



Report No. 505

Waters Proficiency Testing

Sub-Program 84

- *Calcium, Magnesium, Potassium, Sodium* -

April 2006

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1. Foreword

This report summarises the results of a proficiency testing program on the determination of Calcium, Magnesium, Potassium and Sodium in waters. This is sub-program eighty-four in a planned series of programs involving the analysis of chemical and physical parameters of waters.

The exercise was conducted in January 2006 by Proficiency Testing Australia. The main aim of the program was to assess laboratories' abilities to competently perform the prescribed analyses.

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.
- 2.2 Laboratories were provided with the "Instructions to Participants" and "Results Sheet" (see Appendix C). NATA accredited laboratories were requested to perform the tests according to their accredited methods.
- 2.3 Participants were provided with four samples (labelled N194, N195, N196 and N197) in HDPE bottles. For each sample, calcium, magnesium, potassium and sodium was requested.
- 2.4 A total of 129 laboratories received samples, comprising:
 - 103 Australian participants; and
 - 26 overseas participants, including:
 - Hong Kong (1), Japan (2), Korea (3), New Zealand (2), Singapore (5), Vietnam (1), Brunei Darussalam (2), Malaysia (1), Thailand (6), Philippines (1), and Papua New Guinea (2).

Of these 129 laboratories, 7 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, normalised interquartile range, 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 z-score charts relevant to each test are presented in Appendix A.

The document entitled Guide to Proficiency Testing Australia, 2006 (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 4.
- 2.8 Prior to sample distribution, a number of randomly selected samples were analysed for homogeneity. Based on the results of this testing (Appendix B) it is considered that the samples utilised for this program were homogenous. As such, any results later identified as extreme could not be attribute to any significant sample variability.

3. Statistical Format

For each test, where appropriate, 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 three 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 4 summarises the outlier results detected.

3.2 Results Tables and Summary Statistics

Each of these tables contains 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 tables of results and 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 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 0.7413, a 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.

3.3 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 and -3, 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 Adviser's Comments

4.1 The samples were prepared to contain the following (all mg/L):

Sample	Ca	Mg	K	Na	Al	PO ₄
N194	22.2	16.7	4.4	11.1	-	-
N195	27.8	22.2	5.6	7.8	-	-
N196	2.2	1.7	1.1	3.3	50	300
N197	2.2	1.7	1.1	3.3	-	-

4.1.1 All were prepared in deionised water and preserved with nitric acid (HNO₃) to pH<2.

4.2 Robust CV's compare well with those from previous subprograms:

Sub-program	Analyte	Sample	Median (mg/L)	Robust CV (%)
This study	Ca	N194	22.7	3.6
		N195	28.3	4.7
		N196	2.20	8.1
		N197	2.23	6.3

Sub-program	Analyse	Sample	Median (mg/L)	Robust CV (%)
PTAC No 389 (July 2002)	Ca	N153	13.4	5.0
		N154	12.2	5.5
		N155	3.30	9.1
		N156	3.30	6.7
	Ca	N113	10.0	5.2
		N114	10.7	4.8
		N115	2.40	12.4
		N116	2.35	12.6
This study	Mg	N194	16.7	4.9
		N195	22.1	4.4
		N196	1.67	7.1
		N197	1.67	4.4
	Mg	N153	9.2	4.8
		N154	10.0	4.5
		N155	1.70	4.1
		N156	1.70	5.9
	Mg	N113	9.0	4.9
		N114	9.8	4.5
		N115	2.20	6.7
		N116	2.20	6.7
	K	N194	4.5	6.0
		N195	5.6	6.1
		N196	1.15	9.1
		N197	1.13	9.1
	K	N153	3.49	6.5
		N154	3.80	7.9
		N155	0.78	10.5
		N156	0.78	10.0
PTAC No 283 (March 1999)	K	N113	2.0	7.4
		N114	2.2	6.7
		N115	1.1	6.9
		N116	0.87	11.9

Sub-program	Analyse	Sample	Median (mg/L)	Robust CV (%)
This study	Na	N194	11.1	6.0
		N195	7.8	5.7
		N196	3.4	7.7
		N197	3.4	7.6
PTAC No 389 (July 2002)	Na	N153	8.8	5.0
		N154	7.8	5.7
		N155	5.9	6.2
		N156	5.9	5.1
PTAC No 283 (March 1999)	Na	N113	5.0	4.4
		N114	4.7	6.3
		N115	2.7	8.2
		N116	2.5	9.5

4.3 Interferences

Samples N196 contained 50mg aluminium / L and 300mg phosphate / L in addition to the four metals. Calcium and magnesium determined by atomic absorption spectrophotometry (AAS) are subject to interference by aluminium and phosphate however, the addition of lanthanum in the procedure is reported to eliminate the interference effect of up to 100mg Aluminium / L and 600mg phosphate / L. Outlier laboratories which used method code 1 or 2 (AAS) for this sample are advised to check their procedures.

4.4 Outliers

4.4.1 Outliers are those results with an absolute z-score value greater than three (3) and laboratories which returned outlier results are identified in the table on pages 6 and 7. These laboratories should examine their procedures to determine, if possible, the reasons for any errors.

4.4.2 As the samples were stable, free of particulate matter, free of interferences (except N196), and concentration ranges were supplied laboratories which reported results with an absolute z-score between 2 and 3 should also examine their procedures for sources of error.

4.4.3 From previous programs participants have found outliers results caused by error in such areas as: standards (stock, calibration, working), calibration curves, data transcription, dilutions, calculations, faulty instruments, wavelength selections, and instrument drift during runs.

4.5 Conclusion

A large number of laboratories reported outliers results for one or more determinations and this highlights the need for strict adherence to quality control procedures.

[illegible]

Lab Code	Analysis ¹															
	Calcium				Magnesium				Potassium				Sodium			
	N194	N195	N196	N197	N194	N195	N196	N197	N194	N195	N196	N197	N194	N195	N196	N197
574							\$									
575	\$	\$			\$	\$		\$							\$	\$
576									\$	\$	\$	\$	\$	\$	\$	\$
585	\$							\$						\$	\$	\$
602									\$	\$	\$	\$	\$	\$	\$	\$
614	\$	\$		\$			\$									
626														\$	\$	\$
643						\$	\$	\$		\$	\$	\$	\$	\$		
649	\$		\$	\$	\$	\$	\$	\$								
666			\$					\$	\$		\$				\$	\$
699		\$	\$	\$	\$		\$	\$	\$	\$	\$	\$		\$	\$	\$
717.1															\$	\$
717.2	\$	\$	\$	\$			\$	\$								
762			\$				\$	\$								
763							\$	\$								
768	\$		\$	\$									\$			
773			\$				\$									
779							\$	\$			\$					
802					\$	\$	\$	\$					\$	\$	\$	\$
804	\$	\$		\$	\$	\$		\$					\$	\$		\$
816	\$	\$			\$	\$		\$								
821									\$	\$	\$	\$	\$		\$	\$

¹ A "\$" indicates the occurrence of a z-score outlier result (i.e. those results for which $|z\text{-score}| > 3$).

6. References

- [1] Guide to Proficiency Testing Australia, 2006, Version 1.

APPENDIX A

Results & Data Analysis

Calcium.....	A1
Magnesium.....	A12
Potassium.....	A23
Sodium.....	A34

A1

Calcium (Ca)**Results by Laboratory Code**

Lab Code	N194			N195			N196			N197			Method Code ³
	Result ± MU ¹ (mg/L)		Robust z-score ²	Result ± MU ¹ (mg/L)		Robust z-score ²	Result ± MU ¹ (mg/L)		Robust z-score ²	Result ± MU ¹ (mg/L)		Robust z-score ²	
304	22.6	± 4.5	-0.06	27.0	± 5.4	-0.94	2.20	± 0.44	0.00	2.20	± 0.44	-0.21	10
309	22.5		-0.18	27.4		-0.64	2.33		0.73	2.22		-0.07	3
310	18.5	± 1.4	-5.09 §	23.6	± 1.4	-3.48 §	1.63	± 0.2	-3.20 §	1.59	± 0.2	-4.54 §	1
312.1	23.0	± 0.0487	0.43	29.2	± 0.0487	0.71	2.33	± 0.0487	0.73	2.28	± 0.0487	0.35	10
312.2	20.7		-2.39	26.3		-1.46	2.02		-1.01	2.03		-1.42	10
313	22.5		-0.18	28.0		-0.19	2.2		0.00	2.2		-0.21	
315	23.3	± 3.49	0.80	29.6	± 4.44	1.01	2.05	± 0.31	-0.84	2.35	± 0.35	0.85	1
318	22.3	± 2.2	-0.43	28.2	± 2.8	-0.04	2.17	± 0.22	-0.17	2.11	± 0.21	-0.85	2
321	22.9		0.31	28.5		0.19	2.29		0.51	2.22		-0.07	3
322	22.1	± 3	-0.67	27.1	± 3.7	-0.86	2.26	± 0.3	0.34	2.18	± 0.3	-0.35	3
329	21.7		-1.17	27.0		-0.94	2.13		-0.39	2.09		-0.99	3
330	23.2	± 4.6	0.67	29.4	± 5.9	0.86	2.08	± 0.42	-0.67	2.07	± 0.41	-1.14	10
335	23.9	± 0.2	1.53	29.2	± 0.2	0.71	2.31	± 0.1	0.62	2.31	± 0.1	0.57	
336	21.8	± 1.2	-1.04	27.4	± 1.5	-0.64	0.10	± 0.01	-11.80 §	2.32	± 0.13	0.64	10
341	21.9	± 0.219	-0.92	27.3	± 0.273	-0.71	2.08	± 0.208	-0.67	2.17	± 0.217	-0.43	1
343	22.9	± 2.5	0.31	29.4	± 3.2	0.86	2.27	± 0.25	0.39	2.25	± 0.25	0.14	3
344	22.9	± 2.18	0.31	29.2	± 2.78	0.71	2.30	± 0.22	0.56	2.30	± 0.22	0.50	3
348	29.1		7.91 §	33.4		3.86 §	3.08		4.95 §	2.97		5.25 §	3
350	22.8	± 1.4	0.18	28.6	± 1.7	0.26	2.23	± 0.13	0.17	2.28	± 0.14	0.35	3

A2

Calcium (Ca)**Results by Laboratory Code**

Lab Code	N194			N195			N196			N197			Method Code ³
	Result ± MU ¹ (mg/L)		Robust z-score ²	Result ± MU ¹ (mg/L)		Robust z-score ²	Result ± MU ¹ (mg/L)		Robust z-score ²	Result ± MU ¹ (mg/L)		Robust z-score ²	
351	22.9	± 1.41	0.31	28.7	± 1.77	0.34	2.27	± 0.14	0.39	2.21	± 0.14	-0.14	3
355	21.8	± 0.065	-1.01	27.4	± 0.065	-0.64	2.12	± 0.065	-0.45	2.16	± 0.065	-0.50	3
356	22.8		0.18	27.9		-0.26	2.37		0.96	2.33		0.71	3
357	21.4	± 0.027		27.0	± 0.027	-0.94	2.25	± 0.027	0.28	2.25	± 0.027	0.14	1
359	24.8		2.64	29.8		1.16	2.04		-0.90	2.60		2.63	10
360	32.3	± 3.7	11.83 §	28.9	± 3.3	0.49	2.72	± 0.3	2.92	2.87	± 0.3	4.54 §	1
362	21.8	± 2.2	-1.04	27.8	± 2.8	-0.34	1.99	± 0.20	-1.18	2.05	± 0.21	-1.28	2
363	21.7	± 2.3	-1.17	27.5	± 2.8	-0.56	2.18	± 0.32	-0.11	2.23	± 0.32	0.00	3
365	26.6	± 5.2	4.84 §	32.5	± 6.2	3.19 §	3.60	± 0.95	7.87 §	5.40	± 1.34	22.51 §	2
366	21.2		-1.78	26.0		-1.69	1.85		-1.97	1.93		-2.13	3
368	24.6	± 1.2	2.39	30.7	± 1.5	1.84	2.42	± 0.12	1.24	2.42	± 0.12	1.35	3
369	22.5		-0.18	27.9		-0.26	2.17		-0.17	2.16		-0.50	3
370	22.2	± 0.6	-0.55	28.0	± 0.5	-0.19	2.27	± 0.04	0.39	2.23	± 0.03	0.00	3
372	22.5	± 2.4	-0.18	27.8	± 2.8	-0.34	2.24	± 0.65	0.22	2.23	± 0.65	0.00	3
373	21.6	± 2.4	-1.29	27.3	± 3.0	-0.71	2.13	± 0.23	-0.39	2.14	± 0.24	-0.64	3
377.1	23.1	± 1.73	0.55	28.7	± 2.15	0.34	1.76	± 0.13	-2.47	2.03	± 0.15	-1.42	1
377.2	22.8	± 1.51	0.18	27.9	± 1.84	-0.26	0.98	± 0.06	-6.86 §	2.56	± 0.17	2.34	5
383	22.6	± 1.2	-0.06	27.9	± 1.4	-0.26	2.28	± 0.12	0.45	2.30	± 0.12	0.50	1
385	22.6	± 1.39	-0.06	28.7	± 1.77	0.34	2.25	± 0.05	0.28	2.28	± 0.05	0.35	10

Calcium (Ca)**Results by Laboratory Code**

Lab Code	N194		N195		N196		N197		Method Code ³
	Result ± MU ¹ (mg/L)	Robust z-score ²	Result ± MU ¹ (mg/L)	Robust z-score ²	Result ± MU ¹ (mg/L)	Robust z-score ²	Result ± MU ¹ (mg/L)	Robust z-score ²	
396	22.1	-0.67	26.8	-1.09	2.15	-0.28	2.10	-0.92	3
398	23.0	0.43	30.0	1.31	2.19	-0.06	2.22	-0.07	2
399	22.1	-0.67	28.9	0.49	2.95	4.22 §	2.04	-1.35	3
400	22.5	-0.18	28.5	0.19	2.25	0.28	2.25	0.14	1
416									
419	22.4 ± 1.6	-0.31	27.4 ± 1.9	-0.64	2.27 ± 0.16	0.39	2.23 ± 0.16	0.00	3
424	22.9 ± 3.0	0.31	28.5 ± 2.9	0.19	2.32 ± 0.2	0.67	2.27 ± 0.3	0.28	3
425	22.8 ± 1.57	0.18	28.3 ± 1.95	0.04	1.99 ± 0.15	-1.18	2.32 ± 1.75	0.64	
429	22.1 ± 0.2	-0.67	27.9 ± 0.2	-0.26	1.78 ± 0.02	-2.36	2.13 ± 0.02	-0.71	2
433.1	23.4 ± 1.78	0.92	28.2 ± 2.14	-0.04	2.25 ± 0.171	0.28	2.29 ± 0.174	0.43	10
433.2	21.4 ± 1.07	-1.53	27.6 ± 1.38	-0.49	2.24 ± 0.112	0.22	2.06 ± 0.103	-1.21	3
438	22.2 ± 1.0	-0.55	27.7 ± 1.2	-0.41	2.36 ± 0.1	0.90	2.17 ± 0.1	-0.43	3
439	22.8	0.18	28.0	-0.19	2.17	-0.17	2.18	-0.35	
440	22.2 ± 1.33	-0.55	28.5 ± 1.71	0.19	1.91 ± 0.11	-1.63	2.34 ± 0.14	0.78	2
446	33.7 ± 1	13.55 §	36.9 ± 1	6.48 §	<1 ± 1		2.4 ± 1	1.21	5
448	21.5 ± 0.2	-1.41	30.6 ± 0.3	1.76	2.08 ± 0.02	-0.67	2.18 ± 0.02	-0.35	3
450	22.4	-0.31	27.3	-0.71	2.06	-0.79	2.15	-0.57	
454	22.1 ± 0.7	-0.67	27.5 ± 0.9	-0.56	2.12 ± 0.07	-0.45	2.14 ± 0.07	-0.64	3
463	22.8 ± 4.5	0.18	29.4 ± 5.9	0.86	2.3 ± 0.46	0.56	2.15 ± 0.43	-0.57	3
471	22.8 ± 2	0.18	28.8 ± 3	0.41	2.20 ± 0.2	0.00	2.35 ± 0.2	0.85	3

Calcium (Ca)**Results by Laboratory Code**

Lab Code	N194		N195		N196		N197		Method Code ³
	Result ± MU ¹ (mg/L)	Robust z-score ²	Result ± MU ¹ (mg/L)	Robust z-score ²	Result ± MU ¹ (mg/L)	Robust z-score ²	Result ± MU ¹ (mg/L)	Robust z-score ²	
473	22.6	-0.06	27.9	-0.26	2.10	-0.56	2.21	-0.14	3
474	22.4 ± 2.2	-0.31	28.1 ± 2.8	-0.11	2.10 ± 0.20	-0.56	2.13 ± 0.21	-0.71	3
475	23.7 ± 0.8	1.29	29.1 ± 1.0	0.64	2.37 ± 0.08	0.96	2.35 ± 0.08	0.85	3
476	23.0 ± 0.89	0.43	28.9 ± 1.1	0.49	2.11 ± 0.08	-0.51	3.15 ± 0.12	6.53 §	1
477	22.5 ± 0.20	-0.18	28.1 ± 0.23	-0.11	2.21 ± 0.01	0.06	2.20 ± 0.03	-0.21	3
480	23.3 ± 0.1	0.80	29.1 ± 0.2	0.64	2.24 ± 0.02	0.22	2.28 ± 0.01	0.35	1
481	22.3 ± 0.66	-0.43	27.8 ± 2.00	-0.34	2.21 ± 0.23	0.06	2.16 ± 0.18	-0.50	10
488	23.9	1.53	30.6	1.76	2.19	-0.06	2.10	-0.92	3
490	22.4 ± 2.32	-0.31	28.1 ± 2.93	-0.11	2.26 ± 0.24	0.34	2.21 ± 0.24	-0.14	3
493	21.2	-1.78	27.3	-0.71	1.63	-3.20 §	2.13	-0.71	2
500									
503	32.9	12.57 §	37.1	6.63 §	2.11	-0.51	1.98	-1.77	1
504	21.6 ± 3.0	-1.29	27.5 ± 3.8	-0.56	2.25 ± 0.32	0.28	2.23 ± 0.31	0.00	10
506	22.8 ± 0.89	0.18	28.4 ± 0.89	0.11	2.30 ± 0.08	0.56	2.22 ± 0.08	-0.07	3
508	20.9 ± 1.7	-2.15	26.0 ± 2.1	-1.69	2.00 ± 0.16	-1.12	2.09 ± 0.17	-0.99	3
511	22.6 ± 2.3	-0.06	28.0 ± 2.8	-0.19	2.27 ± 0.2	0.39	2.24 ± 0.2	0.07	10
516	22.5 ± 2.3	-0.18	30.0 ± 2.62	1.31	2.7 ± 0.20	2.81	1.1 ± 0.08	-8.02 §	2
520	22.43 ± 2.42	-0.27	29.86 ± 2.42	1.21	2.15 ± 2.42	-0.28	3.18 ± 2.42	6.74 §	1
534	26.5 ± 4.0	4.72 §	31.7 ± 4.8	2.59	3.1 ± 0.47	5.06 §	3.20 ± 0.48	6.89 §	4
537	21.7 ± 4.1	-1.17	27.1 ± 5.1	-0.86	0.81 ± 0.15	-7.81 §	2.08 ± 0.40	-1.06	1

Calcium (Ca)**Results by Laboratory Code**

Lab Code	N194		N195		N196		N197		Method Code ³
	Result ± MU ¹ (mg/L)	Robust z-score ²	Result ± MU ¹ (mg/L)	Robust z-score ²	Result ± MU ¹ (mg/L)	Robust z-score ²	Result ± MU ¹ (mg/L)	Robust z-score ²	
538	23.1 ± 2	0.55	29.2 ± 3	0.71	2.32 ± 0.2	0.67	2.28 ± 0.2	0.35	3
552	22.6	-0.06	27.7	-0.41	2.02	-1.01	1.89	-2.41	3
554	22.8	0.18	28.4	0.11	2.43	1.29	2.36	0.92	M8
567	22.8 ± 1.00	0.18	28.2 ± 1.24	-0.04	2.20 ± 0.10	0.00	2.28 ± 0.10	0.35	1
574	23.2 ± 1.0	0.67	28.0 ± 1.0	-0.19	2.02 ± 0.20	-1.01	2.10 ± 0.20	-0.92	2
575	18.3	-5.33 §	23.5	-3.56 §	2.00	-1.12	1.98	-1.77	3
576	23.2 ± 0.2	0.67	29.2 ± 0.2	0.71	2.23 ± 0.02	0.17	2.23 ± 0.02	0.00	3120B
578	23.0 ± 2.76	0.43	29.0 ± 3.48	0.56	2.15 ± 0.26	-0.28	2.40 ± 0.28	1.21	1
580	21.7 ± 2.0	-1.17	27.1 ± 2.5	-0.86	2.32 ± 0.22	0.67	2.23 ± 0.22	0.00	3120B
581	24.7 ± 0.9	2.51	30.2 ± 0.9	1.46	2.05 ± 0.12	-0.84	2.37 ± 0.13	0.99	1
585	26.2 ± 1.0	4.35 §	31.8 ± 1.0	2.66	1.86 ± 1.0	-1.91	2.01 ± 1.0	-1.56	1
600	23.0 ± 2.3	0.43	27.9 ± 2.8	-0.26	2.06 ± 0.49	-0.79	2.16 ± 0.52	-0.50	1
602	23.1 ± 2.6	0.55	30.6 ± 3.4	1.76	2.36 ± 0.26	0.90	2.44 ± 0.27	1.49	3
614	29.7	8.65 §	37.4	6.86 §			2.88	4.61 §	1
622	23.6 ± 0.2	1.17	29.5 ± 0.3	0.94	2.27 ± 0.02	0.39	2.30 ± 0.03	0.50	3
626	22.8	0.18	26.8	-1.09	2.48	1.57	2.5	1.92	3
633	22.5 ± 0.15	-0.18	28.2 ± 0.15	-0.04	2.20 ± 0.15	0.00	2.20 ± 0.15	-0.21	3
643	23.2	0.67	28.7	0.34	2.31	0.62	2.28	0.35	
649	19.2	-4.23 §	26.8	-1.09	0.706	-8.40 §	0.706	-10.82 §	5
663	22.7 ± 3.2	0.06	28.3 ± 4.0	0.04	2.20 ± 0.31	0.00	2.24 ± 0.31	0.07	3

Calcium (Ca)**Results by Laboratory Code**

Lab Code	N194		N195		N196		N197		Method Code ³
	Result ± MU ¹ (mg/L)	Robust z-score ²	Result ± MU ¹ (mg/L)	Robust z-score ²	Result ± MU ¹ (mg/L)	Robust z-score ²	Result ± MU ¹ (mg/L)	Robust z-score ²	
666	20.5	-2.61	25.76	-1.87	1.05	-6.46 §	<0.1		10
667	23.1	0.55	28.7	0.34	2.47	1.52	2.33	0.71	3
671	22.5	-0.18	27.7	-0.41	2.10	-0.56	2.18	-0.35	2
673	22.0	-0.80	27.8	-0.34	1.96	-1.35	2.20	-0.21	2
686	21.7 ± 4.3	-1.17	26.5 ± 5.3	-1.31	2.10 ± 0.4	-0.56	2.14 ± 0.43	-0.64	3
699	24.37 ± 0.1225	2.11	33.70 ± 0.1225	4.08 §	3.21 ± 0.1225	5.68 §	3.58 ± 0.1225	9.58 §	3
700	22.5 ± 1.5	-0.18	29.3 ± 1.5	0.79	2.34 ± 0.32	0.79	2.34 ± 0.32	0.78	
717.1	22.6	-0.06	28.4	0.11			2.15	-0.57	1
717.2	19.6	-3.74 §	22.7	-4.16 §	0.78	-7.98 §	1.60	-4.47 §	5
727	23.5 ± 0.7	1.04	29.4 ± 0.9	0.86	2.28 ± 0.1	0.45	2.27 ± 0.1	0.28	3
738	22.7 ± 0.4	0.06	27.7 ± 0.5	-0.41	2.29 ± 0.05	0.51	2.30 ± 0.10	0.50	3
742	22.8 ± 2.0	0.18	26.4 ± 2.5	-1.39	2.2 ± 0.2	0.00	2.15 ± 0.2	-0.57	1
762	20.6	-2.51	25.9	-1.76	1.62	-3.26 §	1.94	-2.06	APHA3(1)
763	22.60 ± 1.58	-0.06	27.62 ± 1.93	-0.47	2.61 ± 0.18	2.30	2.41 ± 0.17	1.28	3
766	20.5 ± 4.7	-2.64	29.4 ± 6.8	0.86	2.07 ± 0.47	-0.73	2.12 ± 0.49	-0.78	3
767	22.1 ± 0.9	-0.67	27.4 ± 0.9	-0.64	2.34 ± 0.95	0.79	2.37 ± 0.95	0.99	3
768	25.2 ± 3.147	3.13 §	31.9 ± 3.147	2.74	0.51 ± 3.147	-9.50 §	2.84 ± 3.147	4.33 §	
773	21.6 ± 1.0	-1.29	26.9 ± 1.0	-1.01	1.56 ± 0.2	-3.60 §	2.09 ± 0.2	-0.99	
774	23.4 ± 14.8	0.92	29.3 ± 18.5	0.79	1.99 ± 1.2	-1.18	2.04 ± 1.3	-1.35	3
779	22.1 ± 0.44	-0.67	27.8 ± 0.56	-0.34	2.05 ± 0.04	-0.84	2.03 ± 0.04	-1.42	3

Calcium (Ca)

Results by Laboratory Code

Lab Code	N194		N195		N196		N197		Method Code ³
	Result ± MU ¹ (mg/L)	Robust z-score ²	Result ± MU ¹ (mg/L)	Robust z-score ²	Result ± MU ¹ (mg/L)	Robust z-score ²	Result ± MU ¹ (mg/L)	Robust z-score ²	
784	23.6 ± 3.6	1.17	29.4 ± 4.5	0.86	2.62 ± 0.40	2.36	2.46 ± 0.37	1.63	2
788	23.1	0.55	28.6	0.26	2.14	-0.34	2.17	-0.43	3
800	23.2	0.67	29.0	0.56	2.23	0.17	2.24	0.07	
802	24.6 ± 0.02	2.39	30.4 ± 0.02	1.61	2.49 ± 0.02	1.63	2.49 ± 0.02	1.85	3
804	26.7 ± 15.6	4.97 §	32.8 ± 15.6	3.41 §	2.62 ± 15.6	2.36	2.66 ± 15.6	3.05 §	3
816	25.9 ± 0.6	3.99 §	32.5 ± 0.7	3.19 §	2.60 ± 0.20	2.25	2.57 ± 0.04	2.41	4
817									
821	23.7 ± 2.26	1.29	29.5 ± 2.81	0.94	2.20 ± 0.21	0.00	2.36 ± 0.23	0.92	3
826	22.9 ± 0.28	0.31	28.6 ± 0.38	0.26	2.21 ± 0.15	0.06	2.22 ± 0.15	-0.07	3

No of Results:

124

124

122

124

Median:

22.65

28.25

2.200

2.230

Normalised IQR:

0.82

1.33

0.178

0.141

Robust CV:

3.6%

4.7%

8.1%

6.3%

Minimum:

18.30

22.70

0.100

0.706

Maximum:

33.70

37.40

3.600

5.400

Range:

15.40

14.70

3.500

4.694

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

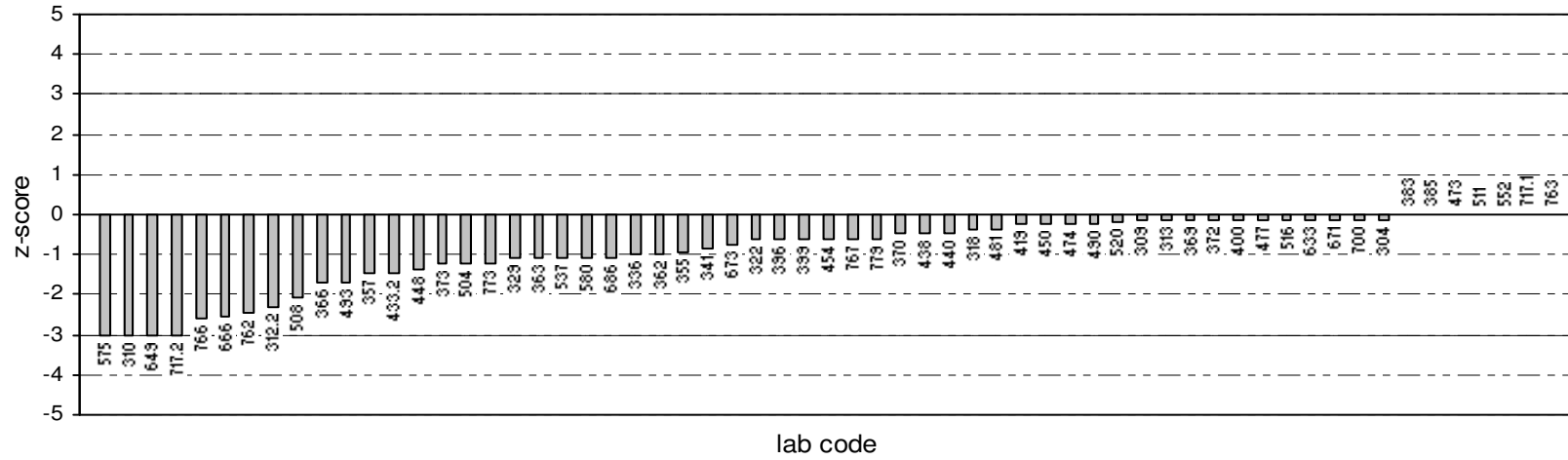
² "§"s denote outliers (i.e. those results for which |z-score| > 3). Robust z-scores are calculated as: $z = (A - \text{median}) \div \text{normalised IQR}$, where, A is the participant laboratory's result.

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

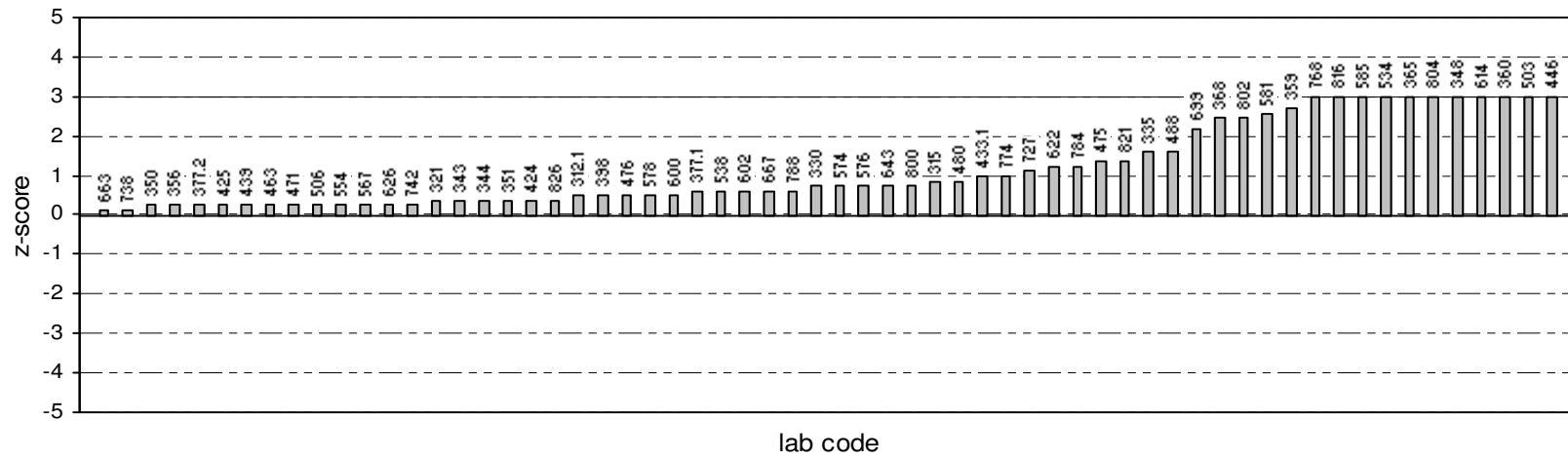
Calcium - N194

Ordered Robust Z-Score Charts

Calcium - N194 - Robust Z-Scores

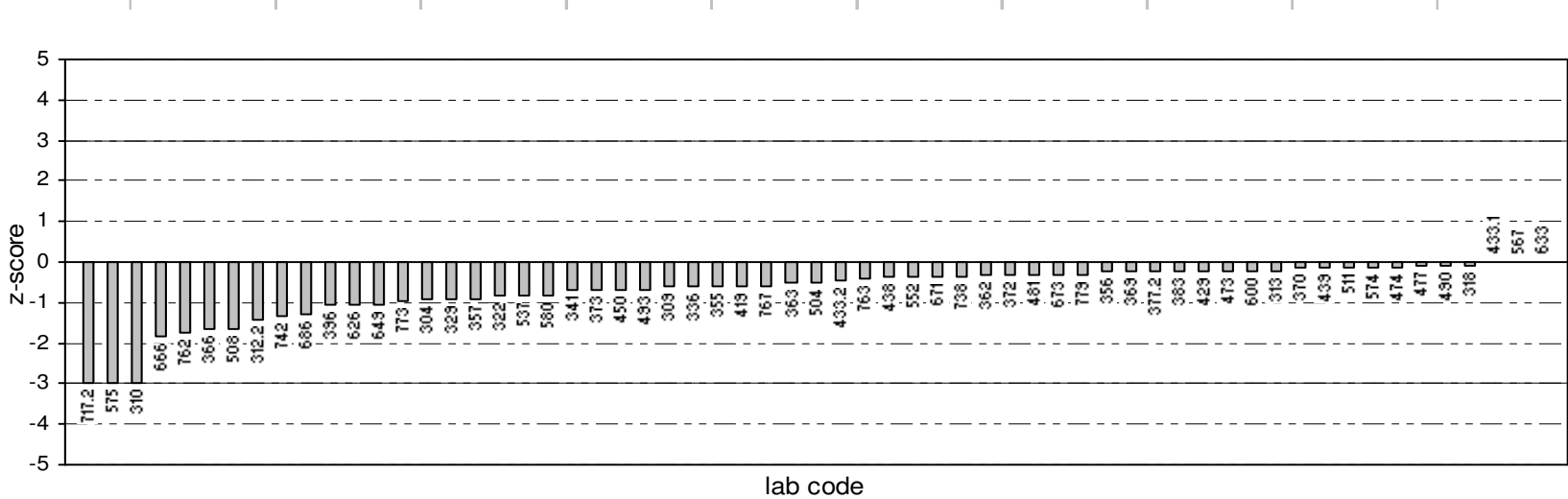


Robust Z-Scores

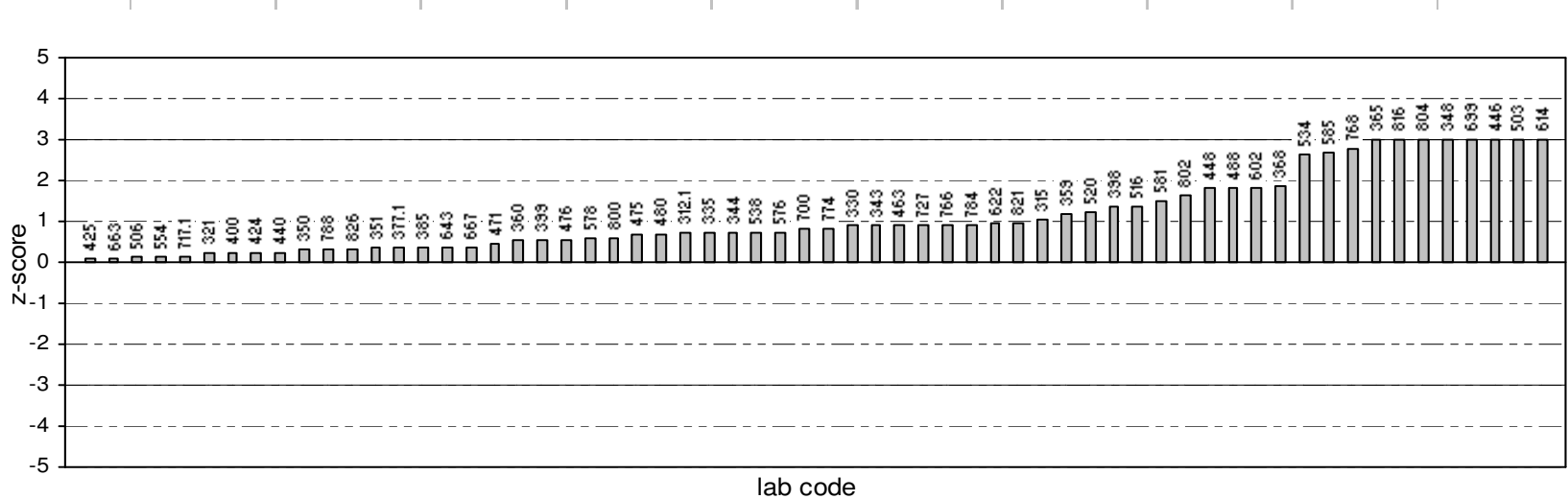


Ordered Robust Z-Score Charts

Calcium - N195 - Robust Z-Scores



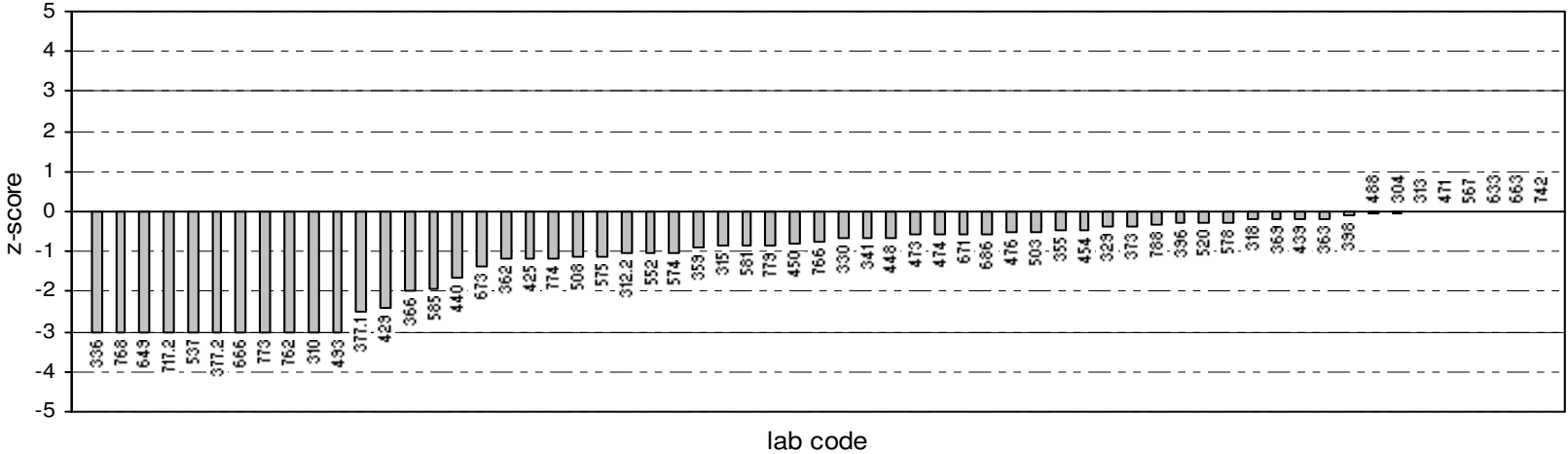
Robust Z-Scores



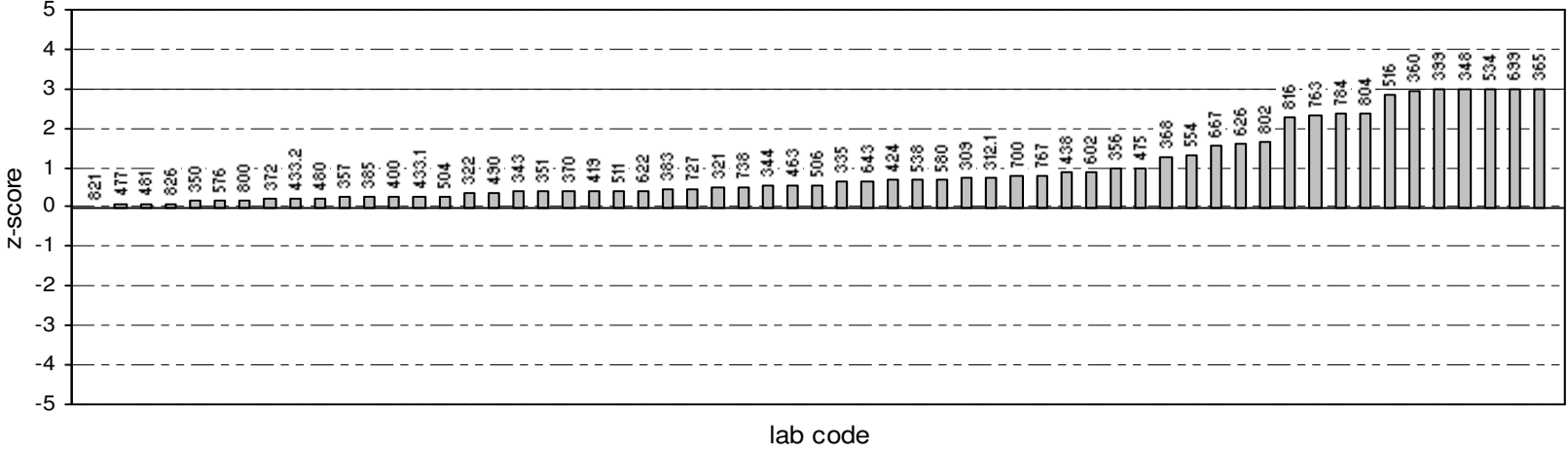
Calcium - N196

Ordered Robust Z-Score Charts

Calcium - N196 - Robust Z-Scores



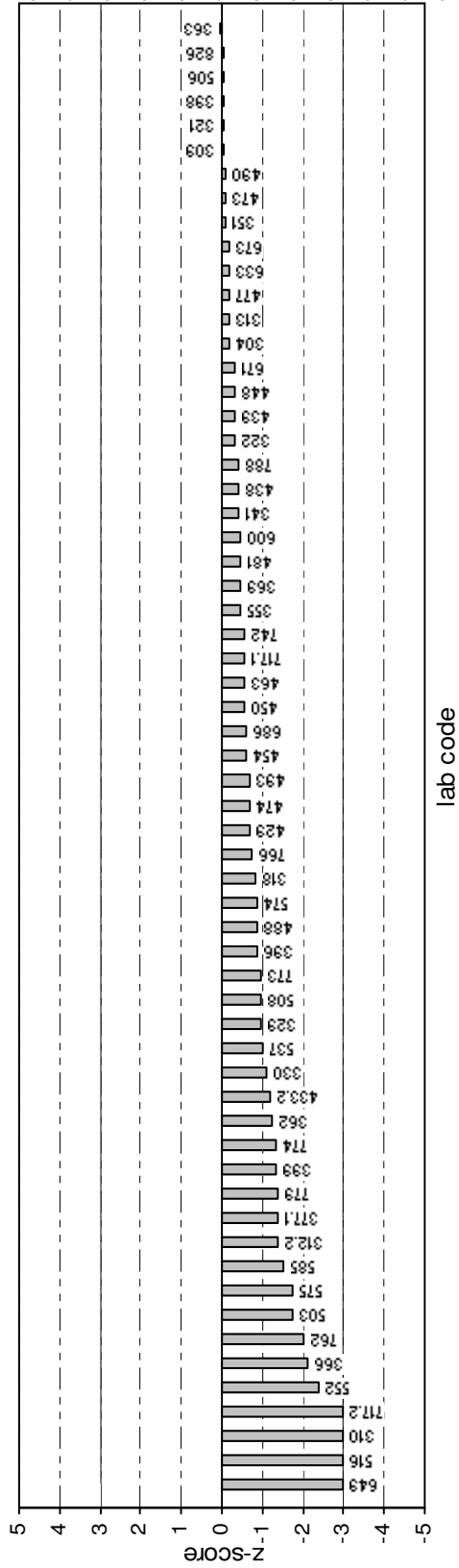
Robust Z-Scores



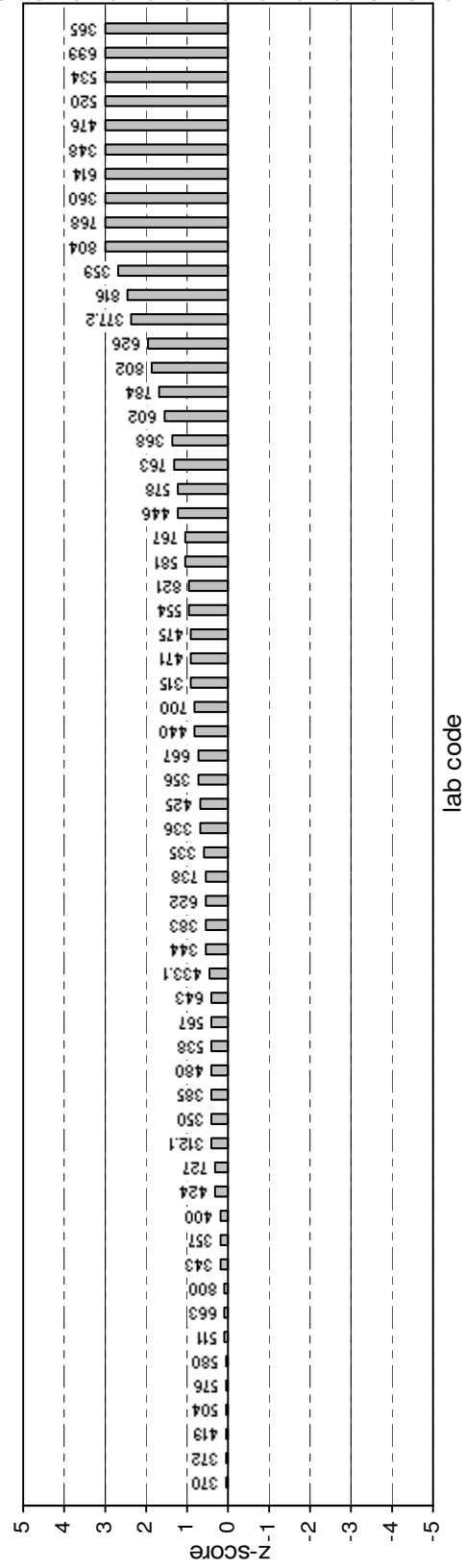
Calcium - N197

Ordered Robust Z-Score Charts

Calcium - N197 - Robust Z-Scores



Robust Z-Scores



Magnesium (Mg)**Results by Laboratory Code**

Lab Code	N194			N195			N196			N197			Method Code ³
	Result ± MU ¹ (mg/L)		Robust z-score ²	Result ± MU ¹ (mg/L)		Robust z-score ²	Result ± MU ¹ (mg/L)		Robust z-score ²	Result ± MU ¹ (mg/L)		Robust z-score ²	
304	16.6	± 3.3	-0.12	22.4	± 4.5	0.31	1.70	± 0.34	0.25	1.70	± 0.34	0.40	10
309	18.2		1.84	24.9		2.91	1.79		1.01	1.66		-0.13	3
310	16.4	± 0.3	-0.37	21.7	± 0.3	-0.42	1.81	± 0.20	1.18	1.78	± 0.20	1.48	1
312.1	17.6	± 0.0760	1.10	23.7	± 0.0760	1.66	1.76	± 0.0760	0.76	1.76	± 0.0760	1.21	10
312.2	15.2		-1.84	21.1		-1.04	1.59		-0.67	1.58		-1.21	10
313	16.5		-0.25	22.0		-0.10	1.67		0.00	1.65		-0.27	
315	16.5	± 1.05	-0.25	20.8	± 1.33	-1.35	1.59	± 0.10	-0.67	1.62	± 0.10	-0.67	1
318	16.0	± 1.6	-0.86	21.2	± 2.1	-0.93	1.50	± 0.15	-1.43	1.62	± 0.16	-0.67	1
321	17.9		1.47	23.3		1.25	1.85		1.52	1.83		2.16	3
322	17.5	± 1.9	0.98	23.4	± 2.5	1.35	1.74	± 0.2	0.59	1.74	± 0.2	0.94	3
329	16.6		-0.12	22.0		-0.10	1.62		-0.42	1.61		-0.81	3
330	16.1	± 4.50	-0.74	21.8	± 6.1	-0.31	1.57	± 0.44	-0.84	1.54	± 0.43	-1.75	10
335	17.5	± 0.2	0.98	22.9	± 0.2	0.83	1.82	± 0.1	1.26	1.80	± 0.1	1.75	
336	*	*		*	*		*	*		*	*		*
341	16.1	± 0.161	-0.74	21.6	± 0.216	-0.52	1.65	± 0.165	-0.17	1.67	± 0.167	0.00	1
343	16.4	± 2.0	-0.37	22.2	± 2.7	0.10	1.60	± 0.19	-0.59	1.64	± 0.20	-0.40	3
344	16.2	± 1.62	-0.61	21.9	± 2.19	-0.21	1.67	± 0.17	0.00	1.69	± 0.17	0.27	3
348	20.7		4.91 §	26.6		4.67 §	1.98		2.61	1.98		4.18 §	3
350	17.6	± 1.4	1.10	22.9	± 1.8	0.83	1.69	± 0.14	0.17	1.72	± 0.14	0.67	3

Magnesium (Mg)

Results by Laboratory Code

Lab Code	N194			N195			N196			N197			Method Code ³
	Result \pm MU ¹ (mg/L)		Robust z-score ²	Result \pm MU ¹ (mg/L)		Robust z-score ²	Result \pm MU ¹ (mg/L)		Robust z-score ²	Result \pm MU ¹ (mg/L)		Robust z-score ²	
351	17.1	\pm 0.52	0.49	22.9	\pm 0.70	0.83	1.75	\pm 0.06	0.67	1.73	\pm 0.06	0.81	3
355	16.0	\pm 0.10	-0.86	21.5	\pm 0.10	-0.62	1.62	\pm 0.10	-0.42	1.66	\pm 0.10	-0.13	3
356	16.8		0.12	21.2		-0.93	1.67		0.00	1.67		0.00	3
357	15.6	\pm 0.010	-1.35	22.2	\pm 0.010	0.10	1.72	\pm 0.010	0.42	1.72	\pm 0.010	0.67	1
359	18.2		1.84	23.6		1.56	1.61		-0.51	1.63		-0.54	10
360	17.7	\pm 2.00	1.23	20.9	\pm 2.4	-1.25	1.47	\pm 0.2	-1.69	1.65	\pm 0.2	-0.27	1
362	23.8	\pm 2.4	8.71 §	32.1	\pm 3.2	10.38 §	2.33	\pm 0.23	5.56 §	2.33	\pm 0.23	8.90 §	1
363	16.8	\pm 1.8	0.12	20.7	\pm 2.2	-1.45	1.54	\pm 0.25	-1.10	1.55	\pm 0.26	-1.62	3
365	14.4	\pm 3.1	-2.82	20.5	\pm 4.2	-1.66	1.28	\pm 0.39	-3.29 §	1.28	\pm 0.39	-5.26 §	1
366	16.4		-0.37	21.7		-0.42	1.49		-1.52	1.53		-1.89	3
368	17.5	\pm 0.9	0.98	22.9	\pm 1.1	0.83	1.87	\pm 0.09	1.69	1.82	\pm 0.09	2.02	3
369	16.6		-0.12	22.1		0.00	1.68		0.08	1.65		-0.27	3
370	17.0	\pm 0.4	0.37	22.7	\pm 0.5	0.62	1.72	\pm 0.05	0.42	1.65	\pm 0.05	-0.27	3
372	16.7	\pm 2.2	0.00	22.0	\pm 2.9	-0.10	1.64	\pm 0.24	-0.25	1.66	\pm 0.24	-0.13	3
373	15.9	\pm 0.8	-0.98	21.2	\pm 1.1	-0.93	1.60	\pm 0.08	-0.59	1.60	\pm 0.08	-0.94	3
377.1	16.0	\pm 1.20	-0.86	16.2	\pm 1.20	-6.12 §	1.80	\pm 0.14	1.10	1.81	\pm 0.14	1.89	1
377.2	17.0	\pm 1.00	0.37	22.1	\pm 1.30	0.00	1.56	\pm 0.09	-0.93	1.43	\pm 0.08	-3.24 §	6
383	16.3	\pm 0.9	-0.49	22.0	\pm 1.1	-0.10	1.63	\pm 0.09	-0.34	1.63	\pm 0.09	-0.54	1
385	16.5	\pm 1.09	-0.25	22.5	\pm 1.49	0.42	1.70	\pm 0.09	0.25	1.70	\pm 0.09	0.40	10

Magnesium (Mg)**Results by Laboratory Code**

Lab Code	N194		N195		N196		N197		Method Code ³
	Result ± MU ¹ (mg/L)	Robust z-score ²	Result ± MU ¹ (mg/L)	Robust z-score ²	Result ± MU ¹ (mg/L)	Robust z-score ²	Result ± MU ¹ (mg/L)	Robust z-score ²	
396	16.6	-0.12	21.9	-0.21	1.64	-0.25	1.61	-0.81	3
398	16.9	0.25	22.0	-0.10	1.68	0.08	1.69	0.27	1
399	18.0	1.59	23.9	1.87	1.75	0.67	1.77	1.35	3
400	16.6	-0.12	21.5	-0.62	1.66	-0.08	1.64	-0.40	1
416									
419	16.9 ± 1.6	0.25	21.9 ± 2.1	-0.21	1.76 ± 0.17	0.76	1.69 ± 0.16	0.27	3
424	16.5 ± 1.6	-0.25	21.4 ± 2.1	-0.73	1.61 ± 0.2	-0.51	1.60 ± 0.2	-0.94	3
425	17.0 ± 1.18	0.37	22.8 ± 1.57	0.73	1.71 ± 0.13	0.34	1.76 ± 0.28	1.21	
429	16.6 ± 0.1	-0.12	21.9 ± 0.1	-0.21	1.68 ± 0.02	0.08	1.66 ± 0.02	-0.13	2
433.1	17.6 ± 0.810	1.10	22.8 ± 1.05	0.73	1.72 ± 0.079	0.42	1.72 ± 0.079	0.67	10
433.2	16.3 ± 0.815	-0.49	22.5 ± 1.125	0.42	1.72 ± 0.086	0.42	1.64 ± 0.082	-0.40	3
438	17.0 ± 0.60	0.37	22.5 ± 0.8	0.42	1.84 ± 0.1	1.43	1.68 ± 0.1	0.13	3
439	16.8	0.12	22.1	0.00	1.72	0.42	1.66	-0.13	
440	16.9 ± 1.00	0.25	22.4 ± 1.34	0.31	1.80 ± 0.11	1.10	1.77 ± 0.11	1.35	2
446	10.2 ± 1	-7.97 §	16.5 ± 1	-5.81 §	<1 ± 1		1.7 ± 1	0.40	6
448	16.0 ± 0.1	-0.86	20.9 ± 0.1	-1.25	1.58 ± 0.01	-0.76	1.63 ± 0.01	-0.54	3
450	15.8	-1.10	20.6	-1.56	1.53	-1.18	1.58	-1.21	
454	16.2 ± 0.50	-0.61	21.5 ± 0.7	-0.62	1.60 ± 0.05	-0.59	1.60 ± 0.05	-0.94	3
463	16.8 ± 3.4	0.12	22.8 ± 4.6	0.73	1.84 ± 0.37	1.43	1.72 ± 0.34	0.67	3
471	17.4 ± 0.9	0.86	23.0 ± 1.2	0.93	1.75 ± 0.1	0.67	1.85 ± 0.1	2.43	3

Magnesium (Mg)**Results by Laboratory Code**

Lab Code	N194		N195		N196		N197		Method Code ³
	Result ± MU ¹ (mg/L)	Robust z-score ²	Result ± MU ¹ (mg/L)	Robust z-score ²	Result ± MU ¹ (mg/L)	Robust z-score ²	Result ± MU ¹ (mg/L)	Robust z-score ²	
473	16.8	0.12	22.2	0.10	1.68	0.08	1.68	0.13	3
474	16.9 ± 1.7	0.25	22.3 ± 2.2	0.21	1.66 ± 0.17	-0.08	1.67 ± 0.17	0.00	3
475	16.7 ± 0.6	0.00	21.9 ± 0.7	-0.21	1.72 ± 0.06	0.42	1.69 ± 0.56	0.27	3
476	16.4 ± 0.94	-0.37	21.5 ± 1.26	-0.62	1.45 ± 0.08	-1.85	1.62 ± 0.09	-0.67	1
477	16.5 ± 0.23	-0.25	22.1 ± 0.35	0.00	1.65 ± 0.02	-0.17	1.63 ± 0.02	-0.54	3
480	17.1 ± 0.1	0.49	23.2 ± 0.10	1.14	1.67 ± 0.01	0.00	1.67 ± 0.01	0.00	1
481	16.8 ± 0.70	0.12	22.0 ± 0.43	-0.10	1.71 ± 0.21	0.34	1.69 ± 0.21	0.27	10
488	17.5	0.98	23.0	0.93	1.68	0.08	1.66	-0.13	3
490	16.8 ± 1.72	0.12	22.1 ± 2.36	0.00	1.77 ± 0.19	0.84	1.69 ± 0.18	0.27	3
493	15.2	-1.84	20.6	-1.56	1.10	-4.81 §	1.00	-9.04 §	2
500									
503	19.6	3.56 §	19.6	-2.59	1.61	-0.51	1.73	0.81	1
504	15.9 ± 2.5	-0.98	21.3 ± 3.2	-0.83	1.71 ± 0.26	0.34	1.66 ± 0.25	-0.13	10
506	16.6 ± 0.49	-0.12	22.3 ± 0.49	0.21	1.71 ± 0.04	0.34	1.64 ± 0.04	-0.40	3
508	16.7 ± 1.3	0.00	22.1 ± 1.8	0.00	1.64 ± 0.13	-0.25	1.70 ± 0.14	0.40	3
511	16.7 ± 1.7	0.00	22.0 ± 2.2	-0.10	1.72 ± 0.2	0.42	1.69 ± 0.2	0.27	10
516	16.3 ± 1.15	-0.49	21.8 ± 1.53	-0.31	1.9 ± 0.13	1.94	1.6 ± 0.11	-0.94	1
520	14.3 ± 2.05	-2.94	20.7 ± 2.05	-1.45	1.56 ± 2.05	-0.93	1.61 ± 2.05	-0.81	1
534	18.1 ± 2.2	1.72	24.0 ± 2.9	1.97	1.9 ± 0.23	1.94	1.90 ± 0.23	3.10 §	4
537	15.5 ± 3.57	-1.47	21.1 ± 4.85	-1.04	1.10 ± 0.25	-4.81 §	1.48 ± 0.34	-2.56	1

Magnesium (Mg)**Results by Laboratory Code**

Lab Code	N194		N195		N196		N197		Method Code ³
	Result ± MU ¹ (mg/L)	Robust z-score ²	Result ± MU ¹ (mg/L)	Robust z-score ²	Result ± MU ¹ (mg/L)	Robust z-score ²	Result ± MU ¹ (mg/L)	Robust z-score ²	
538	21.6 ± 2	6.01 \$	28.9 ± 3	7.06 \$	2.22 ± 0.2	4.64 \$	2.16 ± 0.2	6.61 \$	3
552	17.7	1.23	23.7	1.66	1.79	1.01	1.72	0.67	3
554	14.8	-2.33	20.0	-2.18	1.56	-0.93	1.54	-1.75	M8
567	16.9 ± 0.76	0.25	22.9 ± 1.04	0.83	1.70 ± 0.08	0.25	1.70 ± 0.08	0.40	1
574	18.3 ± 1.0	1.96	23.9 ± 1.0	1.87	0.84 ± 0.05	-7.00 \$	1.68 ± 0.05	0.13	1
575	12.7	-4.91 \$	17.2	-5.08 \$	1.42	-2.11	1.43	-3.24 \$	3
576	17.0 ± 0.1	0.37	22.8 ± 0.2	0.73	1.74 ± 0.03	0.59	1.74 ± 0.05	0.94	3120B
578	16.5 ± 1.32	-0.25	22.0 ± 1.76	-0.10	1.75 ± 0.14	0.67	1.75 ± 0.14	1.08	1
580	16.3 ± 0.95	-0.49	22.1 ± 1.28	0.00	1.79 ± 0.11	1.01	1.73 ± 0.11	0.81	3120B
581	15.1 ± 1.1	-1.96	22.6 ± 1.4	0.52	1.48 ± 0.11	-1.60	1.49 ± 0.11	-2.43	1
585	17.5 ± 1.0	0.98	22.1 ± 1.0	0.00	1.37 ± 1.0	-2.53	1.34 ± 1.0	-4.45 \$	1
600	17.1 ± 1.7	0.49	22.0 ± 2.2	-0.10	1.61 ± 0.21	-0.51	1.61 ± 0.21	-0.81	1
602	16.7 ± 2.0	0.00	22.8 ± 2.8	0.73	1.70 ± 0.21	0.25	1.73 ± 0.21	0.81	3
614	18.0	1.59	23.9	1.87	0.58	-9.19 \$	1.70	0.40	1
622	16.8 ± 0.2	0.12	22.1 ± 0.5	0.00	1.66 ± 0.02	-0.08	1.68 ± 0.02	0.13	3
626	16.5	-0.25	20.6	-1.56	1.57	-0.84	1.64	-0.40	3
633	16.3 ± 0.15	-0.49	21.8 ± 0.15	-0.31	1.63 ± 0.15	-0.34	1.63 ± 0.15	-0.54	3
643	16.9	0.25	5.38	-17.35 \$	1.08	-4.97 \$	1.01	-8.90 \$	
649	21.6	6.01 \$	26.2	4.25 \$	2.67	8.43 \$	2.99	17.81 \$	6
663	16.7 ± 2.3	0.00	22.2 ± 3.1	0.10	1.61 ± 0.23	-0.51	1.63 ± 0.23	-0.54	3

Magnesium (Mg)**Results by Laboratory Code**

Lab Code	N194			N195			N196			N197			Method Code ³	
	Result ± MU ¹ (mg/L)		Robust z-score ²	Result ± MU ¹ (mg/L)		Robust z-score ²	Result ± MU ¹ (mg/L)		Robust z-score ²	Result ± MU ¹ (mg/L)		Robust z-score ²		
666	15.91		-0.97	23.2		1.18	1.56		-0.93	0.749		-12.42	\$	10
667	17.6		1.10	23.1		1.04	1.81		1.18	1.76		1.21		3
671	16.9		0.25	22.2		0.10	1.62		-0.42	1.66		-0.13		1
673														
686	16.5	± 3.3	-0.25	21.4	± 4.3	-0.73	1.61	± 0.32	-0.51	1.64	± 0.33	-0.40		3
699	21.97	± 0.1225	6.46 \$	21.34	± 0.1225	-0.79	3.12	± 0.1225	12.23 \$	3.44	± 0.1225	23.88 \$		3
700	16.3	± 1.5	-0.49	21.5	± 1.5	-0.62	1.65	± 0.32	-0.17	1.68	± 0.32	0.13		
717.1	16.5		-0.25	22.1		0.00	1.38		-2.45	1.58		-1.21		1
717.2	16.6		-0.12	24.2		2.18	0.95		-6.07 \$	1.90		3.10 \$		6
727	16.6	± 0.3	-0.12	22.2	± 0.4	0.10	1.70	± 0.1	0.25	1.66	± 0.1	-0.13		3
738	16.6	± 0.4	-0.12	22.1	± 0.6	0.00	1.66	± 0.05	-0.08	1.64	± 0.05	-0.40		3
742	17.5	± 2.0	0.98	23.0	± 1.0	0.93	1.67	± 0.2	0.00	1.65	± 0.1	-0.27		1
762	18.6		2.33	24.5		2.49	0.52		-9.70 \$	1.93		3.51 \$		APHA3(1)
763	17.40	± 0.87	0.86	22.95	± 1.15	0.88	2.15	± 0.11	4.05 \$	2.14	± 0.11	6.34 \$		3
766	15.5	± 3.1	-1.47	22.8	± 4.6	0.73	1.56	± 0.31	-0.93	1.62	± 0.32	-0.67		3
767	16.5	± 1.0	-0.25	21.9	± 1.0	-0.21	1.69	± 1.02	0.17	1.76	± 1.02	1.21		3
768	17.0	± 0.098	0.37	23.0	± 0.098	0.93	1.70	± 0.098	0.25	1.70	± 0.098	0.40		
773	16.4	± 0.75	-0.37	21.3	± 0.75	-0.83	0.59	± 0.1	-9.11 \$	1.63	± 0.2	-0.54		
774	17.8	± 9.80	1.35	23.7	± 13.0	1.66	1.75	± 0.9	0.67	1.83	± 10	2.16		3
779	16.1	± 0.32	-0.74	21.9	± 0.44	-0.21	1.29	± 0.03	-3.20 \$	1.27	± 0.02	-5.40 \$		3

Magnesium (Mg)

Results by Laboratory Code

Lab Code	N194		N195		N196		N197		Method Code ³
	Result ± MU ¹ (mg/L)	Robust z-score ²	Result ± MU ¹ (mg/L)	Robust z-score ²	Result ± MU ¹ (mg/L)	Robust z-score ²	Result ± MU ¹ (mg/L)	Robust z-score ²	
784									
788	18.3	1.96	23.5	1.45	1.77	0.84	1.81	1.89	1
800	17.0	0.37	22.9	0.83	1.63	-0.34	1.61	-0.81	3
802	20.8 ± 0.01	5.03 §	27.4 ± 0.01	5.50 §	2.18 ± 0.01	4.30 §	2.15 ± 0.01	6.48 §	3
804	19.3 ± 3.8	3.19 §	25.1 ± 3.8	3.11 §	1.92 ± 3.8	2.11	2.00 ± 3.8	4.45 §	3
816	19.4 ± 0.1	3.31 §	25.3 ± 0.3	3.32 §	1.94 ± 0.06	2.28	1.91 ± 0.05	3.24 §	4
817									
821	16.7 ± 1.67	0.00	21.9 ± 2.19	-0.21	1.55 ± 0.15	-1.01	1.71 ± 0.17	0.54	3
826	17.1 ± 0.25	0.49	22.7 ± 0.40	0.62	1.68 ± 0.16	0.08	1.70 ± 0.16	0.40	3

No of Results:

123

122

122

122

Median:

16.70

22.10

1.670

1.670

Normalised IQR:

0.82

0.96

0.119

0.074

Robust CV:

4.9%

4.4%

7.1%

4.4%

Minimum:

10.20

5.38

0.520

0.749

Maximum:

23.80

32.10

3.120

3.440

Range:

13.60

26.72

2.600

2.691

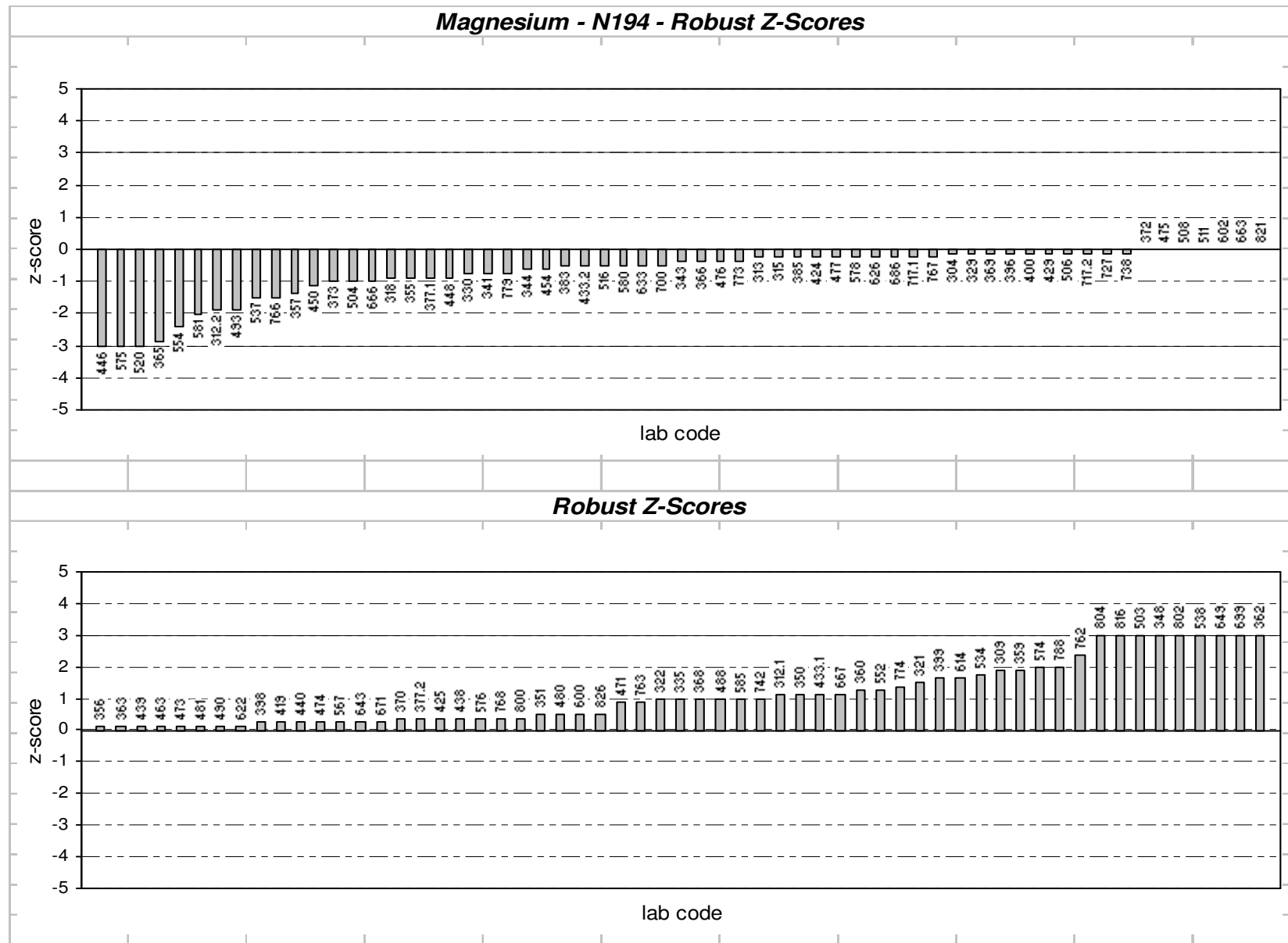
¹ Where reported, results are shown with their corresponding measurement uncertainty (MU).

² "§"s denote outliers (i.e. those results for which $|z\text{-score}| > 3$). Robust $z\text{-scores}$ 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 and digestion code descriptions.

Magnesium - N194

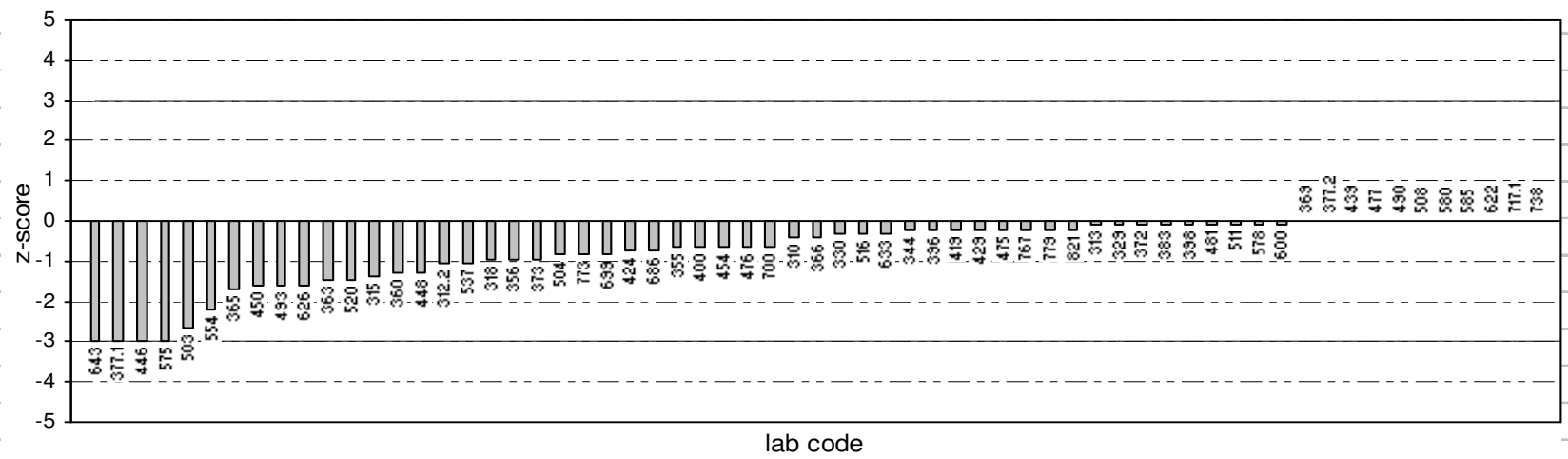
Ordered Robust Z-Score Charts



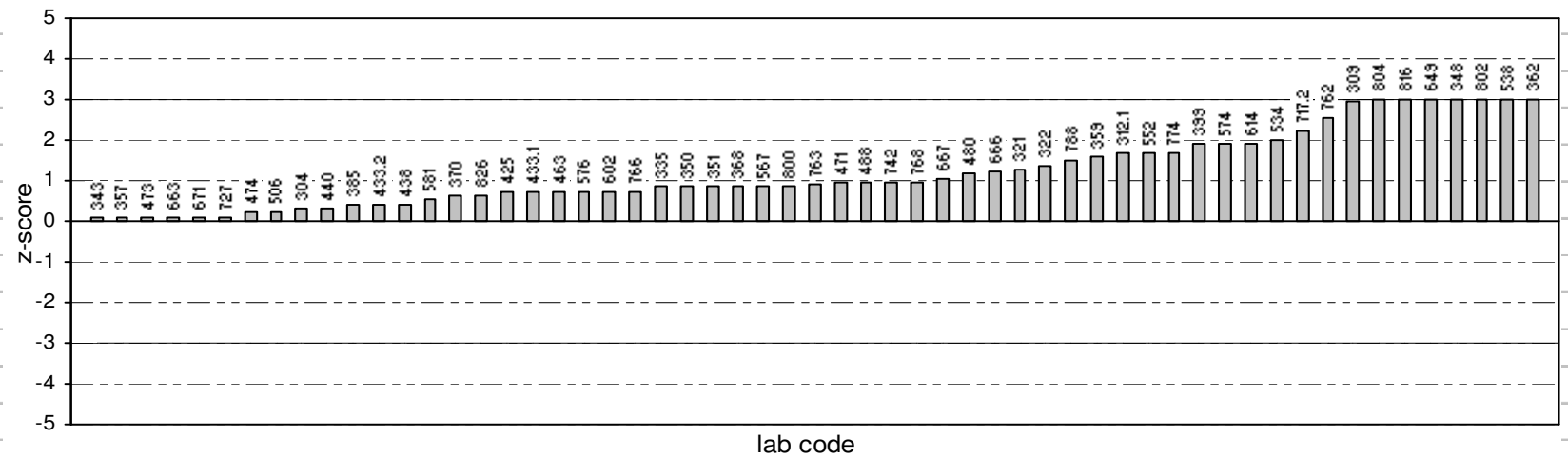
Magnesium - N195

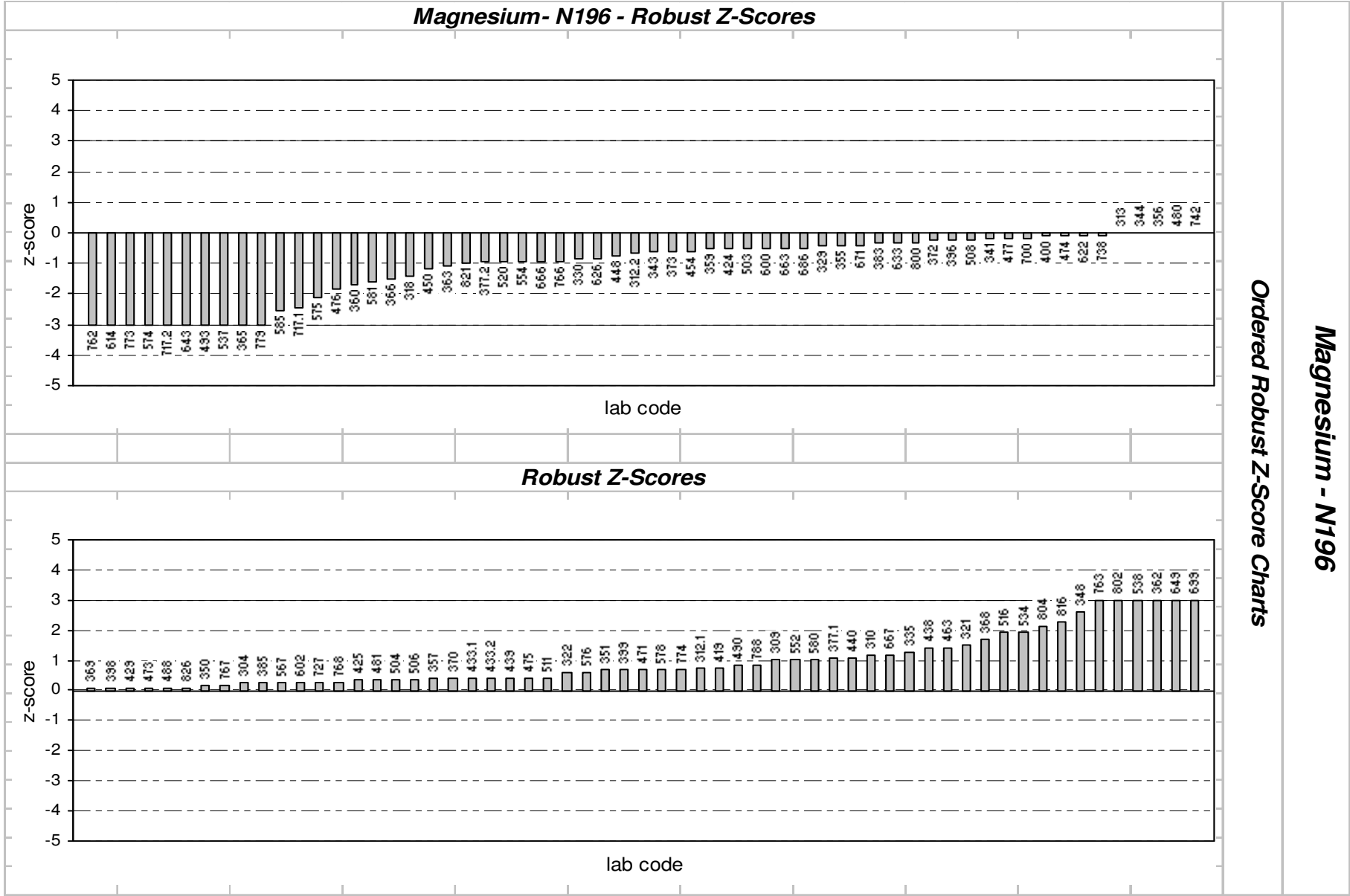
Ordered Robust Z-Score Charts

Magnesium - N195 - Robust Z-Scores



Robust Z-Scores

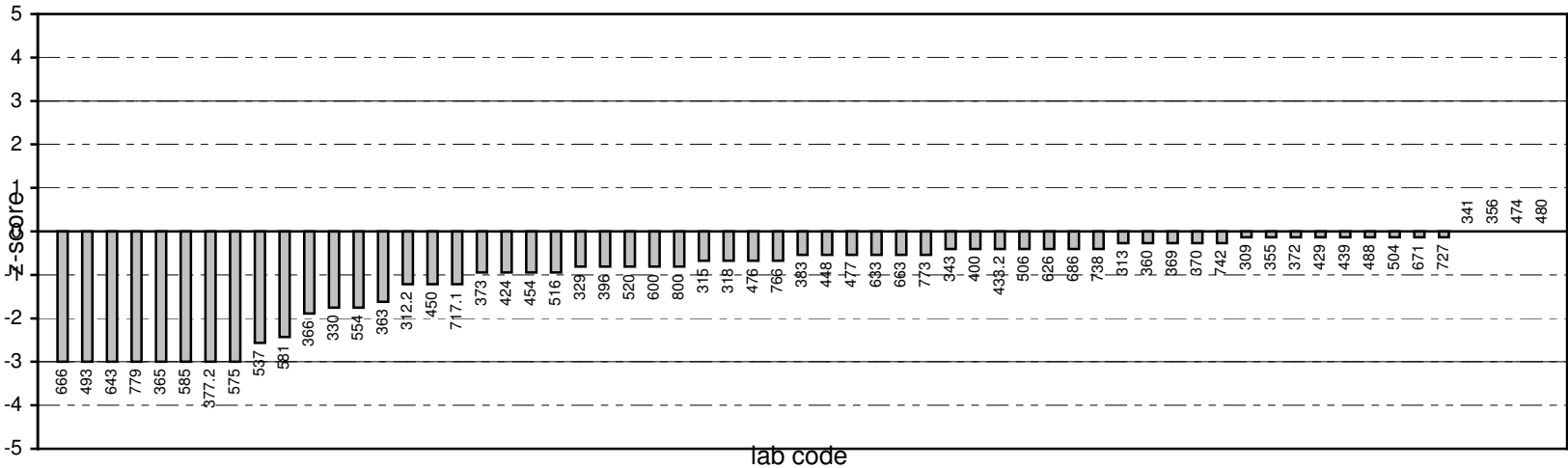




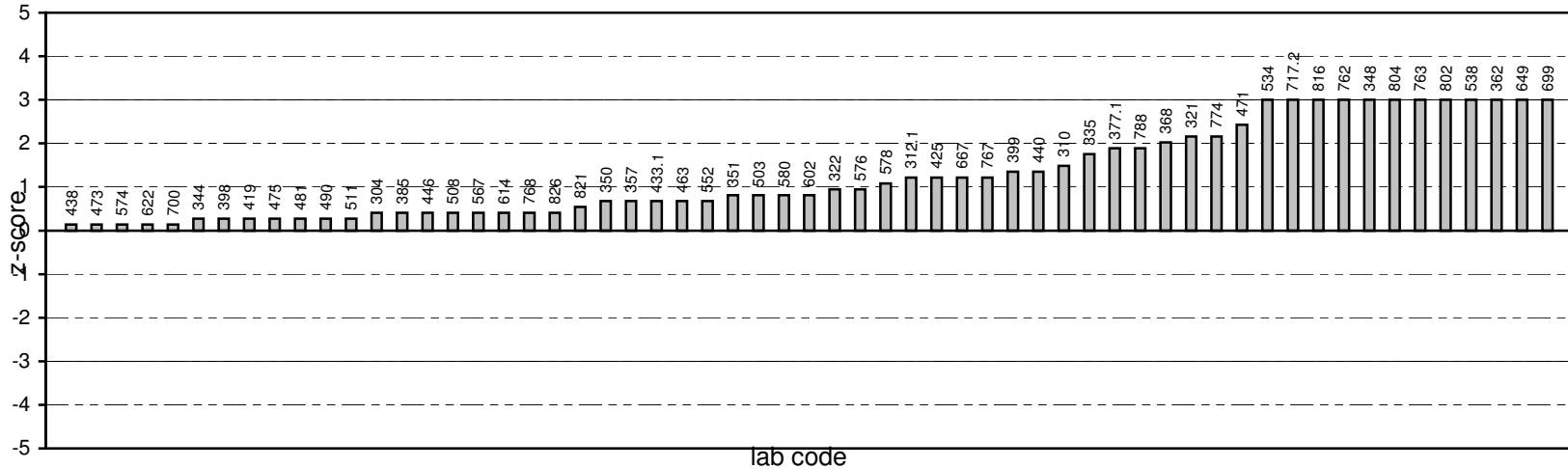
Ordered Robust Z-Score Charts

Magnesium - N196

Magnesium - N197 - Robust Z-Scores



Robust Z-Scores



Ordered Robust Z-Score Charts

Magnesium - N197

Potassium (K)**Results by Laboratory Code**

Lab Code	N194			N195			N196			N197			Method Code ³
	Result ± MU ¹ (mg/L)		Robust z-score ²	Result ± MU ¹ (mg/L)		Robust z-score ²	Result ± MU ¹ (mg/L)		Robust z-score ²	Result ± MU ¹ (mg/L)		Robust z-score ²	
304	4.70	± 0.9	0.59	5.60	± 1.1	0.00	1.50	± 0.3	3.42 §	1.40	± 0.3	2.70	10
309	3.99		-2.02	5.00		-1.76	1.10		-0.43	1.14		0.15	3
310	4.49	± 0.5	-0.18	5.5	± 0.5	-0.29	1.45	± 0.5	2.94	1.21	± 0.5	0.83	1
312.1	4.58	± 0.718	0.15	5.8	± 0.718	0.59	1.23	± 0.0718	0.82	1.12	± 0.0718	-0.05	10
312.2	4.28		-0.95	5.5		-0.29	0.97		-1.69	0.99		-1.32	10
313	4.55		0.04	5.7		0.29	1.14		-0.05	1.12		-0.05	
315	4.63	± 0.62	0.33	7.5	± 1.00	5.57 §	1.00	± 0.13	-1.40	1.00	± 0.13	-1.23	1
318	4.54	± 0.45	0.00	5.6	± 0.56	0.00	1.14	± 0.11	-0.05	1.13	± 0.11	0.05	1
321	4.62		0.29	5.8		0.59	1.18		0.34	1.18		0.54	3
322	4.4	± 0.6	-0.51	5.3	± 0.7	-0.88	1.02	± 0.1	-1.20	1.00	± 0.1	-1.23	3
329	4.56		0.07	5.6		0.00	1.07		-0.72	1.07		-0.54	3
330	4.75	± 0.95	0.77	5.97	± 1.20	1.09	1.05	± 0.21	-0.92	1.08	± 0.22	-0.44	10
335	4.35	± 0.1	-0.70	5.6	± 0.1	0.00	1.17	± 0.1	0.24	1.09	± 0.1	-0.34	
336	*	*		*	*		*	*		*	*		*
341	4.37	± 0.437	-0.62	5.8	± 0.58	0.59	1.07	± 0.107	-0.72	1.08	± 0.108	-0.44	1
343	4.78	± 0.52	0.88	5.9	± 0.6	0.88	1.19	± 0.13	0.43	1.20	± 0.13	0.74	3
344	4.65	± 0.56	0.40	5.7	± 0.68	0.29	1.18	± 0.14	0.34	1.19	± 0.14	0.64	3
348	4.42		-0.44	5.01		-1.73	1.25		1.01	1.03		-0.93	3
350	4.70	± 0.4	0.59	5.8	± 0.5	0.59	1.32	± 0.11	1.69	1.18	± 0.09	0.54	3

Potassium (K)**Results by Laboratory Code**

Lab Code	N194			N195			N196			N197			Method Code ³
	Result ± MU ¹ (mg/L)		Robust z-score ²	Result ± MU ¹ (mg/L)		Robust z-score ²	Result ± MU ¹ (mg/L)		Robust z-score ²	Result ± MU ¹ (mg/L)		Robust z-score ²	
351	4.57	± 0.26	0.11	5.83	± 0.31	0.67	1.22	± 0.10	0.72	1.16	± 0.10	0.34	3
355	4.32	± 0.12	-0.81	5.39	± 0.12	-0.62	1.16	± 0.12	0.14	1.16	± 0.12	0.34	3
356	4.75		0.77	5.81		0.62	1.10		-0.43	1.02		-1.03	3
357	4.42	± 0.011	-0.44	5.44	± 0.011	-0.47	1.14	± 0.011	-0.05	1.10	± 0.011	-0.25	1
359	3.56		-3.60	4.64		-2.82	0.98		-1.59	1.02		-1.03	10
360	5.7	± 0.6	4.26	6.3	± 0.7	2.05	2.93	± 0.3	17.20	2.91	± 0.3	17.51	1
362	4.29	± 0.43	-0.92	5.5	± 0.6	-0.29	1.20	± 0.12	0.53	1.00	± 0.10	-1.23	1
363	4.62	± 0.56	0.29	5.72	± 0.67	0.35	1.14	± 0.12	-0.05	1.16	± 0.22	0.34	3
365	6.0	± 1.5	5.36	6.5	± 1.6	2.64	2.70	± 0.74	14.98	3.79	± 0.99	26.15	1
366	4.43		-0.40	5.41		-0.56	1.20		0.53	1.00		-1.23	3
368	4.77	± 0.24	0.84	5.9	± 0.3	0.88	1.65	± 0.08	4.87	1.50	± 0.08	3.68	1
369	4.67		0.48	5.8		0.59	1.16		0.14	1.14		0.15	3
370	4.30	± 0.15	-0.88	5.4	± 0.2	-0.59	1.09	± 0.03	-0.53	1.07	± 0.02	-0.54	3
372	4.71	± 0.36	0.62	5.8	± 0.4	0.59	1.17	± 0.017	0.24	1.16	± 0.17	0.34	3
373	4.44	± 0.22	-0.37	5.6	± 0.3	0.00	1.12	± 0.06	-0.24	1.12	± 0.06	-0.05	3
377.1	5.20	± 0.21	2.42	6.43	± 0.26	2.43	1.28	± 0.05	1.30	1.32	± 0.05	1.91	7
377.2													
383	4.37	± 0.22	-0.62	5.6	± 0.3	0.00	1.12	± 0.06	-0.24	1.14	± 0.06	0.15	1
385	4.37	± 0.40	-0.62	5.44	± 0.51	-0.47	1.00	± 0.09	-1.40	1.00	± 0.09	-1.23	10

Potassium (K)**Results by Laboratory Code**

Lab Code	N194		N195		N196		N197		Method Code ³
	Result ± MU ¹ (mg/L)	Robust z-score ²	Result ± MU ¹ (mg/L)	Robust z-score ²	Result ± MU ¹ (mg/L)	Robust z-score ²	Result ± MU ¹ (mg/L)	Robust z-score ²	
396	4.35	-0.70	5.42	-0.53	1.06	-0.82	1.04	-0.83	3
398	4.67	0.48	5.66	0.18	1.14	-0.05	1.10	-0.25	1
399	4.25	-1.06	5.3	-0.88	1.09	-0.53	1.00	-1.23	3
400	4.5	-0.15	5.9	0.88	1.10	-0.43	1.10	-0.25	7
416	4.17	-1.36	5.1	-1.47	0.93	-2.07	1.00	-1.23	1
419	4.72 ± 0.28	0.66	5.7 ± 0.3	0.29	1.19 ± 0.07	0.43	1.18 ± 0.07	0.54	3
424	4.42 ± 0.4	-0.44	5.38 ± 0.5	-0.65	1.16 ± 0.1	0.14	1.05 ± 0.1	-0.74	3
425	4.77 ± 0.34	0.84	6.1 ± 0.43	1.47	1.30 ± 0.25	1.49	1.19 ± 0.10	0.64	
429	4.69 ± 0.05	0.55	5.6 ± 0.05	0.00	1.09 ± 0.02	-0.53	1.11 ± 0.02	-0.15	1
433.1	4.78 ± 0.100	0.88	5.53 ± 0.116	-0.21	1.15 ± 0.024	0.05	1.17 ± 0.025	0.44	10
433.2	4.53 ± 0.227	-0.04	5.91 ± 0.296	0.91	1.18 ± 0.059	0.34	1.11 ± 0.056	-0.15	3
438	4.34 ± 0.2	-0.73	5.5 ± 0.2	-0.29	1.26 ± 0.1	1.11	1.15 ± 0.1	0.25	3
439	4.32	-0.81	5.5	-0.29	1.10	-0.43	0.99	-1.32	
440	4.34 ± 0.26	-0.73	5.6 ± 0.34	0.00	1.11 ± 0.07	-0.34	1.13 ± 0.07	0.05	1
446									
448	3.94 ± 0.02	-2.20	4.80 ± 0.02	-2.35	1.30 ± 0.02	1.49	0.84 ± 0.02	-2.80	3
450	5.4	3.16 §	6.3	2.05	1.46	3.04 §	1.21	0.83	
454	4.44 ± 0.7	-0.37	5.53 ± 0.8	-0.21	1.12 ± 0.16	-0.24	1.08 ± 0.16	-0.44	3
463	4.71 ± 0.94	0.62	6.08 ± 1.2	1.41	1.21 ± 0.24	0.63	1.00 ± 0.20	-1.23	3
471	4.15	-1.43	5.1	-1.47	0.9	-2.36	2.2	10.55 §	1

Potassium (K)**Results by Laboratory Code**

Lab Code	N194			N195			N196			N197			Method Code ³
	Result \pm MU ¹ (mg/L)		Robust z-score ²	Result \pm MU ¹ (mg/L)		Robust z-score ²	Result \pm MU ¹ (mg/L)		Robust z-score ²	Result \pm MU ¹ (mg/L)		Robust z-score ²	
473	4.41		-0.48	5.6		0.00	1.10		-0.43	1.12		-0.05	3
474	4.98	\pm 0.50	1.62	6.1	\pm 0.60	1.47	1.48	\pm 0.15	3.23 §	1.23	\pm 0.12	1.03	3
475	4.57	\pm 0.20	0.11	5.6	\pm 0.2	0.00	1.19	\pm 0.05	0.43	1.14	\pm 0.05	0.15	3
476	4.33	\pm 0.16	-0.77	5.4	\pm 0.2	-0.59	1.06	\pm 0.04	-0.82	1.06	\pm 0.04	-0.64	1
477	4.24	\pm 0.08	-1.10	5.4	\pm 0.17	-0.59	1.04	\pm 0.03	-1.01	1.04	\pm 0.03	-0.83	3
480	4.44	\pm 0.08	-0.37	5.5	\pm 0.1	-0.29	1.15	\pm 0.14	0.05	1.08	\pm 0.01	-0.44	1
481	4.35	\pm 0.50	-0.70	5.34	\pm 0.49	-0.76	1.10	\pm 0.20	-0.43	1.05	\pm 0.20	-0.74	10
488	4.45		-0.33	5.7		0.29	1.13		-0.14	1.13		0.05	3
490	4.73	\pm 0.70	0.70	5.8	\pm 0.82	0.59	1.16	\pm 0.24	0.14	1.03	\pm 0.20	-0.93	3
493	4.30		-0.88	5.4		-0.59	1.06		-0.82	1.09		-0.34	1
500	5.0	\pm 1.4	1.69	6.0	\pm 1.6	1.17	0.99	\pm 0.3	-1.49	1.11	\pm 0.3	-0.15	1
503	4.93		1.43	5.9		0.88	1.44		2.84	1.61		4.76 §	1
504	4.41	\pm 0.75	-0.48	5.6	\pm 0.9	0.00	1.20	\pm 0.20	0.53	1.20	\pm 0.20	0.74	10
506	4.73	\pm 0.54	0.70	5.9	\pm 0.54	0.88	1.21	\pm 0.13	0.63	1.21	\pm 0.13	0.83	3
508	4.78	\pm 0.24	0.88	6.0	\pm 0.3	1.17	1.14	\pm 0.06	-0.05	1.19	\pm 0.06	0.64	3
511	4.30	\pm 0.4	-0.88	5.4	\pm 0.5	-0.59	1.19	\pm 0.1	0.43	1.10	\pm 0.1	-0.25	10
516	4.5	\pm 0.64	-0.15	5.4	\pm 0.77	-0.59	0.8	\pm 0.11	-3.32 §	0.6	\pm 0.09	-5.15 §	1
520	4.52	\pm 1.75	-0.07	5.17	\pm 1.75	-1.26	1.18	\pm 1.75	0.34	1.21	\pm 1.75	0.83	1
534	4.75	\pm 0.57	0.77	6.4	\pm 0.77	2.35	1.40	\pm 0.17	2.46	1.70	\pm 0.20	5.64 §	4
537	4.16	\pm 0.91	-1.39	5.3	\pm 1.17	-0.88	1.08	\pm 0.24	-0.63	1.09	\pm 0.24	-0.34	1

Potassium (K)**Results by Laboratory Code**

Lab Code	N194		N195		N196		N197		Method Code ³
	Result ± MU ¹ (mg/L)	Robust z-score ²	Result ± MU ¹ (mg/L)	Robust z-score ²	Result ± MU ¹ (mg/L)	Robust z-score ²	Result ± MU ¹ (mg/L)	Robust z-score ²	
538	5.7 ± 1.0	4.26 \$	7.1 ± 1.0	4.40 \$	1.49 ± 0.2	3.32 \$	1.43 ± 0.2	2.99	3
552	4.55	0.04	5.6	0.00	1.06	-0.82	0.99	-1.32	3
554	4.38	-0.59	5.60	0.00	1.06	-0.82	1.04	-0.83	M8
567	4.58 ± 0.16	0.15	5.8 ± 0.21	0.59	1.08 ± 0.04	-0.63	1.10 ± 0.04	-0.25	1
574	4.55 ± 0.20	0.04	6.10 ± 0.20	1.47	0.95 ± 0.20	-1.88	0.98 ± 0.20	-1.42	1
575	4.10	-1.62	4.78	-2.40	1.24	0.92	1.01	-1.13	3
576	6.8 ± 0.01	8.30 \$	8.2 ± 0.2	7.62 \$	2.55 ± 0.1	13.54 \$	2.19 ± 0.1	10.45 \$	3120B
578	4.00 ± 0.52	-1.98	5.0 ± 0.65	-1.76	0.95 ± 0.12	-1.88	1.00 ± 0.01	-1.23	1
580	4.45 ± 0.93	-0.33	5.66 ± 0.96	0.18	1.20 ± 0.87	0.53	1.15 ± 0.87	0.25	3120B
581	5.1 ± 0.6	2.06	5.4 ± 0.6	-0.59	1.30 ± 0.16	1.49	1.13 ± 0.14	0.05	1
585	3.94 ± 1.0	-2.20	5.17 ± 1.0	-1.26	0.95 ± 1.0	-1.88	0.99 ± 1.0	-1.32	1
600	5.19 ± 0.73	2.39	5.58 ± 0.78	-0.06	1.13 ± 0.16	-0.14	1.12 ± 0.16	-0.05	1
602	11.4 ± 1.2	25.18 \$	8.76 ± 0.96	9.27 \$	4.34 ± 0.47	30.79 \$	4.48 ± 0.49	32.92 \$	3
614	4.72	0.66	5.86	0.76	1.14	-0.05	1.14	0.15	1
622	4.37 ± 0.05	-0.62	5.5 ± 0.1	-0.29	1.29 ± 0.05	1.40	0.98 ± 0.04	-1.42	3
626	4.68	0.51	6.0	1.17	1.18	0.34	1.19	0.64	3
633	4.66 ± 0.15	0.44	5.84 ± 0.15	0.70	1.14 ± 0.15	-0.05	1.15 ± 0.15	0.25	3
643	4.42	-0.44	22.4	49.27 \$	1.68	5.16 \$	1.64	5.05 \$	
649	4.98	1.62	5.52	-0.23	1.16	0.14	1.15	0.25	7
663	4.81 ± 0.67	0.99	6.0 ± 0.8	1.17	1.19 ± 0.17	0.43	1.19 ± 0.17	0.64	3

Potassium (K)**Results by Laboratory Code**

Lab Code	N194			N195			N196			N197			Method Code ³
	Result ± MU ¹ (mg/L)		Robust z-score ²	Result ± MU ¹ (mg/L)		Robust z-score ²	Result ± MU ¹ (mg/L)		Robust z-score ²	Result ± MU ¹ (mg/L)		Robust z-score ²	
666	6.209		6.13 §	6.614		2.97	1.68		5.16 §	1.19		0.64	10
667	4.65		0.40	5.8		0.59	1.28		1.30	1.25		1.23	3
671	4.54		0.00	5.7		0.29	1.08		-0.63	1.10		-0.25	1
673	4.50		-0.15	5.6		0.00	1.14		-0.05	1.12		-0.05	1
686	4.53 ± 0.91		-0.04	5.57 ± 1.1		-0.09	1.10 ± 0.22		-0.43	1.10 ± 0.22		-0.25	3
699	6.03 ± 0.1225		5.47 §	7.99 ± 0.1225		7.01 §	3.20 ± 0.1225		19.80 §	3.06 ± 0.1225		18.98 §	3
700	4.44 ± 0.5		-0.37	5.51 ± 0.5		-0.26	1.26 ± 0.32		1.11	1.31 ± 0.32		1.81	
717.1	4.19		-1.28	5.17		-1.26	0.95		-1.88	1.14		0.15	1
717.2													
727	4.5 ± 0.3		-0.15	5.72 ± 0.3		0.35	1.12 ± 0.1		-0.24	1.15 ± 0.1		0.25	3
738	4.54 ± 0.14		0.00	5.7 ± 0.2		0.29	1.16 ± 0.11		0.14	1.14 ± 0.11		0.15	3
742	4.67 ± 0.3		0.48	5.90 ± 0.6		0.88	1.10 ± 0.1		-0.43	1.14 ± 0.1		0.15	1
762	4.50		-0.15	5.58		-0.06	1.12		-0.24	1.12		-0.05	APHA3(1)
763	4.77 ± 0.38		0.84	6.07 ± 0.49		1.38	1.19 ± 0.10		0.43	1.05 ± 0.08		-0.74	3
766	4.80 ± 0.82		0.95	5.9 ± 1.01		0.88	1.21 ± 0.21		0.63	1.21 ± 0.21		0.83	3
767	4.18 ± 0.67		-1.32	5.2 ± 0.7		-1.17	1.01 ± 0.67		-1.30	1.02 ± 0.67		-1.03	3
768	4.40		-0.51	5.4		-0.59	1.05		-0.92	1.31		1.81	
773	4.00 ± 0.5		-1.98	4.90 ± 0.5		-2.05	0.98 ± 0.2		-1.59	1.03 ± 0.2		-0.93	
774	4.62 ± 3.7		0.29	6.0 ± 4.8		1.17	1.06 ± 0.8		-0.82	1.14 ± 0.9		0.15	3
779	4.17 ± 0.08		-1.36	5.7 ± 0.11		0.29	0.71 ± 0.02		-4.19 §	1.11 ± 0.02		-0.15	3

Potassium (K)**Results by Laboratory Code**

Lab Code	N194		N195		N196		N197		Method Code ³
	Result ± MU ¹ (mg/L)	Robust z-score ²	Result ± MU ¹ (mg/L)	Robust z-score ²	Result ± MU ¹ (mg/L)	Robust z-score ²	Result ± MU ¹ (mg/L)	Robust z-score ²	
784									
788	4.19	-1.28	5.3	-0.88	1.03	-1.11	1.03	-0.93	1
800	4.74	0.73	6.0	1.17	1.19	0.43	1.16	0.34	3
802	5.00 ± 0.1	1.69	6.22 ± 0.1	1.82	1.30 ± 0.1	1.49	1.25 ± 0.1	1.23	3
804	5.0 ± 2.2	1.69	6.2 ± 2.2	1.76	1.22 ± 2.2	0.72	1.28 ± 2.2	1.52	3
816	5.2 ± 0.2	2.42	6.5 ± 0.2	2.64	1.35 ± 0.11	1.98	1.33 ± 0.09	2.01	4
817	4.43 ± 0.41	-0.40	5.6 ± 0.5	0.00	1.09 ± 0.13	-0.53	1.09 ± 0.13	-0.34	1
821	11.4 ± 1.37	25.18 §	8.0 ± 0.96	7.04 §	3.30 ± 0.40	20.76 §	3.47 ± 0.42	23.01 §	3
826	4.49 ± 0.18	-0.18	5.6 ± 0.17	0.00	1.07 ± 0.19	-0.72	1.10 ± 0.19	-0.25	3

No of Results:

123

123

123

123

Median:

4.540

5.60

1.145

1.125

Normalised IQR:

0.272

0.34

0.104

0.102

Robust CV:

6.0%

6.1%

9.1%

9.1%

Minimum:

3.560

4.64

0.710

0.600

Maximum:

11.400

22.40

4.340

4.480

Range:

7.840

17.76

3.630

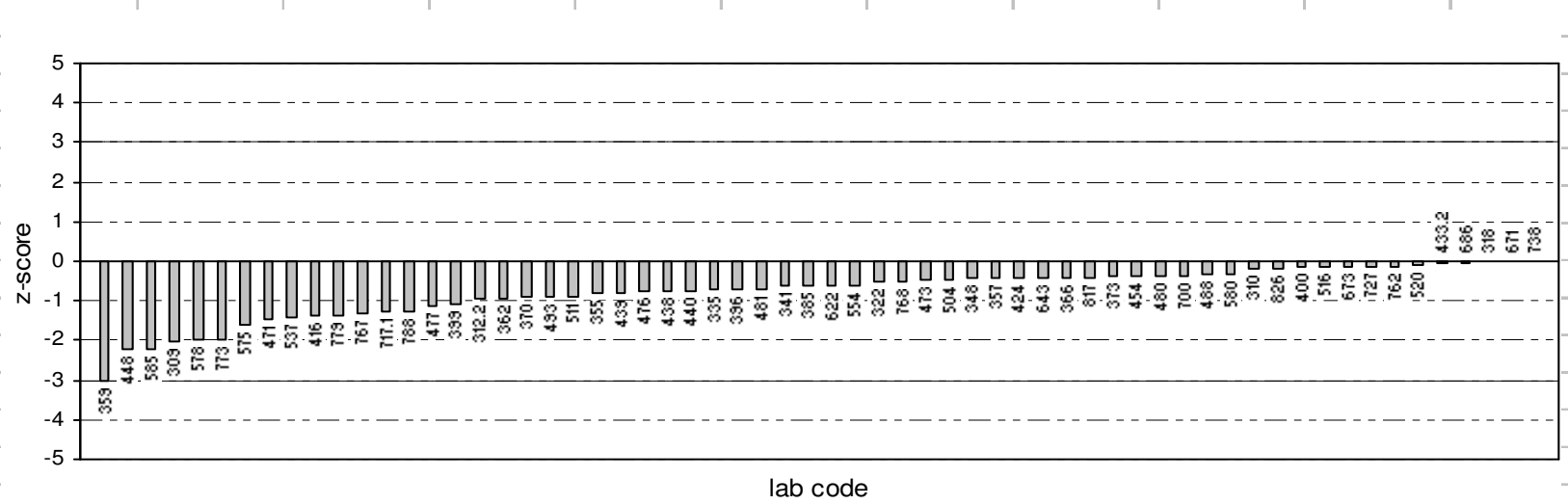
3.880

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). 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 and digestion code descriptions.

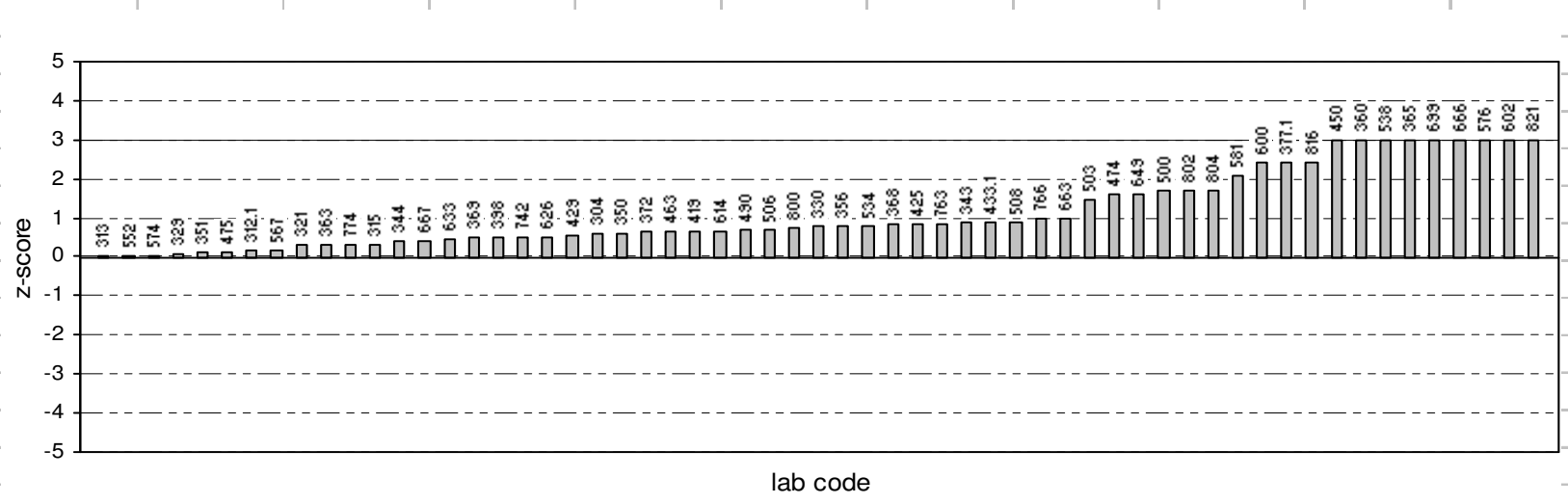
Potassium - N194

Ordered Robust Z-Score Charts

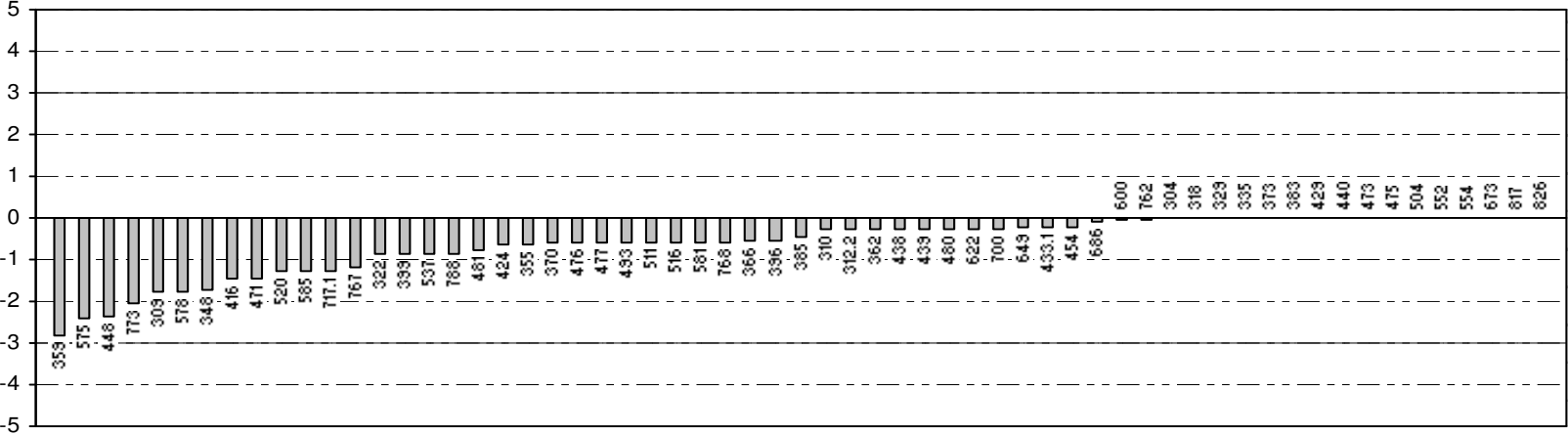
Potassium - N194 - Robust Z-Scores



Robust Z-Scores



Potassium - N195 - Robust Z-Scores



Ordered Robust Z-Score Charts



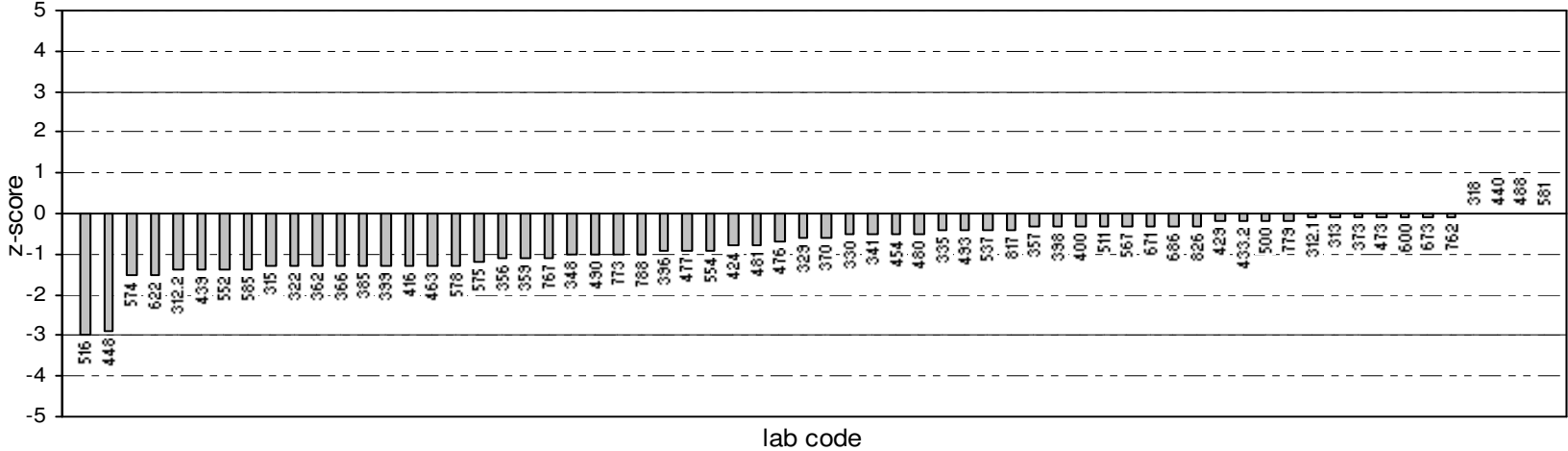
Robust Z-Scores

lab code

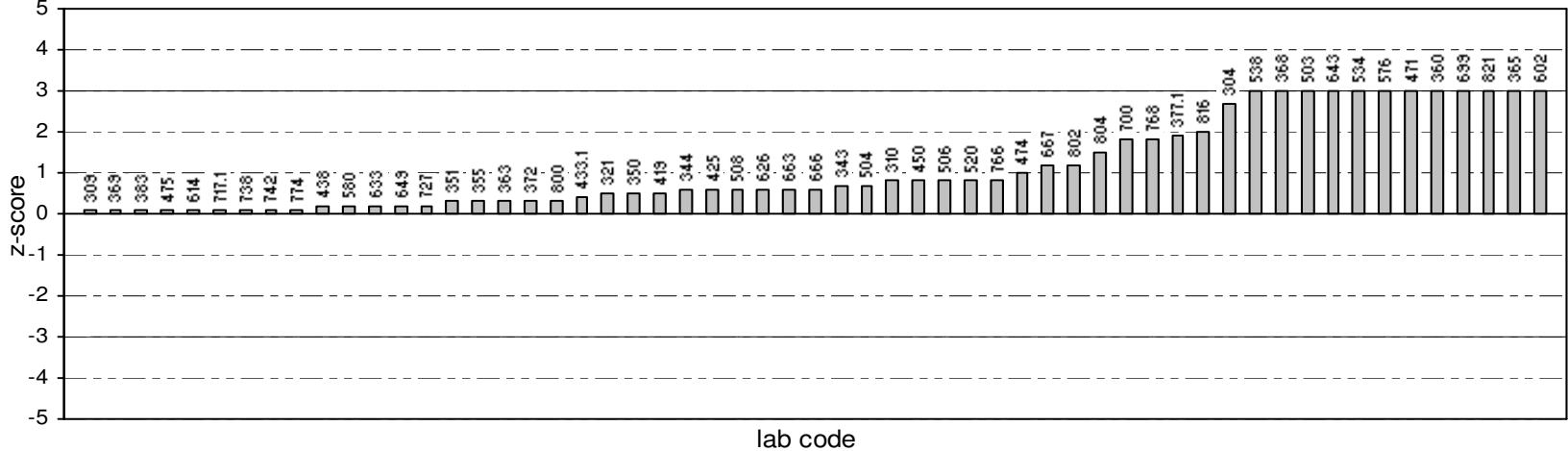
Potassium - N197

Ordered Robust Z-Score Charts

Potassium - N197 - Robust Z-Scores



Robust Z-Scores



Sodium (Na)**Results by Laboratory Code**

Lab Code	N194				N195				N196				N197				Method Code ³		
	Result ± MU ¹ (mg/L)			Robust z-score ²	Result ± MU ¹ (mg/L)			Robust z-score ²	Result ± MU ¹ (mg/L)			Robust z-score ²	Result ± MU ¹ (mg/L)			Robust z-score ²			
304	11.8	±	2.4	1.05	8.5	±	1.7	1.56	4.30	±	0.9	3.30	§	4.20	±	0.8	3.23	§	10
309	11.7			0.90	7.67			-0.30	3.72			1.11		3.65			1.08		3
310	11.6	±	0.5	0.75	8.1	±	0.5	0.66	3.84	±	0.5	1.57		4.41	±	0.5	4.05	§	1
312.1	11.6	±	0.068	0.75	8.2	±	0.068	0.89	3.42	±	0.068	-0.02		3.42	±	0.068	0.18		10
312.2	9.8			-1.95	7.8			-0.01	3.35			-0.28		3.41			0.14		10
313	11.2			0.15	7.7			-0.24	3.37			-0.21		3.32			-0.22		
315	9.9	±	1.48	-1.80	6.6	±	0.99	-2.71	2.29	±	0.34	-4.28	§	2.40	±	0.36	-3.81	§	1
318	11.1	±	1.1	0.00	7.58	±	0.76	-0.51	3.34	±	0.33	-0.32		3.36	±	0.34	-0.06		1
321	11.2			0.15	7.8			-0.01	3.38			-0.17		3.42			0.18		3
322	11.3	±	1.0	0.30	7.86	±	0.7	0.12	3.26	±	0.3	-0.62		3.29	±	0.3	-0.33		3
329	10.4			-1.05	7.2			-1.36	3.12			-1.15		3.06			-1.23		3
330	11.6	±	3.2	0.75	8.18	±	2.3	0.84	3.29	±	0.92	-0.51		3.30	±	0.92	-0.29		10
335	11.2	±	0.2	0.15	8.0	±	0.1	0.44	3.65	±	0.1	0.85		3.48	±	0.1	0.41		
336	10.4	±	0.2	-1.05	7.3	±	0.2	-1.14	2.53	±	0.06	-3.38	§	2.40	±	0.06	-3.81	§	10
341	11.2	±	0.112	0.15	7.60	±	0.76	-0.46	3.24	±	0.324	-0.70		3.20	±	0.32	-0.68		1
343	11.1	±	1.5	0.00	8.2	±	1.1	0.89	4.04	±	0.56	2.32		3.70	±	0.51	1.27		3
344	10.8	±	1.43	-0.45	8.1	±	1.08	0.66	3.31	±	0.44	-0.43		3.51	±	0.47	0.53		3
348	10.1			-1.50	6.7			-2.48	3.85			1.60		3.44			0.25		3
350	10.4	±	0.8	-1.05	7.9	±	0.6	0.21	3.55	±	0.28	0.47		3.36	±	0.27	-0.06		3

Sodium (Na)
Results by Laboratory Code

Lab Code	N194		N195		N196		N197		Method Code ³
	Result ± MU ¹ (mg/L)	Robust z-score ²	Result ± MU ¹ (mg/L)	Robust z-score ²	Result ± MU ¹ (mg/L)	Robust z-score ²	Result ± MU ¹ (mg/L)	Robust z-score ²	
351	11.6 ± 1.23	0.75	8.24 ± 0.88	0.98	3.56 ± 0.39	0.51	3.46 ± 0.38	0.33	3
355	10.6 ± 0.15	-0.75	7.7 ± 0.15	-0.24	3.52 ± 0.15	0.36	3.37 ± 0.15	-0.02	3
356	11.1	0.00	8.42	1.38	3.60	0.66	3.14	-0.92	3
357	11.2 ± 0.012	0.15	8.2 ± 0.012	0.89	3.51 ± 0.012	0.32	3.55 ± 0.012	0.68	1
359	11.4	0.45	8.1	0.66	3.33	-0.36	3.34	-0.14	10
360	10.0 ± 1.2	-1.65	8.1 ± 0.9	0.66	5.8 ± 0.7	8.96 §	6.3 ± 0.7	11.44 §	1
362	11.6 ± 1.2	0.75	8.0 ± 0.8	0.44	3.48 ± 0.35	0.21	3.43 ± 0.34	0.22	1
363	10.7 ± 1.2	-0.60	7.5 ± 0.8	-0.69	3.15 ± 0.42	-1.04	3.18 ± 0.42	-0.76	3
365	11.0 ± 2.5	-0.15	7.2 ± 1.7	-1.36	2.93 ± 0.80	-1.87	2.82 ± 0.77	-2.17	1
366	10.1	-1.50	6.9	-2.03	2.35	-4.06 §	2.19	-4.63 §	3
368	15.1 ± 0.8	6.00 §	8.7 ± 0.4	2.01	4.10 ± 0.21	2.55	4.51 ± 0.23	4.44 §	1
369	11.5	0.60	8.0	0.44	3.44	0.06	3.39	0.06	3
370	10.8 ± 0.3	-0.45	7.6 ± 0.2	-0.46	3.36 ± 0.08	-0.25	3.29 ± 0.10	-0.33	3
372	11.8 ± 2.2	1.05	8.1 ± 1.6	0.66	3.52 ± 0.97	0.36	3.52 ± 0.97	0.57	3
373	10.7 ± 0.6	-0.60	7.7 ± 0.5	-0.24	3.34 ± 0.20	-0.32	3.35 ± 0.20	-0.10	3
377.1	10.6 ± 0.56	-0.75	7.7 ± 0.41	-0.24	3.47 ± 0.18	0.17	3.48 ± 0.18	0.41	9
377.2									
383	10.7 ± 0.6	-0.60	7.9 ± 0.4	0.21	3.3 ± 0.17	-0.47	3.27 ± 0.17	-0.41	1
385	10.9 ± 0.80	-0.30	7.4 ± 0.54	-0.91	3.19 ± 0.29	-0.89	3.17 ± 0.29	-0.81	10

Sodium (Na)**Results by Laboratory Code**

Lab Code	N194			N195			N196			N197			Method Code ³
	Result \pm MU ¹ (mg/L)		Robust z-score ²	Result \pm MU ¹ (mg/L)		Robust z-score ²	Result \pm MU ¹ (mg/L)		Robust z-score ²	Result \pm MU ¹ (mg/L)		Robust z-score ²	
396	11.3		0.30	7.6		-0.44	3.18		-0.92	3.10		-1.08	3
398	11.0		-0.15	8.1		0.66	3.33		-0.36	3.50		0.49	1
399	11.1		0.00	7.7		-0.24	3.33		-0.36	3.27		-0.41	3
400	11.0		-0.15	7.9		0.21	3.35		-0.28	3.30		-0.29	9
416	10.1		-1.50	7.0		-1.81	3.06		-1.38	3.10		-1.08	1
419	11.8	\pm 0.9	1.05	8.0	\pm 0.6	0.44	3.59	\pm 0.27	0.62	3.56	\pm 0.26	0.72	3
424	10.9	\pm 1.1	-0.30	7.5	\pm 0.7	-0.69	3.13	\pm 0.3	-1.11	3.17	\pm 0.3	-0.80	3
425	11.7	\pm 0.82	0.90	8.3	\pm 0.58	1.11	3.56	\pm 0.26	0.51	4.84	\pm 0.35	5.73	\$
429	10.9	\pm 0.1	-0.30	7.7	\pm 0.07	-0.24	3.34	\pm 0.03	-0.32	3.38	\pm 0.03	0.02	1
433.1	12.1	\pm 1.39	1.50	7.93	\pm 0.912	0.28	3.44	\pm 0.396	0.06	3.49	\pm 0.401	0.45	10
433.2	11.16	\pm 0.558	0.09	8.07	\pm 0.404	0.60	3.47	\pm 0.174	0.17	3.29	\pm 0.165	-0.33	3
438	10.6	\pm 1.0	-0.75	7.4	\pm 1	-0.91	3.43	\pm 1	0.02	3.40	\pm 1	0.10	3
439	10.8		-0.45	7.6		-0.46	3.52		0.36	3.14		-0.92	
440	11.0	\pm 0.67	-0.15	7.9	\pm 0.47	0.21	3.46	\pm 0.21	0.13	3.53	\pm 0.21	0.61	1
446													
448	11.2	\pm 0.07	0.15	8.1	\pm 0.05	0.71	3.92	\pm 0.02	1.87	3.43	\pm 0.02	0.22	3
450	10.7		-0.60	8.0		0.44	3.80		1.42	3.20		-0.68	
454	10.7	\pm 0.5	-0.60	7.50	\pm 0.3	-0.69	3.26	\pm 0.14	-0.62	3.16	\pm 0.14	-0.84	3
463	12.1	\pm 2.4	1.50	8.75	\pm 1.8	2.12	3.8	\pm 0.76	1.42	3.07	\pm 0.61	-1.19	3
471	11.1		0.00	7.1		-1.59	3		-1.60	3.10		-1.08	1

Sodium (Na)**Results by Laboratory Code**

Lab Code	N194			N195			N196			N197			Method Code ³
	Result \pm MU ¹ (mg/L)		Robust z-score ²	Result \pm MU ¹ (mg/L)		Robust z-score ²	Result \pm MU ¹ (mg/L)		Robust z-score ²	Result \pm MU ¹ (mg/L)		Robust z-score ²	
473	11.1		0.00	7.81		0.01	3.35		-0.28	3.35		-0.10	3
474	11.5	\pm 1.2	0.60	8.1	\pm 0.80	0.66	3.63	\pm 0.36	0.77	3.07	\pm 0.31	-1.19	3
475	11.2	\pm 0.7	0.15	7.8	\pm 0.5	-0.01	3.44	\pm 0.21	0.06	3.36	\pm 0.20	-0.06	3
476	11.0	\pm 0.48	-0.15	7.6	\pm 0.33	-0.51	3.30	\pm 0.14	-0.47	3.35	\pm 0.15	-0.10	1
477	10.6	\pm 0.31	-0.75	7.4	\pm 0.12	-0.91	3.17	\pm 0.12	-0.96	3.20	\pm 0.02	-0.68	3
480	11.1	\pm 0.3	0.00	8.1	\pm 0.1	0.66	3.49	\pm 0.14	0.25	3.48	\pm 0.08	0.41	1
481	11.2	\pm 0.40	0.15	7.8	\pm 0.44	0.01	3.52	\pm 0.19	0.36	3.38	\pm 0.20	0.02	10
488	11.7		0.90	8.1		0.66	3.67		0.92	3.61		0.92	3
490	11.5	\pm 1.34	0.60	8.1	\pm 0.94	0.66	3.62	\pm 0.40	0.74	3.31	\pm 0.55	-0.25	3
493	11.7		0.90	7.8		-0.01	2.83		-2.25	2.87		-1.97	1
500	11.0	\pm 1.05	-0.15	4.5	\pm 0.71	-7.43 §	3.00	\pm 0.29	-1.60	3.07	\pm 0.29	-1.19	1
503	10.2		-1.35	6.9		-2.03	2.32		-4.17 §	2.32		-4.13 §	1
504	10.5	\pm 1.2	-0.90	7.5	\pm 0.8	-0.69	3.41	\pm 0.38	-0.06	3.34	\pm 0.37	-0.14	10
506	11.5	\pm 0.22	0.60	8.0	\pm 0.22	0.44	3.46	\pm 0.07	0.13	3.41	\pm 0.07	0.14	3
508	12.5	\pm 1.5	2.10	8.7	\pm 1.0	2.01	3.64	\pm 0.44	0.81	3.74	\pm 0.45	1.43	3
511	11.1	\pm 1.1	0.00	7.7	\pm 0.8	-0.24	3.56	\pm 0.4	0.51	3.47	\pm 0.3	0.37	10
516	12.7	\pm 0.63	2.40	9.2	\pm 0.45	3.14 §	4.7	\pm 0.23	4.81 §	4.3	\pm 0.21	3.62 §	1
520	9.75	\pm 2.21	-2.02	7.92	\pm 2.21	0.26	2.81	\pm 2.21	-2.32	3.54	\pm 2.21	0.65	1
534	10.5	\pm 0.95	-0.90	7.3	\pm 0.66	-1.14	3.20	\pm 0.29	-0.85	2.50	\pm 0.23	-3.42 §	4
537	10.8	\pm 2.27	-0.45	7.2	\pm 1.61	-1.36	3.53	\pm 0.74	0.40	3.74	\pm 0.79	1.43	1

Sodium (Na)**Results by Laboratory Code**

Lab Code	N194		N195		N196		N197		Method Code ³
	Result ± MU ¹ (mg/L)	Robust z-score ²	Result ± MU ¹ (mg/L)	Robust z-score ²	Result ± MU ¹ (mg/L)	Robust z-score ²	Result ± MU ¹ (mg/L)	Robust z-score ²	
538	10.8 ± 2	-0.45	7.5 ± 1.5	-0.69	3.15 ± 0.6	-1.04	3.10 ± 0.6	-1.08	3
552	12.2	1.65	8.6	1.79	3.59	0.62	3.58	0.80	3
554	11.4	0.45	8.48	1.52	3.76	1.26	4.44	4.16 §	M8
567	11.0 ± 0.49	-0.15	7.6 ± 0.34	-0.46	3.09 ± 0.14	-1.26	3.08 ± 0.14	-1.15	1
574	11.2 ± 1.0	0.15	8.0 ± 1.0	0.44	3.53 ± 0.20	0.40	3.49 ± 0.20	0.45	1
575	11.0	-0.15	8.0	0.44	5.1	6.32 §	4.30	3.62 §	3
576	26.4 ± 0.2	22.93 §	23.1 ± 0.2	34.39 §	19.1 ± 0.03	59.15 §	18.9 ± 0.01	60.70 §	3120B
578	11.0 ± 1.21	-0.15	7.7 ± 0.85	-0.24	3.30 ± 0.63	-0.47	3.20 ± 0.61	-0.68	1
580	11.4 ± 0.91	0.45	7.95 ± 0.65	0.33	3.71 ± 0.35	1.08	3.60 ± 0.34	0.88	3120B
581									
585	10.8 ± 1.0	-0.45	6.36 ± 1.0	-3.25 §	2.56 ± 1.0	-3.26 §	2.30 ± 1.0	-4.20 §	1
600	12.4 ± 1.2	1.95	8.07 ± 0.81	0.60	3.69 ± 0.59	1.00	3.67 ± 0.59	1.15	1
602	5.09 ± 0.7	-9.01 §	6.4 ± 0.88	-3.16 §	1.44 ± 0.20	-7.49 §	1.46 ± 0.20	-7.49 §	3
614	11.5	0.60	8.49	1.54	3.52	0.36	3.39	0.06	1
622	11.5 ± 0.1	0.60	8.1 ± 0.1	0.66	3.48 ± 0.03	0.21	3.49 ± 0.02	0.45	3
626	12.7	2.40	9.5	3.81 §	5.2	6.70 §	4.78	5.49 §	3
633	11.0 ± 0.15	-0.15	7.65 ± 0.15	-0.35	3.30 ± 0.15	-0.47	3.30 ± 0.15	-0.29	3
643	8.97	-3.19 §	6.32	-3.34 §	3.42	-0.02	2.82	-2.17	
649	10.4	-1.05	7.18	-1.41	3.31	-0.43	3.38	0.02	9
663	11.2 ± 1.6	0.15	7.7 ± 1.1	-0.24	3.23 ± 0.45	-0.74	3.24 ± 0.45	-0.53	3

Sodium (Na)**Results by Laboratory Code**

Lab Code	N194		N195		N196		N197		Method Code ³
	Result ± MU ¹ (mg/L)	Robust z-score ²	Result ± MU ¹ (mg/L)	Robust z-score ²	Result ± MU ¹ (mg/L)	Robust z-score ²	Result ± MU ¹ (mg/L)	Robust z-score ²	
666	10.92	-0.27	7.777	-0.06	50.67	##### §	2.191	-4.63 §	10
667	11.8	1.05	8.2	0.89	3.79	1.38	3.66	1.11	3
671	11.2	0.15	7.8	-0.01	3.48	0.21	3.56	0.72	1
673									
686	10.6 ± 2.1	-0.75	7.31 ± 1.5	-1.11	3.19 ± 0.64	-0.89	3.23 ± 0.65	-0.57	3
699	12.08 ± 0.1225	1.47	9.47 ± 0.1225	3.74 §	4.32 ± 0.1225	3.38 §	4.36 ± 0.1225	3.85 §	3
700	9.7 ± 0.8	-2.10	6.79 ± 0.5	-2.28	2.89 ± 0.32	-2.02	2.94 ± 0.32	-1.70	
717.1	10.1	-1.50	6.91	-2.01	2.45	-3.68 §	4.28	3.54 §	1
717.2									
727	11.0 ± 0.3	-0.15	7.7 ± 0.2	-0.24	3.25 ± 0.1	-0.66	3.39 ± 0.1	0.06	3
738	11.1 ± 0.8	0.00	7.7 ± 0.5	-0.24	3.41 ± 0.23	-0.06	3.41 ± 0.25	0.14	3
742	11.0 ± 0.9	-0.15	7.4 ± 0.6	-0.91	3.33 ± 0.2	-0.36	3.47 ± 0.2	0.37	1
762	11.70	0.90	8.3	1.11	3.87	1.68	3.75	1.47	APHA3(1)
763	11.80 ± 0.71	1.05	8.26 ± 0.50	1.02	3.41 ± 0.21	-0.06	3.58 ± 0.21	0.80	3
766	10.6 ± 1.0	-0.75	7.8 ± 0.7	-0.01	3.06 ± 0.29	-1.38	3.17 ± 0.30	-0.80	3
767	10.6 ± 0.8	-0.75	7.4 ± 0.8	-0.91	3.10 ± 0.84	-1.23	3.07 ± 0.84	-1.19	3
768	14.9 ± 0.242	5.70 §	8.0 ± 0.24	0.44	3.86 ± 0.242	1.64	3.36 ± 0.242	-0.06	
773	10.5 ± 0.6	-0.90	7.3 ± 0.6	-1.14	3.24 ± 0.3	-0.70	3.19 ± 0.3	-0.72	
774	12.1 ± 3.8	1.50	8.6 ± 2.7	1.79	3.47 ± 11	0.17	3.36 ± 1.04	-0.06	3
779	10.5 ± 0.21	-0.90	7.4 ± 0.15	-0.91	3.36 ± 0.07	-0.25	3.29 ± 0.07	-0.33	3

Sodium (Na)

Results by Laboratory Code

Lab Code	N194		N195		N196		N197		Method Code ³
	Result ± MU ¹ (mg/L)	Robust z-score ²	Result ± MU ¹ (mg/L)	Robust z-score ²	Result ± MU ¹ (mg/L)	Robust z-score ²	Result ± MU ¹ (mg/L)	Robust z-score ²	
784									
788	11.6	0.75	8.3	1.11	3.58	0.58	3.52	0.57	1
800	11.3	0.30	7.8	-0.01	3.44	0.06	3.38	0.02	3
802	13.7 ± 0.3	3.90 \$	9.53 ± 0.3	3.88 \$	4.50 ± 0.3	4.06 \$	4.33 ± 0.3	3.73 \$	3
804	13.3 ± 4.8	3.30 \$	9.3 ± 4.8	3.36 \$	4.04 ± 4.8	2.32	4.21 ± 4.8	3.26 \$	3
816	12.9 ± 0.3	2.70	8.8 ± 0.4	2.24	3.93 ± 0.1	1.91	3.84 ± 0.15	1.82	4
817									
821	4.97 ± 0.66	-9.19 \$	7.0 ± 0.93	-1.81	1.44 ± 0.19	-7.49 \$	1.24 ± 0.16	-8.35 \$	3
826	11.3 ± 0.12	0.30	7.9 ± 0.18	0.21	3.29 ± 0.08	-0.51	3.29 ± 0.08	-0.33	3

No of Results:

120

120

120

120

Median:

11.10

7.81

3.425

3.375

Normalised IQR:

0.67

0.44

0.265

0.256

Robust CV:

6.0%

5.7%

7.7%

7.6%

Minimum:

4.97

4.50

1.440

1.240

Maximum:

26.40

23.10

50.670

18.900

Range:

21.43

18.60

49.230

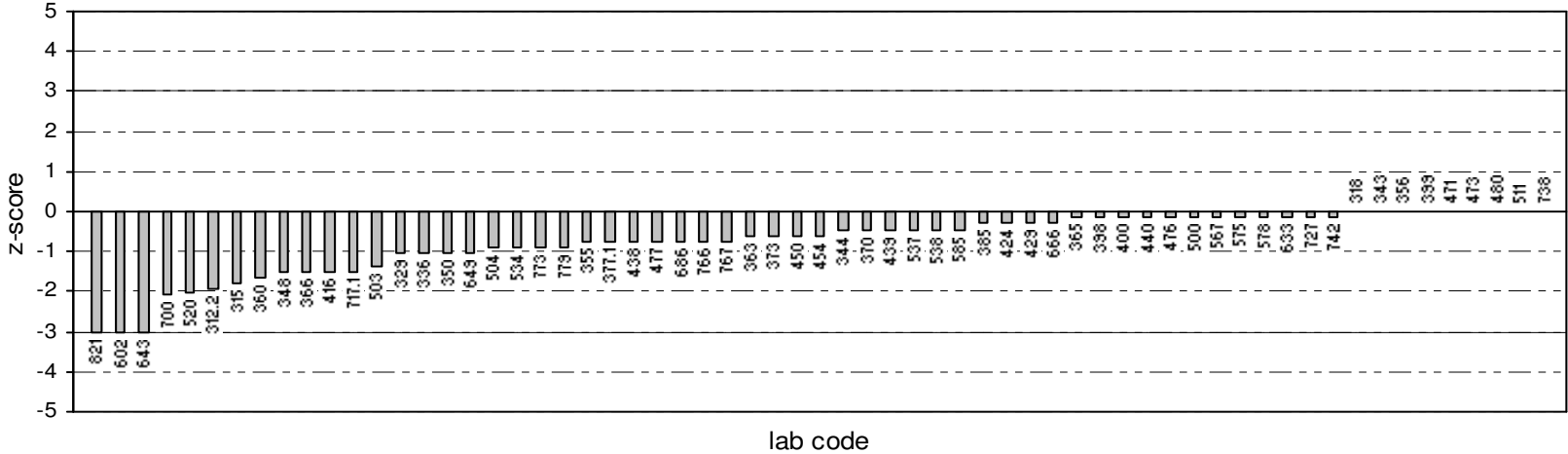
17.660

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

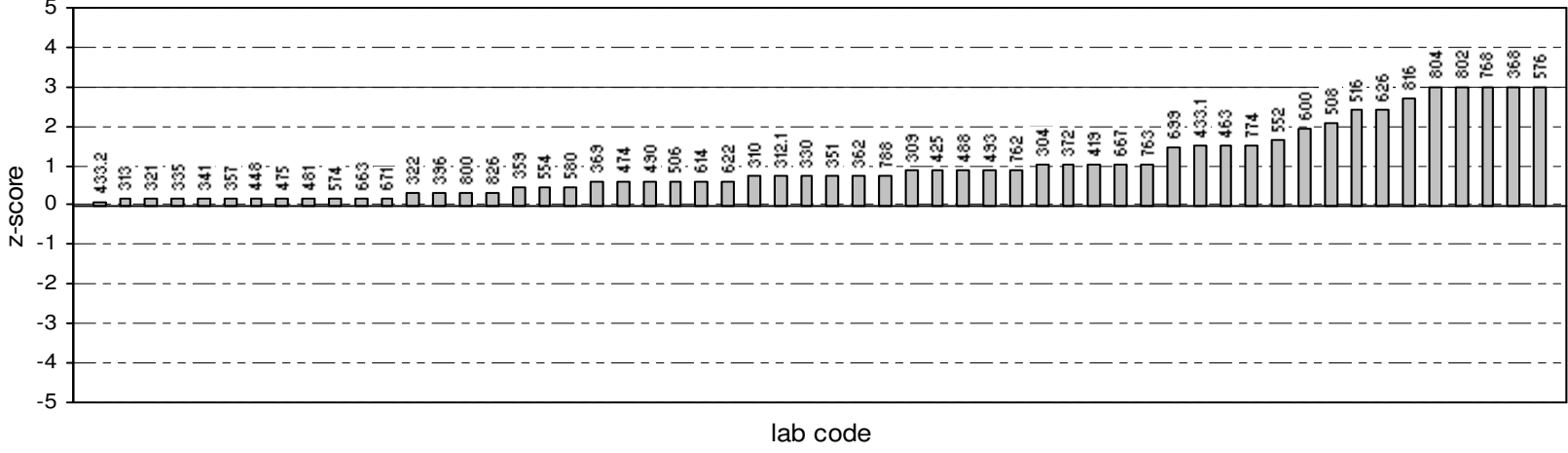
² "\$"s denote outliers (i.e. those results for which $|z\text{-score}| > 3$). Robust $z\text{-scores}$ are calculated as: $z = (A - \text{median}) \div \text{normalised IQR}$, where, A is the participant laboratory's result.

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

Sodium - N194 - Robust Z-Scores



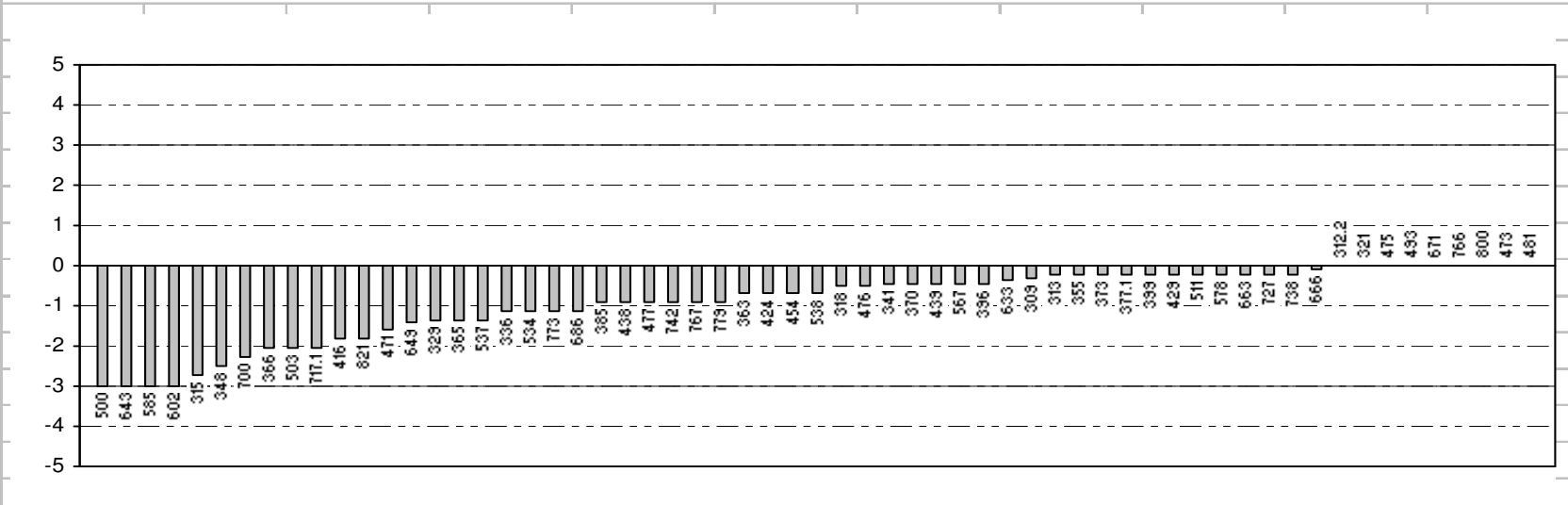
Robust Z-Scores



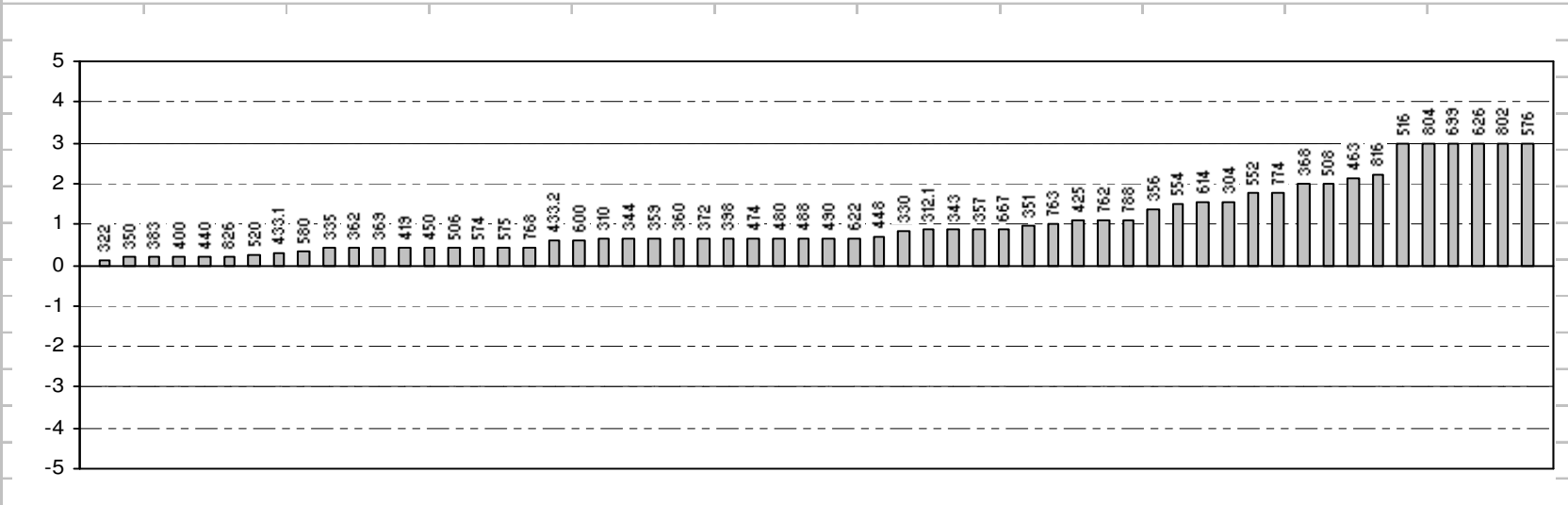
Ordered Robust Z-Score Charts

Sodium - N194

Sodium - N195 - Robust Z-Scores



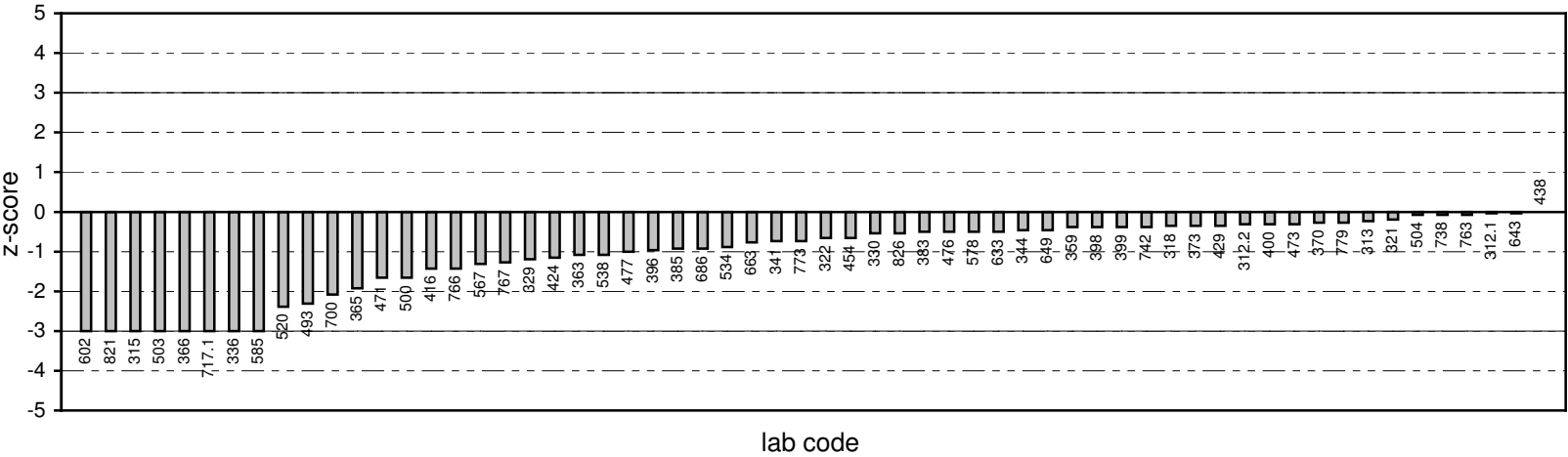
Robust Z-Scores



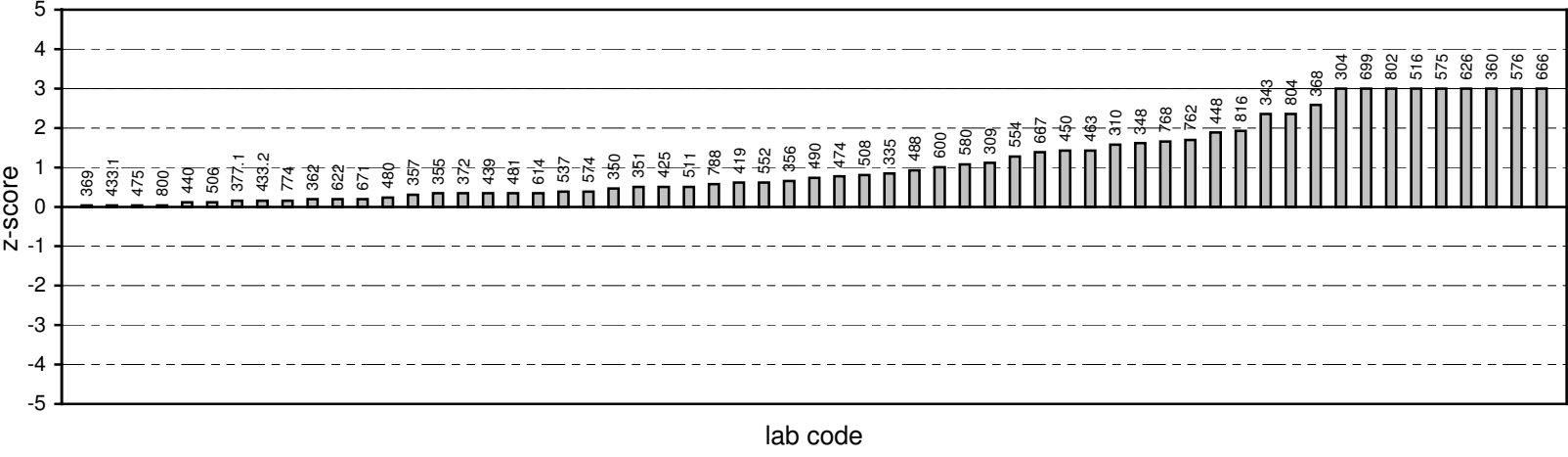
Ordered Robust Z-Score Charts

Sodium - N195

Sodium - N196 - Robust Z-Scores



Robust Z-Scores



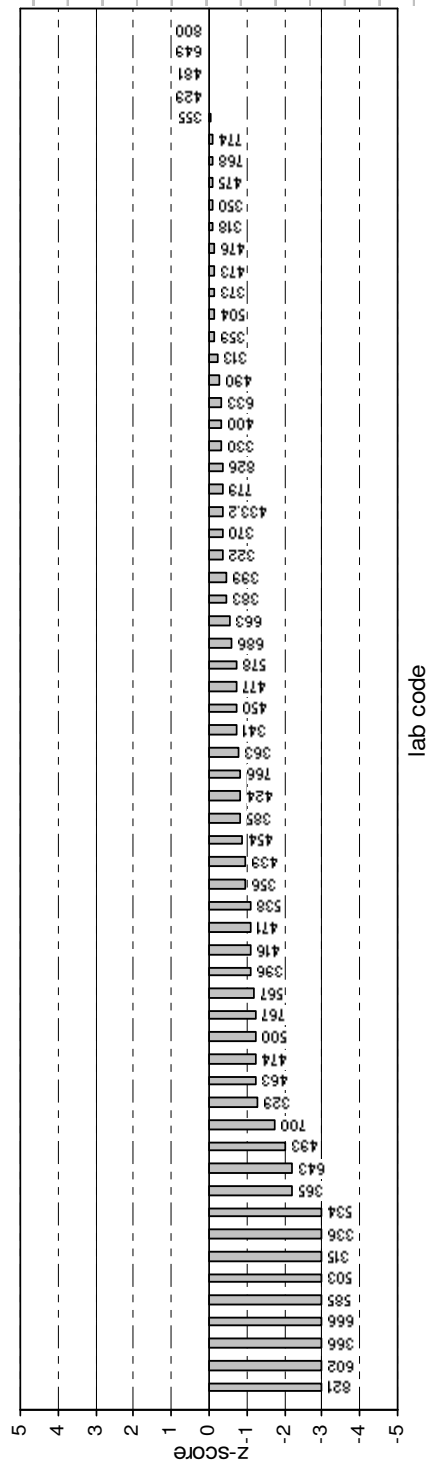
Ordered Robust Z-Score Charts

Sodium - N196

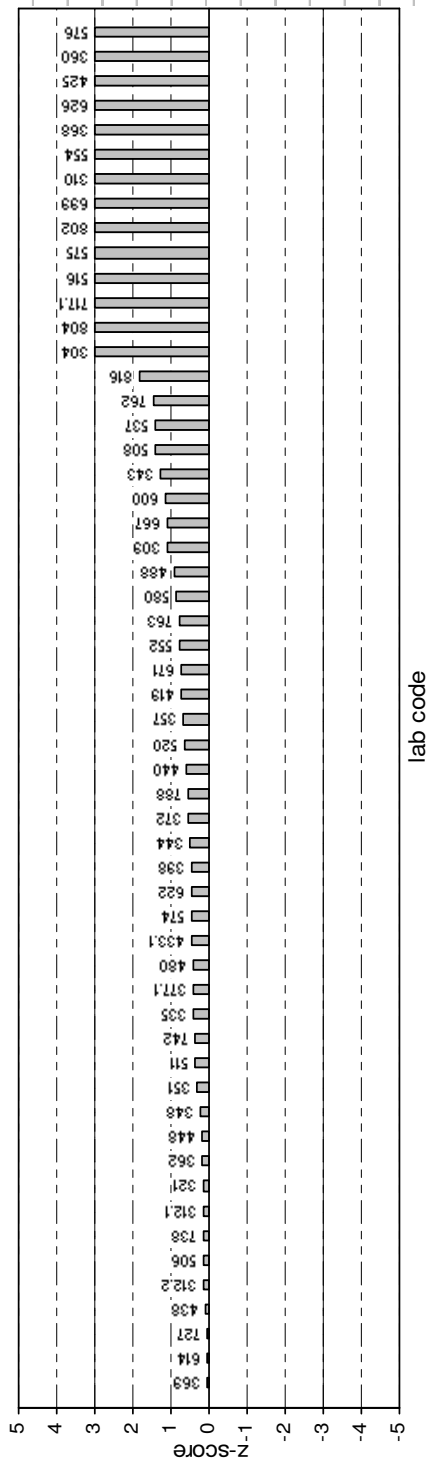
Sodium - N197

Ordered Robust Z-Score Charts

Sodium - N197 - Robust Z-Scores



Robust Z-Scores



APPENDIX B

Sample Homogeneity

Homogeneity Testing Data

The following results were obtained for the purpose of homogeneity testing. Statistics analysis (ANOVA) showed that all samples were sufficiency homogenous so that any results later identified as outliers should not be attributed to any significant sample variability.

Sample Identification: N194 Water (Ca, Mg, K Na)

Test	Bottle No									
Potassium	6	36	65	67	88	89	116	129	139	141
Result 1	4.39	4.43	4.38	4.34	4.37	4.37	4.38	4.38	4.37	4.35
Result 2	4.41	4.41	4.36	4.38	4.38	4.38	4.38	4.4	4.35	4.38

Sample Identification: N195 Water (Ca, Mg, K Na)

Test	Bottle No									
Potassium	35	37	61	80	82	104	126	129	134	153
Result 1	5.56	5.56	5.58	5.56	5.6	5.56	5.61	5.57	5.55	5.68
Result 2	5.56	5.55	5.62	5.61	5.59	5.58	5.56	5.51	5.52	5.59

Sample Identification: N196 Water (Ca, Mg, K Na)

Test	Bottle No									
Potassium	8	19	21	56	81	112	138	146	149	150
Result 1	1.14	1.14	1.11	1.10	1.12	1.11	1.11	1.11	1.09	1.05
Result 2	1.12	1.10	1.11	1.10	1.12	1.09	1.05	1.07	1.04	1.09

Sample Identification: N197 Water (Ca, Mg, K Na)

Test	Bottle No									
Potassium	2	26	42	62	76	103	105	128	138	150
Result 1	1.09	1.12	1.10	1.10	1.09	1.09	1.10	1.10	1.09	1.11
Result 2	1.09	1.11	1.10	1.10	1.09	1.09	1.08	1.10	1.07	1.08

APPENDIX C

Documentation

Instructions to Participants	C1
Results Sheet	C3
Method Code	C4



National Association of Testing Authorities, Australia

WATERS PROFICIENCY TESTING PROGRAM

CHEMICAL ANALYSIS SUB-PROGRAM 84

CALCIUM, MAGNESIUM, POTASSIUM, SODIUM

February 2006

INSTRUCTIONS TO PARTICIPANTS

Participants are requested to note the following before commencing the analysis of the samples.

1. Samples

Four samples of approx. 200mL each in acid washed HDPE bottles.

- | | | |
|-----|------|---------------------------|
| i) | N194 | Water (for Ca, Mg, K, Na) |
| ii) | N195 | Water (for Ca, Mg, K, Na) |
| lii | N196 | Water (for Ca, Mg, K, Na) |
| iv) | N197 | Water (for Ca, Mg, K, Na) |

2. Preservation

All have been acidified to pH<2 with high purity nitric acid (HNO₃)

3. Tests Requested

For each sample:

- | | |
|------|----------------|
| i) | calcium (Ca) |
| ii) | magnesium (Mg) |
| iii) | potassium (K) |
| iv) | sodium (Na) |

Participants are requested to perform all tests for which NATA accreditation is held, using their accredited method. Participants are welcome to report results for any of these tests even if NATA accreditation is not held.

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

4. Safety

- i) Samples are for laboratory use only.
- ii) Mouth pipetting should **not** be used for any of the samples; if required use an automatic pipette filler.
- iii) Use of fume hoods, safety glasses and gloves, where appropriate during determinations, is recommended.

5. Reporting

- i) For each metal in each sample only a single result on the Results Sheet is requested.

For statistical purposes:

results less than (<) 5 mg/L report to two decimal places, eg. 1.55 mg/L

results greater than (>) 5 mg/L report to one decimal place, eg 12.1 mg/L

*NATA recognises that this request may exceed the usual number of significant figures reported by laboratories for some of the results.

ii) In addition to reporting the results, please also record on the results sheet:
Method of analysis using the attached codes

iii) Laboratories are also requested to calculate and report an estimate of uncertainty of measurement for each reported measurement result. All estimates of uncertainty of measurement must be given as a 95% confidence interval (coverage factor $k \approx 2$). **Please report in mg/L.**

6. Testing should commence as soon as possible after receiving the samples and results reported

NO LATER THAN 28 FEBRUARY 2006 to:

<p>Mr Michael Li National Association of Testing Authorities, Australia 7 Leeds Street RHODES NSW 2138 AUSTRALIA</p> <p>Phone: +612 9736 8222 Fax: +612 974 3 6664 or +612 9743 5311 Email: michael.li@nata.asn.au</p>
--

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 (all in mg/L):

Sample	Calcium (Ca)	Magnesium (Mg)	Potassium (K)	Sodium (Na)
N194	10 — 40	10—40	2—20	2—20
N195	10—40	10—40	2—20	2—20
N196	0.5—10	0.5—10	0.1—10	0.1—10
N197	0.5—10	0.5—10	0.1—10	0.1—10


NATIONAL ASSOCIATION OF TESTING AUTHORITIES, AUSTRALIA
**WATERS PROFICIENCY TESTING PROGRAM
CHEMICAL ANALYSIS SUB-PROGRAM 84**
CALCIUM, MAGNESIUM, POTASSIUM, SODIUM
FEBRUARY 2006
**RESULTS SHEET
(mg/L)**

									Laboratory Code	
Analysis	N194		N195		N196		N197		Method Code	
	Result	±MU*	Result	±MU*	Result	±MU*	Result	±MU*		
Calcium (Ca)										
Magnesium (Mg)										
Potassium (K)										
Sodium (Na)										

For Statistical purposes:

 results less than (<) 5 mg/L
 results greater than (>) 5 mg/L

 report to two decimal places, eg. 1.55 mg/L
 report to one decimal place, eg. 12.1 mg/L

*NATA recognises that this request may exceed the usual number of significant figures reported by laboratories for some of the results.

MU* Laboratories' Uncertainty of Measurement. Please report in mg/L
DATE: _____

SIGNATURE: _____

 Return results **NO LATER THAN 28 FEBRUARY 2006** to:

 Mr Michael Li
 National Association of Testing Authorities, Australia
 7 Leeds Street
 RHODES NSW 2138
 AUSTRALIA

Phone: +612 9736 8222

Fax: +612 974 3 6664 or +612 9743 5311

Email: michael.li@nata.asn.au

Method Codes to be used for the Results Sheet

<u>Analysis</u>	<u>Method</u>	Code
Calcium (Ca) Magnesium (Mg)	APHA 18 th Edition 1992, APHA 19 th Edition 1995, APHA 20 th Edition 1998	
Potassium (K)	Part 3111B (Flame AAS, direct aspiration)	1
Sodium (Na)	Part 3111D (Flame AAS, direct aspiration)	2
	Part 3120B (ICP)	3
	Part 3125B (ICP/MS)	4
	Part 3500 -Ca B	5
	Part 3500 - Mg B	6
	Part 3500 – KB (Flame Photometric)	7
	Part 3500 – KC (Potassium – Selective Electrode)	8
	Part 3500 – Na D (Flame Emission Photometric)	9
	Other (please specify)	10