



Report No. 830

Waters Proficiency Testing

Round 158

***- Total Solids, Total Suspended Solids,
Total Dissolved Solids -***

November 2013

Acknowledgments

PTA wishes to gratefully acknowledge the technical assistance provided for this program by Ms R Ryan, Global Proficiency Ltd (New Zealand). Also our thanks go to Global Proficiency Ltd (New Zealand) and Global Proficiency Pty Ltd (Australia) for the supply and distribution of the samples.

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1. Foreword

This report summarises the results of a proficiency testing program on the determination of total solids, total suspended solids and total dissolved solids in waters. This is round 158 in a planned series of programs involving the analysis of chemical and physical parameters of waters.

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

The Program Coordinator was Ms D Mihaila and the Technical Advisor was Ms R Ryan from Global Proficiency Ltd, New Zealand. This report was authorised by Mr P Briggs, PTA General Manager.

2. Program Features and Design

- 2.1 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. Please note that a number of laboratories reported more than one set of results and, therefore, their code numbers (with letter) could appear several times in the same data set.
 - 2.2 Laboratories were provided with the "Instructions to Participants" and "Results Sheet" (see Appendix C). Laboratories were requested to perform the tests according to their routine methods.
 - 2.3 Participants were provided with two plastic vials (labelled PTA 1 and PTA 2) containing solutions of total solids, total suspended solids and total dissolved solids.
 - 2.4 A total of 73 laboratories received samples, comprising:
 - 56 Australian participants; and
 - 17 overseas participants, including:
 - Brunei Darussalam (1), China (1), Croatia (1), Democratic Republic of Congo (1), Indonesia (4), Malaysia (2), Papua New Guinea (3), Singapore (3), Thailand (1).
- Of these 73 laboratories, 5 were unable to submit results by the due date.
- 2.5 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).
 - 2.6 A robust statistical approach, using z-scores, was utilised to assess laboratories' testing performance (see Section 3). Robust z-scores and ordered z-score charts relevant to each test are presented in Appendix A.

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.

- 2.7 A tabulated listing of laboratories (by code number) identified as having outlier results can be found on page 25.
- 2.8 Prior to sample distribution, a number of randomly selected samples were analysed for homogeneity and stability. Based on the results of this testing (see Appendix B) it was considered that the samples utilised for this program were homogeneous and stable. As such, any results later identified as outliers could not be attributed to any notable sample variability.

3. Statistical Format

For each test the following information is given:

- a table of results and calculated z-scores;
- a list of summary statistics; and
- ordered z-score charts.

3.1 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 "§".

Each determination was examined for outliers with all methods pooled. The table on page 25 summarises the outlier results detected.

3.2 Results Tables and Summary Statistics

The tables in Appendix A contain the results returned by each laboratory, including the code number for the method used and 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 Sheet 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 results tables and consists of:

- *No. of Results*: the total number of results for that test/sample;
- *Median*: the middle value of the results;
- *Uncertainty of the Median*: a robust estimate of the standard deviation of the *Median*;
- *Normalised IQR*: the normalised interquartile range of the results;
- *Robust CV*: the robust coefficient of variation expressed as a percentage, i.e. $100 \times \text{Normalised IQR} / \text{Median}$;
- *Minimum*: the lowest laboratory result;
- *Maximum*: the highest laboratory result; and
- *Range*: the difference between the *Maximum* and *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).

For normally distributed data, the uncertainty of the median is approximated by:

$$\sqrt{\frac{\pi}{2}} \times \frac{\text{normIQR}}{\sqrt{n}}$$

n = number of results

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

3.3 Ordered Z-score Charts

The charts in Appendix A indicate each laboratory's robust z-score, in order of magnitude, marked with its laboratory 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.

4. PTA and Technical Advisor's Comments

4.1 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.

Sample preparation was undertaken according to Global Proficiency Ltd's Standard Operating Procedures to ensure samples were fit-for-purpose, homogeneous and stable.

Solutions were stable and homogeneous, and medians obtained from this proficiency round were in good agreement with the expected levels (dope concentration), as shown in Table 1.

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 also presented in Table 1.

Analyte	Sample	Dope Concentration (mg/L)	Median (mg/L)	Uncertainty of the median (mg/L)
Total Solids	PTA 1	375	371.0	4.1
	PTA 2	268	266.0	3.8
Total Suspended Solids	PTA 1	75	70.00	0.99
	PTA 2	54	48.00	0.68
Total Dissolved Solids	PTA 1	300	304.0	3.7
	PTA 2	214	220.0	3.1

Table 1. Comparison of expected levels (dope concentration) and proficiency medians. The values of the calculated uncertainty of the median are also presented.

Overall, the performance of participants in this round was good, with robust CVs below 10% for all analytes.

4.2 Analysis of Round 158 Results

4.2.1 Total Solids (TS)

Table 2 compares the Total Solids medians and robust CVs from this round to those obtained in previous PTA rounds.

Round	Sample	Median (mg/L)	Robust CV (%)	No. of Results
This study	PTA 1	371.0	6.2	49
	PTA 2	266.0	8.1	49
Report 786	R147	209.0	11.3	50
Report 767	PTA 1	262.5	6.5	56
	PTA 2	312.0	4.8	56

Table 2. Comparison of current round variability and proficiency medians of Total Solids testing with the results of the previous two rounds.

The robust CV's observed in this round for Total Solids are comparable to those observed in previous rounds.

Bias / Accuracy

Total Solids analysis was successfully performed, with satisfactory results ($|z\text{-score}| \leq 2.0$) ranging between 325 – 417 mg/L for sample PTA 1 and 223 – 309 mg/L for sample PTA 2.

Out of 49 results submitted for each sample, three questionable results ($2.0 < |z\text{-score}| < 3.0$) were obtained for sample PTA 1 and three questionable results were obtained for sample PTA 2 (laboratories 207, 343, 364, 376, 418a and 507).

Three outlier results ($|z\text{-score}| \geq 3.0$) were obtained for each sample, requiring follow-up action by laboratories 209, 292, 343 and 364.

The Total Solids dataset formed a normal distribution with no significant bias attributable to any one method (Figures 1 and 2). The method most frequently used for Total Solids testing in this round was APHA 2540B. (Total Solids Dried at 103–105°C), with approximately 90% of participants reporting the use of this method.

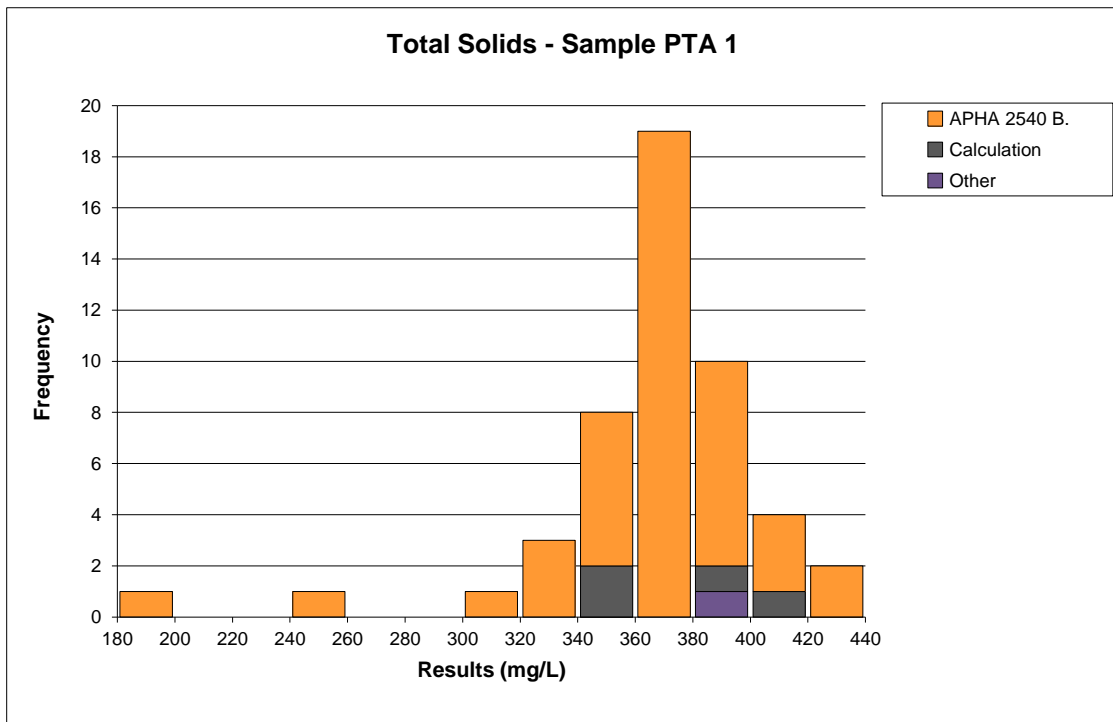


Figure 1. Spread of results for Total Solids testing of sample PTA 1, with a median concentration of 371.0 mg/L.

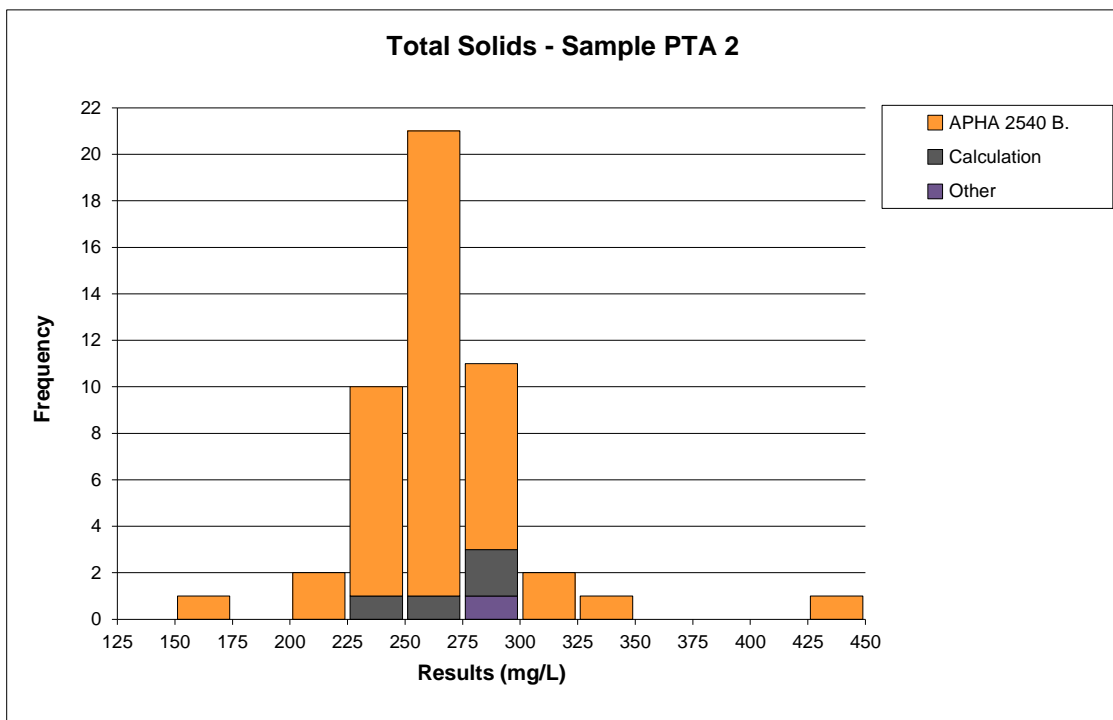


Figure 2. Spread of results for Total Solids testing of sample PTA 2, with a median concentration of 266.0 mg/L.

Reproducibility / Measurement Uncertainty (MU)

Using the t-value, (outliers removed, 95% confidence interval) results indicated that the estimate of reproducibility (~2SD) for Total Solids analysis was 371.0 ± 46.5 mg/L for sample PTA 1 and 266.0 ± 42.4 mg/L for sample PTA 2.

Results submitted by laboratories using Method 1, APHA 2540 B. (n=41), indicated a method reproducibility of ± 45.3 mg/L for sample PTA 1 and of ± 43.3 mg/L for sample PTA 2.

Out of 49 participants, 27 (55%) submitted MU information. The majority of the reported measurement uncertainties were an accurate reflection of the difference between the median and the participants result for each proficiency sample.

Laboratories 140, 152, 195, 203b, 207, 209, 249, 317, 507, 595 may wish to re-examine their MU calculations, as their result was further from the median than their stated MU, as shown in Figures 3 and 4 below. To keep it in perspective, confidence in the medians was 371.0 ± 4.1 mg/L for sample PTA 1 and 266.0 ± 3.8 mg/L for sample PTA 2.

Total Solids - Sample PTA 1

Results of sample PTA 1, including MU, compared to the median

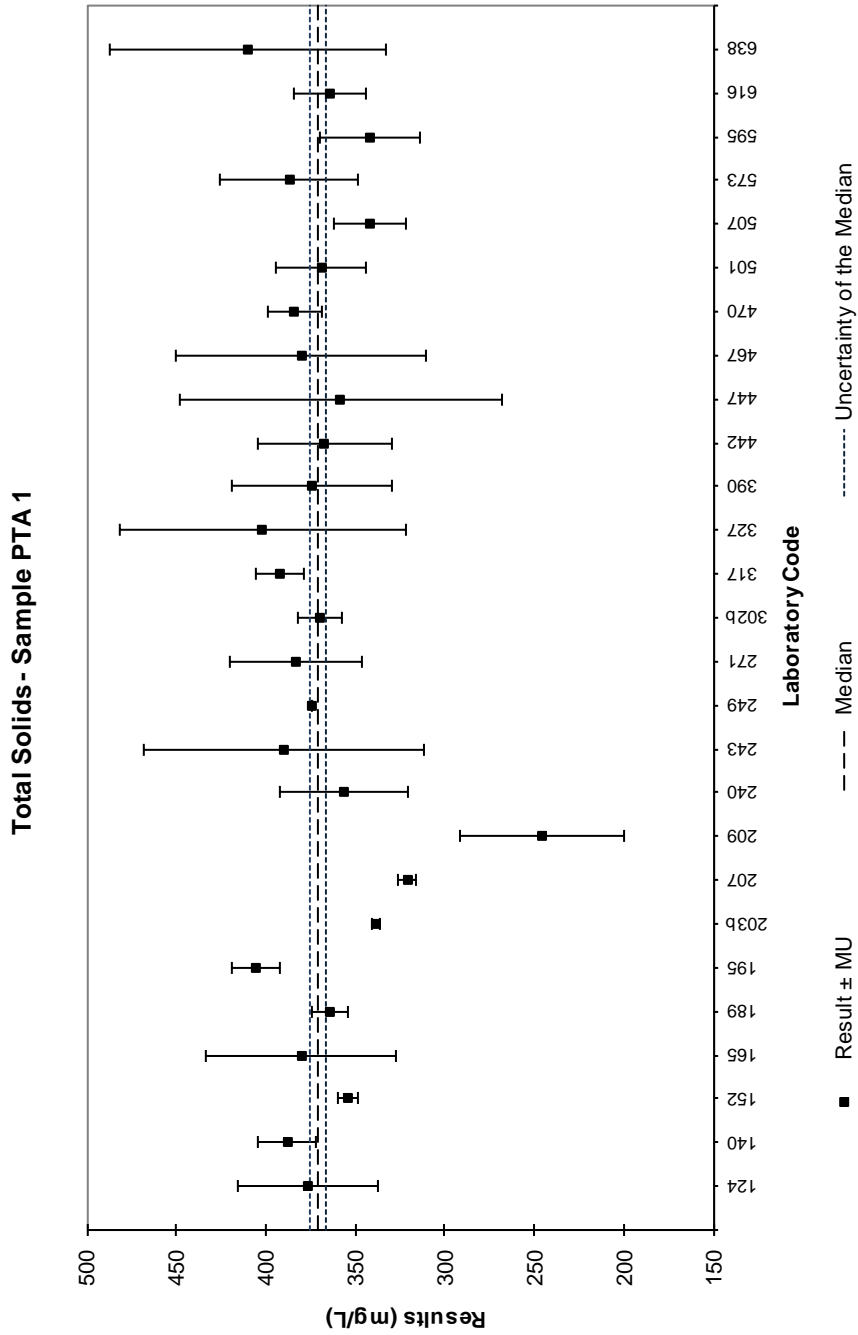


Figure 3. Total Solids - Results of sample PTA 1, including MU, compared to the median.

Total Solids - Sample PTA 2

Results of sample PTA 2, including MU, compared to the median

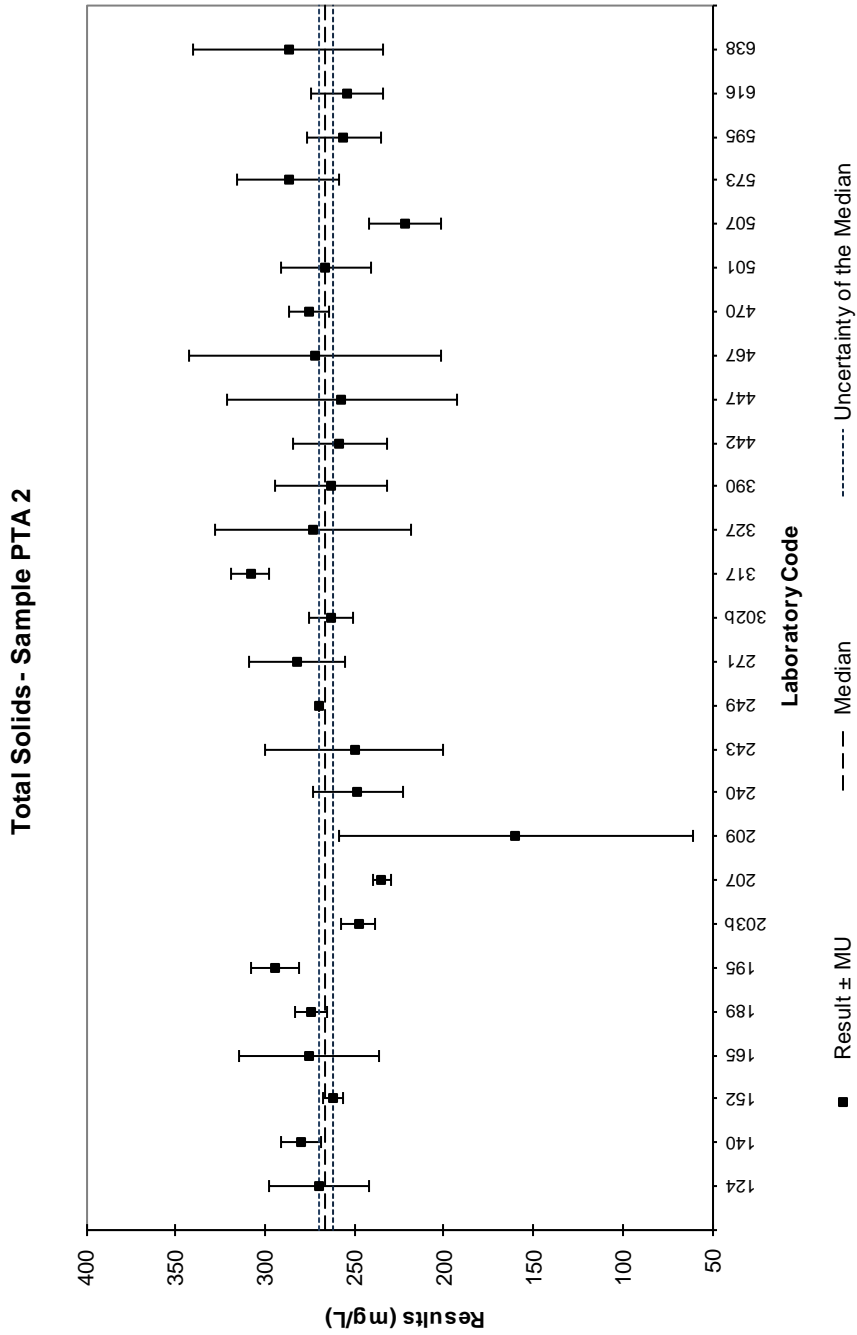


Figure 4. Total Solids - Results of sample PTA 2, including MU, compared to the median.

The MU reported by participants can be seen in Figures 5 and 6, displayed by the methods used.

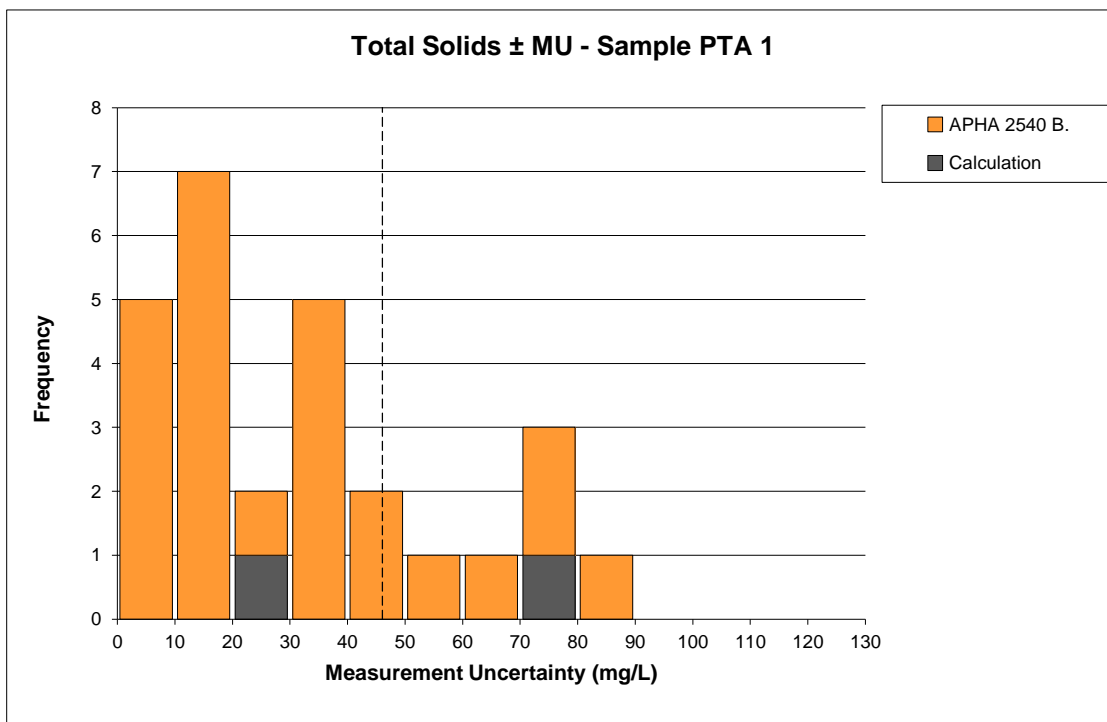


Figure 5. MU for Total Solids testing of sample PTA 1, as reported by participants, compared with 95% confidence interval for overall reproducibility ± 46.5 mg/L in this round, shown as dashed line.

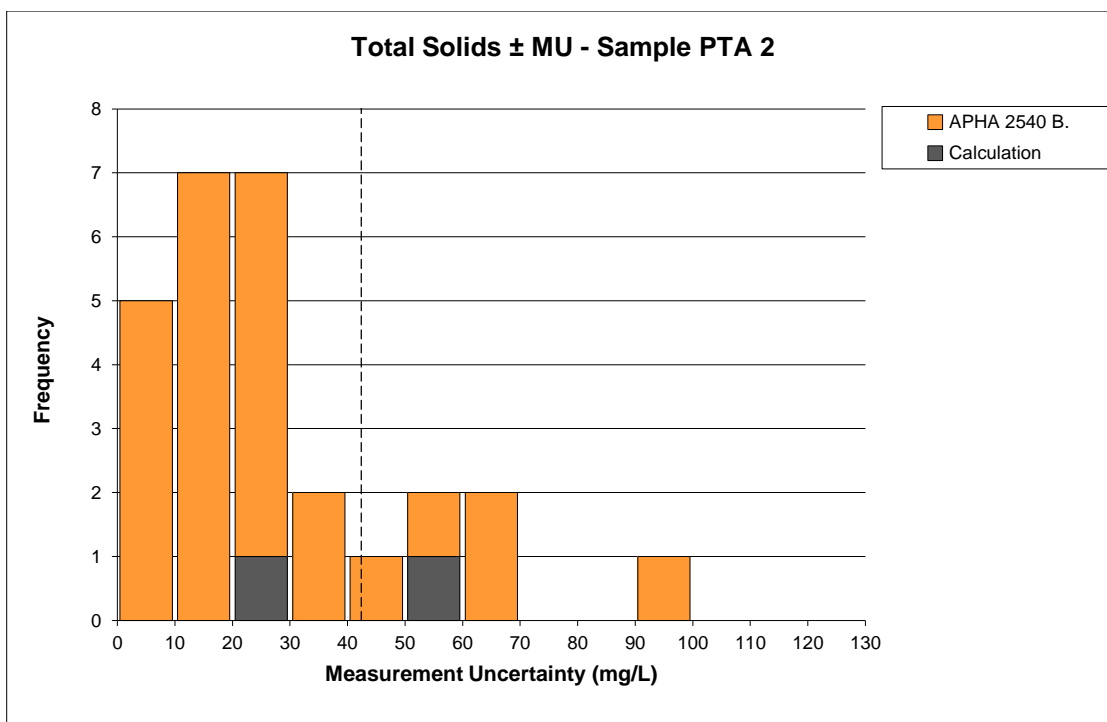


Figure 6. MU for Total Solids testing of sample PTA 2, as reported by participants, compared with 95% confidence interval for overall reproducibility ± 42.4 mg/L in this round, shown as dashed line.

4.2.2 Total Suspended Solids (TSS)

Table 3 compares the Total Suspended Solids medians and robust CVs from this round to those obtained in previous PTA rounds.

Round	Sample	Median (mg/L)	Robust CV (%)	No. of Results
This study	PTA 1	70.00	9.3	68
	PTA 2	48.00	9.3	68
Report 767	PTA 1	63.70	6.9	70
	PTA 2	78.30	7.3	70
Report 698	PTA 1	168.5	11.1	88
	PTA 2	251.0	8.7	88

Table 3. Comparison of current round variability and proficiency medians of Total Suspended Solids testing with the results of the previous two rounds.

The robust CV's observed for Total Suspended Solids in this round are comparable to those seen in previous rounds.

Bias / Accuracy

Total Suspended Solids analysis was successfully performed, with satisfactory results ($|z\text{-score}| \leq 2.0$) ranging between 57.0 – 83.0 mg/L for sample PTA 1 and 39.0 – 57.0 mg/L for sample PTA 2.

Out of 68 results submitted for each sample, three questionable results ($2.0 < |z\text{-score}| < 3.0$) were obtained for sample PTA 1 and three questionable results were also obtained for sample PTA 2 (laboratories 240, 292, 327, 342, 364 and 501).

Nine outlier results ($|z\text{-score}| \geq 3.0$) were obtained for sample PTA 1, requiring follow-up action by laboratories 209, 302b, 372, 406a, 421, 501, 595, 632 and 638. Six outlier results were obtained for sample PTA 2, requiring follow-up action by laboratories 203b, 302b, 372, 595, 632 and 638.

The Total Suspended Solids dataset formed a normal distribution with no bias attributed to any one method (Figures 7 and 8). The vast majority of participants (approximately 94%) used method APHA 2540 D. (Total Suspended Solids Dried at 103–105°C).

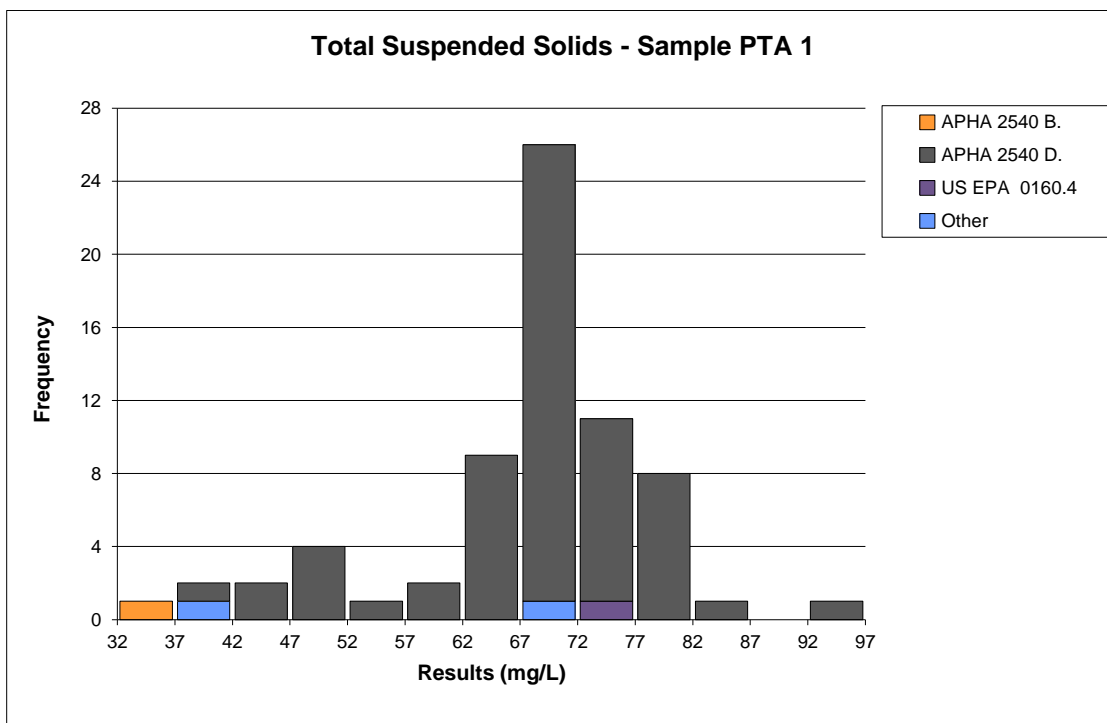


Figure 7. Spread of results for Total Suspended Solids testing of sample PTA 1, with a median concentration of 70.00 mg/L.

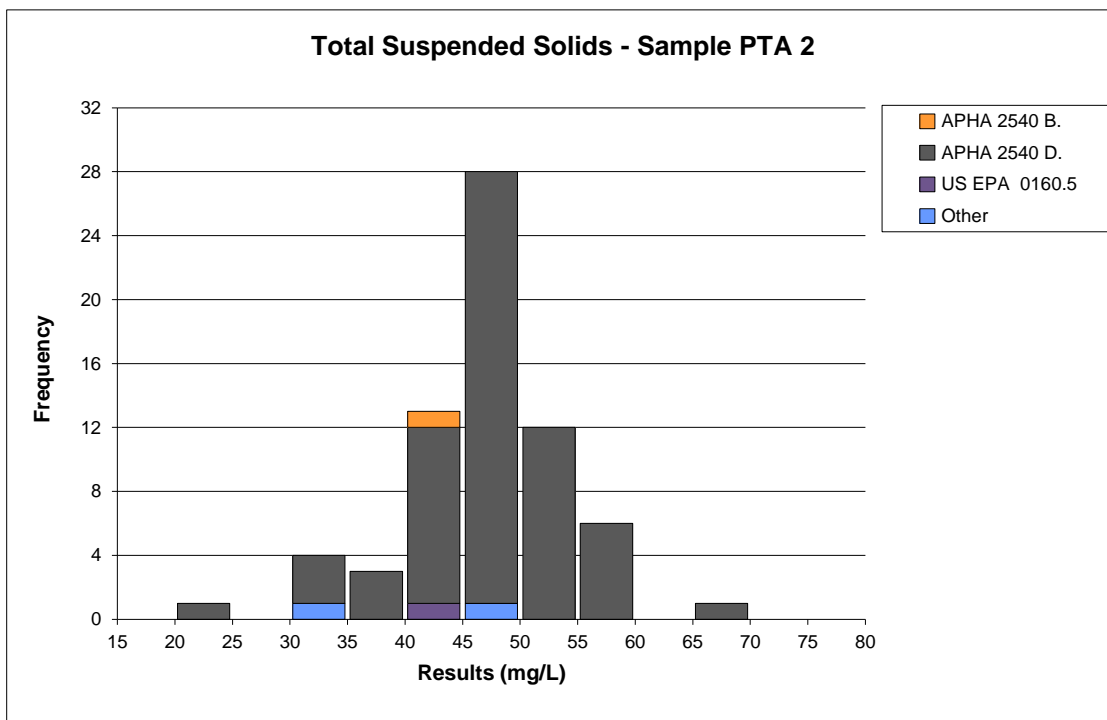


Figure 8. Spread of results for Total Suspended Solids testing of sample PTA 2, with a median concentration of 48.00 mg/L.

Reproducibility / Measurement Uncertainty (MU)

Using the t-value, (outliers removed, 95% confidence interval) results indicated that the estimate of reproducibility (~2SD) for Total Suspended Solids testing was 70.00 ± 12.11 mg/L for sample PTA 1 and 48.00 ± 9.39 mg/L for sample PTA 2.

Results submitted by laboratories using Method 5, APHA 2540 D. (n=57), indicated a method reproducibility of ± 12.30 mg/L for sample PTA 1 and of ± 9.36 mg/L for sample PTA 2.

Out of 68 participants, 43 (63%) submitted MU information. Approximately half of the reported measurement uncertainties were an accurate reflection of the difference between the median and the participants result for each proficiency sample.

Laboratories 118, 124, 156, 173, 195, 203b, 207, 240, 249, 271, 290, 302b, 330, 340, 352, 360, 501, 520, 573, 595 and 638 may wish to re-examine their MU calculations, as their result was further from the median than their stated MU, as shown in Figures 9 and 10 below. To keep it in perspective, confidence in the medians were 70.00 ± 0.99 mg/L for sample PTA 1 and 48.00 ± 0.68 mg/L for sample PTA 2.

Total Suspended Solids - Sample PTA 1

Results of sample PTA 1, including MU, compared to the median

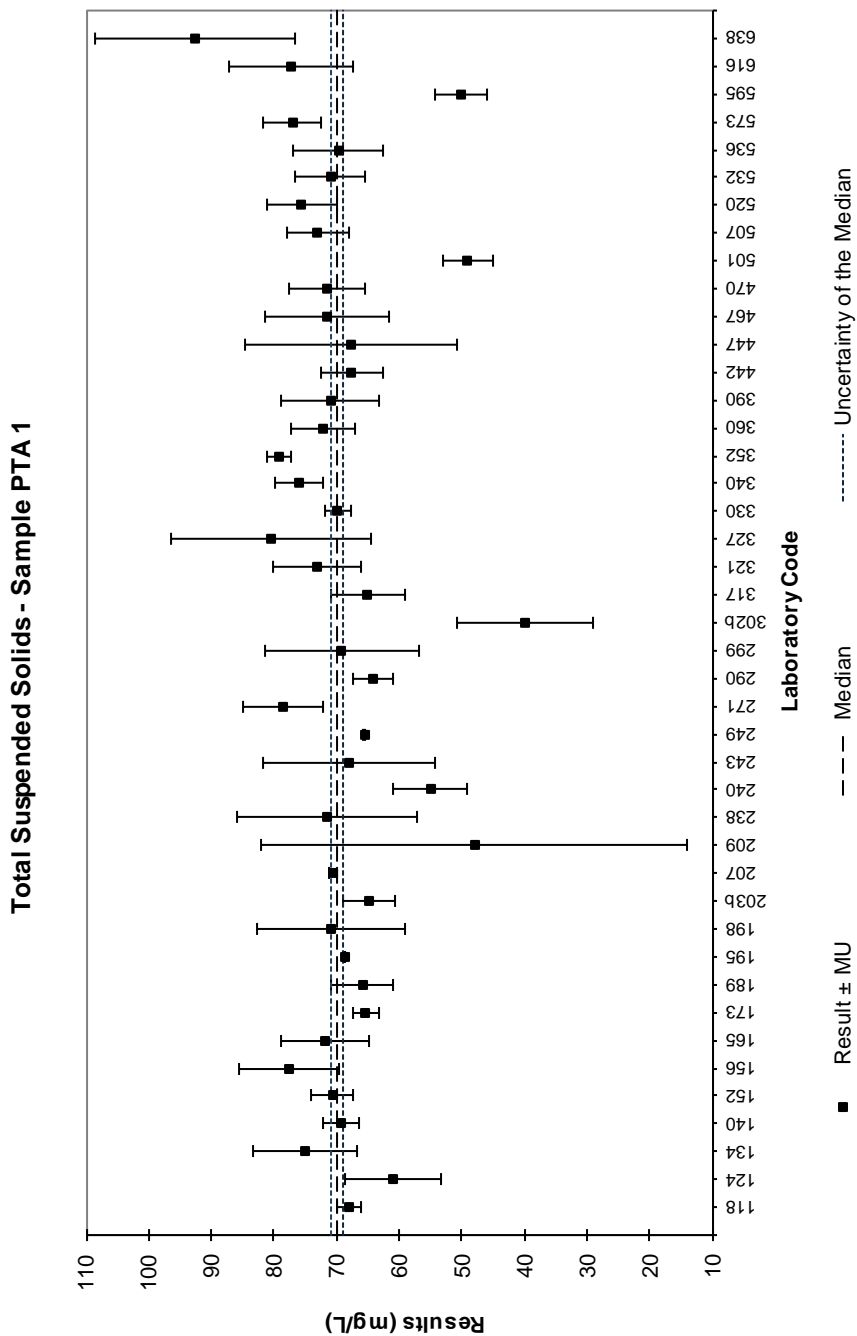


Figure 9. Total Suspended Solids - Results of sample PTA 1, including MU, compared to the median.

Total Suspended Solids - Sample PTA 2

Results of sample PTA 2, including MU, compared to the median

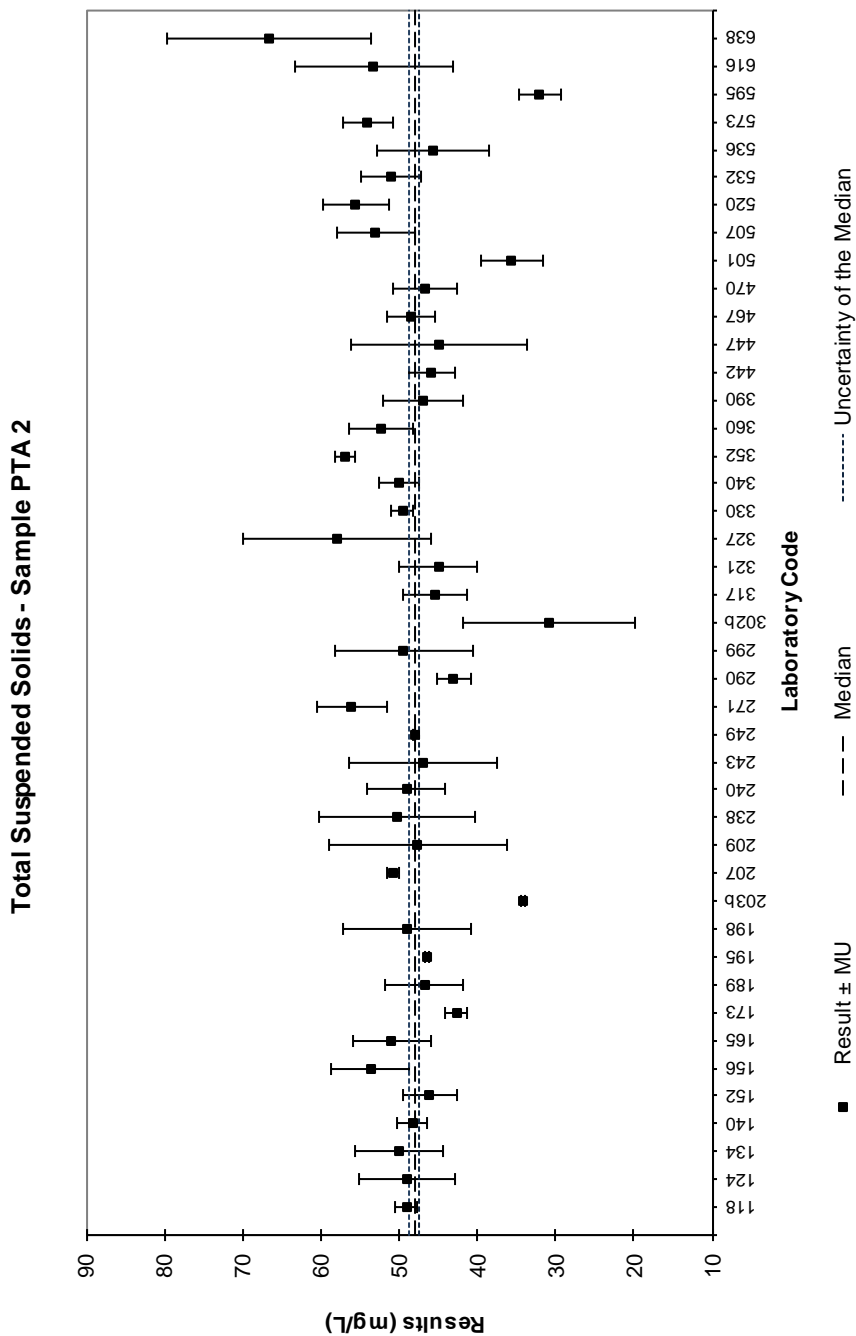


Figure 10. Total Suspended Solids - Results of sample PTA 2, including MU, compared to the median.

The MU reported by participants can be seen in Figures 11 and 12, displayed by the methods used.

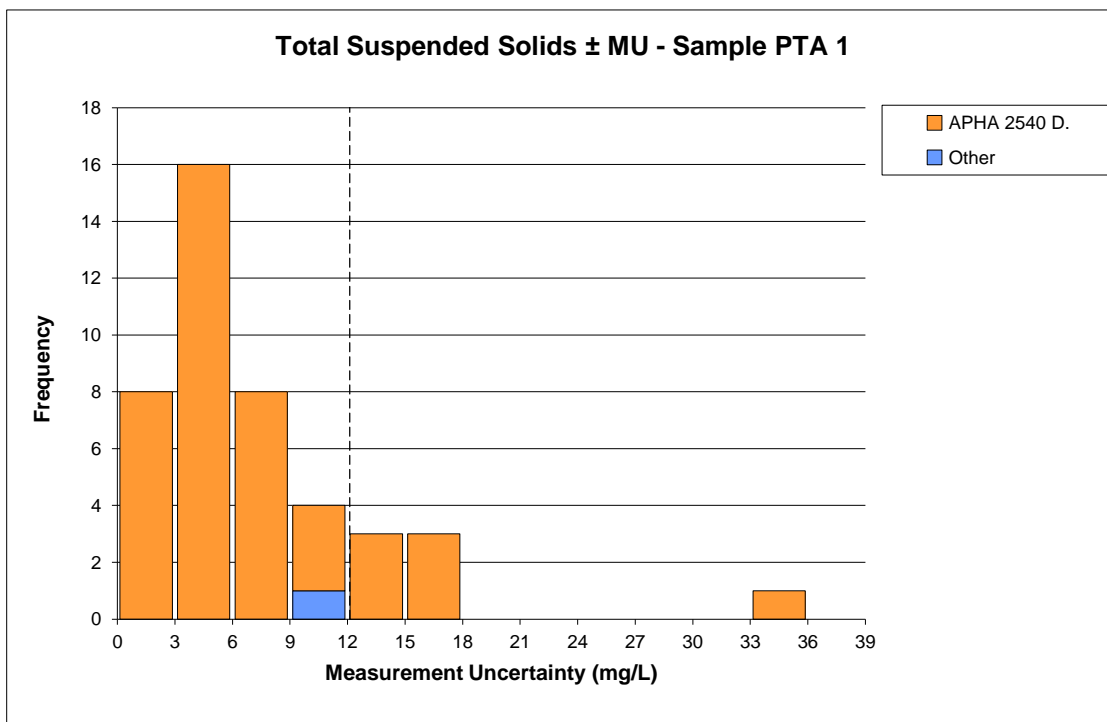


Figure 11. MU for Total Suspended Solids testing of sample PTA 1, as reported by participants, compared with 95% confidence interval for overall reproducibility ± 12.11 mg/L in this round, shown as dashed line.

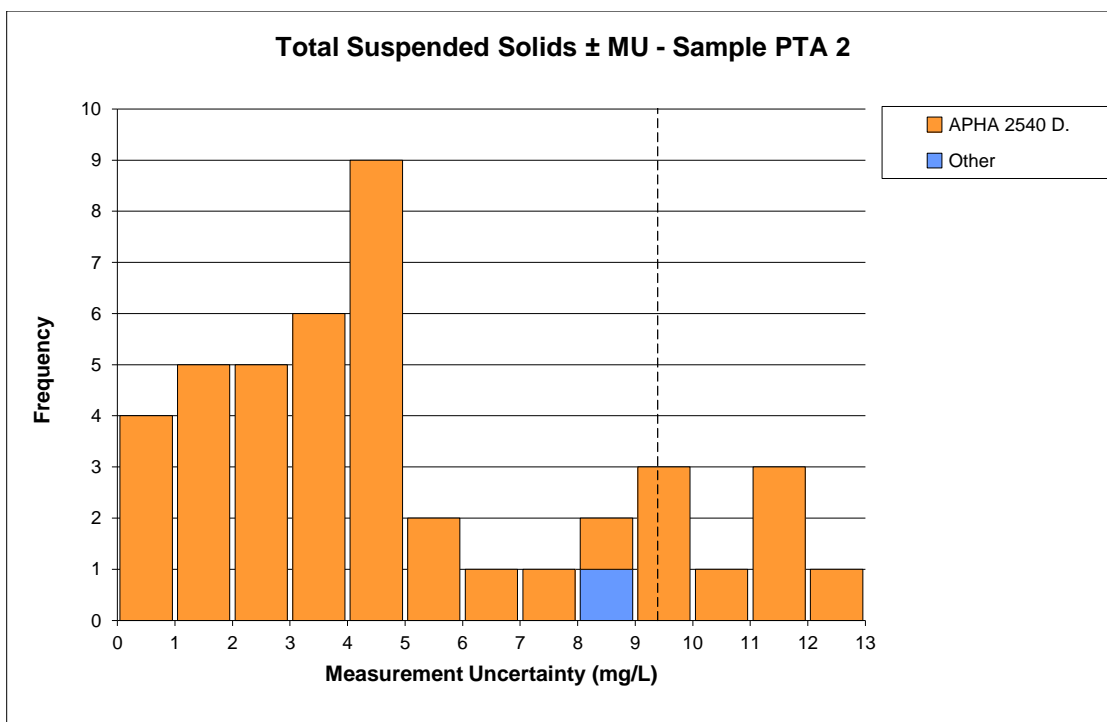


Figure 12. MU for Total Suspended Solids testing of sample PTA 2, as reported by participants, compared with 95% confidence interval for overall reproducibility ± 9.39 mg/L in this round, shown as dashed line.

4.2.3 Total Dissolved Solids

Table 4 compares the Total Dissolved Solids medians and robust CVs from this round to those obtained in previous PTA rounds.

Round	Sample	Median (mg/L)	Robust CV (%)	No. of Results
This study	PTA 1	304.0	7.2	55
	PTA 2	220.0	8.4	55
Report 786	R147	198.0	9.4	57
Report 767	PTA 1	199.0	6.2	58
	PTA 2	231.0	5.9	58

Table 4. Comparison of current round variability and proficiency medians of Total Dissolved Solids testing with the results of the previous two rounds.

The robust CV's observed for Total Dissolved Solids in this round are comparable to those observed in previous rounds.

Bias / Accuracy

Total Dissolved Solids analysis was successfully performed, with satisfactory results ($|z\text{-score}| \leq 2.0$) ranging between 260– 348 mg/L for sample PTA 1 and 183 – 257 mg/L for sample PTA 2.

Out of 55 results submitted for each sample, three questionable results ($2.0 < |z\text{-score}| < 3.0$) were obtained for sample PTA 1 and six questionable results were obtained for sample PTA 2 (laboratories 134, 173, 317, 364, 372, 421, 470 and 632).

Eight outlier results ($|z\text{-score}| \geq 3.0$) were obtained for sample PTA 1, requiring follow-up action by laboratories 173, 292, 343, 364, 376, 406b, 421 and 614. Three outlier results were obtained for sample PTA 2, requiring follow-up action by laboratories 134, 292 and 406b.

The Total Dissolved Solids dataset formed a normal a normal distribution for both samples, with no bias attributed to any one method (Figures 13 and 14). The majority of participants (approximately 84%) used method APHA 2540 C. (Total Dissolved Solids Dried at 180°C).

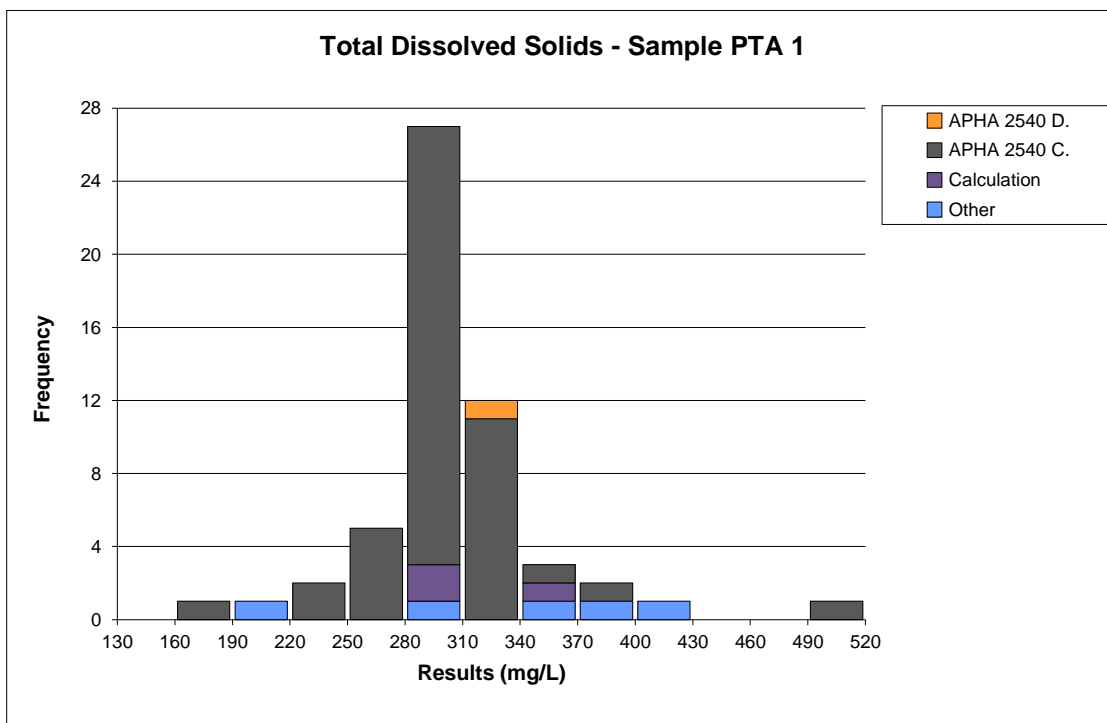


Figure 13. Spread of results for Total Dissolved Solids testing of sample PTA 1, with a median concentration of 304.0 mg/L.

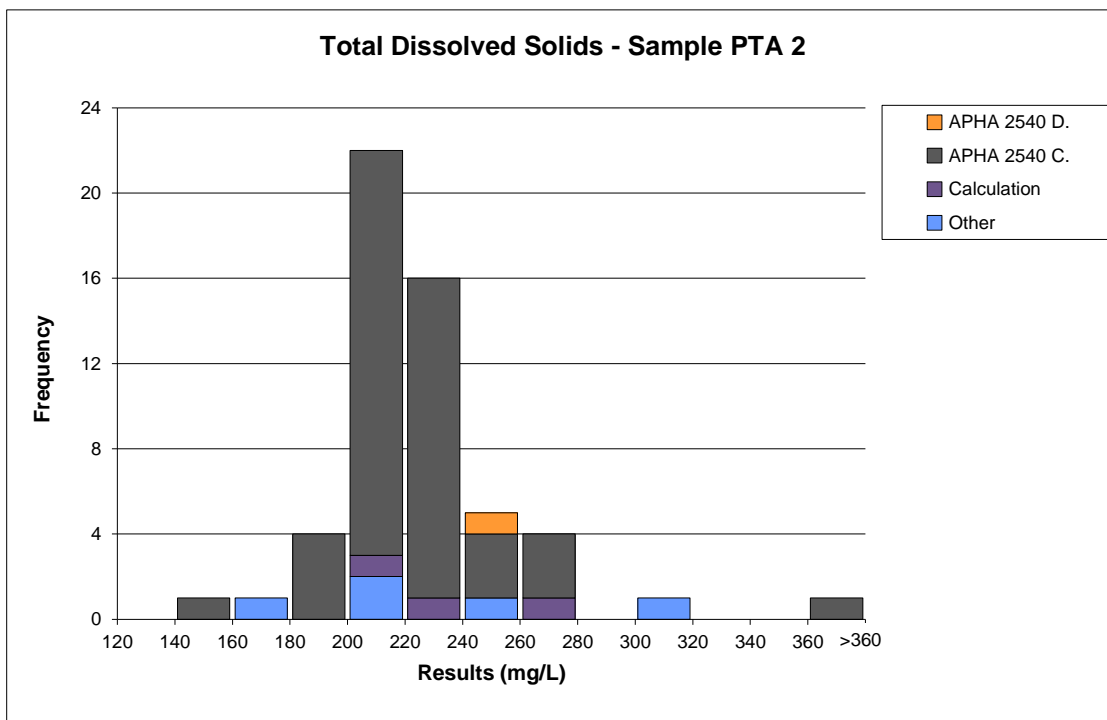


Figure 14. Spread of results for Total Dissolved Solids testing of sample PTA 2, with a median concentration of 220.0 mg/L.

Reproducibility / Measurement Uncertainty (MU)

Using the t-value, (outliers removed, 95% confidence interval) results indicated that the estimate of reproducibility (~2SD) for Total Dissolved Solids testing was 304.0 ± 41.7 mg/L for sample PTA 1 and 220.0 ± 42.6 mg/L for sample PTA 2.

Results submitted by laboratories using Method 8, APHA 2540 C. (n=42), indicated a method reproducibility of ± 41.0 mg/L for sample PTA 1 and of ± 38.8 mg/L for sample PTA 2.

Out of 55 participants, 34 (62%) submitted MU information. The majority of the reported measurement uncertainties were an accurately reflection of the difference between the median and the participants result for each proficiency sample.

Laboratories 140, 152, 173, 207, 209, 240, 243, 249, 302b, 317, 330, 406a, 470, 532 and 573 may wish to re-examine their MU calculations, as their result was further from the median than their stated MU, as shown in Figures 15 and 16 below. To keep it in perspective, confidence in the medians was 304.0 ± 3.7 mg/L for sample PTA 1, and 220.0 ± 3.1 mg/L for sample PTA 2.

Total Dissolved Solids - Sample PTA 1

Results of sample PTA 1, including MU, compared to the median

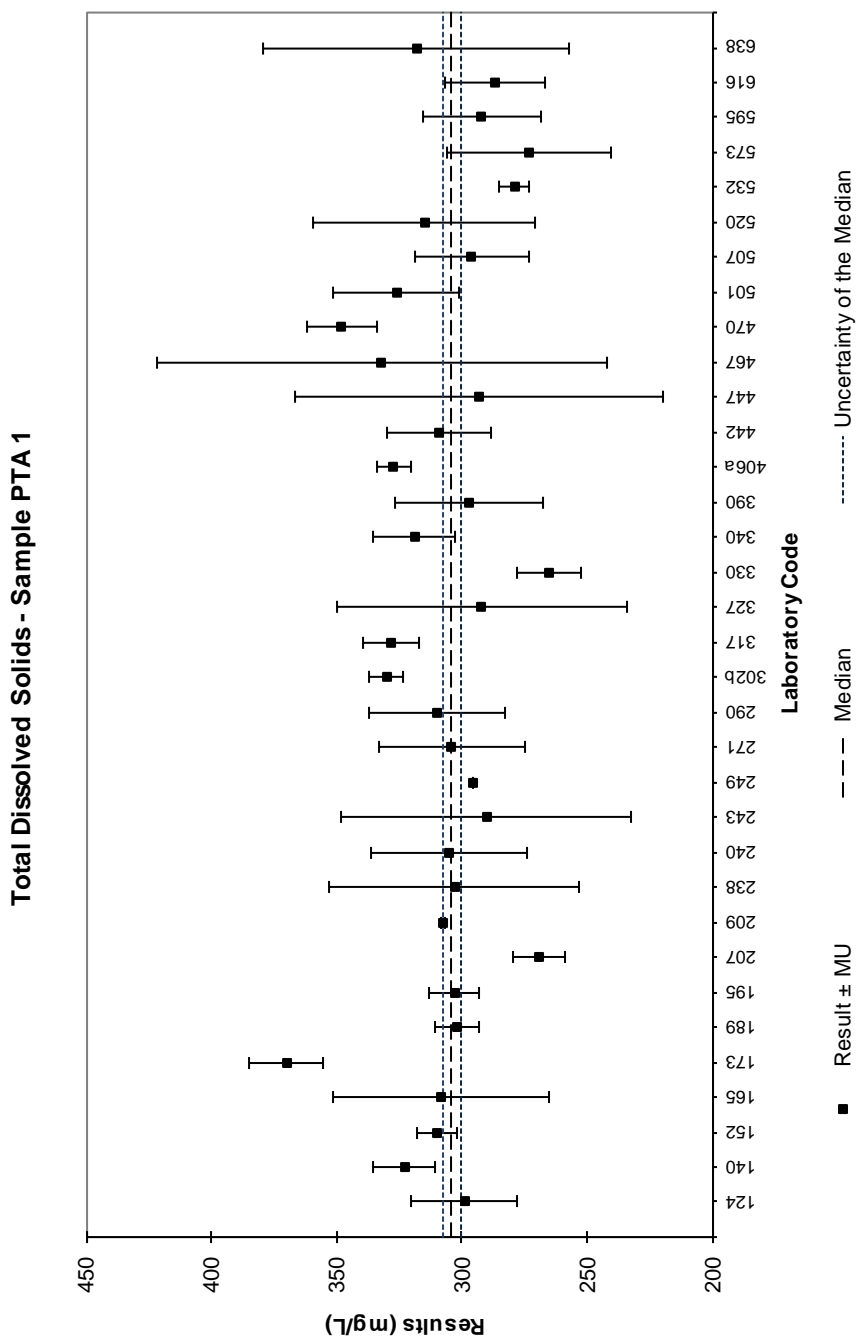


Figure 15. Total Dissolved Solids - Results of sample PTA 1, including MU, compared to the median.

Total Dissolved Solids - Sample PTA 2

Results of sample PTA 2, including MU, compared to the median

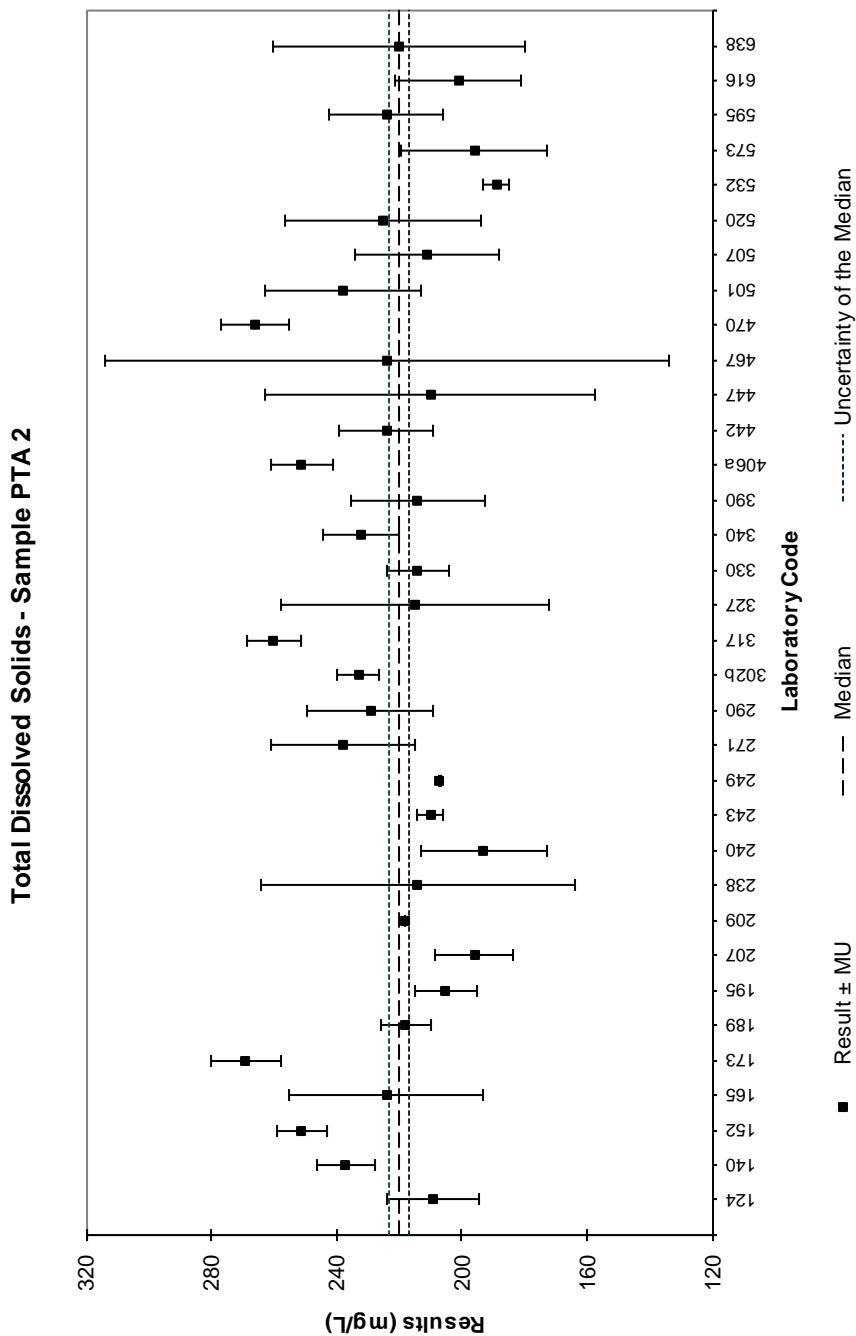


Figure 16. Total Dissolved Solids - Results of sample PTA 2, including MU, compared to the median.

The MU reported by participants can be seen in Figures 17 and 18, displayed by the methods used.

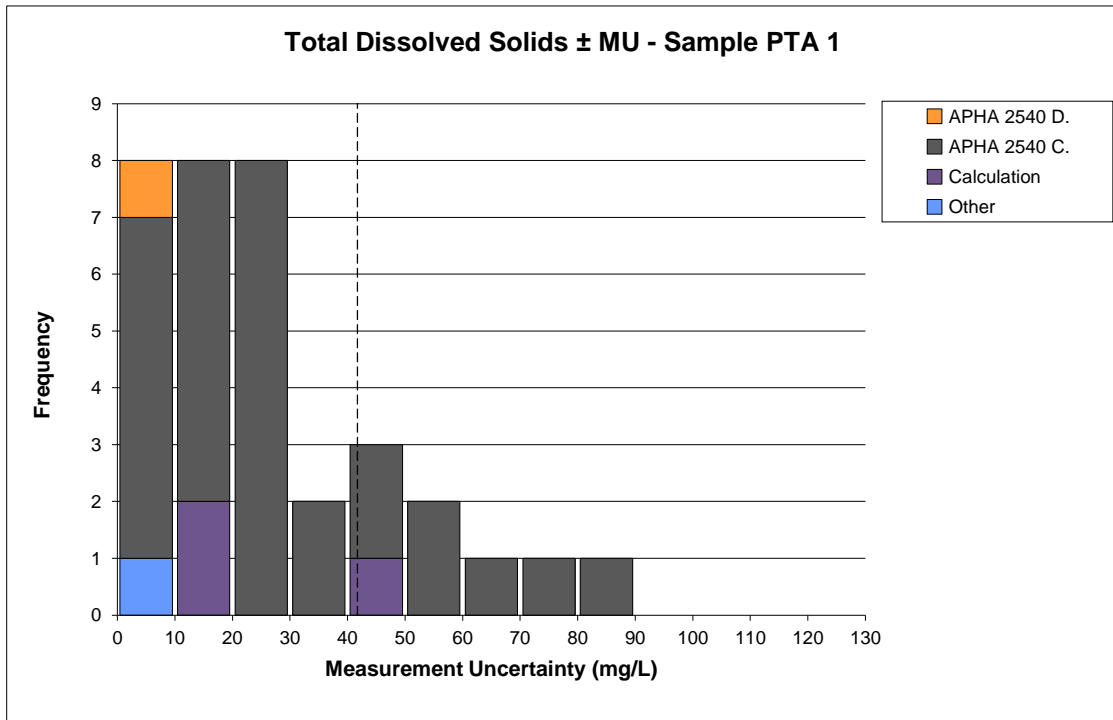


Figure 17. MU for Total Dissolved Solids testing of sample PTA 1, as reported by participants, compared with 95% confidence interval for overall reproducibility ± 41.7 mg/L in this round, shown as dashed line.

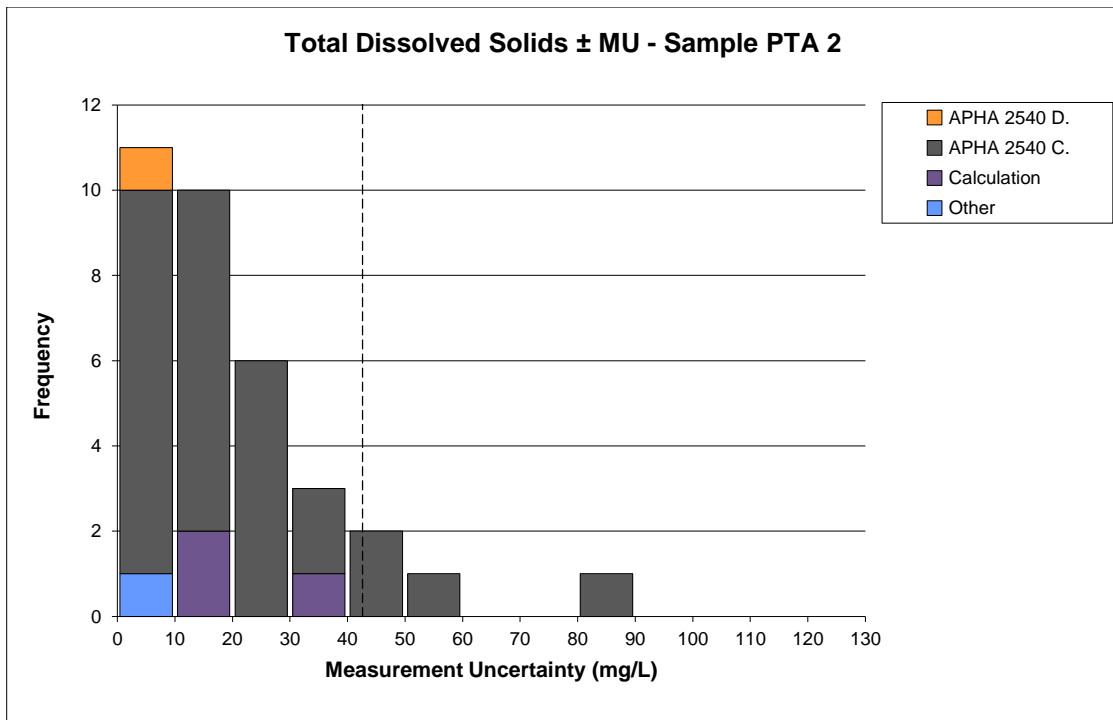


Figure 18. MU for Total Dissolved Solids testing of sample PTA 2, as reported by participants, compared with 95% confidence interval for overall reproducibility ± 42.6 mg/L in this round, shown as dashed line.

4.3 Analysis of Results by Method Groups

Further analysis of results by method groups is undertaken to provide specific information on individual method performance.

In order for methods to be grouped for analysis, PTA requires at least 11 sets of results from the same method group. For methods and analytes other than those presented below, there were less than 11 results submitted, therefore reliable conclusions cannot be drawn from analysing them separately on this occasion.

4.3.1. Total Solids

The method APHA Part 2540 B. - Total Solids Dried at 103-105°C (method code 1) was most frequently employed for Total Solids analysis, with 44 out of 49 laboratories indicating the use of this method.

Table 5 below presents the median, uncertainty of the median and robust CV for Total Solids results obtained by this method in round 158.

Analyte	Sample	Participants	Median \pm Uncertainty of the Median (mg/L)	Robust CV (%)
Total Solids	PTA 1	44	371.0 \pm 3.8	5.4
	PTA 2	44	265.0 \pm 3.7	7.5

Table 5. Variability and proficiency medians of Total Solids results obtained by method APHA Part 2540 B.

4.3.2. Total Suspended Solids

The method APHA Part 2540 D. - Total Suspended Solids Dried at 103-105°C (method code 5) was most frequently employed for Total Suspended Solids analysis, with 64 out of 68 laboratories indicating the use of this method.

Table 6 below presents the median, uncertainty of the median and robust CV for Total Suspended Solids results obtained by this method in round 158.

Analyte	Sample	Participants	Median \pm Uncertainty of the Median (mg/L)	Robust CV (%)
Total Suspended Solids	PTA 1	64	70.00 \pm 0.99	9.1
	PTA 2	64	48.00 \pm 0.70	9.3

Table 6. Variability and proficiency medians of Total Suspended Solids results obtained by method APHA Part 2540 D.

4.3.3. Total Dissolved Solids

The method APHA Part 2540 C. - Total Dissolved Solids Dried at 180°C (method code 8) was most frequently employed for Total Dissolved Solids analysis, with 46 out of 55 laboratories indicating the use of this method.

Table 7 below presents the median, uncertainty of the median and robust CV for Total Suspended Solids results obtained by this method in round 158.

Analyte	Sample	Participants	Median ± Uncertainty of the Median (mg/L)	Robust CV (%)
Total Suspended Solids	PTA 1	64	302.5 ± 3.5	6.3
	PTA 2	64	220.0 ± 2.9	7.2

Table 7. Variability and proficiency medians of Total Dissolved Solids results obtained by method APHA Part 2540 C.

5. Outlier Results

Laboratories reporting results that have been identified as outliers are listed in Table 8 below.

Lab Code	Analysis					
	Total Solids		Total Suspended Solids		Total Dissolved Solids	
	PTA 1	PTA 2	PTA 1	PTA 2	PTA 1	PTA 2
134						§
173					§	
203b				§		
209	§	§	§			
292	§	§			§	§
302b			§	§		
343		§			§	
364	§				§	
372			§	§		
376					§	
406a			§			
406b					§	§
421			§		§	
501			§			
595			§	§		
614					§	
632			§	§		
638			§	§		

Table 8. Laboratory results identified as outliers for each analysis performed.

Note:

1. A "§" indicates the occurrence of a z-score outlier result (i.e. those results for which $|z\text{-score}| \geq 3.0$).

6. Reference

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

APPENDIX A

Results and Data Analysis

Total Solids	A1
Total Suspended Solids.....	A5
Total Dissolved Solids	A11

Total Solids Results

Samples PTA 1 and PTA 2

Total Solids
Results by Laboratory Code

Lab Code	Sample PTA 1				Sample PTA 2			
	Result ± MU ¹ (mg/L)	Robust z-score ²	Method Code ³	Result ± MU ¹ (mg/L)	Robust z-score ²	Method Code ³	Result ± MU ¹ (mg/L)	Robust z-score ²
123	386	#	0.65	3	277	#	0.51	3
124	376 ± 39.10		0.22	1	270 ± 28.08		0.19	1
131	368	#	-0.13	1	273	#	0.33	1
134	340	#	-1.35	1	240	#	-1.21	1
140	388 ± 16		0.74	1	280 ± 11		0.65	1
152	354 ± 6		-0.74	1	262 ± 6		-0.19	1
156	371	#	0.00	1	264	#	-0.09	1
165	380 ± 53		0.39	1	275 ± 39		0.42	1
182	370	#	-0.04	1	260	#	-0.28	1
189	364 ± 10		-0.30	1	274 ± 9		0.37	1
195	405 ± 13.4		1.48	1	294 ± 13.4		1.30	1
203b	338.8 ± 2.3		-1.40	1	247.9 ± 9.3		-0.84	1
207	321 ± 5.07		-2.18	1	235 ± 5.07		-1.44	1
209	246 ± 46		-5.44	§	160 ± 99		-4.93	§
240	356 ± 36.0		-0.65	1	248 ± 25.0		-0.84	1
243	390 ± 78		0.83	1	250 ± 50		-0.74	1
244	365	#	-0.26	1	264	#	-0.09	1
249	374 ± 0.1		0.13	1	269.5 ± 0.1		0.16	1
258	389	#	0.78	1	279	#	0.60	1
271	383 ± 36.9		0.52	1	282 ± 27.2		0.74	1
292	440	#	3.00	§	431	#	7.68	§
302b	370 ± 12.4		-0.04	1	263 ± 12.4		-0.14	1
317	392 ± 13.3		0.91	1	308 ± 10.5		1.95	1
327	402 ± 80		1.35	1	273 ± 55		0.33	1
342	387	#	0.70	1	283	#	0.79	1
343	435	#	2.78	1	339	#	3.40	§
364	186	#	-8.05	§	310	#	2.05	1
372	392	#	0.91	4	280	#	0.65	4
376	320	#	-2.22	1	238	#	-1.30	1
390	374 ± 44.9		0.13	1	263 ± 31.6		-0.14	1
418a	378	#	0.30	1	208	#	-2.70	1
421	376.5	#	0.24	1	231	#	-1.63	1
442	367 ± 37		-0.17	1	258 ± 26		-0.37	1
446	349	#	-0.96	1	258	#	-0.37	1
447	358 ± 89.5		-0.57	1	257 ± 64.3		-0.42	1
467	380 ± 70		0.39	1	272 ± 70		0.28	1
470	384 ± 15		0.57	1	275 ± 11		0.42	1
501	369 ± 25		-0.09	1	266 ± 25		0.00	1
507	342 ± 20		-1.26	1	222 ± 20		-2.05	1
520	410	#	1.70	1	280	#	0.65	1

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

² "§" denotes an outlier (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.

³ Please refer to Appendix C (page C3) for method code descriptions.

Total Solids (cont.)
Results by Laboratory Code

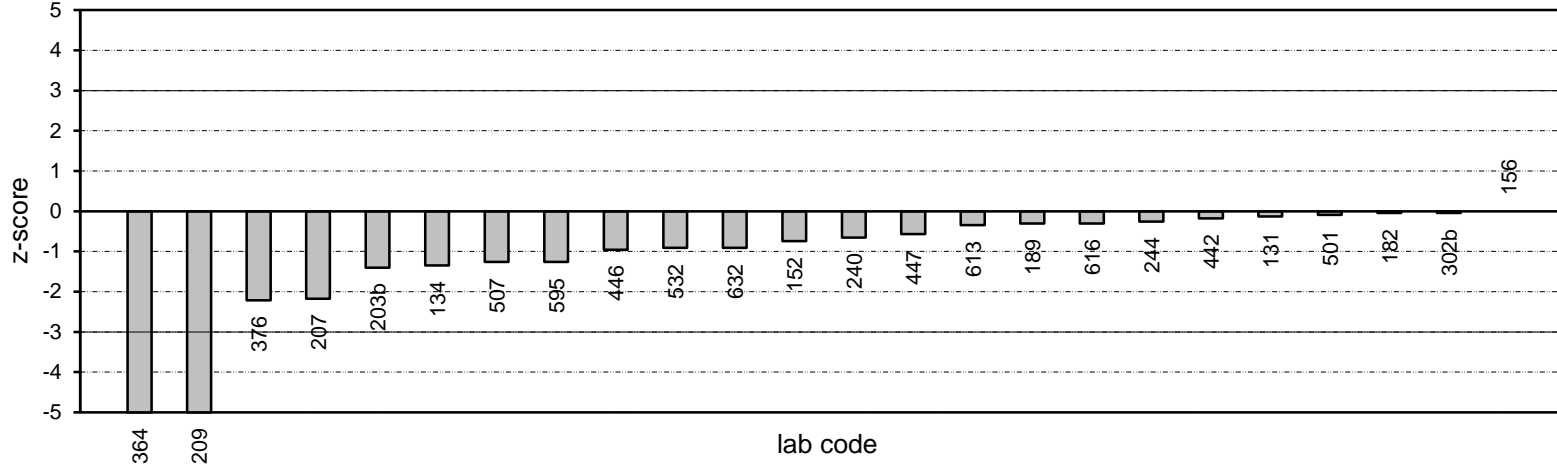
Lab Code	Sample PTA 1				Sample PTA 2			
	Result ± MU ¹ (mg/L)	Robust z-score ²	Method Code ³		Result ± MU ¹ (mg/L)	Robust z-score ²	Method Code ³	
530	371	#	0.00	1	269	#	0.14	1
532	350	#	-0.91	3	240	#	-1.21	3
573	387 ± 38.7		0.70	1	287 ± 28.7		0.98	1
595	342 ± 27.8		-1.26	3	256 ± 20.7		-0.47	3
597	380	#	0.39	1	250	#	-0.74	1
613	363	#	-0.35	1	276	#	0.47	1
616	364 ± 20		-0.30	1	254 ± 20		-0.56	1
632	350	#	-0.91	1	226	#	-1.86	1
638	410 ± 77		1.70	3	287 ± 53		0.98	3
<i>No of Results:</i>					49			
<i>Median:</i>					371.0			
<i>Normalised IQR:</i>					23.0			
<i>Uncertainty of the Median:</i>					4.1			
<i>Robust CV:</i>					6.2%			
<i>Minimum:</i>					186			
<i>Maximum:</i>					440			
<i>Range:</i>					254			

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

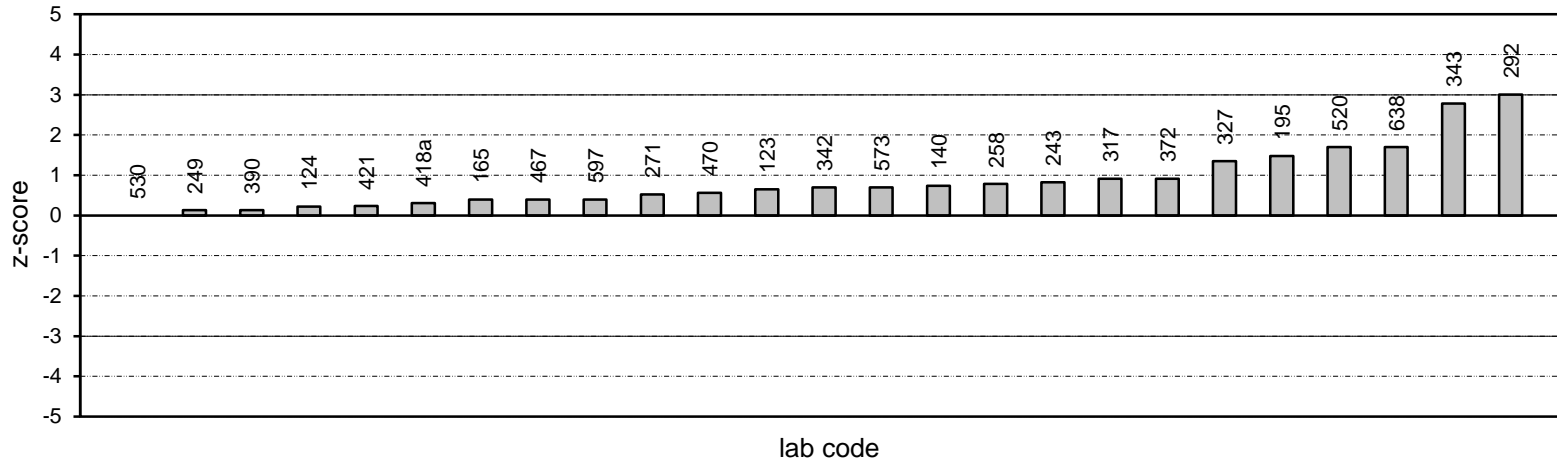
² "\$" denotes an outlier (i.e. those results for which $|z\text{-score}| \geq 3.0$). Robust z-scores are calculated as:
 $z = (A - \text{median}) \div \text{normalised IQR}$, where A is the participant laboratory's result.

³ Please refer to Appendix C (page C3) for method code descriptions.

Total Solids - Sample PTA 1 - Robust Z-Scores



Robust Z-Scores

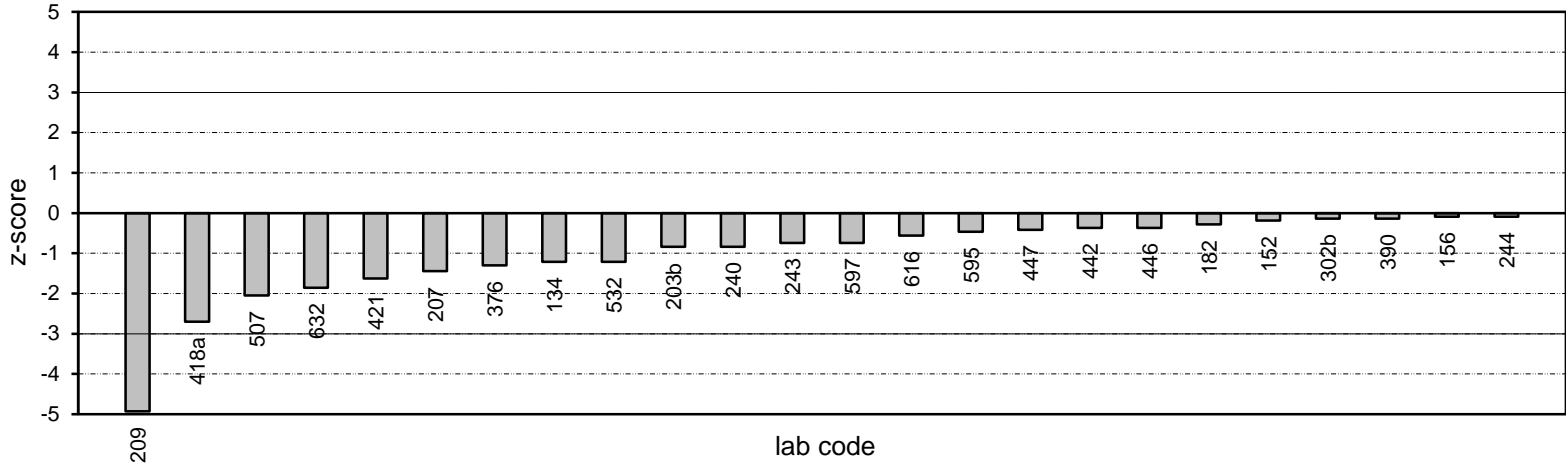


Ordered Robust Z-Score Charts
Total Solids - Sample PTA 1

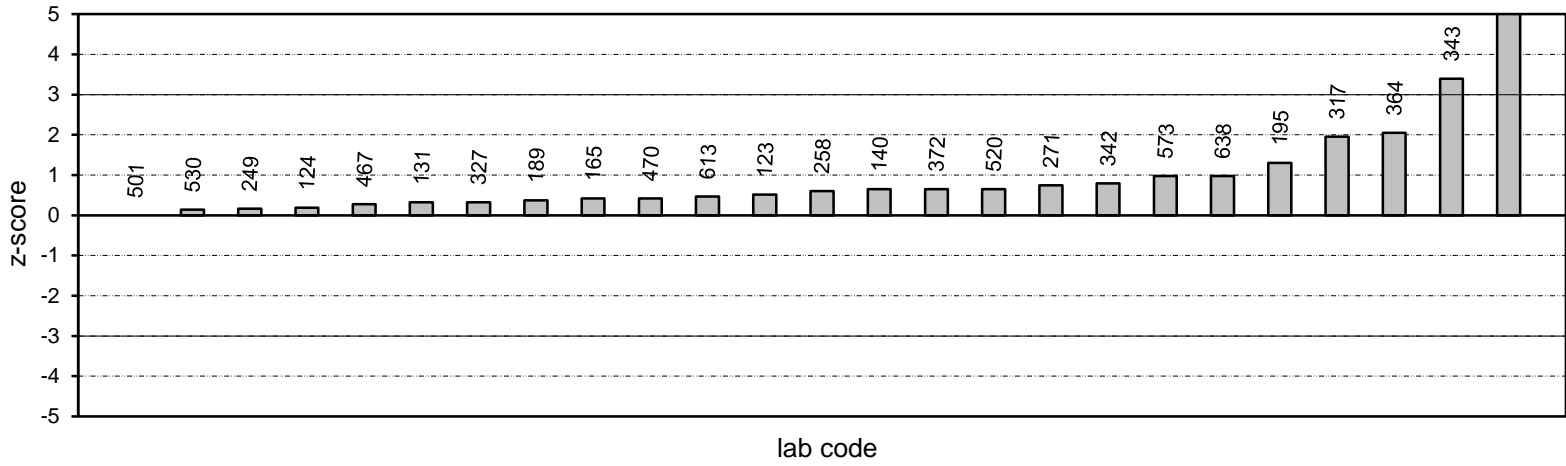
Total Solids - Sample PTA 2

Ordered Robust Z-Score Charts

Total Solids - Sample PTA 2 - Robust Z-Scores



Robust Z-Scores



Total Suspended Solids Results

Samples PTA 1 and PTA 2

Total Suspended Solids
Results by Laboratory Code

Lab Code	Sample PTA 1				Sample PTA 2			
	Result ± MU ¹ (mg/L)	Robust z-score ²	Method Code ³	Result ± MU ¹ (mg/L)	Robust z-score ²	Method Code ³		
118	68.0 ± 1.9	-0.31	5	49.0 ± 1.4	0.22	5		
123	69 #	-0.15	5	48 #	0.00	5		
124	61.0 ± 7.69	-1.39	5	49.0 ± 6.17	0.22	5		
131	80.0 #	1.54	5	56.0 #	1.78	5		
134	75.0 ± 8.2	0.77	5	50.0 ± 5.5	0.45	5		
140	69.3 ± 2.9	-0.11	5	48.3 ± 2.0	0.07	5		
152	70.6 ± 3.4	0.09	5	46.1 ± 3.4	-0.42	5		
156	77.6 ± 8	1.17	5	53.7 ± 5	1.27	5		
165	71.7 ± 7	0.26	5	51.0 ± 5	0.67	5		
173	65.3 ± 2.0	-0.72	5	42.7 ± 1.3	-1.18	5		
182	70 #	0.00	5	50 #	0.45	5		
189	65.8 ± 5	-0.65	5	46.8 ± 5	-0.27	5		
195	68.7 ± 0.21	-0.20	5	46.5 ± 0.21	-0.33	5		
198	71 ± 11.8	0.15	7	49 ± 8.2	0.22	7		
203b	64.8 ± 4.1	-0.80	5	34.2 ± 0.3	-3.08	§	5	
207	70.5 ± 0.64	0.08	5	50.8 ± 0.73	0.62	5		
209	48 ± 33.9	-3.39	§	47.6 ± 11.3	-0.09	5		
237	74 #	0.62	5	49 #	0.22	5		
238	71.5 ± 14.3	0.23	5	50.2 ± 10.0	0.49	5		
240	55.0 ± 6.0	-2.31	5	49 ± 5.0	0.22	5		
243	68 ± 13.6	-0.31	5	47 ± 9.4	-0.22	5		
244	65.8 #	-0.65	5	45.0 #	-0.67	5		
249	65.5 ± 0.1	-0.69	5	48.0 ± 0.1	0.00	5		
258	72 #	0.31	5	50 #	0.45	5		
271	78.5 ± 6.28	1.31	5	56.1 ± 4.49	1.81	5		
290	64 ± 3	-0.93	5	43 ± 2	-1.11	5		
292	70.0 #	0.00	5	58.3 #	2.30	5		
299	69.2 ± 12.3	-0.12	5	49.4 ± 8.8	0.31	5		
302b	39.9 ± 10.9	-4.64	§	30.8 ± 10.9	-3.84	§	5	
317	65.1 ± 5.9	-0.76	5	45.4 ± 4.1	-0.58	5		
320	76 #	0.93	6	41 #	-1.56	6		
321	73 ± 7	0.46	5	45 ± 5	-0.67	5		
327	80.5 ± 16	1.62	5	58 ± 12	2.23	5		
330	69.8 ± 1.98	-0.03	5	49.6 ± 1.41	0.36	5		
340	76.0 ± 3.8	0.93	5	50.0 ± 2.50	0.45	5		
342	51.3 #	-2.88	5	44.5 #	-0.78	5		
343	63 #	-1.08	5	46 #	-0.45	5		
352	79.1 ± 2.0	1.40	5	56.9 ± 1.4	1.98	5		
360	72.1 ± 5	0.32	5	52.3 ± 4	0.96	5		
364	85 #	2.31	5	48 #	0.00	5		

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

² "§" denotes an outlier (i.e. those results for which |z-score| ≥ 3.0). Robust z-scores are calculated as:
z = (A - median) ÷ normalised IQR, where A is the participant laboratory's result.

³ Please refer to Appendix C (page C3) for method code descriptions.

Total Suspended Solids (cont.)
Results by Laboratory Code

Lab Code	Sample PTA 1				Sample PTA 2						
	Result ± MU ¹ (mg/L)	Robust z-score ²	Method Code ³		Result ± MU ¹ (mg/L)	Robust z-score ²	Method Code ³				
372	39.0	#	-4.78	§	7	32.5	#	-3.46	§	7	
376	80	#	1.54		5	40	#	-1.78		5	
390	71.0 ± 7.81		0.15		5	47.0 ± 5.17		-0.22		5	
406a	32.4	#	-5.80	§	1	43.7	#	-0.96		1	
418a	78	#	1.23		5	53	#	1.11		5	
421	42.5	#	-4.24	§	5	43	#	-1.11		5	
442	67.6 ± 5		-0.37		5	45.8 ± 3		-0.49		5	
446	61.0	#	-1.39		5	40.9	#	-1.58		5	
447	67.6 ± 16.9		-0.37		5	44.9 ± 11.2		-0.69		5	
467	71.5 ± 10		0.23		5	48.5 ± 3		0.11		5	
470	71.5 ± 6		0.23		5	46.7 ± 4		-0.29		5	
501	49.1 ± 4		-3.22	§	5	35.6 ± 4		-2.76		5	
507	73.0 ± 5		0.46		5	53.0 ± 5		1.11		5	
520	75.5 ± 5.59		0.85		5	55.5 ± 4.11		1.67		5	
530	65.0	#	-0.77		5	44.0	#	-0.89		5	
532	71.0 ± 5.5		0.15		5	51 ± 3.9		0.67		5	
534	70.0	#	0.00		5	45.0	#	-0.67		5	
536	69.6 ± 7.2		-0.06		5	45.6 ± 7.2		-0.54		5	
558	75.6	#	0.86		5	54.0	#	1.34		5	
561	68.0	#	-0.31		5	52.6	#	1.03		5	
573	77 ± 4.6		1.08		5	54 ± 3.2		1.34		5	
595	50.0 ± 4.20		-3.08	§	5	32.0 ± 2.64		-3.57	§	5	
597	70	#	0.00		5	40	#	-1.78		5	
613	72.0	#	0.31		5	47.0	#	-0.22		5	
614	74	#	0.62		5	43	#	-1.11		5	
616	77.2 ± 10		1.11		5	53.2 ± 10		1.16		5	
632	45	#	-3.85	§	5	24	#	-5.35	§	5	
638	92.5 ± 16		3.47	§	5	66.7 ± 13		4.17	§	5	
<i>No of Results:</i>					68	<i>No of Results:</i>					68
<i>Median:</i>					70.00	<i>Median:</i>					48.00
<i>Normalised IQR:</i>					6.49	<i>Normalised IQR:</i>					4.48
<i>Uncertainty of the Median:</i>					0.99	<i>Uncertainty of the Median:</i>					0.68
<i>Robust CV:</i>					9.3%	<i>Robust CV:</i>					9.3%
<i>Minimum:</i>					32.4	<i>Minimum:</i>					24
<i>Maximum:</i>					92.5	<i>Maximum:</i>					66.7
<i>Range:</i>					60.1	<i>Range:</i>					42.7

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

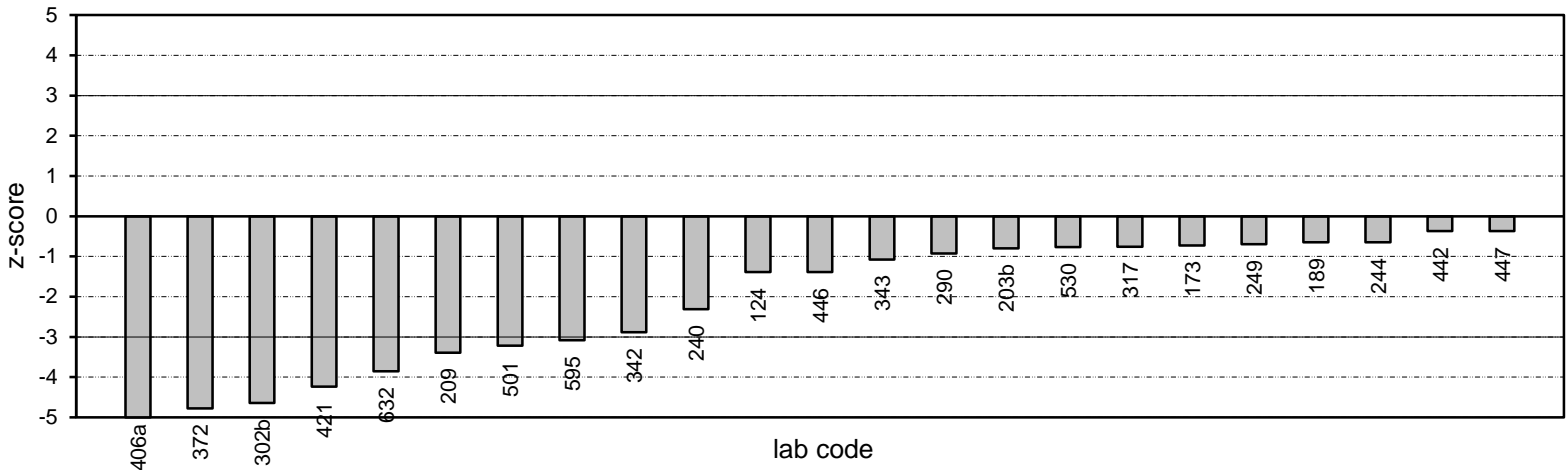
² "§" denotes an outlier (i.e. those results for which $|z\text{-score}| \geq 3.0$). Robust z-scores are calculated as:
 $z = (A - \text{median}) \div \text{normalised IQR}$, where A is the participant laboratory's result.

³ Please refer to Appendix C (page C3) for method code descriptions.

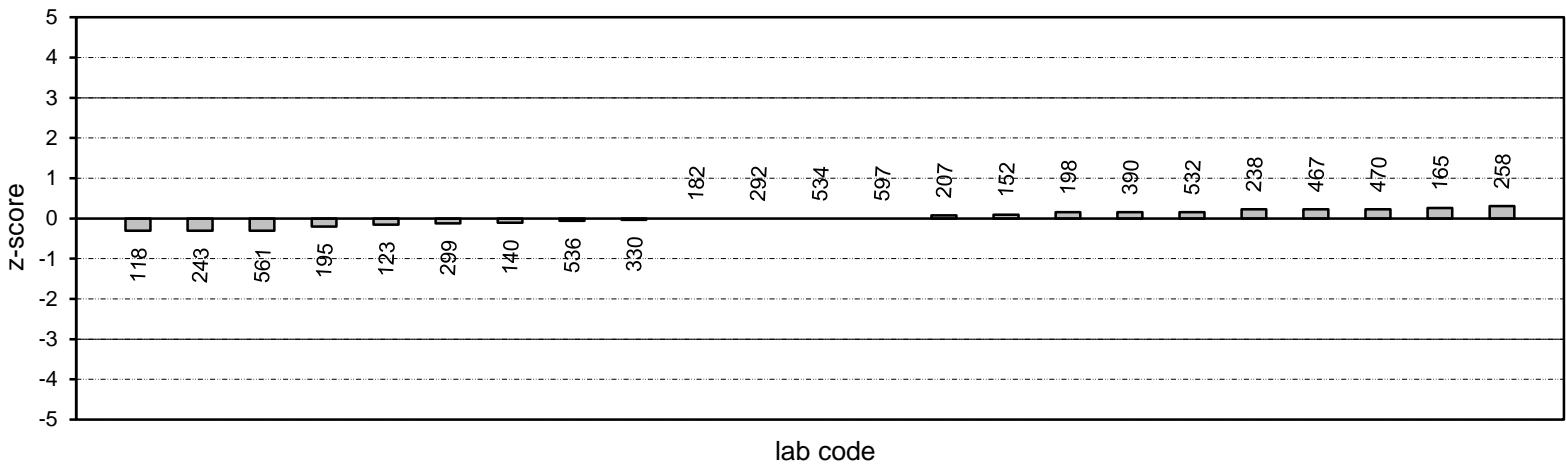
Total Suspended Solids - Sample PTA 1

Ordered Robust Z-Score Charts

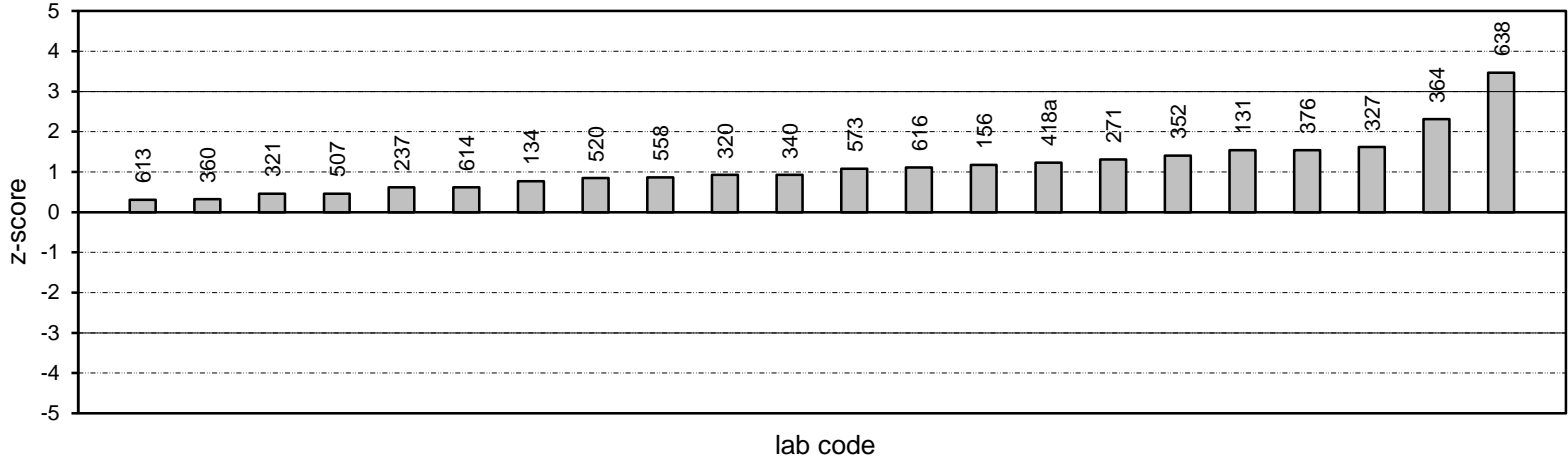
Total Suspended Solids - Sample PTA 1 - Robust Z-Scores



Robust Z-Scores



Total Suspended Solids - Sample PTA 1 - Robust Z-Scores (cont.)

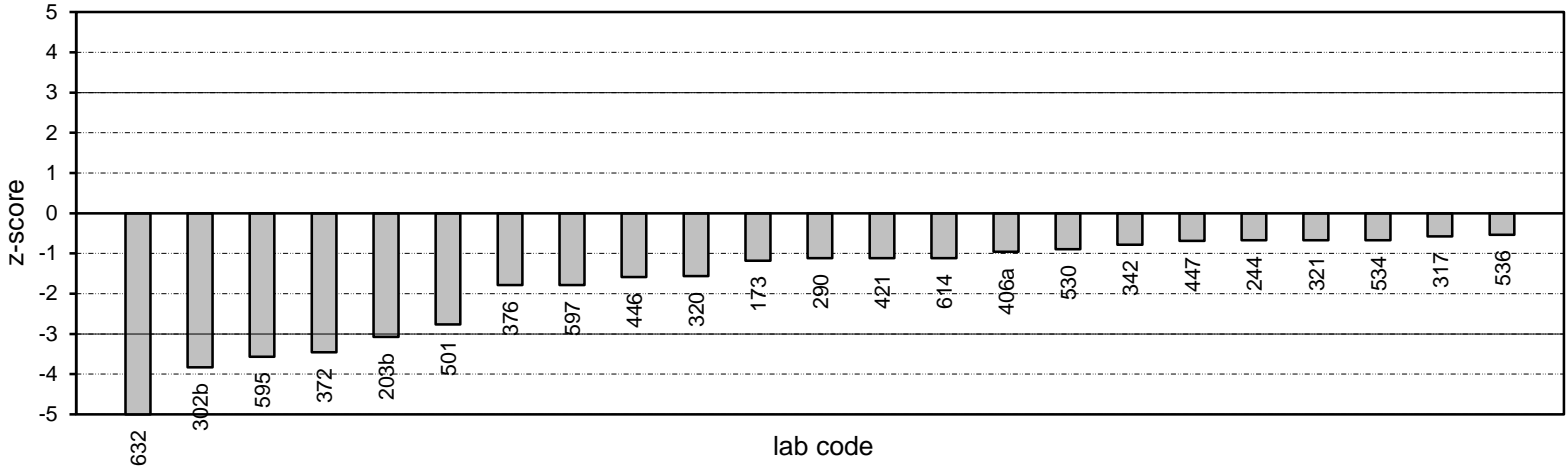


Total Suspended Solids - Sample PTA 1 (cont.)
Ordered Robust Z-Score Charts

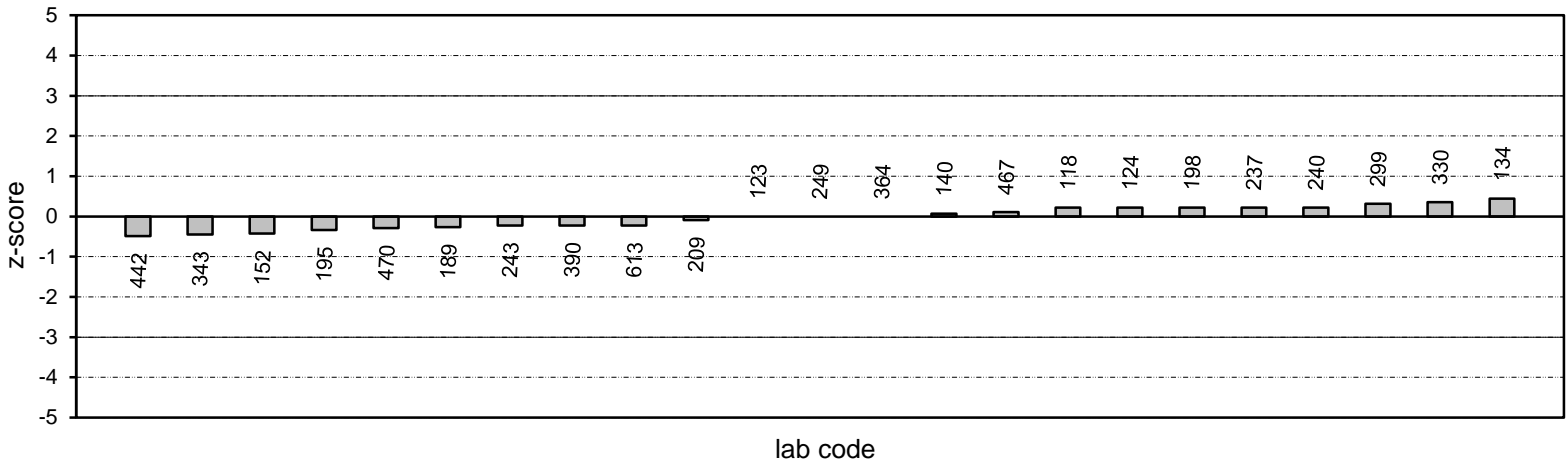
Total Suspended Solids - Sample PTA 2

Ordered Robust Z-Score Charts

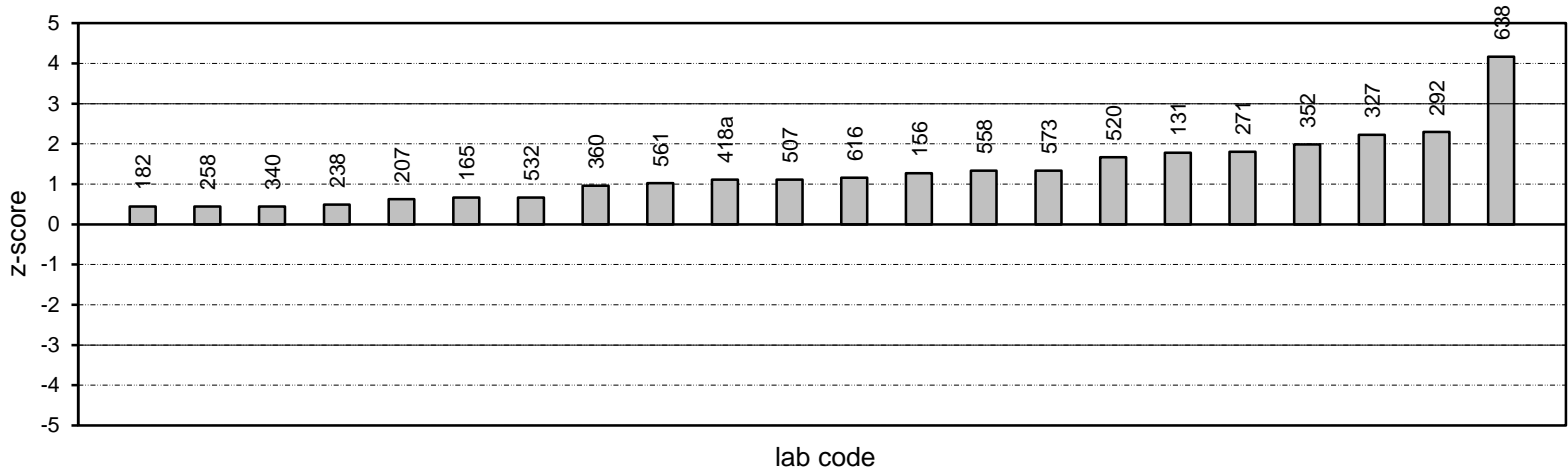
Total Suspended Solids - Sample PTA 2 - Robust Z-Scores



Robust Z-Scores



Total Suspended Solids - Sample PTA 2 - Robust Z-Scores (cont.)



Total Suspended Solids - Sample PTA 2 (cont.)
Ordered Robust Z-Score Charts

Total Dissolved Solids Results

Samples PTA 1 and PTA 2

Total Dissolved Solids
Results by Laboratory Code

Lab Code	Sample PTA 1				Sample PTA 2				
	Result ± MU ¹ (mg/L)	Robust z-score ²	Method Code ³		Result ± MU ¹ (mg/L)	Robust z-score ²	Method Code ³		
123	317	#	0.59	8	229	#	0.49	8	
124	299 ± 20.93	-0.23	8		209 ± 14.63	-0.59	8		
131	276	#	-1.28	8	221	#	0.05	8	
134	240	#	-2.93	8	160	#	-3.24	§	
140	323 ± 12.7	0.87	8		237 ± 9.2	0.92	8		
152	310 ± 8	0.27	8		251 ± 8	1.67	8		
156	296	#	-0.37	8	211	#	-0.49	8	
165	308 ± 43	0.18	10		224 ± 31	0.22	10		
173	370 ± 15	3.02	§	10	269 ± 11	2.64	10		
182	295	#	-0.41	8	210	#	-0.54	8	
189	302 ± 9	-0.09	8		218 ± 8	-0.11	8		
195	303 ± 9.73	-0.05	8		205 ± 9.73	-0.81	8		
207	269 ± 10.35	-1.60	8		196 ± 12.621	-1.30	8		
209	307.3 ± 1	0.15	11		218 ± 0.0	-0.11	11		
238	303 ± 50	-0.05	8		214 ± 50	-0.32	8		
240	305 ± 31.0	0.05	8		193 ± 20.0	-1.46	8		
243	290 ± 58	-0.64	8		210 ± 4.2	-0.54	8		
244	300	#	-0.18	8	220	#	0.00	8	
249	295.5 ± 0.1	-0.39	8		207 ± 0.1	-0.70	8		
258	309	#	0.23	8	221	#	0.05	8	
271	304 ± 29.3	0.00	8		238 ± 23.0	0.97	8		
290	310 ± 27	0.27	8		229 ± 20	0.49	8		
292	494	#	8.69	§	8	587	#	19.80	§
302b	330 ± 6.70	1.19	8		233 ± 6.70	0.70	8		
317	328 ± 11.2	1.10	8		260 ± 8.8	2.16	8		
327	292 ± 58	-0.55	8		215 ± 43	-0.27	8		
330	265 ± 12.5	-1.78	8		214 ± 10.1	-0.32	8		
340	319 ± 16	0.69	8		232 ± 12	0.65	8		
342	327	#	1.05	8	241	#	1.13	8	
343	373	#	3.16	§	11	201	#	-1.03	11
364	395	#	4.16	§	8	275	#	2.97	8
372	348	#	2.01	11	252	#	1.73	11	
376	238	#	-3.02	§	8	201	#	-1.03	8
390	297 ± 29.7	-0.32	8		214 ± 21.4	-0.32	8		
406a	327 ± 7	1.05	5		251 ± 10	1.67	5		
406b	422	#	5.40	§	11	312	#	4.96	§
421	220	#	-3.84	§	11	175	#	-2.43	11
442	309 ± 21	0.23	8		224 ± 15	0.22	8		
446	292	#	-0.55	8	222	#	0.11	8	
447	293 ± 73.3	-0.50	8		210 ± 52.5	-0.54	8		

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

² "§" denotes an outlier (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.

³ Please refer to Appendix C (page C3) for method code descriptions.

Total Dissolved Solids (cont.)
Results by Laboratory Code

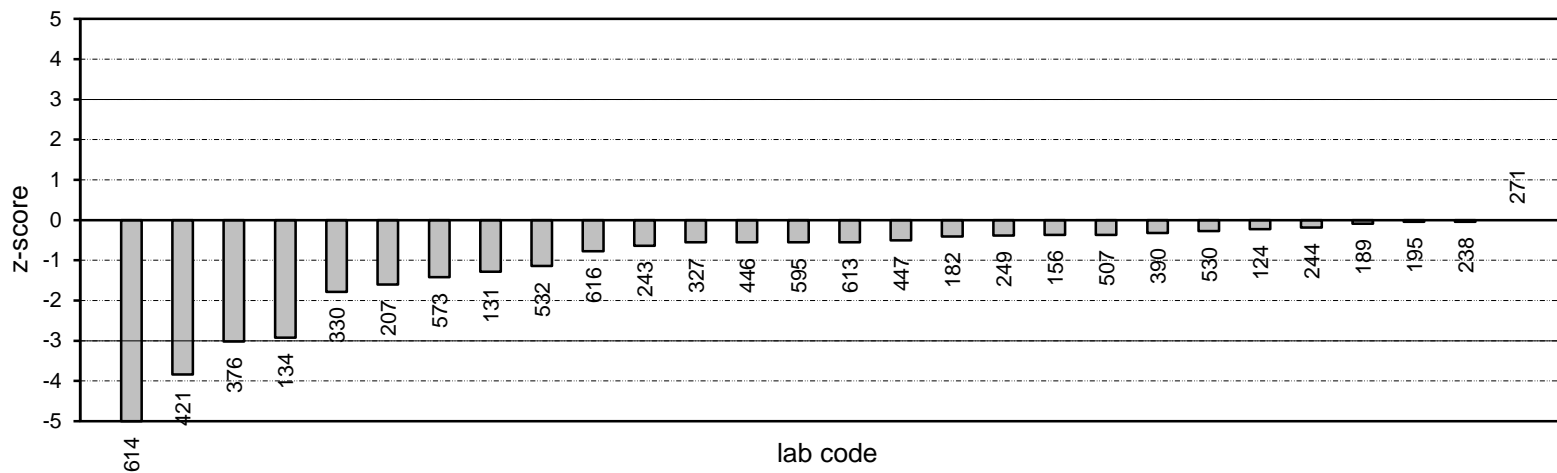
Lab Code	Sample PTA 1				Sample PTA 2				
	Result ± MU ¹ (mg/L)	Robust z-score ²	Method Code ³		Result ± MU ¹ (mg/L)	Robust z-score ²	Method Code ³		
467	332 ± 90	1.28	8		224 ± 90	0.22	8		
470	348 ± 14	2.01	8		266 ± 11	2.48	8		
501	326 ± 25	1.01	8		238 ± 25	0.97	8		
507	296 ± 23	-0.37	8		211 ± 23	-0.49	8		
520	315 ± 44.1	0.50	8		225 ± 31.5	0.27	8		
530	298 #	-0.27	8		216 #	-0.22	8		
532	279 ± 5.7	-1.14	8		189 ± 3.9	-1.67	8		
573	273 ± 32.8	-1.42	8		196 ± 23.5	-1.30	8		
595	292 ± 23.6	-0.55	8		224 ± 18.1	0.22	8		
597	310 #	0.27	8		220 #	0.00	8		
613	292 #	-0.55	8		225 #	0.27	8		
614	189 #	-5.26	§	8	209 #	-0.59	8		
616	287 ± 20	-0.78	10		201 ± 20	-1.03	10		
632	320 #	0.73	8		265 #	2.43	8		
638	318 ± 61	0.64	8		220 ± 40	0.00	8		
<i>No of Results:</i> 55					55				
<i>Median:</i> 304.0					220.0				
<i>Normalised IQR:</i> 21.9					18.5				
<i>Uncertainty of the Median:</i> 3.7					3.1				
<i>Robust CV:</i> 7.2%					8.4%				
<i>Minimum:</i> 189					160				
<i>Maximum:</i> 494					587				
<i>Range:</i> 305					427				

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

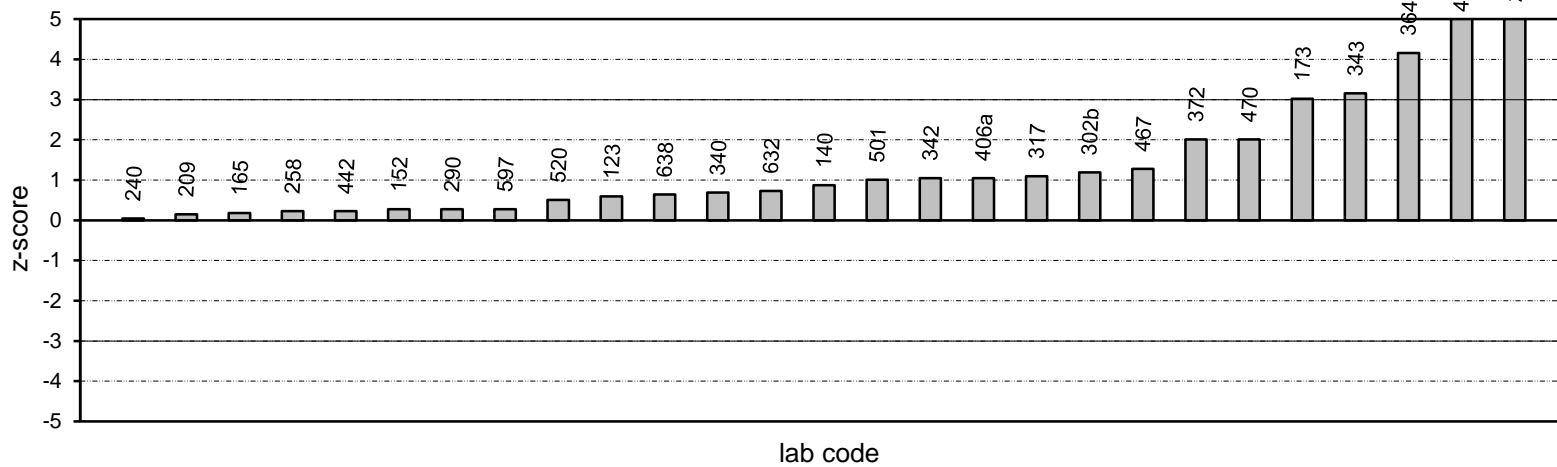
² "§" denotes an outlier (i.e. those results for which $|z\text{-score}| \geq 3.0$). Robust z-scores are calculated as:
 $z = (A - \text{median}) \div \text{normalised IQR}$, where A is the participant laboratory's result.

³ Please refer to Appendix C (page C3) for method code descriptions.

Total Dissolved Solids - Sample PTA 1 - Robust Z-Scores



Robust Z-Scores

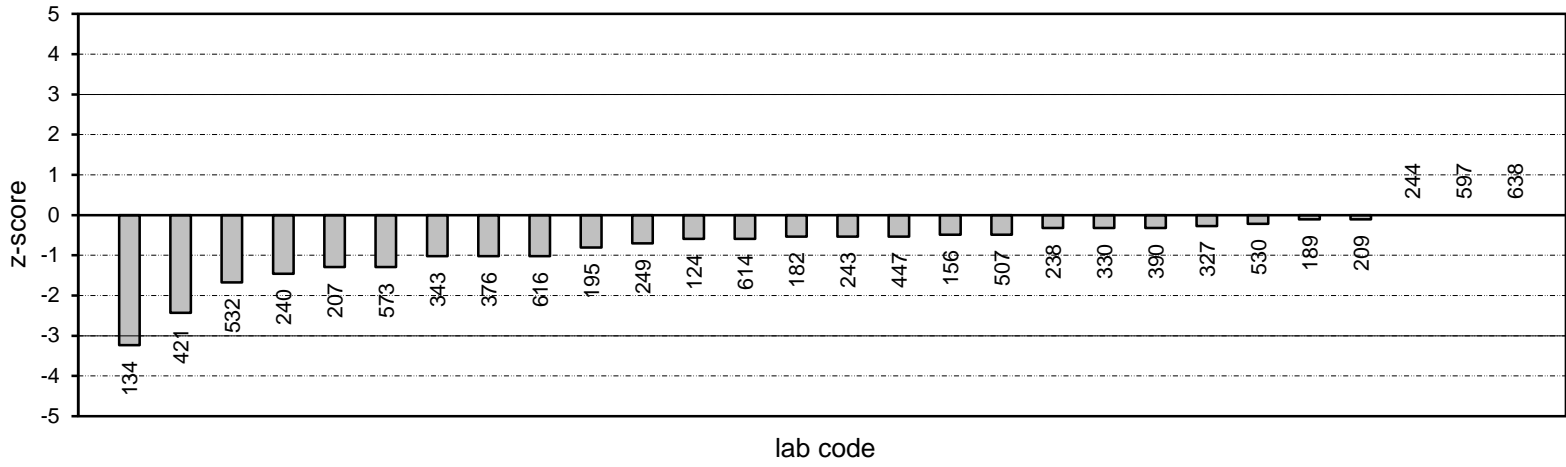


Total Dissolved Solids - Sample PTA 1
Ordered Robust Z-Score Charts

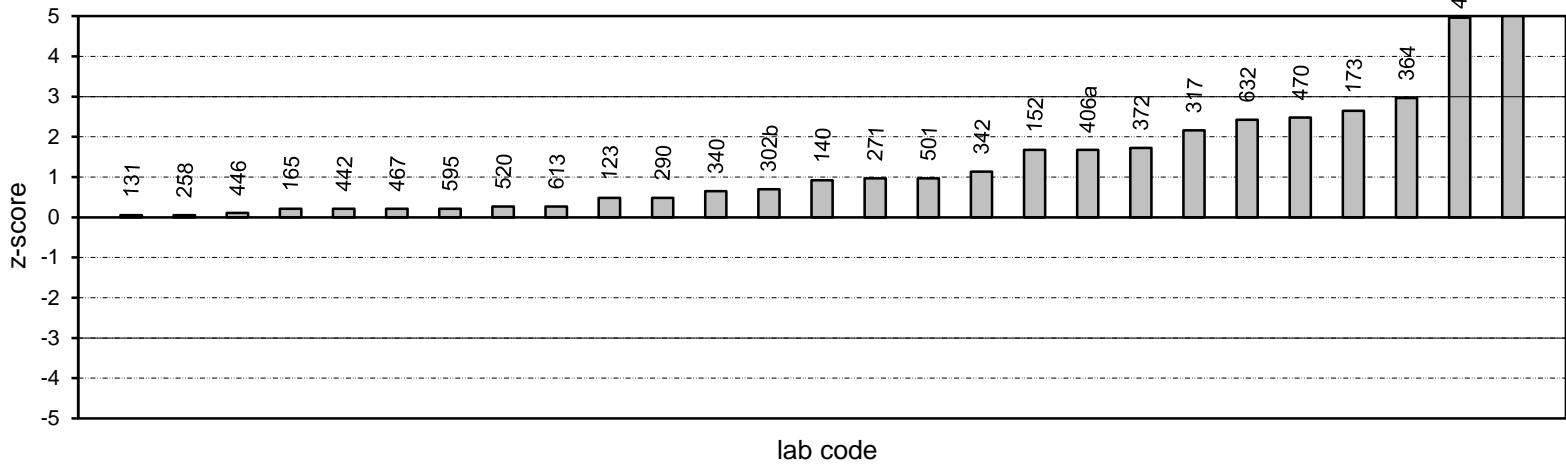
Total Dissolved Solids - Sample PTA 2

Ordered Robust Z-Score Charts

Total Dissolved Solids - Sample PTA 2 - Robust Z-Scores



Robust Z-Scores



APPENDIX B

Sample Homogeneity and Stability

Homogeneity and Stability Testing B1

Homogeneity and Stability Testing

Samples for this program were obtained from Global Proficiency Ltd, New Zealand. All samples are subjected to rigorous stability and homogeneity testing.

A random selection of ten samples was chosen from samples PTA 2 for homogeneity and stability testing. Seven of these samples were stored chilled and the remaining three were subjected to 35°C for three days for an accelerated ageing stability trial. The samples were then analysed in duplicate by Hill Laboratories, New Zealand.

All stability samples showed no increased variability when compared to the chilled samples.

Samples PTA 1 were also tested to confirm the levels were within the expected range. Two samples were randomly selected, stored chilled in the same conditions as the homogeneity samples and subjected to a verification testing (one replicate per sample) by Hill Laboratories, New Zealand. Homogeneity and stability characteristics were assumed to be similar to samples PTA 2, based on identical manufacturing procedure and sample handling.

From statistical analyses based on the results of this testing and rigorous quality control, it was considered that all samples were sufficiently homogeneous and stable, so that any results later identified as outliers should not be attributed to any notable sample variability.

The results of homogeneity and stability testing are presented in Tables 9 and 10 below. Please note that the mean results for these testings are not intended to be used as reference values.

Round PTA 158	Samples PTA 2 (g/m³)						
	Sample ID	Total Suspended Solids		Total Dissolved Solids		Total Solids	
		Rep 1	Rep 2	Rep 1	Rep 2	Rep 1	Rep 2
Homogeneity	H1	45.3	42.7	220	225	265.3	267.7
	H2	45.0	45.3	222	229	267.0	274.3
	H3	44.0	44.3	227	223	271.0	267.3
	H4	43.3	45.0	220	224	263.3	269.0
	H5	48.7	47.0	219	220	267.7	267.0
	H6	46.3	45.0	218	225	264.3	270.0
	H7	44.0	43.0	225	223	269.0	266.0
Stability	S1	50.0	48.0	219	220	269.0	268.0
	S2	50.3	44.5	215	213	265.3	257.5
	S3	48.7	43.2	219	220	267.7	263.2
RSD		5.67%	3.79%	1.57%	1.93%	0.90%	1.64%

Table 9. Homogeneity and stability testing of PTA 2 samples.

Round PTA 158	Samples PTA 1 (g/m³)			
	Sample ID	Total Suspended Solids	Total Dissolved Solids	Total Solids
Homogeneity	H1	64.3	310	374.3
	H2	64.3	311	375.3

Table 10. Homogeneity testing of PTA 1 samples.

APPENDIX C

Documentation

Instructions to Participants	C1
Method Codes.....	C3
Results Sheet.....	C4



PROFICIENCY TESTING AUSTRALIA
WATERS PROFICIENCY TESTING PROGRAM

CHEMICAL ANALYSIS ROUND 158

AUGUST, 2013

Total Solids (TS), Total Suspended Solids (TSS), Total Dissolved Solids (TDS)

INSTRUCTIONS TO PARTICIPANTS

*****Please record (on the Results Sheet) the approximate temperature of the samples upon receipt*****

Please note the following before commencing the analysis of the samples.

1. Samples

- i) Two plastic vials labelled PTA 1 and PTA 2, supplied by Global Proficiency Ltd. The vials contain 20 mL of artificial waste water concentrates for analysis of total solids, total suspended solids and total dissolved solids.
- ii) Each vial will require a 50-fold dilution in reagent grade water to yield dissolved solids between 140-650 mg/L and suspended solids between 23-100 mg/L (please follow the Sample Preparation section below).
- iii) The samples must be thoroughly mixed prior to analysis.

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

2. Sample Preparation

Note: The Residue sample colour is white.

Caution: Analysis must begin immediately after vial is opened.

- i) A separate sample must be prepared from each vial.
- ii) Adjust vial temperature to 20°C.
- iii) Add approximately 800 millilitres (mL) of reagent grade water to a one-litre volumetric flask.
- iv) Record vial ID number and mix thoroughly.
- v) Quantitatively transfer the entire contents from the vial into the flask, rinse the sides of the vial with reagent grade water and include this in the flask.
- vi) Bring to volume with reagent grade water.
- vii) Close the flask with a stopper and mix by inversion.
- viii) Repeat steps ii) – vii) for second sample.

Please report results for the diluted sample.

3. Tests Requested

For the samples prepared from the two vials PTA 1 and PTA 2:

- i) Total Solids (TS)
- ii) Total Suspended Solids (TSS)
- iii) Total Dissolved Solids (TDS)

(It is recommended that a reagent water blank is analysed by the same method used to analyse the samples.)

If unable to perform the above please note this on your Results Sheet.

4. Safety

- i) Samples are for laboratory use only.
- ii) Participants should have sufficient experience and training to take the necessary precautions when handling the samples and reagent chemicals and during disposal.
- iii) Use of safety glasses, gloves, and fume hoods, where appropriate during the determinations, is recommended.

5. Reporting

- i) Report results using three significant figures (e.g. 12.3, 123).
- ii) Report results in milligrams per litre (mg/L).
- iii) Do not correct results for recovery.
- iv) In addition to reporting the results, record the method of analysis using the attached codes.
- v) Laboratories are also requested to calculate and report an estimate of measurement uncertainty (MU) for each reported measurement result. All estimates of MU must be given as a 95% confidence interval (coverage factor $k \approx 2$) and reported in milligrams per litre (mg/L).

6. Testing should commence as soon as possible after receiving the samples and results reported **NO LATER THAN 13 SEPTEMBER 2013** to:

Delfina Mihaila
 Proficiency Testing Australia
 PO Box 7507
 SILVERWATER NSW 2128
 AUSTRALIA
Phone: +612 9736 8397
Fax: +612 9743 6664
Email: dmihaila@pta.asn.au

7. For this program your laboratory has been allocated the code number shown on the attached Results Sheet. All reference to your laboratory in reports associated with the program will be through this code number, thus ensuring the confidentiality of your results.

8. As a guide, ranges for the samples can be expected to be (in mg/L):

Analyte	Range
Total Solids	140 – 675 mg/L
Total Suspended Solids	23 – 100 mg/L
Total Dissolved Solids	140 – 650 mg/L

Method Codes to be used for the Results Sheet

ANALYSIS	METHOD REFERENCE	METHOD DESCRIPTION	CODE
Total Solids Dried at 103–105°C	APHA SM	Part 2540 B. Total Solids Dried at 103–105°C	1
	US EPA	Method Number: 0160.3 Residue, Total	2
	Other	Calculation: Suspended + Dissolved	3
		Other (please specify)	4
Total Suspended Solids Dried at 103–105°C	APHA SM	Part 2540 D. Total Suspended Solids Dried at 103–105°C	5
	US EPA	Method Number: 0160.2 Residue, Non-Filterable & Total Suspended Solids	6
	Other	Other (please specify)	7
Total Dissolved Solids Dried at 180°C	APHA	Part 2540 C. Total Dissolved Solids Dried at 180°C	8
	US EPA	Method Number: 0160.1 Residue, Filterable	9
	Other	Calculation: Total – Suspended	10
		Other (please specify)	11

Method Reference Key

- i) **APHA SM** APHA “Standard Methods for the Examination of Water and Wastewater” (18, 19 20, 21, 22 Edition). (<http://www.standardmethods.org/>)
- ii) **US EPA** U.S Environmental Protection Agency. (<http://www.epa.gov/osa/fem/methcollectns.htm>), (<http://www.epa.gov/greatlakes/lmmb/methods>).



PROFICIENCY TESTING AUSTRALIA
WATERS PROFICIENCY TESTING PROGRAM
CHEMICAL ANALYSIS ROUND 158

Total Solids (TS), Total Suspended Solids (TSS), Total Dissolved Solids (TDS)
AUGUST, 2013

RESULTS SHEET
(mg/L)

Laboratory Code

*Approximate temperature of samples upon receipt:

ANALYSIS	SAMPLE PTA 1		SAMPLE PTA 2		METHOD CODE
	Result (mg/L)	±MU	Result (mg/L)	±MU	
Total Solids Dried at 103–105°C					
Total Suspended Solids Dried at 103–105°C					
Total Dissolved Solids Dried at 180°C					

Please state: Brand of filter used _____

Nominal Filter size _____

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

- i) For each prepared sample only a single result is requested.
- ii) Report results using three significant figures (e.g. 12.3, 123).
- iii) Report results in milligrams per litre (mg/L).
- iv) Do not correct results for recovery.
- v) MU* Laboratories Measurement Uncertainty (MU) if known for the result. Please report in mg/L.

DATE: _____

SIGNATURE: _____

Return results **NO LATER THAN 13 SEPTEMBER 2013** to:

Delfina Mihaila

Proficiency Testing Australia

PO Box 7507

SILVERWATER NSW 2128

AUSTRALIA

Phone: +61 2 9736 8397

Fax: +61 2 9743 6664

Email: dmihaila@pta.asn.au

- End of Report -