					
NITROGEN (0.01%)					
CARBONATE CARBON (0.001%)					
PHOSPHORUS IN COAL (0.001%)					
RELATIVE DENSITY (0.001%)					
FLUORINE (1 mg/kg)					
MERCURY (0.01 mg/kg)					
SELENIUM (0.1 mg/kg)					
ARSENIC (0.1 mg/kg)					
BORON (0.1 mg/kg)					

Signed: _____

Date: _____

Please return to: Yvette Christie, Fax: +61 2 9743 6664, Email: yvette.christie@pta.asn.au by the 19 April 2013.

**PROFICIENCY TESTING AUSTRALIA
COAL PROFICIENCY TESTING PROGRAM (ROUND 29)**

RESULTS SHEET

The reporting basis for all tests is dry except for Moisture (air-dry).

Lab Code

«Code»

PTA requests (where possible) that the analysis of samples PTA 1 and PTA 2 is conducted on different days by different analysts.

TEST (report to)	PTA 2		MU (±)	a. Method b. Technique	ISO 17025 Accreditation Y/N
	Result 1	Result 2			
MOISTURE (air-dry basis) (0.01%)					
ASH (0.01%)					
VOLATILE MATTER (0.01%)					
GROSS CALORIFIC VALUE (0.001 MJ/kg)					
TOTAL SULFUR (0.001%)					
PYRITIC SULFUR (0.001%)					
SULPHATE SULFUR (0.001%)					
CHLORINE (0.001%)					
CARBON (total) (0.01%)					
HYDROGEN (0.01%)					
NITROGEN (0.01%)					
CARBONATE CARBON (0.001%)					
PHOSPHORUS IN COAL (0.001%)					
RELATIVE DENSITY (0.001%)					
FLUORINE (1 mg/kg)					
MERCURY (0.01 mg/kg)					
SELENIUM (0.1 mg/kg)					
ARSENIC (0.1 mg/kg)					
BORON (0.1 mg/kg)					

Signed: _____

Date: _____

Was the analysis of samples PTA 1 and PTA 2 conducted on different days by different analysts? _____ (Y/N)

Please return to: Yvette Christie, Fax: +61 2 9743 6664, Email: yvette.christie@pta.asn.au by the 19 April 2013.

- End of Report -