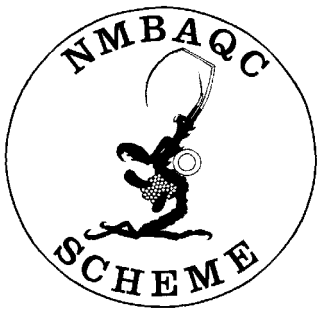

The National Marine Biological
Analytical Quality Control Scheme
www.nmbaqcs.org

Particle Size Results – PS44

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Contents

Tables

Figures

Appendices

Table 1. Summary of the particle size information received from participating laboratories and replicate analysis laboratory for the forty-forth particle size distribution – PS44.

Benchmark Data

Sample	Method	% Gravel	% Sand	% Silt	Median ϕ	Mean ϕ	Sediment Description (Post analysis)
PS44 60	NMBAQC	0.00	41.40	58.60	4.526	4.705	Sandy Mud
PS44 61	NMBAQC	0.00	46.56	53.44	4.226	4.460	Sandy Mud
PS44 62	NMBAQC	0.00	44.93	55.07	4.326	4.574	Sandy Mud
PS44 63	NMBAQC	0.00	41.66	58.34	4.534	4.688	Sandy Mud
PS44 64	NMBAQC	0.00	44.10	55.90	4.366	4.588	Sandy Mud
PS44 65	NMBAQC	0.00	45.40	54.60	4.290	4.531	Sandy Mud
PS44 66	NMBAQC	0.00	43.94	56.06	4.382	4.601	Sandy Mud
PS44 67	NMBAQC	0.00	43.61	56.39	4.398	4.600	Sandy Mud
PS44 68	NMBAQC	0.00	46.09	53.91	4.276	4.540	Sandy Mud
PS44 69	NMBAQC	0.00	43.36	56.64	4.418	4.614	Sandy Mud
TUM AVERAGE	NMBAQC	0.00	44.11	55.89	4.37	4.59	Sandy Mud

Participant Data

Lab	Method	% Gravel	% Sand	% Silt	Sediment Description (Post analysis)
LB_1901	NMBAQC	0.00	42.34	57.66	Sandy silt
LB_1903	NMBAQC	0.00	50.45	49.55	mS
LB_1904	NMBAQC	0.00	51.85	48.15	Muddy sand
LB_1905	NMBAQC	0.00	38.78	61.22	Sandy mud
LB_1908 (A)	OTHER	0.00	42.04	57.96	Sandy mud
LB_1908 (B)	OTHER	0.00	42.38	57.62	Sandy mud
LB_1909	NMBAQC	0.00	42.64	57.36	Sandy mud
LB_1910	NMBAQC	0.00	49.69	50.31	Sandy mud
LB_1917	NMBAQC	0.00	45.48	54.52	Sandy mud
LB_1921	NMBAQC	0.00	42.73	57.27	-
LB_1955	NMBAQC	0.00	24.76	75.24	Sandy mud
LB_1958	NMBAQC	0	42.32	57.68	-

Key to methods

NMBAQC - States following NMBAQC PSA SOP for supporting biological data

OTHER - Following a diferent SOP.

"-" - Not provided.

Figure 1. Particle size distribution curves resulting from analysis of ten replicate samples of sediment distributed as PS44 (Benchmark Data).

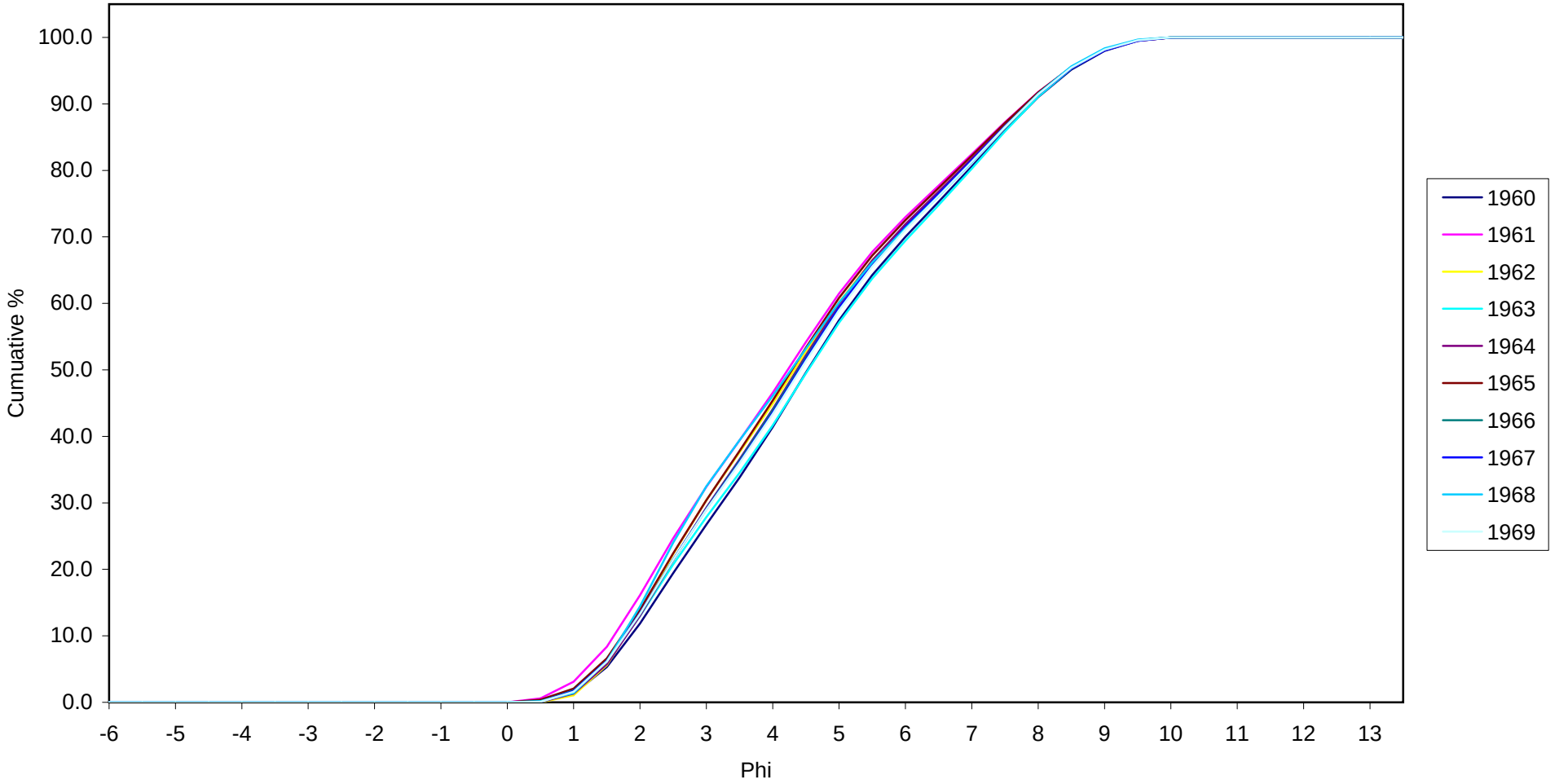


Figure 2. Particle size distribution curves from all participating laboratories for sediment samples from PS44.

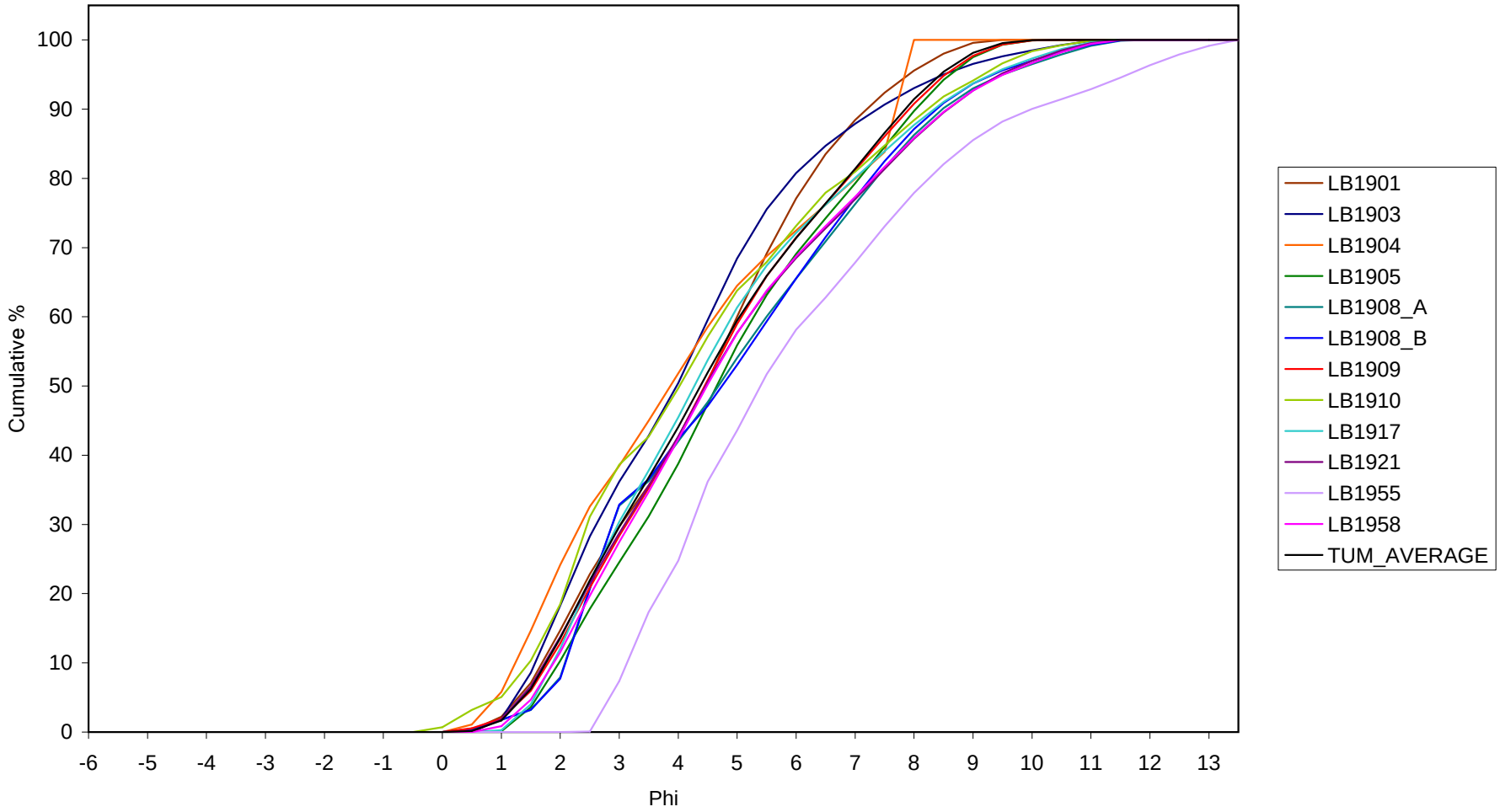


Figure 3. Summary of z-score for the Benchmark Data (TUM AVERAGE); when data from all participating laboratories are included in mean and standard deviation calculations.

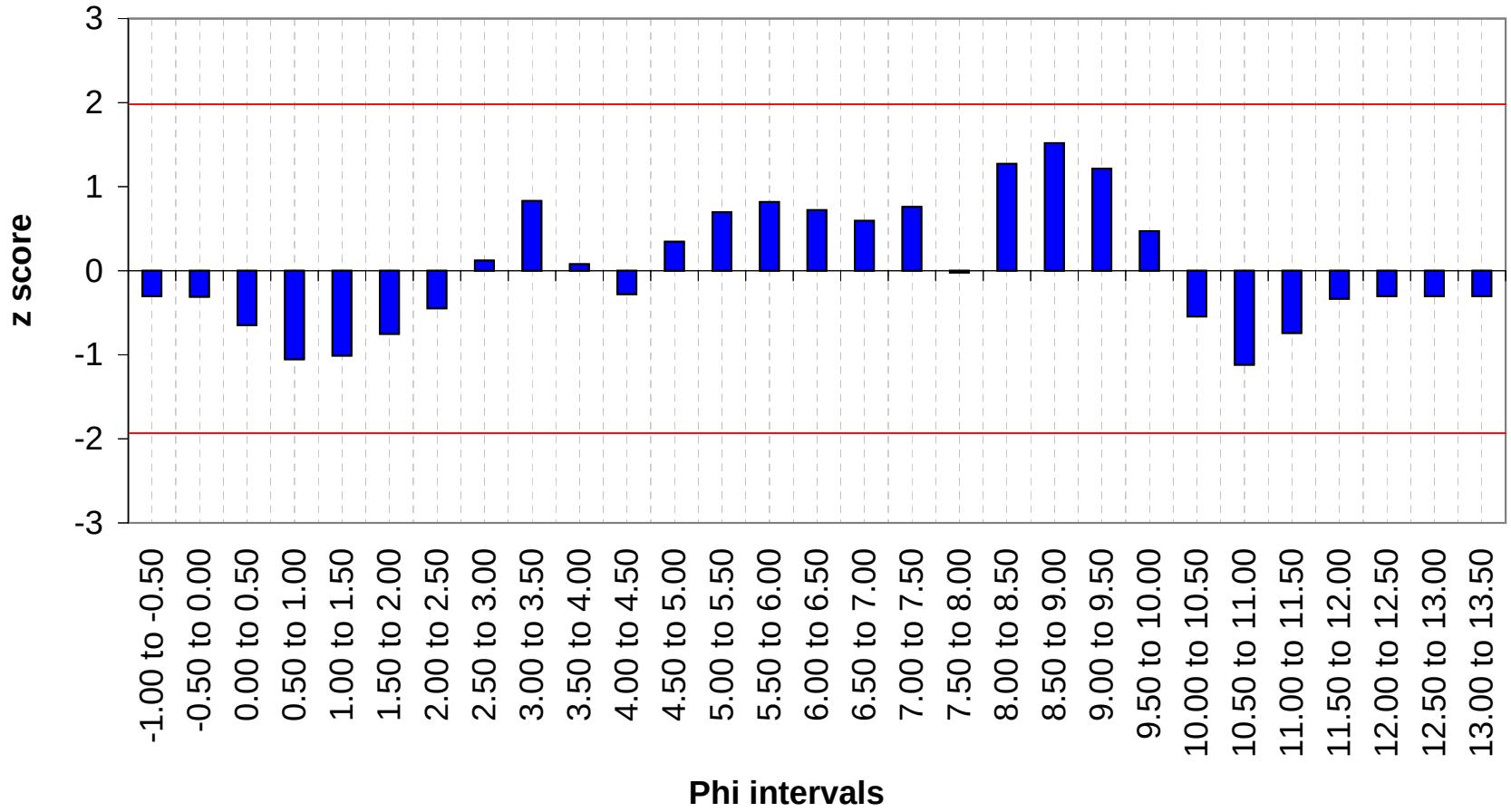
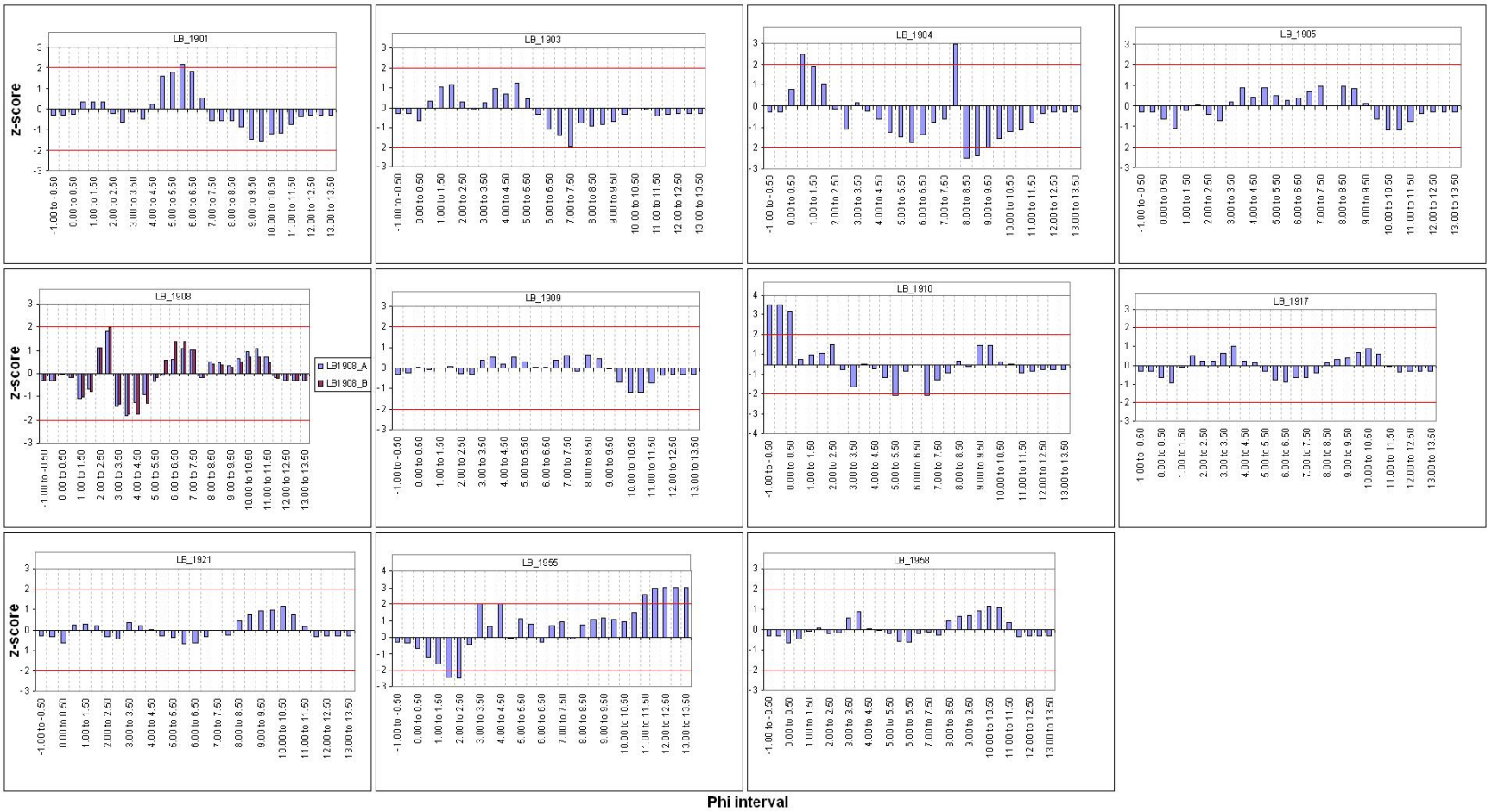
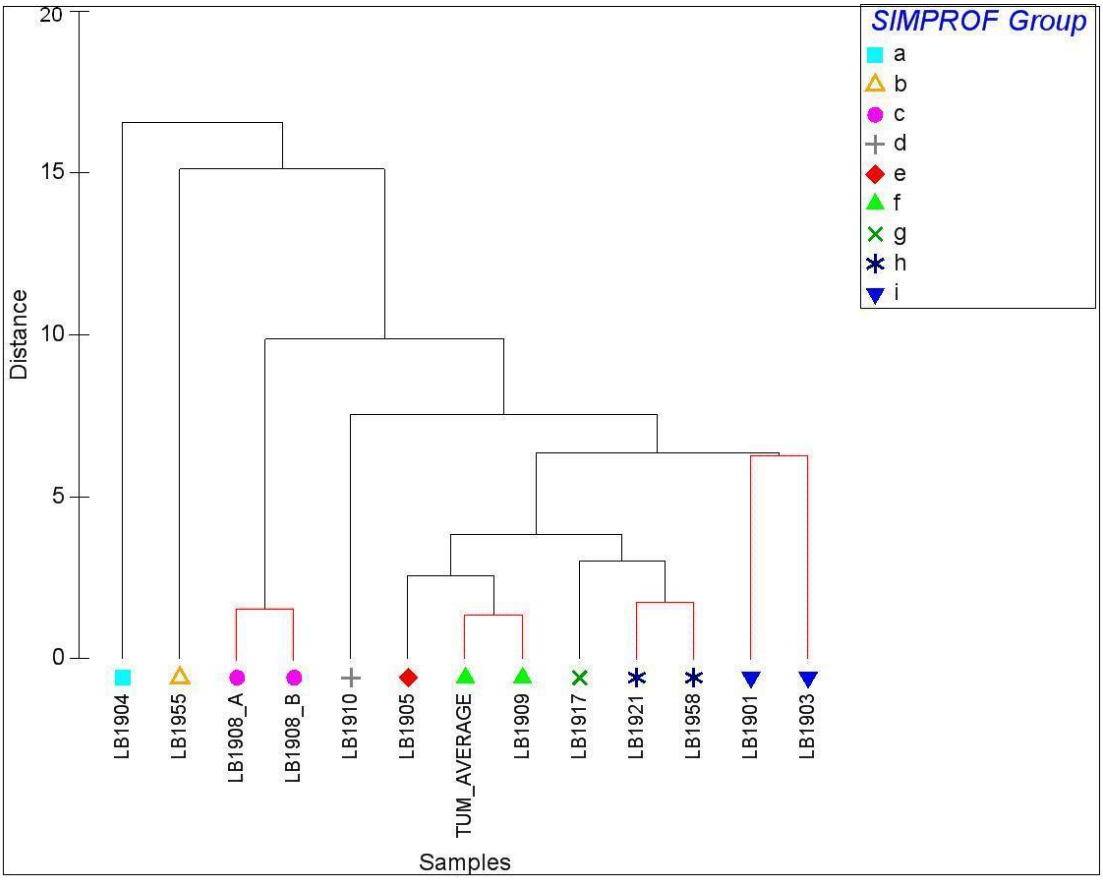


Figure 4. Summary of z-scores for each half phi-interval; when data from all laboratories are included in mean and standard deviation calculations.



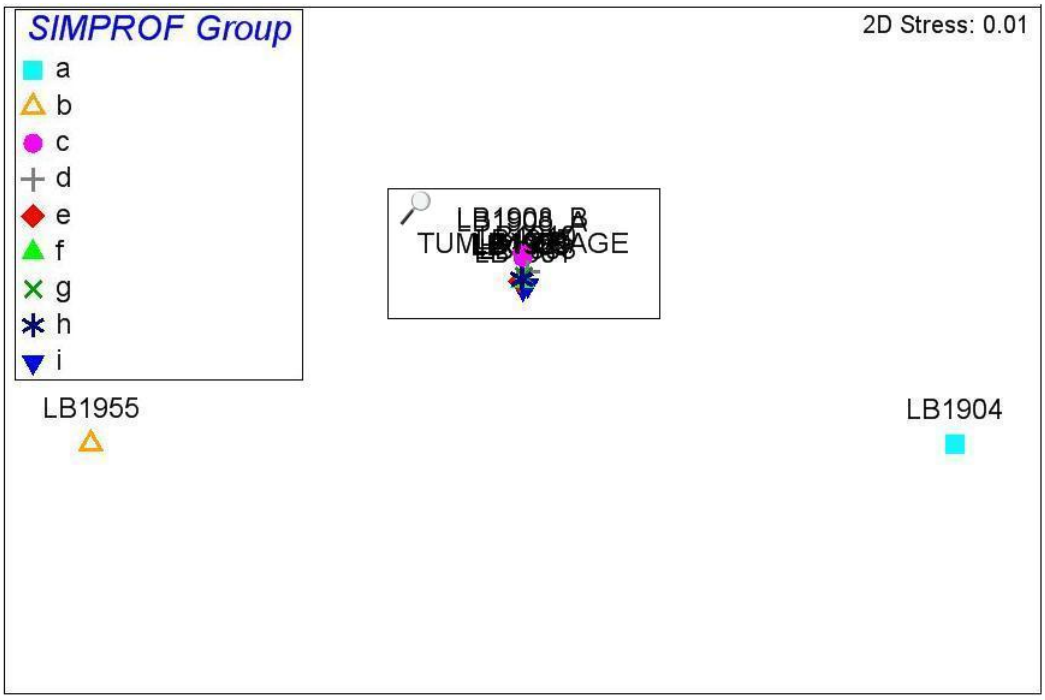
Results of SIMPROF testing on PSA Ring test PS44 data



Data was entered into PRIMER v. 6.1.13 in half-phi intervals; any missing data was entered as zero. The data did not need to be transformed as all data was on a similar percentage scale. A Euclidean distance matrix was created from the data; The Euclidean distance between two samples (laboratories) *j* and *k,* is defined algebraically as $d_{jk} = \sqrt{\sum_{i=1}^{p}(y_{ij} - y_{ik})^2}$. From this distance matrix cluster analysis was carried out including a SIMPROF test at a 5% significance level. The red SIMPROF lines on the dendrogram indicate laboratories that cannot be distinguished from each other at the 5% significance level; the black lines indicate laboratories that can be distinguished from each other. The results are presented as a cluster dendrogram (Figure 5) and non-metric Multi-Dimensional Scaling (MDS) diagrams (Figures 6) below. It is important to note that, although the MDS plot is bounded by a box, the box does not represent either axes or scale. Two samples with a high similarity index will appear close together while those less similar will appear further apart. The 'correct' configuration of sample points will be multidimensional and the plot represents the best 2-dimensional solution to the problem. The technique should be viewed as complementary to cluster analysis, offering a different perspective of the same information.

Figure 5.Cluster dendrogram of PS44 including all laboratories, with the benchmark replicates (TUM AVERAGE) averaged.

a.



b.

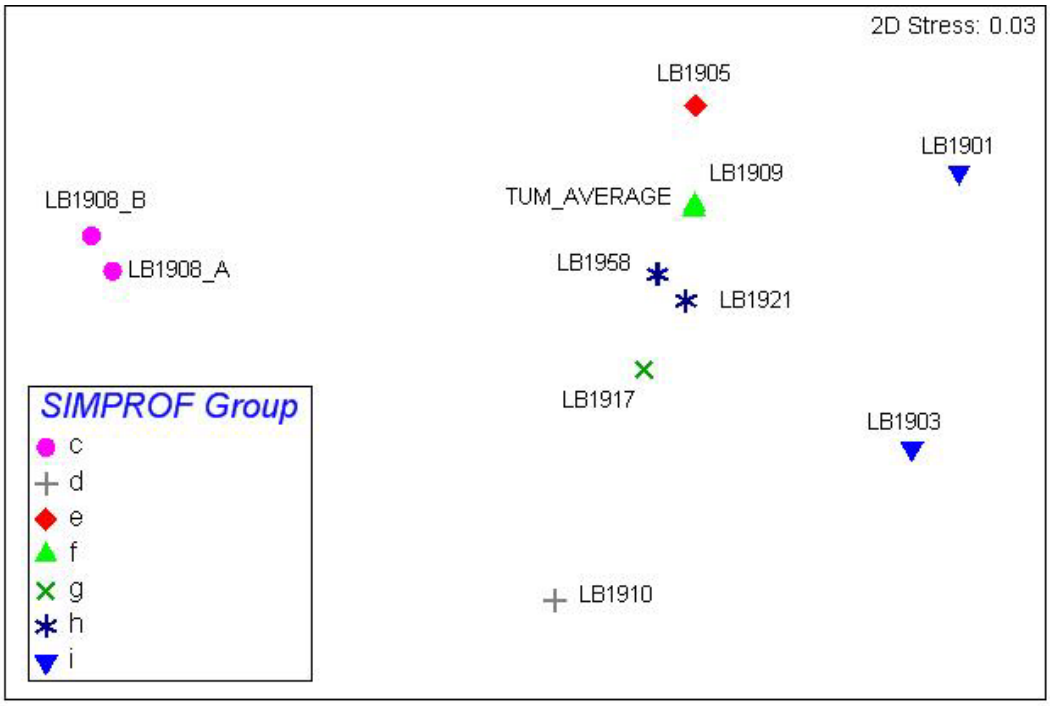


Figure 6. MDS plots of PS44 with the benchmark replicates (TUM AVERAGE) averaged; (a) including all laboratories and (b) sub-set of cluster groups c, d, e, f, g, h and i.

The cluster analysis separates the laboratories into 9 SIMPROF cluster groups; five of these groups comprise a single laboratory.

Cluster group A is formed of a single laboratory (LB1904), the cumulative percentage curve in figure 2 shows that LB1904 had a sharp rise in percentage between 7.5 and 8 phi. It appears as though LB1904 did not analyse above 8.5 phi. This is purely observational and not mentioned in LB1904's notes.

Cluster group B comprises one laboratory (LB1955). This laboratory recorded a much higher percentage of silt (75.24%) compared to the other laboratories (average silt component of other participating laboratories was 55.39%). LB1955 also used a chemical dispersant 3%w/v sodium hexametaphosphate.

Cluster group C comprised laboratory, LB1908 who provided two subsets of data from the replicate. LB1908 also used the chemical dispersant sodium hexametaphosphate and were the only participating laboratory to use alternate methods. Their two sub-sample replicates were indistinguishable from each other at the 5% level.

Cluster group D comprised LB1910. The cumulative percentage curve in figure 2 shows that this laboratory recorded a higher percentage of sediment between -0.5 and 1 phi compared to the other participating laboratories.

Cluster groups E, F, G, H and I have cumulative percentage curves that look very similar. Cluster group E was formed of one laboratory, LB1905; this laboratory recorded a lower percentage of particles between 2.5 and 4.5 phi compared to other laboratories. Cluster group F comprises two laboratories, LB1909 and the TUM AVERAGE (Benchmark Data). Cluster group G contains one laboratory, LB1917. Cluster group H contains two laboratories, LB1921 and LB1958. Cluster group I consists of two laboratories, LB1901 and LB1903. The cumulative percentage curve in figure 2 shows that both these laboratories recorded a slightly higher percentage of particles between 4.5 and 8 phi compared to other laboratories.

Appendices

Exercise Code:	PS44
LabCode:	LB1901
Sample Code:	PS441901
Equipment used (e.g. laser model and range):	*Mastersizer 2000*
Method used:	NMBAQC PSA SOP for supporting biological data*
Peroxide pre-treatment used:	NO*
Chemical dispersant used:	NO*
Phi interval (explicit) + sieve mesh (theoretical sieves shown in brackets)	Volume/Weight (mark as "0" for not analysed or no material)
-6.50 to -6.00; 63 mm	**0.0000**
-6.00 to -5.50; 45 mm	**0.0000**
-5.50 to -5.00; 31.5 mm	**0.0000**
-5.00 to -4.50; 22.4 mm	**0.0000**
-4.50 to -4.00; 16 mm	**0.0000**
-4.00 to -3.50; 11.2 mm	**0.0000**
-3.50 to -3.00; 8 mm	**0.0000**
-3.00 to -2.50; 5.6 mm	**0.0000**
-2.50 to -2.00; 4 mm	**0.0000**
-2.00 to -1.50; 2.8 mm	**0.0000**
-1.50 to -1.00; 2 mm	**0.0000**
-1.00 to -0.50; 1.4 mm	**0.0000**
-0.50 to 0.00; 1 mm	**0.0000**
0.00 to 0.50; (707 µm)	0.2901
0.50 to 1.00; (500 µm)	1.9306
1.00 to 1.50; (353.6 µm)	4.8815
1.50 to 2.00; (250 µm)	7.5923
2.00 to 2.50; (176.8 µm)	8.1324
2.50 to 3.00; (125 µm)	6.8421
3.00 to 3.50; (88.39 µm)	5.9618
3.50 to 4.00; (62.5 µm)	6.7120
4.00 to 4.50; (44.19 µm)	8.3025
4.50 to 5.00; (31.25 µm)	9.3528
5.00 to 5.50; (22.097 µm)	9.1728
5.50 to 6.00; (15.625 µm)	7.9624
6.00 to 6.50; (11.049 µm)	6.3619
6.50 to 7.00; (7.813 µm)	4.9515
7.00 to 7.50; (5.524 µm)	3.9312
7.50 to 8.00; (3.906 µm)	3.1810
8.00 to 8.50; (2.762 µm)	2.4707
8.50 to 9.00; (1.953 µm)	1.5405
9.00 to 9.50; (1.381 µm)	0.4300
9.50 to 10.00; (0.977 µm)	0.0000
10.00 to 10.50; (0.691 µm)	0.0000
10.50 to 11.00; (0.488 µm)	0.0000
11.00 to 11.50; (0.345 µm)	0.0000
11.50 to 12.00; (0.244 µm)	0.0000
12.00 to 12.50; (0.173 µm)	0.0000
12.50 to 13.00; (0.122 µm)	0.0000
13.00 to 13.50; (0.086 µm)	0.0000

Exercise Code:	PS44
LabCode:	LB1903
Sample Code:	PS441903
Equipment used (e.g. laser model and range):	*Malvern 2000 (0.02 - 2000 µm) Hydro G*
Method used:	NMBAQC PSA SOP for supporting biological data*
Peroxide pre-treatment used:	NO*
Chemical dispersant used:	NO*
Phi interval (explicit) + sieve mesh (theoretical sieves shown in brackets)	Volume/Weight (mark as "0" for not analysed or no material)
-6.50 to -6.00; 63 mm	**0.0000**
-6.00 to -5.50; 45 mm	**0.0000**
-5.50 to -5.00; 31.5 mm	**0.0000**
-5.00 to -4.50; 22.4 mm	**0.0000**
-4.50 to -4.00; 16 mm	**0.0000**
-4.00 to -3.50; 11.2 mm	**0.0000**
-3.50 to -3.00; 8 mm	**0.0000**
-3.00 to -2.50; 5.6 mm	**0.0000**
-2.50 to -2.00; 4 mm	**0.0000**
-2.00 to -1.50; 2.8 mm	**0.0000**
-1.50 to -1.00; 2 mm	**0.0000**
-1.00 to -0.50; 1.4 mm	**0.0000**
-0.50 to 0.00; 1 mm	**0.0000**
0.00 to 0.50; (707 µm)	0.0000
0.50 to 1.00; (500 µm)	1.9222
1.00 to 1.50; (353.6 µm)	6.6344
1.50 to 2.00; (250 µm)	9.7100
2.00 to 2.50; (176.8 µm)	9.9978
2.50 to 3.00; (125 µm)	7.9122
3.00 to 3.50; (88.39 µm)	6.6178
3.50 to 4.00; (62.5 µm)	7.6544
4.00 to 4.50; (44.19 µm)	9.0956
4.50 to 5.00; (31.25 µm)	8.8756
5.00 to 5.50; (22.097 µm)	7.1522
5.50 to 6.00; (15.625 µm)	5.2222
6.00 to 6.50; (11.049 µm)	3.9144
6.50 to 7.00; (7.813 µm)	3.1989
7.00 to 7.50; (5.524 µm)	2.7667
7.50 to 8.00; (3.906 µm)	2.3778
8.00 to 8.50; (2.762 µm)	1.9889
8.50 to 9.00; (1.953 µm)	1.5233
9.00 to 9.50; (1.381 µm)	1.0900
9.50 to 10.00; (0.977 µm)	0.8389
10.00 to 10.50; (0.691 µm)	0.7722
10.50 to 11.00; (0.488 µm)	0.5800
11.00 to 11.50; (0.345 µm)	0.1511
11.50 to 12.00; (0.244 µm)	0.0000
12.00 to 12.50; (0.173 µm)	0.0000
12.50 to 13.00; (0.122 µm)	0.0000
13.00 to 13.50; (0.086 µm)	0.0000

Exercise Code:	PS44
LabCode:	LB1904
Sample Code:	PS441904
Equipment used (e.g. laser model and range):	*Laser granulometer Malvern 2000*
Method used:	NMBAQC PSA SOP for supporting biological data*
Peroxide pre-treatment used:	NO*
Chemical dispersant used:	NO*
Phi interval (explicit) + sieve mesh (theoretical sieves shown in brackets)	Volume/Weight (mark as "0" for not analysed or no material)
-6.50 to -6.00; 63 mm	**0.0000**
-6.00 to -5.50; 45 mm	**0.0000**
-5.50 to -5.00; 31.5 mm	**0.0000**
-5.00 to -4.50; 22.4 mm	**0.0000**
-4.50 to -4.00; 16 mm	**0.0000**
-4.00 to -3.50; 11.2 mm	**0.0000**
-3.50 to -3.00; 8 mm	**0.0000**
-3.00 to -2.50; 5.6 mm	**0.0000**
-2.50 to -2.00; 4 mm	**0.0000**
-2.00 to -1.50; 2.8 mm	**0.0000**
-1.50 to -1.00; 2 mm	**0.0000**
-1.00 to -0.50; 1.4 mm	**0.0000**
-0.50 to 0.00; 1 mm	**0.0000**
0.00 to 0.50; (707 µm)	1.0887
0.50 to 1.00; (500 µm)	4.7047
1.00 to 1.50; (353.6 µm)	8.8564
1.50 to 2.00; (250 µm)	9.4944
2.00 to 2.50; (176.8 µm)	8.4682
2.50 to 3.00; (125 µm)	5.8713
3.00 to 3.50; (88.39 µm)	6.5060
3.50 to 4.00; (62.5 µm)	6.8583
4.00 to 4.50; (44.19 µm)	6.6978
4.50 to 5.00; (31.25 µm)	5.9484
5.00 to 5.50; (22.097 µm)	4.3020
5.50 to 6.00; (15.625 µm)	3.6758
6.00 to 6.50; (11.049 µm)	3.7092
6.50 to 7.00; (7.813 µm)	3.7603
7.00 to 7.50; (5.524 µm)	3.8761
7.50 to 8.00; (3.906 µm)	16.1826
8.00 to 8.50; (2.762 µm)	0.0000
8.50 to 9.00; (1.953 µm)	0.0000
9.00 to 9.50; (1.381 µm)	0.0000
9.50 to 10.00; (0.977 µm)	0.0000
10.00 to 10.50; (0.691 µm)	0.0000
10.50 to 11.00; (0.488 µm)	0.0000
11.00 to 11.50; (0.345 µm)	0.0000
11.50 to 12.00; (0.244 µm)	0.0000
12.00 to 12.50; (0.173 µm)	0.0000
12.50 to 13.00; (0.122 µm)	0.0000
13.00 to 13.50; (0.086 µm)	0.0000

Exercise Code:	PS44
LabCode:	LB1905
Sample Code:	PS441905
Equipment used (e.g. laser model and range):	*Masterszer 2000,Hydro mu accessorry unit*
Method used:	NMBAQC PSA SOP for supporting biological data*
Peroxide pre-treatment used:	NO*
Chemical dispersant used:	NO*
Phi interval (explicit) + sieve mesh (theoretical sieves shown in brackets)	Volume/Weight (mark as "0" for not analysed or no material)
-6.50 to -6.00; 63 mm	**0.0000**
-6.00 to -5.50; 45 mm	**0.0000**
-5.50 to -5.00; 31.5 mm	**0.0000**
-5.00 to -4.50; 22.4 mm	**0.0000**
-4.50 to -4.00; 16 mm	**0.0000**
-4.00 to -3.50; 11.2 mm	**0.0000**
-3.50 to -3.00; 8 mm	**0.0000**
-3.00 to -2.50; 5.6 mm	**0.0000**
-2.50 to -2.00; 4 mm	**0.0000**
-2.00 to -1.50; 2.8 mm	**0.0000**
-1.50 to -1.00; 2 mm	**0.0000**
-1.00 to -0.50; 1.4 mm	**0.0000**
-0.50 to 0.00; 1 mm	**0.0000**
0.00 to 0.50; (707 µm)	0.0000
0.50 to 1.00; (500 µm)	0.1186
1.00 to 1.50; (353.6 µm)	3.4695
1.50 to 2.00; (250 µm)	6.6989
2.00 to 2.50; (176.8 µm)	7.4985
2.50 to 3.00; (125 µm)	6.7672
3.00 to 3.50; (88.39 µm)	6.5975
3.50 to 4.00; (62.5 µm)	7.6264
4.00 to 4.50; (44.19 µm)	8.6390
4.50 to 5.00; (31.25 µm)	8.4817
5.00 to 5.50; (22.097 µm)	7.2752
5.50 to 6.00; (15.625 µm)	5.9198
6.00 to 6.50; (11.049 µm)	5.1547
6.50 to 7.00; (7.813 µm)	5.0670
7.00 to 7.50; (5.524 µm)	5.2475
7.50 to 8.00; (3.906 µm)	5.1703
8.00 to 8.50; (2.762 µm)	4.5105
8.50 to 9.00; (1.953 µm)	3.2806
9.00 to 9.50; (1.381 µm)	1.8081
9.50 to 10.00; (0.977 µm)	0.6230
10.00 to 10.50; (0.691 µm)	0.0459
10.50 to 11.00; (0.488 µm)	0.0000
11.00 to 11.50; (0.345 µm)	0.0000
11.50 to 12.00; (0.244 µm)	0.0000
12.00 to 12.50; (0.173 µm)	0.0000
12.50 to 13.00; (0.122 µm)	0.0000
13.00 to 13.50; (0.086 µm)	0.0000

Exercise Code:	**PS44_A**
LabCode:	**LB1908**
Sample Code:	**PS44_A1908**
Equipment used (e.g. laser model and range):	**Endecotts Test Sieves, Malvern Mastersizer Micro Laser Diffractor (Model: MAF5000)**
Method used:	**Sub-sample oven dried @ 105°C to constant weight, wet split at 63µm, followed by dry sieving >63um**
Peroxide pre-treatment used:	**NO***
Chemical dispersant used:	**Yes - approx 20ml of sodium hexametaphosphate used to disaggregate sample after oven drying.**
Phi interval (explicit) + sieve mesh (theoretical sieves shown in brackets)	**Volume % (mark as "0" for not analysed or no material)**
-6.50 to -6.00; 63 mm	0.0000
-6.00 to -5.50; 45 mm	0.0000
-5.50 to -5.00; 31.5 mm	0.0000
-5.00 to -4.50; 22.4 mm	0.0000
-4.50 to -4.00; 16 mm	0.0000
-4.00 to -3.50; 11.2 mm	0.0000
-3.50 to -3.00; 8 mm	0.0000
-3.00 to -2.50; 5.6 mm	0.0000
-2.50 to -2.00; 4 mm	0.0000
-2.00 to -1.50; 2.8 mm	0.0000
-1.50 to -1.00; 2 mm	0.0000
-1.00 to -0.50; 1.4 mm	0.0000
-0.50 to 0.00; 1 mm	0.0000
0.00 to 0.50; (707 µm)	0.4424
0.50 to 1.00; (500 µm)	1.3271
1.00 to 1.50; (353.6 µm)	1.4285
1.50 to 2.00; (250 µm)	4.7187
2.00 to 2.50; (176.8 µm)	12.9735
2.50 to 3.00; (125 µm)	11.8368
3.00 to 3.50; (88.39 µm)	3.5206
3.50 to 4.00; (62.5 µm)	5.7878
4.00 to 4.50; (44.19 µm)	5.6469
4.50 to 5.00; (31.25 µm)	6.3662
5.00 to 5.50; (22.097 µm)	5.9876
5.50 to 6.00; (15.625 µm)	5.4955
6.00 to 6.50; (11.049 µm)	5.3567
6.50 to 7.00; (7.813 µm)	5.3945
7.00 to 7.50; (5.524 µm)	5.2620
7.50 to 8.00; (3.906 µm)	4.7320
8.00 to 8.50; (2.762 µm)	3.8677
8.50 to 9.00; (1.953 µm)	2.8708
9.00 to 9.50; (1.381 µm)	1.9875
9.50 to 10.00; (0.977 µm)	1.5206
10.00 to 10.50; (0.691 µm)	1.4070
10.50 to 11.00; (0.488 µm)	1.2366
11.00 to 11.50; (0.345 µm)	0.7382
11.50 to 12.00; (0.244 µm)	0.0946
12.00 to 12.50; (0.173 µm)	"0"
12.50 to 13.00; (0.122 µm)	"0"
13.00 to 13.50; (0.086 µm)	"0"

Exercise Code:	PS44_B
LabCode:	LB1908
Sample Code:	PS44_B1908
Equipment used (e.g. laser model and range):	Endecotts Test Sieves, Malvern Mastersizer Micro Laser Diffractor (Model: MAF5000)
Method used:	Sub-sample oven dried @ 105°C to constant weight, wet split at 63µm, followed by dry sieving >63um
Peroxide pre-treatment used:	NO*
Chemical dispersant used:	Yes - approx 20ml of sodium hexametaphosphate used to disaggregate sample after oven drying.
Phi interval (explicit) + sieve mesh (theoretical sieves shown in brackets)	Volume % (mark as "0" for not analysed or no material)
-6.50 to -6.00; 63 mm	0.0000
-6.00 to -5.50; 45 mm	0.0000
-5.50 to -5.00; 31.5 mm	0.0000
-5.00 to -4.50; 22.4 mm	0.0000
-4.50 to -4.00; 16 mm	0.0000
-4.00 to -3.50; 11.2 mm	0.0000
-3.50 to -3.00; 8 mm	0.0000
-3.00 to -2.50; 5.6 mm	0.0000
-2.50 to -2.00; 4 mm	0.0000
-2.00 to -1.50; 2.8 mm	0.0000
-1.50 to -1.00; 2 mm	0.0000
-1.00 to -0.50; 1.4 mm	0.0000
-0.50 to 0.00; 1 mm	0.0000
0.00 to 0.50; (707 µm)	0.4543
0.50 to 1.00; (500 µm)	1.3220
1.00 to 1.50; (353.6 µm)	1.4597
1.50 to 2.00; (250 µm)	4.4906
2.00 to 2.50; (176.8 µm)	12.9646
2.50 to 3.00; (125 µm)	12.1644
3.00 to 3.50; (88.39 µm)	3.6757
3.50 to 4.00; (62.5 µm)	5.8448
4.00 to 4.50; (44.19 µm)	4.7552
4.50 to 5.00; (31.25 µm)	5.9332
5.00 to 5.50; (22.097 µm)	6.2786
5.50 to 6.00; (15.625 µm)	6.1923
6.00 to 6.50; (11.049 µm)	5.9702
6.50 to 7.00; (7.813 µm)	5.6927
7.00 to 7.50; (5.524 µm)	5.2918
7.50 to 8.00; (3.906 µm)	4.6504
8.00 to 8.50; (2.762 µm)	3.7684
8.50 to 9.00; (1.953 µm)	2.7878
9.00 to 9.50; (1.381 µm)	1.8996
9.50 to 10.00; (0.977 µm)	1.4309
10.00 to 10.50; (0.691 µm)	1.2582
10.50 to 11.00; (0.488 µm)	1.0423
11.00 to 11.50; (0.345 µm)	0.5983
11.50 to 12.00; (0.244 µm)	0.0740
12.00 to 12.50; (0.173 µm)	"0"
12.50 to 13.00; (0.122 µm)	"0"
13.00 to 13.50; (0.086 µm)	"0"

Exercise Code:	PS44
LabCode:	LB1909
Sample Code:	PS441909
Equipment used (e.g. laser model and range):	*Malvern Mastersizer 2000 (0.01µm to 2000µm).*
Method used:	NMBAQC PSA SOP for supporting biological data*
Peroxide pre-treatment used:	NO*
Chemical dispersant used:	NO*
+ sieve mesh (theoretical sieves shown in brackets)	(mark as "0" for not analysed or no material)
-6.50 to -6.00; 63 mm	**0.0000**
-6.00 to -5.50; 45 mm	**0.0000**
-5.50 to -5.00; 31.5 mm	**0.0000**
-5.00 to -4.50; 22.4 mm	**0.0000**
-4.50 to -4.00; 16 mm	**0.0000**
-4.00 to -3.50; 11.2 mm	**0.0000**
-3.50 to -3.00; 8 mm	**0.0000**
-3.00 to -2.50; 5.6 mm	**0.0000**
-2.50 to -2.00; 4 mm	**0.0000**
-2.00 to -1.50; 2.8 mm	**0.0000**
-1.50 to -1.00; 2 mm	**0.0000**
-1.00 to -0.50; 1.4 mm	**0.0000**
-0.50 to 0.00; 1 mm	**0.0200**
0.00 to 0.50; (707 µm)	0.6228
0.50 to 1.00; (500 µm)	1.6613
1.00 to 1.50; (353.6 µm)	4.7325
1.50 to 2.00; (250 µm)	8.0616
2.00 to 2.50; (176.8 µm)	9.4898
2.50 to 3.00; (125 µm)	8.8309
3.00 to 3.50; (88.39 µm)	8.1108
3.50 to 4.00; (62.5 µm)	8.7010
4.00 to 4.50; (44.19 µm)	9.6778
4.50 to 5.00; (31.25 µm)	9.5361
5.00 to 5.50; (22.097 µm)	8.1630
5.50 to 6.00; (15.625 µm)	6.5966
6.00 to 6.50; (11.049 µm)	5.7413
6.50 to 7.00; (7.813 µm)	5.6565
7.00 to 7.50; (5.524 µm)	5.7846
7.50 to 8.00; (3.906 µm)	5.5699
8.00 to 8.50; (2.762 µm)	4.7473
8.50 to 9.00; (1.953 µm)	3.4193
9.00 to 9.50; (1.381 µm)	1.9235
9.50 to 10.00; (0.977 µm)	0.6969
10.00 to 10.50; (0.691 µm)	0.0563
10.50 to 11.00; (0.488 µm)	0.0000
11.00 to 11.50; (0.345 µm)	0.0000
11.50 to 12.00; (0.244 µm)	0.0000
12.00 to 12.50; (0.173 µm)	0.0000
12.50 to 13.00; (0.122 µm)	0.0000
13.00 to 13.50; (0.086 µm)	0.0000

Exercise Code:	PS44
LabCode:	LB1910
Sample Code:	PS441910
Equipment used (e.g. laser model and range):	*Coulter laser sizer*
Method used:	NMBAQC PSA SOP for supporting biological data*
Peroxide pre-treatment used:	NO*
Chemical dispersant used:	NO*
Phi interval (explicit) + sieve mesh (theoretical sieves shown in brackets)	Volume/Weight (mark as "0" for not analysed or no material)
-6.50 to -6.00; 63 mm	**0.0000**
-6.00 to -5.50; 45 mm	**0.0000**
-5.50 to -5.00; 31.5 mm	**0.0000**
-5.00 to -4.50; 22.4 mm	**0.0000**
-4.50 to -4.00; 16 mm	**0.0000**
-4.00 to -3.50; 11.2 mm	**0.0000**
-3.50 to -3.00; 8 mm	**0.0000**
-3.00 to -2.50; 5.6 mm	**0.0000**
-2.50 to -2.00; 4 mm	**0.0000**
-2.00 to -1.50; 2.8 mm	**0.0000**
-1.50 to -1.00; 2 mm	**0.0000**
-1.00 to -0.50; 1.4 mm	**0.0088**
-0.50 to 0.00; 1 mm	**0.7010**
0.00 to 0.50; (707 µm)	2.5000
0.50 to 1.00; (500 µm)	1.8400
1.00 to 1.50; (353.6 µm)	5.2800
1.50 to 2.00; (250 µm)	8.1500
2.00 to 2.50; (176.8 µm)	12.6200
2.50 to 3.00; (125 µm)	7.5300
3.00 to 3.50; (88.39 µm)	4.0500
3.50 to 4.00; (62.5 µm)	7.0300
4.00 to 4.50; (44.19 µm)	7.4300
4.50 to 5.00; (31.25 µm)	6.6600
5.00 to 5.50; (22.097 µm)	4.1400
5.50 to 6.00; (15.625 µm)	5.1900
6.00 to 6.50; (11.049 µm)	4.8200
6.50 to 7.00; (7.813 µm)	3.0300
7.00 to 7.50; (5.524 µm)	3.7800
7.50 to 8.00; (3.906 µm)	3.6600
8.00 to 8.50; (2.762 µm)	3.4200
8.50 to 9.00; (1.953 µm)	2.2800
9.00 to 9.50; (1.381 µm)	2.5000
9.50 to 10.00; (0.977 µm)	1.7500
10.00 to 10.50; (0.691 µm)	0.8700
10.50 to 11.00; (0.488 µm)	0.6500
11.00 to 11.50; (0.345 µm)	0.1590
11.50 to 12.00; (0.244 µm)	0.0000
12.00 to 12.50; (0.173 µm)	0.0000
12.50 to 13.00; (0.122 µm)	0.0000
13.00 to 13.50; (0.086 µm)	0.0000

Exercise Code:	PS44
LabCode:	LB1917
Sample Code:	PS441917
Equipment used (e.g. laser model and range):	*Mastersizer 2000 with Hydro2000 G*
Method used:	NMBAQC PSA SOP for supporting biological data*
Peroxide pre-treatment used:	NO*
Chemical dispersant used:	NO*
Phi interval (explicit) + sieve mesh (theoretical sieves shown in brackets)	Volume/Weight (mark as "0" for not analysed or no material)
-6.50 to -6.00; 63 mm	**0.0000**
-6.00 to -5.50; 45 mm	**0.0000**
-5.50 to -5.00; 31.5 mm	**0.0000**
-5.00 to -4.50; 22.4 mm	**0.0000**
-4.50 to -4.00; 16 mm	**0.0000**
-4.00 to -3.50; 11.2 mm	**0.0000**
-3.50 to -3.00; 8 mm	**0.0000**
-3.00 to -2.50; 5.6 mm	**0.0000**
-2.50 to -2.00; 4 mm	**0.0000**
-2.00 to -1.50; 2.8 mm	**0.0000**
-1.50 to -1.00; 2 mm	**0.0000**
-1.00 to -0.50; 1.4 mm	**0.0000**
-0.50 to 0.00; 1 mm	**0.0000**
0.00 to 0.50; (707 µm)	0.0000
0.50 to 1.00; (500 µm)	0.2618
1.00 to 1.50; (353.6 µm)	3.7549
1.50 to 2.00; (250 µm)	8.0126
2.00 to 2.50; (176.8 µm)	9.7726
2.50 to 3.00; (125 µm)	8.5843
3.00 to 3.50; (88.39 µm)	7.3774
3.50 to 4.00; (62.5 µm)	7.7174
4.00 to 4.50; (44.19 µm)	8.2600
4.50 to 5.00; (31.25 µm)	7.5972
5.00 to 5.50; (22.097 µm)	6.0671
5.50 to 6.00; (15.625 µm)	4.7127
6.00 to 6.50; (11.049 µm)	4.0489
6.50 to 7.00; (7.813 µm)	3.8920
7.00 to 7.50; (5.524 µm)	3.8791
7.50 to 8.00; (3.906 µm)	3.7532
8.00 to 8.50; (2.762 µm)	3.3490
8.50 to 9.00; (1.953 µm)	2.7188
9.00 to 9.50; (1.381 µm)	2.0134
9.50 to 10.00; (0.977 µm)	1.5529
10.00 to 10.50; (0.691 µm)	1.3534
10.50 to 11.00; (0.488 µm)	0.9703
11.00 to 11.50; (0.345 µm)	0.3508
11.50 to 12.00; (0.244 µm)	0.0000
12.00 to 12.50; (0.173 µm)	0.0000
12.50 to 13.00; (0.122 µm)	0.0000
13.00 to 13.50; (0.086 µm)	0.0000

Exercise Code:	PS44
LabCode:	LB1921
Sample Code:	PS441921
Equipment used (e.g. laser model and range):	*Malvern Mastersizer 2000*
Method used:	NMBAQC PSA SOP for supporting biological data*
Peroxide pre-treatment used:	NO*
Chemical dispersant used:	NO*
Phi interval (explicit) + sieve mesh (theoretical sieves shown in brackets)	Volume/Weight (mark as "0" for not analysed or no material)
-6.50 to -6.00; 63 mm	**0.0000**
-6.00 to -5.50; 45 mm	**0.0000**
-5.50 to -5.00; 31.5 mm	**0.0000**
-5.00 to -4.50; 22.4 mm	**0.0000**
-4.50 to -4.00; 16 mm	**0.0000**
-4.00 to -3.50; 11.2 mm	**0.0000**
-3.50 to -3.00; 8 mm	**0.0000**
-3.00 to -2.50; 5.6 mm	**0.0000**
-2.50 to -2.00; 4 mm	**0.0000**
-2.00 to -1.50; 2.8 mm	**0.0000**
-1.50 to -1.00; 2 mm	**0.0000**
-1.00 to -0.50; 1.4 mm	**0.0000**
-0.50 to 0.00; 1 mm	**0.0000**
0.00 to 0.50; (707 µm)	0.0284
0.50 to 1.00; (500 µm)	1.8144
1.00 to 1.50; (353.6 µm)	4.7706
1.50 to 2.00; (250 µm)	7.1431
2.00 to 2.50; (176.8 µm)	7.7844
2.50 to 3.00; (125 µm)	7.2030
3.00 to 3.50; (88.39 µm)	6.8293
3.50 to 4.00; (62.5 µm)	7.1612
4.00 to 4.50; (44.19 µm)	7.8648
4.50 to 5.00; (31.25 µm)	7.0927
5.00 to 5.50; (22.097 µm)	5.9531
5.50 to 6.00; (15.625 µm)	4.8527
6.00 to 6.50; (11.049 µm)	4.3050
6.50 to 7.00; (7.813 µm)	4.1783
7.00 to 7.50; (5.524 µm)	4.3954
7.50 to 8.00; (3.906 µm)	4.3260
8.00 to 8.50; (2.762 µm)	3.8170
8.50 to 9.00; (1.953 µm)	3.1836
9.00 to 9.50; (1.381 µm)	2.4964
9.50 to 10.00; (0.977 µm)	1.7594
10.00 to 10.50; (0.691 µm)	1.5286
10.50 to 11.00; (0.488 µm)	1.0650
11.00 to 11.50; (0.345 µm)	0.4476
11.50 to 12.00; (0.244 µm)	0.0000
12.00 to 12.50; (0.173 µm)	0.0000
12.50 to 13.00; (0.122 µm)	0.0000
13.00 to 13.50; (0.086 µm)	0.0000

Exercise Code:	PS44
LabCode:	LB1955
Sample Code:	PS441955
Equipment used (e.g. laser model and range):	*Coulter LS230 and Variable Speed Fluid Module*
Method used:	NMBAQC PSA SOP for supporting biological data*
Peroxide pre-treatment used:	NO*
Chemical dispersant used:	3% w/v sodium hexametaphosphate
Phi interval (explicit) + sieve mesh (theoretical sieves shown in brackets)	Volume/Weight (mark as "0" for not analysed or no material)
-6.50 to -6.00; 63 mm	**0.0000**
-6.00 to -5.50; 45 mm	**0.0000**
-5.50 to -5.00; 31.5 mm	**0.0000**
-5.00 to -4.50; 22.4 mm	**0.0000**
-4.50 to -4.00; 16 mm	**0.0000**
-4.00 to -3.50; 11.2 mm	**0.0000**
-3.50 to -3.00; 8 mm	**0.0000**
-3.00 to -2.50; 5.6 mm	**0.0000**
-2.50 to -2.00; 4 mm	**0.0000**
-2.00 to -1.50; 2.8 mm	**0.0000**
-1.50 to -1.00; 2 mm	**0.0000**
-1.00 to -0.50; 1.4 mm	**0.0000**
-0.50 to 0.00; 1 mm	**0.0000**
0.00 to 0.50; (707 µm)	0.0000
0.50 to 1.00; (500 µm)	0.0000
1.00 to 1.50; (353.6 µm)	0.0000
1.50 to 2.00; (250 µm)	0.0000
2.00 to 2.50; (176.8 µm)	0.0791
2.50 to 3.00; (125 µm)	7.2925
3.00 to 3.50; (88.39 µm)	9.9536
3.50 to 4.00; (62.5 µm)	7.4367
4.00 to 4.50; (44.19 µm)	11.4387
4.50 to 5.00; (31.25 µm)	7.3864
5.00 to 5.50; (22.097 µm)	8.1321
5.50 to 6.00; (15.625 µm)	6.4470
6.00 to 6.50; (11.049 µm)	4.6192
6.50 to 7.00; (7.813 µm)	5.0478
7.00 to 7.50; (5.524 µm)	5.2366
7.50 to 8.00; (3.906 µm)	4.8240
8.00 to 8.50; (2.762 µm)	4.1627
8.50 to 9.00; (1.953 µm)	3.4819
9.00 to 9.50; (1.381 µm)	2.6719
9.50 to 10.00; (0.977 µm)	1.8271
10.00 to 10.50; (0.691 µm)	1.3932
10.50 to 11.00; (0.488 µm)	1.4541
11.00 to 11.50; (0.345 µm)	1.6899
11.50 to 12.00; (0.244 µm)	1.7727
12.00 to 12.50; (0.173 µm)	1.5689
12.50 to 13.00; (0.122 µm)	1.2579
13.00 to 13.50; (0.086 µm)	0.8260

Exercise Code:	**PS44**
LabCode:	**LB1958**
Sample Code:	**PS441958**
Equipment used (e.g. laser model and range):	*Mastersizer 2000 for particles below1000um*
Method used:	**NMBAQC PSA SOP for supporting biological data***
Peroxide pre-treatment used:	**NO***
Chemical dispersant used:	**NO***
Phi interval (explicit) + sieve mesh (theoretical sieves shown in brackets)	**Volume/Weight (mark as "0" for not analysed or no material)**
-6.50 to -6.00; 63 mm	**0.0000**
-6.00 to -5.50; 45 mm	**0.0000**
-5.50 to -5.00; 31.5 mm	**0.0000**
-5.00 to -4.50; 22.4 mm	**0.0000**
-4.50 to -4.00; 16 mm	**0.0000**
-4.00 to -3.50; 11.2 mm	**0.0000**
-3.50 to -3.00; 8 mm	**0.0000**
-3.00 to -2.50; 5.6 mm	**0.0000**
-2.50 to -2.00; 4 mm	**0.0000**
-2.00 to -1.50; 2.8 mm	**0.0000**
-1.50 to -1.00; 2 mm	**0.0000**
-1.00 to -0.50; 1.4 mm	**0.0000**
-0.50 to 0.00; 1 mm	**0.0000**
0.00 to 0.50; (707 µm)	0.0000
0.50 to 1.00; (500 µm)	0.8700
1.00 to 1.50; (353.6 µm)	3.8100
1.50 to 2.00; (250 µm)	6.8400
2.00 to 2.50; (176.8 µm)	8.1900
2.50 to 3.00; (125 µm)	7.7500
3.00 to 3.50; (88.39 µm)	7.2600
3.50 to 4.00; (62.5 µm)	7.6000
4.00 to 4.50; (44.19 µm)	7.9400
4.50 to 5.00; (31.25 µm)	7.4000
5.00 to 5.50; (22.097 µm)	6.1500
5.50 to 6.00; (15.625 µm)	4.9500
6.00 to 6.50; (11.049 µm)	4.3300
6.50 to 7.00; (7.813 µm)	4.2500
7.00 to 7.50; (5.524 µm)	4.3200
7.50 to 8.00; (3.906 µm)	4.1900
8.00 to 8.50; (2.762 µm)	3.7600
8.50 to 9.00; (1.953 µm)	3.0700
9.00 to 9.50; (1.381 µm)	2.2700
9.50 to 10.00; (0.977 µm)	1.7300
10.00 to 10.50; (0.691 µm)	1.5300
10.50 to 11.00; (0.488 µm)	1.2400
11.00 to 11.50; (0.345 µm)	0.5500
11.50 to 12.00; (0.244 µm)	0.0000
12.00 to 12.50; (0.173 µm)	0.0000
12.50 to 13.00; (0.122 µm)	0.0000
13.00 to 13.50; (0.086 µm)	0.0000

Appendix 2. Z-score calculations when data from all participating laboratories are included in mean and standard deviation calculations.

	-6.50 to -6.00	-6.00 to -5.50	-5.50 to -5.00	-5.00 to -4.50	-4.50 to -4.00	-4.00 to -3.50	-3.50 to -3.00	-3.00 to -2.50	-2.50 to -2.00	-2.00 to -1.50	-1.50 to -1.00	-1.00 to -0.50	z-score
TUM AVERAGE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.302
LB1901	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.302
LB1903	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.302
LB1904	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.302
LB1905	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.302
LB1908_A	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.302
LB1908_B	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.302
LB1909	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.302
LB1910	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	3.015
LB1917	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.302
LB1921	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.302
LB1955	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.302
LB1958	0.0000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	-0.3015
Mean	0.000	0.000	0.000	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0008	
St. Dev	0.000	0.000	0.000	0.000	0.000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0027	

	-0.50 to 0.00	z-score	0.00 to 0.50	z-score	0.50 to 1.00	z-score	1.00 to 1.50	z-score	1.50 to 2.00	z-score	2.00 to 2.50	z-score
TUM AVERAGE	0.000	-0.309	0.000	-0.647	0.159	-1.052	1.5205	-1.009	4.5613	-0.751	7.3210	-0.447
LB1901	0.000	-0.309	0.290	-0.260	1.931	0.323	4.8815	0.331	7.592	0.353	8.132	-0.223
LB1903	0.000	-0.309	0.000	-0.647	1.922	0.317	6.6344	1.030	9.710	1.125	9.998	0.292
LB1904	0.000	-0.309	1.089	0.806	4.705	2.476	8.8564	1.916	9.494	1.046	8.468	-0.130
LB1905	0.000	-0.309	0.000	-0.647	0.119	-1.083	3.4695	-0.232	6.699	0.028	7.499	-0.398
LB1908_A	0.000	-0.309	0.442	-0.057	1.327	-0.145	1.4285	-1.045	4.719	-0.694	12.973	1.113
LB1908_B	0.000	-0.309	0.454	-0.041	1.322	-0.149	1.4597	-1.033	4.491	-0.777	12.965	1.110
LB1909	0.017	-0.229	0.529	0.059	1.410	-0.080	4.0174	-0.013	6.843	0.080	8.056	-0.244
LB1910	0.701	3.014	2.500	2.689	1.840	0.253	5.2800	0.490	8.150	0.556	12.620	1.015
LB1917	0.000	-0.309	0.000	-0.647	0.262	-0.972	3.7549	-0.118	8.013	0.506	9.773	0.229
LB1921	0.000	-0.309	0.028	-0.609	1.814	0.233	4.7706	0.287	7.143	0.189	7.784	-0.319
LB1955	0.000	-0.309	0.000	-0.647	0.000	-1.175	0.0000	-1.615	0.000	-2.413	0.079	-2.445
LB1958	0.000	-0.309	0.000	-0.647	0.870	-0.500	3.810	-0.096	6.840	0.079	8.190	-0.207
Mean	0.0653		0.4848		1.5138		4.0503		6.6231		8.9406	
St. Dev	0.2109		0.7494		1.2887		2.5083		2.7448		3.6250	

z-score >1.96 or <-1.96
All values equal zero

Appendix 2. Z-score calculations when data from all participating laboratories are included in mean and standard deviation calculations.

	2.50 to 3.00	z-score	3.00 to 3.50	z-score	3.50 to 4.00	z-score	4.00 to 4.50	z-score	4.50 to 5.00	z-score	5.00 to 5.50	z-score
TUM AVERAGE	8.3829	0.121	7.7315	0.830	7.0723	0.078	7.3579	-0.277	7.8393	0.346	7.5250	0.694
LB1901	6.842	-0.638	5.962	-0.116	6.712	-0.453	8.302	0.255	9.353	1.642	9.173	1.800
LB1903	7.912	-0.110	6.618	0.234	7.654	0.936	9.096	0.702	8.876	1.233	7.152	0.444
LB1904	5.871	-1.116	6.506	0.175	6.858	-0.238	6.698	-0.649	5.948	-1.273	4.302	-1.468
LB1905	6.767	-0.674	6.598	0.223	7.626	0.894	8.639	0.445	8.482	0.896	7.275	0.527
LB1908_A	11.837	1.823	3.521	-1.421	5.788	-1.815	5.647	-1.241	6.366	-0.916	5.988	-0.337
LB1908_B	12.164	1.984	3.676	-1.338	5.845	-1.731	4.755	-1.744	5.933	-1.286	6.279	-0.142
LB1909	7.496	-0.315	6.885	0.377	7.386	0.540	8.215	0.206	8.095	0.565	6.930	0.295
LB1910	7.530	-0.299	4.050	-1.138	7.030	0.015	7.430	-0.236	6.660	-0.664	4.140	-1.577
LB1917	8.584	0.221	7.377	0.640	7.717	1.028	8.260	0.231	7.597	0.139	6.067	-0.284
LB1921	7.203	-0.460	6.829	0.347	7.161	0.209	7.865	0.009	7.093	-0.293	5.953	-0.360
LB1955	7.293	-0.416	9.954	2.017	7.437	0.615	11.439	2.022	7.386	-0.042	8.132	1.102
LB1958	7.750	-0.190	7.260	0.578	7.600	0.855	7.940	0.051	7.400	-0.030	6.150	-0.228
Mean	8.1364		6.1795		7.0196		7.8496		7.4354		6.4900	
St. Dev	2.0300		1.8707		0.6786		1.7747		1.1679		1.4905	

	5.50 to 6.00	z-score	6.00 to 6.50	z-score	6.50 to 7.00	z-score	7.00 to 7.50	z-score	7.50 to 8.00	z-score	8.00 to 8.50	z-score
TUM AVERAGE	6.4701	0.818	5.4363	0.721	4.9870	0.594	5.0532	0.760	5.1606	-0.020	4.8639	1.271
LB1901	7.962	2.174	6.362	1.823	4.951	0.554	3.931	-0.578	3.181	-0.551	2.471	-0.576
LB1903	5.222	-0.316	3.914	-1.090	3.199	-1.406	2.767	-1.967	2.378	-0.767	1.989	-0.948
LB1904	3.676	-1.721	3.709	-1.335	3.760	-0.778	3.876	-0.644	16.183	2.939	0.000	-2.483
LB1905	5.920	0.318	5.155	0.386	5.067	0.684	5.247	0.991	5.170	-0.017	4.511	0.998
LB1908_A	5.495	-0.068	5.357	0.627	5.395	1.050	5.262	1.009	4.732	-0.135	3.868	0.502
LB1908_B	6.192	0.565	5.970	1.357	5.693	1.383	5.292	1.044	4.650	-0.157	3.768	0.426
LB1909	5.600	0.027	4.874	0.052	4.802	0.387	4.911	0.590	4.728	-0.136	4.030	0.628
LB1910	5.190	-0.345	4.820	-0.012	3.030	-1.595	3.780	-0.759	3.660	-0.423	3.420	0.157
LB1917	4.713	-0.779	4.049	-0.930	3.892	-0.631	3.879	-0.640	3.753	-0.398	3.349	0.102
LB1921	4.853	-0.652	4.305	-0.625	4.178	-0.310	4.395	-0.025	4.326	-0.244	3.817	0.463
LB1955	6.447	0.797	4.619	-0.251	5.048	0.662	5.237	0.978	4.824	-0.110	4.163	0.730
LB1958	4.950	-0.563	4.330	-0.596	4.250	-0.230	4.320	-0.115	4.190	-0.281	3.760	0.419
Mean	5.5700		4.8304		4.4559		4.4161		5.2351		3.2168	
St. Dev	1.1005		0.8400		0.8940		0.8386		3.7251		1.2957	

z-score >1.96 or <-1.96

All values equal zero

Appendix 2. Z-score calculations when data from all participating laboratories are included in mean and standard deviation calculations.

	8.50 to 9.00	z-score	9.00 to 9.50	z-score	9.50 to 10.00	z-score	10.00 to 10.50	z-score	10.50 to 11.00	z-score	11.00 to 11.50	z-score	11.50 to 12.00
TUM AVERAGE	3.9764	1.519	2.7240	1.214	1.4090	0.471	0.4370	-0.544	0.0122	-1.118	0.000	-0.741	0.000
LB1901	1.540	-0.851	0.430	-1.465	0.000	-1.553	0.000	-1.219	0.000	-1.140	0.000	-0.741	0.000
LB1903	1.523	-0.868	1.090	-0.694	0.839	-0.348	0.772	-0.026	0.580	-0.101	0.151	-0.443	0.000
LB1904	0.000	-2.350	0.000	-1.968	0.000	-1.553	0.000	-1.219	0.000	-1.140	0.000	-0.741	0.000
LB1905	3.281	0.842	1.808	0.144	0.623	-0.658	0.046	-1.148	0.000	-1.140	0.000	-0.741	0.000
LB1908_A	2.871	0.443	1.987	0.354	1.521	0.631	1.407	0.956	1.237	1.076	0.738	0.714	0.095
LB1908_B	2.788	0.362	1.900	0.251	1.431	0.502	1.258	0.726	1.042	0.728	0.598	0.438	0.074
LB1909	2.903	0.474	1.633	-0.060	0.592	-0.703	0.048	-1.145	0.000	-1.140	0.000	-0.741	0.000
LB1910	2.280	-0.132	2.500	0.953	1.750	0.960	0.870	0.126	0.650	0.025	0.159	-0.427	0.000
LB1917	2.719	0.295	2.013	0.384	1.553	0.677	1.353	0.873	0.970	0.599	0.351	-0.049	0.000
LB1921	3.184	0.747	2.496	0.948	1.759	0.974	1.529	1.143	1.065	0.769	0.448	0.141	0.000
LB1955	3.482	1.038	2.672	1.153	1.827	1.071	1.393	0.934	1.454	1.466	1.690	2.589	1.773
LB1958	3.070	0.637	2.270	0.684	1.730	0.932	1.53	1.146	1.24	1.082	0.550	0.343	0.000
Mean	2.4154		1.6845		1.0813		0.7888		0.6362		0.3759		0.176
St. Dev	1.0279		0.8561		0.6963		0.6470		0.5579		0.5075		0.531

	z-score	12.00 to 12.50	z-score	12.50 to 13.00	z-score	13.00 to 13.50	z-score
TUM AVERAGE	-0.333	0.000	-0.302	0.000	-0.302	0.000	-0.302
LB1901	-0.333	0.000	-0.302	0.000	-0.302	0.000	-0.302
LB1903	-0.333	0.000	-0.302	0.000	-0.302	0.000	-0.302
LB1904	-0.333	0.000	-0.302	0.000	-0.302	0.000	-0.302
LB1905	-0.333	0.000	-0.302	0.000	-0.302	0.000	-0.302
LB1908_A	-0.154	0.000	-0.302	0.000	-0.302	0.000	-0.302
LB1908_B	-0.193	0.000	-0.302	0.000	-0.302	0.000	-0.302
LB1909	-0.333	0.000	-0.302	0.000	-0.302	0.000	-0.302
LB1910	-0.333	0.000	-0.302	0.000	-0.302	0.000	-0.302
LB1917	-0.333	0.000	-0.302	0.000	-0.302	0.000	-0.302
LB1921	-0.333	0.000	-0.302	0.000	-0.302	0.000	-0.302
LB1955	3.009	1.569	3.015	1.258	3.015	0.826	3.015
LB1958	-0.333	0.000	-0.302	0.000	-0.302	0.000	-0.302
Mean		0.143		0.114		0.075	
St. Dev		0.473		0.379		0.249	

z-score >1.96 or <-1.96
All values equal zero