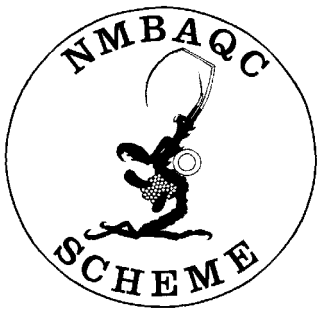

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Particle Size Results – PS45

Lydia Finbow
Adam Procter
Sarah Hussey
Richard Arnold
January 2013
E-mail:adam.procter@unicomarine.com

thomson unicomarine

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Table 1. Summary of the particle size information received from participating laboratories and replicate analysis laboratory for the forty-fifth particle size distribution – PS45.

Benchmark Data

Sample	Method	% Gravel	% Sand	% Silt	Median ϕ	Mean ϕ	Sediment Description (Post analysis)
PS45 60	NMBAQC	0.00	100.00	0.00	1.685	1.684	Sand
PS45 61	NMBAQC	0.00	100.00	0.00	1.701	1.700	Sand
PS45 62	NMBAQC	0.00	100.00	0.00	1.709	1.709	Sand
PS45 63	NMBAQC	0.00	100.00	0.00	1.699	1.699	Sand
PS45 64	NMBAQC	0.00	100.00	0.00	1.718	1.718	Sand
PS45 65	NMBAQC	0.00	100.00	0.00	1.719	1.719	Sand
PS45 66	NMBAQC	0.00	100.00	0.00	1.700	1.699	Sand
PS45 67	NMBAQC	0.00	100.00	0.00	1.711	1.710	Sand
PS45 68	NMBAQC	0.00	100.00	0.00	1.707	1.706	Sand
PS45 69	NMBAQC	0.00	100.00	0.00	1.700	1.699	Sand
TUM AVERAGE	NMBAQC	0.00	100.00	0.00	1.70	1.70	Sand

Participant Data

Lab	Method	% Gravel	% Sand	% Silt	Sediment Description (Post analysis)
LB_1901	NMBAQC	0.00	100.00	0.00	Sand
LB_1903	NMBAQC	0.00	100.00	0.00	Sand
LB_1904	NMBAQC	0.00	100.00	0.00	Sand
LB_1905	NMBAQC	0.00	100.00	0.00	Sand
LB_1908 (A)	OTHER	0.00	99.79	0.21	Sand
LB_1908 (B)	OTHER	0.00	99.69	0.31	Sand
LB_1909	NMBAQC	0.00	100.00	0.00	Sand
LB_1910	NMBAQC	0.00	100.00	0.00	Sand
LB_1917	NMBAQC	0.00	100.00	0.00	Sand
LB_1921	NMBAQC	0.00	100.00	0.00	Sand
LB_1955	NMBAQC	0.00	99.30	0.70	Sand
LB_1958	NMBAQC	0.00	100.00	0.00	Sand

Key to methods

NMBAQC - States following NMBAQC PSA SOP for supporting biological data

OTHER - Following a diferent SOP.

Figure 1. Particle size distribution curves resulting from analysis of ten replicate samples of sediment distributed as PS45 (Benchmark Data).

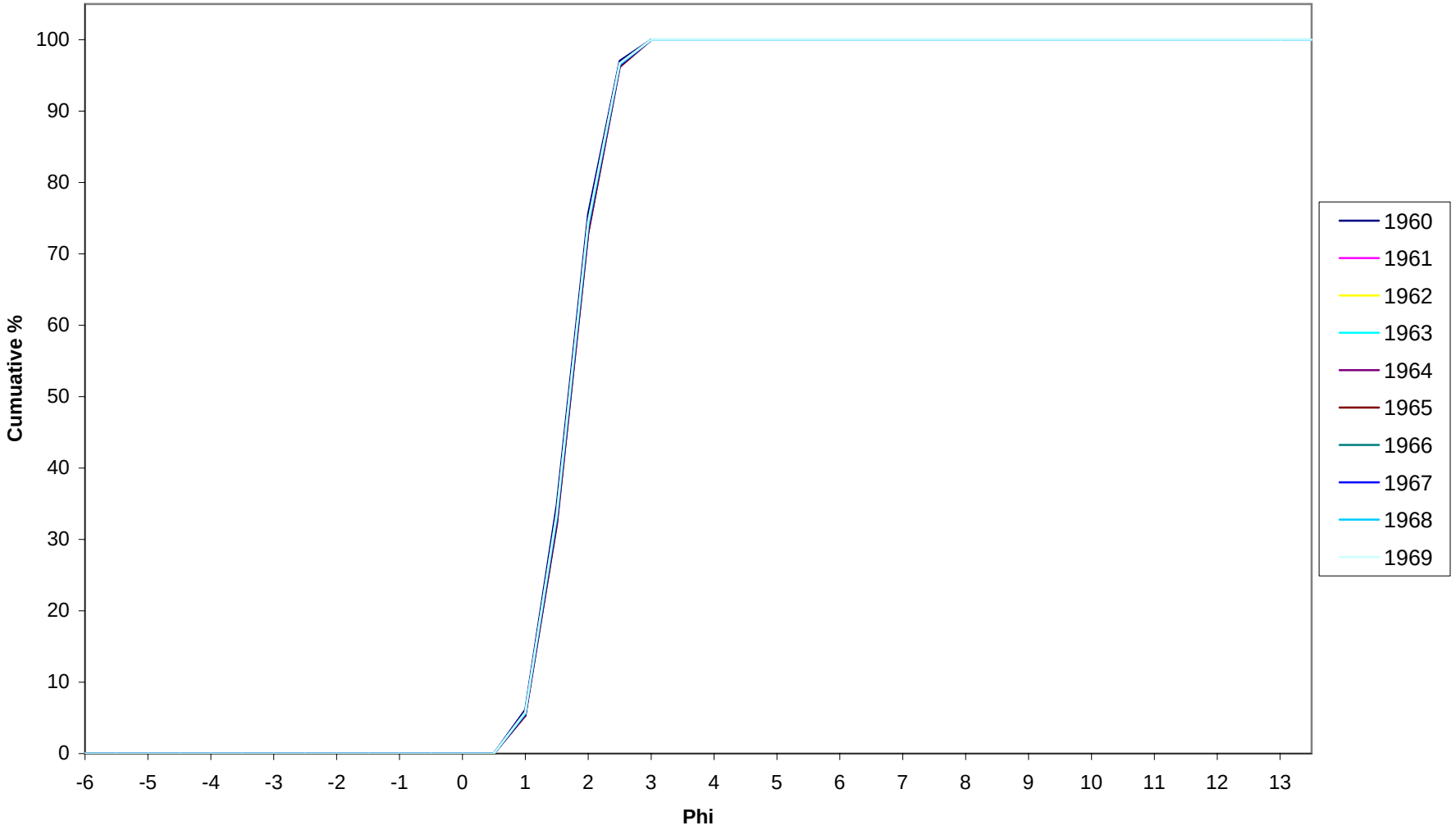


Figure 2. Particle size distribution curves from all participating laboratories for sediment samples from PS45.

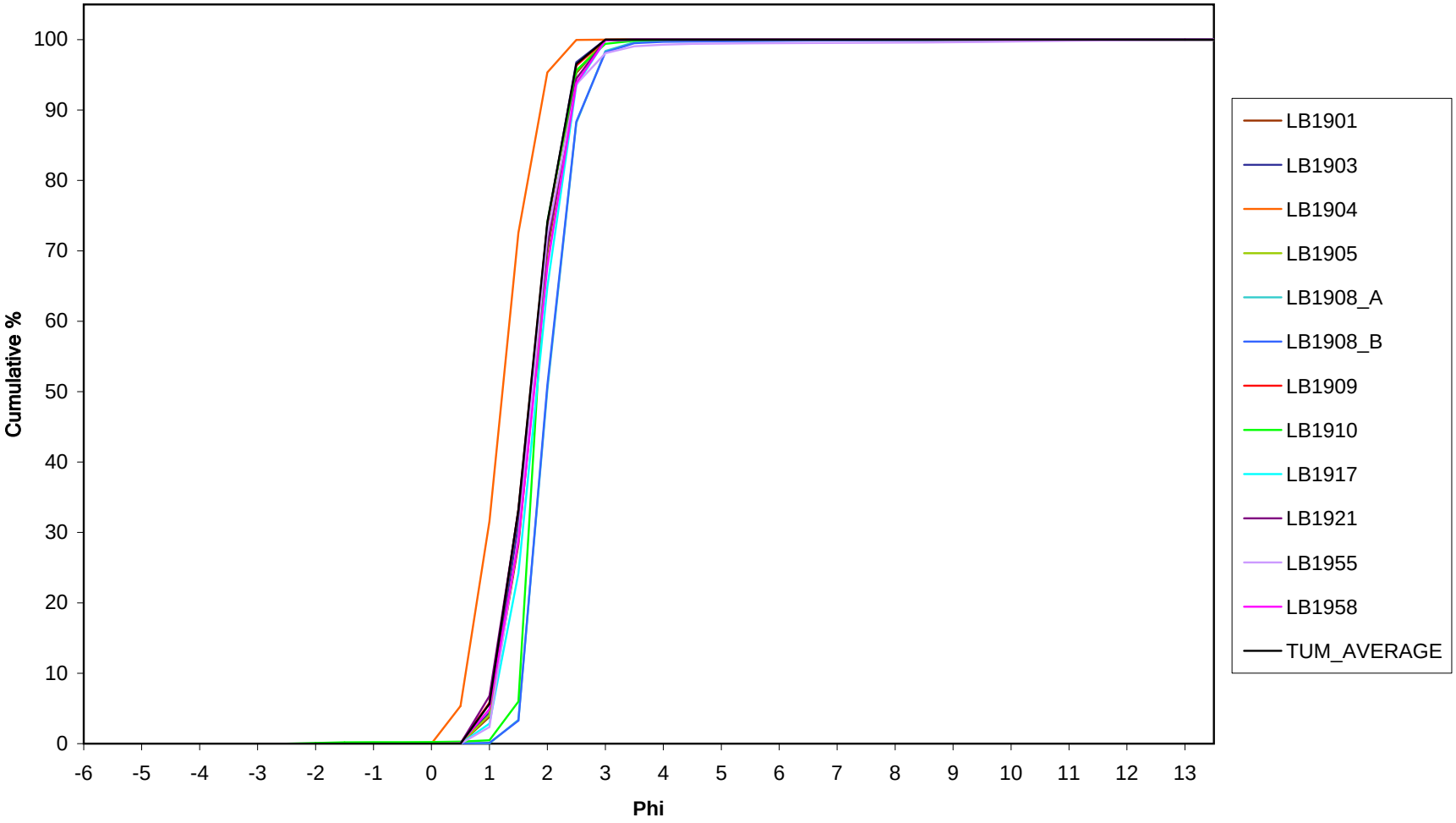


Table 2. Summary of z-scores for each half-phi interval for PS45; data from all participating laboratories included in mean and standard deviation calculations.

	-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	-0.50 to 0.00	0.00 to 0.50	0.50 to 1.00	1.00 to 1.50	1.50 to 2.00	2.00 to 2.50	2.50 to 3.00	3.00 to 3.50
TUM AVERAGE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.56	-0.18	-0.28	-0.62	-0.70
LB1901	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.29	-0.29	-0.29	-0.29	-0.49	-0.30	-0.19	0.28	-0.12	0.10	-0.18	-0.64
LB1903	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.29	-0.29	-0.29	-0.29	-0.49	-0.30	-0.10	0.48	-0.01	-0.21	-0.71	-0.71
LB1904	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.29	-0.29	-0.29	-0.29	-0.49	3.17	3.01	1.72	-1.95	-2.39	-1.85	-0.71
LB1905	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.29	-0.29	-0.29	-0.29	-0.49	-0.30	-0.15	0.31	-0.12	0.05	-0.26	-0.65
LB1908_A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.29	-0.29	-0.29	-0.29	0.12	-0.30	-0.73	-1.56	0.42	1.54	1.81	1.73
LB1908_B	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.29	-0.29	-0.29	-0.29	0.77	-0.28	-0.72	-1.58	0.49	1.49	1.68	1.82
LB1909	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.29	-0.29	-0.29	-0.29	0.16	-0.25	0.09	0.53	-0.21	-0.26	-0.54	-0.68
LB1910	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.18	3.18	3.18	3.18	2.90	-0.27	-0.70	-1.38	2.51	-0.39	-0.50	0.17
LB1917	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.29	-0.29	-0.29	-0.29	-0.49	-0.30	-0.32	0.01	-0.19	0.46	0.42	-0.52
LB1921	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.29	-0.29	-0.29	-0.29	-0.49	-0.30	0.24	0.44	-0.49	-0.13	0.10	-0.57
LB1955	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.29	-0.29	-0.29	-0.29	-0.49	-0.30	-0.39	0.51	0.02	-0.40	-0.28	1.24
LB1958	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.29	-0.29	-0.29	-0.29	-0.49	-0.26	-0.04	0.23	-0.36	0.15	0.31	-0.48
μ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.46	5.11	21.25	42.62	24.82	5.18	0.36
σ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.00	0.00	0.00	1.54	7.01	11.45	10.17	8.46	2.79	0.51

	3.50 to 4.00	4.00 to 4.50	4.50 to 5.00	5.00 to 5.50	5.50 to 6.00	6.00 to 6.50	6.50 to 7.00	7.00 to 7.50	7.50 to 8.00	8.00 to 8.50	8.50 to 9.00	9.00 to 9.50	9.50 to 10.00	10.00 to 10.50	10.50 to 11.00	11.00 to 11.50	11.50 to 12.00	12.00 to 12.50	12.50 to 13.00	13.00 to 13.50
TUM AVERAGE	-0.65	-0.52	-0.55	-0.54	-0.55	-0.54	-0.54	-0.54	-0.54	-0.54	-0.46	-0.38	-0.35	-0.35	-0.35	-0.33	-0.30	-0.29	-0.29	-0.29
LB1901	-0.65	-0.52	-0.55	-0.54	-0.55	-0.54	-0.54	-0.54	-0.54	-0.54	-0.46	-0.38	-0.35	-0.35	-0.35	-0.33	-0.30	-0.29	-0.29	-0.29
LB1903	-0.65	-0.52	-0.55	-0.54	-0.55	-0.54	-0.54	-0.54	-0.54	-0.54	-0.46	-0.38	-0.35	-0.35	-0.35	-0.33	-0.30	-0.29	-0.29	-0.29
LB1904	-0.65	-0.52	-0.55	-0.54	-0.55	-0.54	-0.54	-0.54	-0.54	-0.54	-0.46	-0.38	-0.35	-0.35	-0.35	-0.33	-0.30	-0.29	-0.29	-0.29
LB1905	-0.65	-0.52	-0.55	-0.54	-0.55	-0.54	-0.54	-0.54	-0.54	-0.54	-0.46	-0.38	-0.35	-0.35	-0.35	-0.33	-0.30	-0.29	-0.29	-0.29
LB1908_A	1.09	0.35	1.35	1.21	1.31	1.32	1.21	1.21	1.24	0.98	0.39	0.04	-0.07	-0.07	-0.07	-0.14	-0.27	-0.29	-0.29	-0.29
LB1908_B	1.44	0.81	1.92	1.54	1.85	2.18	2.18	2.22	2.25	1.87	0.92	0.32	0.11	0.10	0.11	-0.01	-0.25	-0.29	-0.29	-0.29
LB1909	-0.65	-0.52	-0.55	-0.54	-0.55	-0.54	-0.54	-0.54	-0.54	-0.54	-0.46	-0.38	-0.35	-0.35	-0.35	-0.33	-0.30	-0.29	-0.29	-0.29
LB1910	0.71	0.16	-0.55	-0.54	-0.55	-0.54	-0.54	-0.54	-0.54	-0.54	-0.46	-0.38	-0.35	-0.35	-0.35	-0.33	-0.30	-0.29	-0.29	-0.29
LB1917	-0.65	-0.52	-0.55	-0.54	-0.55	-0.54	-0.54	-0.54	-0.54	-0.54	-0.46	-0.38	-0.35	-0.35	-0.35	-0.33	-0.30	-0.29	-0.29	-0.29
LB1921	-0.65	-0.52	-0.55	-0.54	-0.55	-0.54	-0.54	-0.54	-0.54	-0.54	-0.46	-0.38	-0.35	-0.35	-0.35	-0.33	-0.30	-0.29	-0.29	-0.29
LB1955	1.97	2.84	1.66	2.13	1.78	1.36	1.47	1.41	1.34	1.99	2.84	3.09	3.14	3.14	3.14	3.16	3.18	3.18	3.18	3.18
LB1958	-0.65	-0.52	-0.55	-0.54	-0.55	-0.54	-0.54	-0.54	-0.54	-0.54	-0.46	-0.38	-0.35	-0.35	-0.35	-0.33	-0.30	-0.29	-0.29	-0.29
μ	0.06	0.02	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00
σ	0.09	0.03	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.00

z-score >1.96 or <-1.96

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.

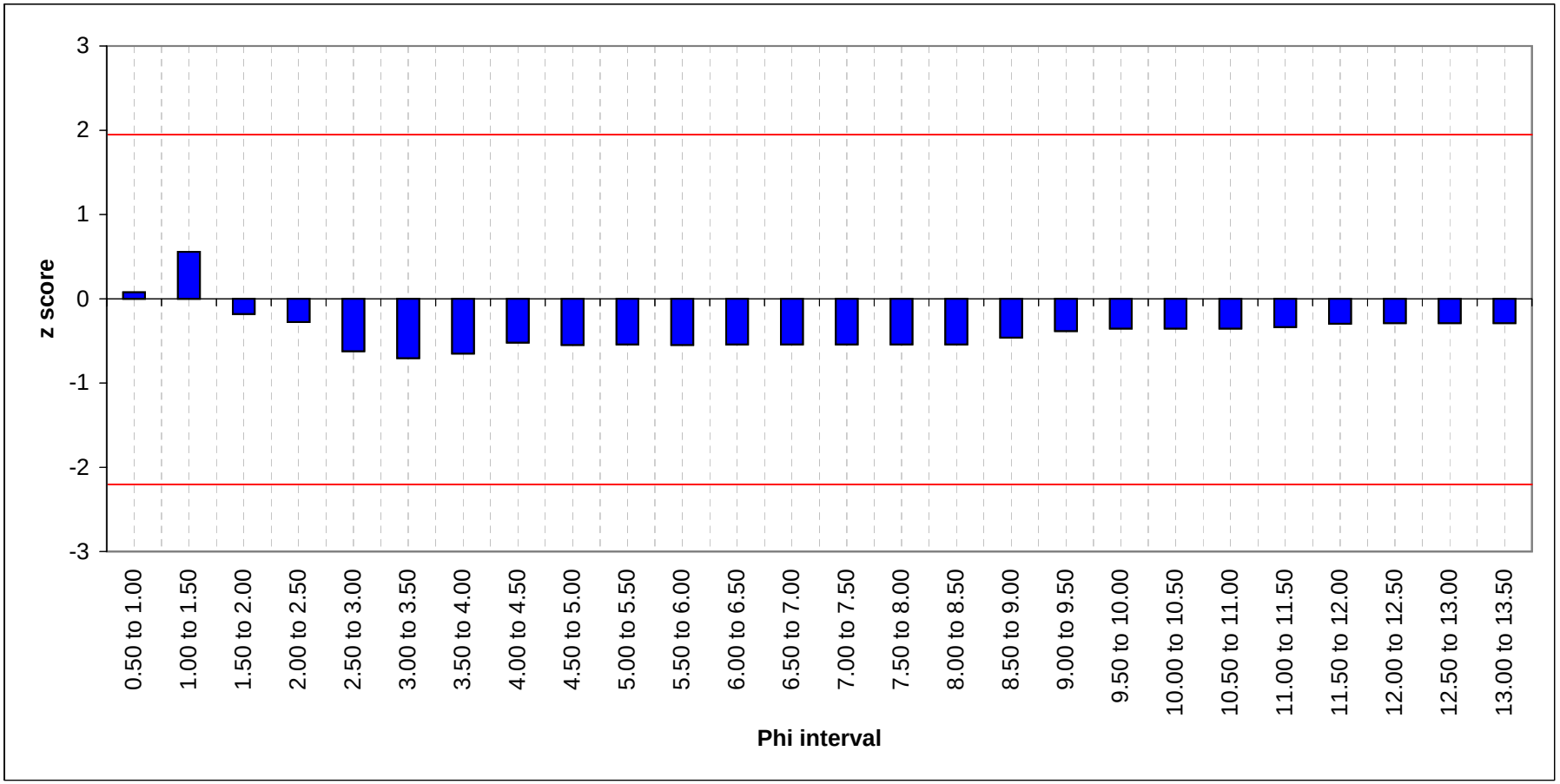
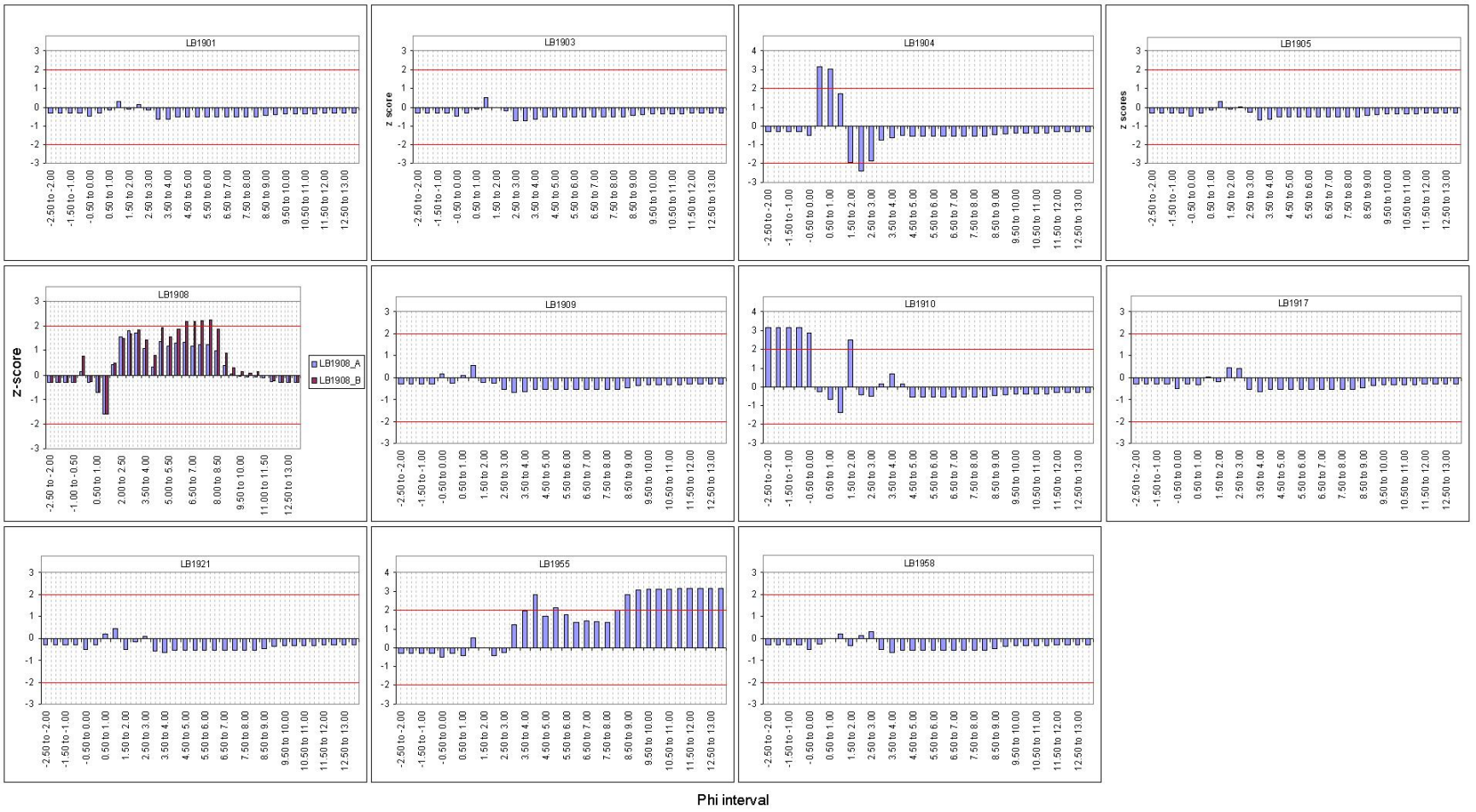


Figure 4. Summary of z-scores for each half phi interval; when data from all laboratories are included in mean and standard deviation calculations.



Results of SIMPROF testing on PSA Ring test PS45 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 (labs) *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 labs that cannot be distinguished from each other at the 5% significance level; the black lines indicate labs that can be distinguished from each other. The results are presented as a cluster dendrogram (Figure 4) and non-metric Multi-Dimensional Scaling (MDS) diagrams (Figures 5) 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.

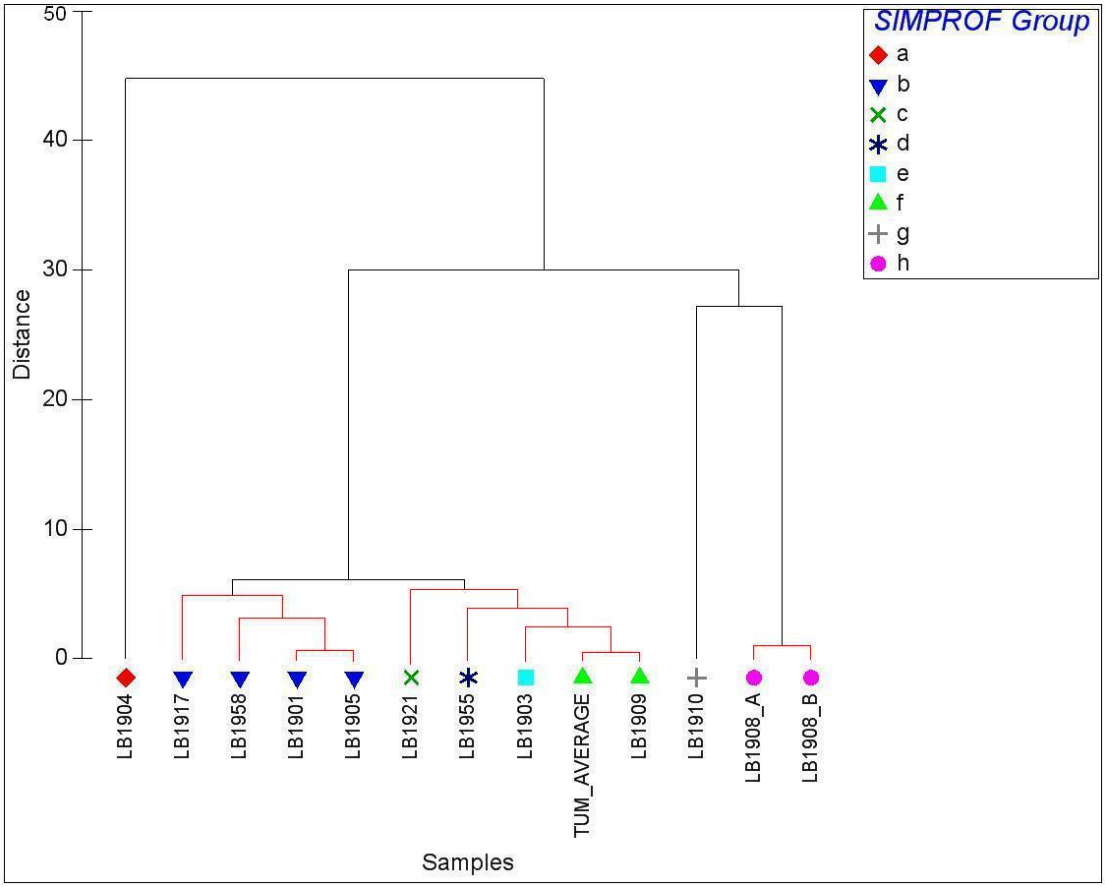


Figure 5.Cluster dendrogram of PS45 including all laboratories, with the benchmark replicates (TUM AVERAGE) averaged.

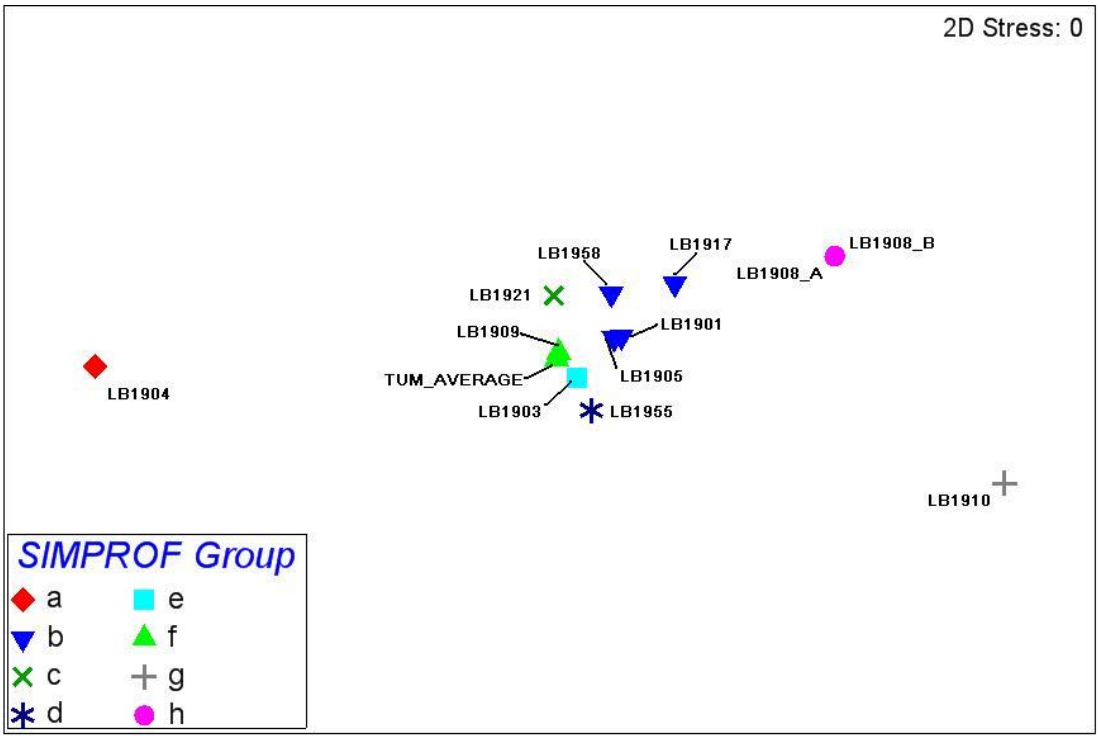


Figure 6. MDS plots of PS45 with the benchmark replicates (TUM AVERAGE) averaged.

The cluster analysis separates the laboratories into 8 SIMPROF cluster groups; five of these groups each comprise a single lab.

Cluster group A is formed of a single laboratory (LB1904), figure 2 shows that their cumulative percentage curve is displaced by half a phi. This could be due to a data entry error.

Cluster group B comprises four laboratories (LB1917, LB1958, LB1901 and LB1905). These laboratories cumulative frequency curves (figure 2) are all very similar. The cumulative frequency curves of Cluster groups C (LB1921), D (LB1955), E (LB1903) and F (LB1909 and TUM AVERERAGE) are all very similar to those of cluster group B's.

Cluster group E contains one laboratory (LB1910). The cumulative percentage curve in figure 2 shows that they recorded lower percentages between 1.0 and 1.5 phi compared to the laboratories in cluster groups B, C, D, E and F. LB1910 was the only lab to dry sieve the entire sample.

Cluster group H consists of two replicates from one laboratory (LB1908). This laboratory used alternate methods, which involved dry sieving to 4.0 phi and laser analysis on particles less than 4.0 phi. The cumulative percentage curve (figure 2) shows that they recorded slightly lower percentages between 1.0 and 3.0 phi compared to cluster groups B, C, D, E and F.

Appendices

Exercise Code:	**PS45_A**
LabCode:	**LB1908**
Sample Code:	**PS45_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	0.0026
0.00 to 0.50; (707 µm)	0.0040
0.50 to 1.00; (500 µm)	0.0251
1.00 to 1.50; (353.6 µm)	3.3573
1.50 to 2.00; (250 µm)	46.8854
2.00 to 2.50; (176.8 µm)	37.8898
2.50 to 3.00; (125 µm)	10.2277
3.00 to 3.50; (88.39 µm)	1.2374
3.50 to 4.00; (62.5 µm)	0.1583
4.00 to 4.50; (44.19 µm)	0.0298
4.50 to 5.00; (31.25 µm)	0.0296
5.00 to 5.50; (22.097 µm)	0.0244
5.50 to 6.00; (15.625 µm)	0.0205
6.00 to 6.50; (11.049 µm)	0.0190
6.50 to 7.00; (7.813 µm)	0.0179
7.00 to 7.50; (5.524 µm)	0.0160
7.50 to 8.00; (3.906 µm)	0.0135
8.00 to 8.50; (2.762 µm)	0.0108
8.50 to 9.00; (1.953 µm)	0.0082
9.00 to 9.50; (1.381 µm)	0.0060
9.50 to 10.00; (0.977 µm)	0.0048
10.00 to 10.50; (0.691 µm)	0.0047
10.50 to 11.00; (0.488 µm)	0.0043
11.00 to 11.50; (0.345 µm)	0.0026
11.50 to 12.00; (0.244 µm)	0.0003
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:	PS45_B
LabCode:	LB1908
Sample Code:	PS45_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	0.0054
0.00 to 0.50; (707 µm)	0.0313
0.50 to 1.00; (500 µm)	0.0804
1.00 to 1.50; (353.6 µm)	3.1582
1.50 to 2.00; (250 µm)	47.6494
2.00 to 2.50; (176.8 µm)	37.4231
2.50 to 3.00; (125 µm)	9.8723
3.00 to 3.50; (88.39 µm)	1.2815
3.50 to 4.00; (62.5 µm)	0.1893
4.00 to 4.50; (44.19 µm)	0.0455
4.50 to 5.00; (31.25 µm)	0.0383
5.00 to 5.50; (22.097 µm)	0.0291
5.50 to 6.00; (15.625 µm)	0.0265
6.00 to 6.50; (11.049 µm)	0.0279
6.50 to 7.00; (7.813 µm)	0.0279
7.00 to 7.50; (5.524 µm)	0.0253
7.50 to 8.00; (3.906 µm)	0.0212
8.00 to 8.50; (2.762 µm)	0.0171
8.50 to 9.00; (1.953 µm)	0.0133
9.00 to 9.50; (1.381 µm)	0.0098
9.50 to 10.00; (0.977 µm)	0.0078
10.00 to 10.50; (0.691 µm)	0.0076
10.50 to 11.00; (0.488 µm)	0.0070
11.00 to 11.50; (0.345 µm)	0.0043
11.50 to 12.00; (0.244 µm)	0.0006
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:	PS45
LabCode:	LB1910
Sample Code:	PS451910
Equipment used (e.g. laser model and range):	*Retsch AS200 sieve shaker*
Method used:	Dry sieve
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	**0.3300**
-2.00 to -1.50; 2.8 mm	**0.3300**
-1.50 to -1.00; 2 mm	**0.0400**
-1.00 to -0.50; 1.4 mm	**0.0400**
-0.50 to 0.00; 1 mm	**0.0500**
0.00 to 0.50; (707 µm)	0.1600
0.50 to 1.00; (500 µm)	0.6600
1.00 to 1.50; (353.6 µm)	18.7300
1.50 to 2.00; (250 µm)	232.1700
2.00 to 2.50; (176.8 µm)	73.3000
2.50 to 3.00; (125 µm)	12.8600
3.00 to 3.50; (88.39 µm)	1.5300
3.50 to 4.00; (62.5 µm)	0.4200
4.00 to 4.50; (44.19 µm)	0.0800
4.50 to 5.00; (31.25 µm)	0.0000
5.00 to 5.50; (22.097 µm)	0.0000
5.50 to 6.00; (15.625 µm)	0.0000
6.00 to 6.50; (11.049 µm)	0.0000
6.50 to 7.00; (7.813 µm)	0.0000
7.00 to 7.50; (5.524 µm)	0.0000
7.50 to 8.00; (3.906 µm)	0.0000
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:	PS45
LabCode:	LB1901
Sample Code:	PS451901
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)	0.0000
0.50 to 1.00; (500 µm)	3.8104
1.00 to 1.50; (353.6 µm)	24.4724
1.50 to 2.00; (250 µm)	41.3641
2.00 to 2.50; (176.8 µm)	25.6326
2.50 to 3.00; (125 µm)	4.6805
3.00 to 3.50; (88.39 µm)	0.0400
3.50 to 4.00; (62.5 µm)	0.0000
4.00 to 4.50; (44.19 µm)	0.0000
4.50 to 5.00; (31.25 µm)	0.0000
5.00 to 5.50; (22.097 µm)	0.0000
5.50 to 6.00; (15.625 µm)	0.0000
6.00 to 6.50; (11.049 µm)	0.0000
6.50 to 7.00; (7.813 µm)	0.0000
7.00 to 7.50; (5.524 µm)	0.0000
7.50 to 8.00; (3.906 µm)	0.0000
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:	**PS45**
LabCode:	**LB1903**
Sample Code:	**PS451903**
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)	4.4089
1.00 to 1.50; (353.6 µm)	26.7522
1.50 to 2.00; (250 µm)	42.5544
2.00 to 2.50; (176.8 µm)	23.0678
2.50 to 3.00; (125 µm)	3.2122
3.00 to 3.50; (88.39 µm)	0.0033
3.50 to 4.00; (62.5 µm)	0.0000
4.00 to 4.50; (44.19 µm)	0.0000
4.50 to 5.00; (31.25 µm)	0.0000
5.00 to 5.50; (22.097 µm)	0.0000
5.50 to 6.00; (15.625 µm)	0.0000
6.00 to 6.50; (11.049 µm)	0.0000
6.50 to 7.00; (7.813 µm)	0.0000
7.00 to 7.50; (5.524 µm)	0.0000
7.50 to 8.00; (3.906 µm)	0.0000
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:	**PS45**
LabCode:	**LB1904**
Sample Code:	**PS451904**
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)	5.3451
0.50 to 1.00; (500 µm)	26.2307
1.00 to 1.50; (353.6 µm)	40.9905
1.50 to 2.00; (250 µm)	22.7905
2.00 to 2.50; (176.8 µm)	4.6109
2.50 to 3.00; (125 µm)	0.0323
3.00 to 3.50; (88.39 µm)	0.0000
3.50 to 4.00; (62.5 µm)	0.0000
4.00 to 4.50; (44.19 µm)	0.0000
4.50 to 5.00; (31.25 µm)	0.0000
5.00 to 5.50; (22.097 µm)	0.0000
5.50 to 6.00; (15.625 µm)	0.0000
6.00 to 6.50; (11.049 µm)	0.0000
6.50 to 7.00; (7.813 µm)	0.0000
7.00 to 7.50; (5.524 µm)	0.0000
7.50 to 8.00; (3.906 µm)	0.0000
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:	PS45
LabCode:	LB1905
Sample Code:	PS451905
Equipment used (e.g. laser model and range):	*Mastersizer 2000, Hydro mu accessory 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)	4.0579
1.00 to 1.50; (353.6 µm)	24.8471
1.50 to 2.00; (250 µm)	41.4034
2.00 to 2.50; (176.8 µm)	25.2161
2.50 to 3.00; (125 µm)	4.4448
3.00 to 3.50; (88.39 µm)	0.0308
3.50 to 4.00; (62.5 µm)	0.0000
4.00 to 4.50; (44.19 µm)	0.0000
4.50 to 5.00; (31.25 µm)	0.0000
5.00 to 5.50; (22.097 µm)	0.0000
5.50 to 6.00; (15.625 µm)	0.0000
6.00 to 6.50; (11.049 µm)	0.0000
6.50 to 7.00; (7.813 µm)	0.0000
7.00 to 7.50; (5.524 µm)	0.0000
7.50 to 8.00; (3.906 µm)	0.0000
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:	**PS45**
LabCode:	**LB1909**
Sample Code:	**PS451909**
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***
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	**0.0100**
0.00 to 0.50; (707 µm)	0.2799
0.50 to 1.00; (500 µm)	20.1478
1.00 to 1.50; (353.6 µm)	96.3397
1.50 to 2.00; (250 µm)	142.7227
2.00 to 2.50; (176.8 µm)	79.6194
2.50 to 3.00; (125 µm)	12.9037
3.00 to 3.50; (88.39 µm)	0.0669
3.50 to 4.00; (62.5 µm)	0.0000
4.00 to 4.50; (44.19 µm)	0.0000
4.50 to 5.00; (31.25 µm)	0.0000
5.00 to 5.50; (22.097 µm)	0.0000
5.50 to 6.00; (15.625 µm)	0.0000
6.00 to 6.50; (11.049 µm)	0.0000
6.50 to 7.00; (7.813 µm)	0.0000
7.00 to 7.50; (5.524 µm)	0.0000
7.50 to 8.00; (3.906 µm)	0.0000
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:	**PS45**
LabCode:	**LB1917**
Sample Code:	**PS451917**
Equipment used (e.g. laser model and range):	*Mastersizer 2000 with Hydo2000G*
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)	2.8387
1.00 to 1.50; (353.6 µm)	21.3577
1.50 to 2.00; (250 µm)	40.6621
2.00 to 2.50; (176.8 µm)	28.6863
2.50 to 3.00; (125 µm)	6.3586
3.00 to 3.50; (88.39 µm)	0.0967
3.50 to 4.00; (62.5 µm)	0.0000
4.00 to 4.50; (44.19 µm)	0.0000
4.50 to 5.00; (31.25 µm)	0.0000
5.00 to 5.50; (22.097 µm)	0.0000
5.50 to 6.00; (15.625 µm)	0.0000
6.00 to 6.50; (11.049 µm)	0.0000
6.50 to 7.00; (7.813 µm)	0.0000
7.00 to 7.50; (5.524 µm)	0.0000
7.50 to 8.00; (3.906 µm)	0.0000
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:	PS45
LabCode:	LB1921
Sample Code:	PS451921
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)	0.0000
0.50 to 1.00; (500 µm)	6.7609
1.00 to 1.50; (353.6 µm)	26.3241
1.50 to 2.00; (250 µm)	37.6634
2.00 to 2.50; (176.8 µm)	23.7128
2.50 to 3.00; (125 µm)	5.4654
3.00 to 3.50; (88.39 µm)	0.0736
3.50 to 4.00; (62.5 µm)	0.0000
4.00 to 4.50; (44.19 µm)	0.0000
4.50 to 5.00; (31.25 µm)	0.0000
5.00 to 5.50; (22.097 µm)	0.0000
5.50 to 6.00; (15.625 µm)	0.0000
6.00 to 6.50; (11.049 µm)	0.0000
6.50 to 7.00; (7.813 µm)	0.0000
7.00 to 7.50; (5.524 µm)	0.0000
7.50 to 8.00; (3.906 µm)	0.0000
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:	**PS45**
LabCode:	**LB1955**
Sample Code:	**PS451955**
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:	**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)	2.3728
1.00 to 1.50; (353.6 µm)	27.0340
1.50 to 2.00; (250 µm)	42.8088
2.00 to 2.50; (176.8 µm)	21.4393
2.50 to 3.00; (125 µm)	4.4156
3.00 to 3.50; (88.39 µm)	0.9883
3.50 to 4.00; (62.5 µm)	0.2374
4.00 to 4.50; (44.19 µm)	0.1152
4.50 to 5.00; (31.25 µm)	0.0344
5.00 to 5.50; (22.097 µm)	0.0373
5.50 to 6.00; (15.625 µm)	0.0257
6.00 to 6.50; (11.049 µm)	0.0195
6.50 to 7.00; (7.813 µm)	0.0207
7.00 to 7.50; (5.524 µm)	0.0178
7.50 to 8.00; (3.906 µm)	0.0142
8.00 to 8.50; (2.762 µm)	0.0179
8.50 to 9.00; (1.953 µm)	0.0317
9.00 to 9.50; (1.381 µm)	0.0484
9.50 to 10.00; (0.977 µm)	0.0583
10.00 to 10.50; (0.691 µm)	0.0581
10.50 to 11.00; (0.488 µm)	0.0528
11.00 to 11.50; (0.345 µm)	0.0455
11.50 to 12.00; (0.244 µm)	0.0379
12.00 to 12.50; (0.173 µm)	0.0298
12.50 to 13.00; (0.122 µm)	0.0231
13.00 to 13.50; (0.086 µm)	0.0157

Exercise Code:	**PS45**
LabCode:	**LB1958**
Sample Code:	**PS451958**
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)	0.0600
0.50 to 1.00; (500 µm)	4.8500
1.00 to 1.50; (353.6 µm)	23.8500
1.50 to 2.00; (250 µm)	39.0000
2.00 to 2.50; (176.8 µm)	26.0700
2.50 to 3.00; (125 µm)	6.0600
3.00 to 3.50; (88.39 µm)	0.1200
3.50 to 4.00; (62.5 µm)	0.0000
4.00 to 4.50; (44.19 µm)	0.0000
4.50 to 5.00; (31.25 µm)	0.0000
5.00 to 5.50; (22.097 µm)	0.0000
5.50 to 6.00; (15.625 µm)	0.0000
6.00 to 6.50; (11.049 µm)	0.0000
6.50 to 7.00; (7.813 µm)	0.0000
7.00 to 7.50; (5.524 µm)	0.0000
7.50 to 8.00; (3.906 µm)	0.0000
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

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	z-score	-2.00 to -1.50	z-score
TUM AVERAGE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.29	0.0000	-0.29
LB1901	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.29	0.0000	-0.29
LB1903	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.29	0.0000	-0.29
LB1904	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.29	0.0000	-0.29
LB1905	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.29	0.0000	-0.29
LB1908_A	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.29	0.0000	-0.29
LB1908_B	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.29	0.0000	-0.29
LB1909	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.29	0.0000	-0.29
LB1910	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0969	3.18	0.0969	3.18
LB1917	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.29	0.0000	-0.29
LB1921	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.29	0.0000	-0.29
LB1955	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.29	0.0000	-0.29
LB1958	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.29	0.0000	-0.29
μ	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0081		0.0081	
σ	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0280		0.0280	

	-1.50 to -1.00	z-score	-1.00 to -0.50	z-score	-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
TUM AVERAGE	0.0000	-0.29	0.0000	-0.29	0.0000	-0.49	0.0000	-0.30	5.6529	0.08	27.6200	0.56
LB1901	0.0000	-0.29	0.0000	-0.29	0.0000	-0.49	0.0000	-0.30	3.8104	-0.19	24.4724	0.28
LB1903	0.0000	-0.29	0.0000	-0.29	0.0000	-0.49	0.0000	-0.30	4.4089	-0.10	26.7522	0.48
LB1904	0.0000	-0.29	0.0000	-0.29	0.0000	-0.49	5.3451	3.17	26.2307	3.01	40.9905	1.72
LB1905	0.0000	-0.29	0.0000	-0.29	0.0000	-0.49	0.0000	-0.30	4.0579	-0.15	24.8471	0.31
LB1908_A	0.0000	-0.29	0.0000	-0.29	0.0026	0.12	0.0040	-0.30	0.0251	-0.73	3.3573	-1.56
LB1908_B	0.0000	-0.29	0.0000	-0.29	0.0054	0.77	0.0313	-0.28	0.0804	-0.72	3.1582	-1.58
LB1909	0.0000	-0.29	0.0000	-0.29	0.0028	0.16	0.0795	-0.25	5.7223	0.09	27.3622	0.53
LB1910	0.0117	3.18	0.0117	3.18	0.0147	2.90	0.0470	-0.27	0.1937	-0.70	5.4975	-1.38
LB1917	0.0000	-0.29	0.0000	-0.29	0.0000	-0.49	0.0000	-0.30	2.8387	-0.32	21.3577	0.01
LB1921	0.0000	-0.29	0.0000	-0.29	0.0000	-0.49	0.0000	-0.30	6.7609	0.24	26.3241	0.44
LB1955	0.0000	-0.29	0.0000	-0.29	0.0000	-0.49	0.0000	-0.30	2.3728	-0.39	27.0340	0.51
LB1958	0.0000	-0.29	0.0000	-0.29	0.0000	-0.49	0.0600	-0.26	4.85000	-0.04	23.8500	0.23
μ	0.0010		0.0010		0.0021		0.4639		5.1126		21.2503	
σ	0.0034		0.0034		0.0043		1.5374		7.0098		11.4504	

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.

	1.50 to 2.00	z-score	2.00 to 2.50	z-score	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
TUM AVERAGE	40.7862	-0.18	22.4878	-0.28	3.4476	-0.62	0.0054	-0.70	0.0000	-0.65	0.0000	-0.52	0.0000	-0.55
LB1901	41.3641	-0.12	25.6326	0.10	4.6805	-0.18	0.0400	-0.64	0.0000	-0.65	0.0000	-0.52	0.0000	-0.55
LB1903	42.5544	-0.01	23.0678	-0.21	3.2122	-0.71	0.0033	-0.71	0.0000	-0.65	0.0000	-0.52	0.0000	-0.55
LB1904	22.7905	-1.95	4.6109	-2.39	0.0323	-1.85	0.0000	-0.71	0.0000	-0.65	0.0000	-0.52	0.0000	-0.55
LB1905	41.4034	-0.12	25.2161	0.05	4.4448	-0.26	0.0308	-0.65	0.0000	-0.65	0.0000	-0.52	0.0000	-0.55
LB1908_A	46.8854	0.42	37.8898	1.54	10.2277	1.81	1.2374	1.73	0.1583	1.09	0.0298	0.35	0.0296	1.35
LB1908_B	47.6494	0.49	37.4231	1.49	9.8723	1.68	1.2815	1.82	0.1893	1.44	0.0455	0.81	0.0383	1.92
LB1909	40.5358	-0.21	22.6134	-0.26	3.6649	-0.54	0.0190	-0.68	0.0000	-0.65	0.0000	-0.52	0.0000	-0.55
LB1910	68.1450	2.51	21.5145	-0.39	3.7746	-0.50	0.4491	0.17	0.1233	0.71	0.0235	0.16	0.0000	-0.55
LB1917	40.6621	-0.19	28.6863	0.46	6.3586	0.42	0.0967	-0.52	0.0000	-0.65	0.0000	-0.52	0.0000	-0.55
LB1921	37.6634	-0.49	23.7128	-0.13	5.4654	0.10	0.0736	-0.57	0.0000	-0.65	0.0000	-0.52	0.0000	-0.55
LB1955	42.8088	0.02	21.4393	-0.40	4.4156	-0.28	0.9883	1.24	0.2374	1.97	0.1152	2.84	0.0344	1.66
LB1958	39.0000	-0.36	26.0700	0.15	6.0600	0.31	0.1200	-0.48	0.0000	-0.65	0.0000	-0.52	0.0000	-0.55
μ	42.6219		24.8230		5.1841		0.3616		0.0590		0.0178		0.0085	
σ	10.1675		8.4580		2.7921		0.5058		0.0908		0.0343		0.0155	

	5.00 to 5.50	z-score	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	0.0000	-0.54	0.0000	-0.55	0.0000	-0.54	0.0000	-0.54	0.0000	-0.54	0.0000	-0.52	0.0000	-0.55
LB1901	0.0000	-0.54	0.0000	-0.55	0.0000	-0.54	0.0000	-0.54	0.0000	-0.54	0.0000	-0.52	0.0000	-0.55
LB1903	0.0000	-0.54	0.0000	-0.55	0.0000	-0.54	0.0000	-0.54	0.0000	-0.54	0.0000	-0.52	0.0000	-0.55
LB1904	0.0000	-0.54	0.0000	-0.55	0.0000	-0.54	0.0000	-0.54	0.0000	-0.54	0.0000	-0.52	0.0000	-0.55
LB1905	0.0000	-0.54	0.0000	-0.55	0.0000	-0.54	0.0000	-0.54	0.0000	-0.54	0.0000	-0.52	0.0000	-0.55
LB1908_A	0.0244	1.21	0.0205	1.31	0.0190	1.32	0.0179	1.21	0.0160	1.21	0.0135	-0.13	0.0108	0.14
LB1908_B	0.0291	1.54	0.0265	1.85	0.0279	2.18	0.0279	2.18	0.0253	2.22	0.0212	0.10	0.0171	0.55
LB1909	0.0000	-0.54	0.0000	-0.55	0.0000	-0.54	0.0000	-0.54	0.0000	-0.54	0.0000	-0.52	0.0000	-0.55
LB1910	0.0000	-0.54	0.0000	-0.55	0.0000	-0.54	0.0000	-0.54	0.0000	-0.54	0.0000	-0.52	0.0000	-0.55
LB1917	0.0000	-0.54	0.0000	-0.55	0.0000	-0.54	0.0000	-0.54	0.0000	-0.54	0.0000	-0.52	0.0000	-0.55
LB1921	0.0000	-0.54	0.0000	-0.55	0.0000	-0.54	0.0000	-0.54	0.0000	-0.54	0.0000	-0.52	0.0000	-0.55
LB1955	0.0373	2.13	0.0257	1.78	0.0195	1.36	0.0207	1.47	0.0178	1.41	0.0142	-0.11	0.0179	0.60
LB1958	0.0000	-0.54	0.0000	-0.55	0.0000	-0.54	0.0000	-0.54	0.0000	-0.54	0.0000	-0.52	0.0000	-0.55
μ	0.0076		0.0061		0.0055		0.0055		0.0049		0.0041		0.0038	
σ	0.0140		0.0111		0.0102		0.0103		0.0092		0.0076		0.0071	

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.

	7.50 to 8.00	z-score	8.00 to 8.50	z-score	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
TUM AVERAGE	0.0000	-0.54	0.0000	-0.54	0.0000	-0.46	0.0000	-0.38	0.0000	-0.35	0.0000	-0.35
LB1901	0.0000	-0.54	0.0000	-0.54	0.0000	-0.46	0.0000	-0.38	0.0000	-0.35	0.0000	-0.35
LB1903	0.0000	-0.54	0.0000	-0.54	0.0000	-0.46	0.0000	-0.38	0.0000	-0.35	0.0000	-0.35
LB1904	0.0000	-0.54	0.0000	-0.54	0.0000	-0.46	0.0000	-0.38	0.0000	-0.35	0.0000	-0.35
LB1905	0.0000	-0.54	0.0000	-0.54	0.0000	-0.46	0.0000	-0.38	0.0000	-0.35	0.0000	-0.35
LB1908_A	0.0135	1.24	0.0108	0.98	0.0082	0.39	0.0060	0.04	0.0048	-0.07	0.0047	-0.07
LB1908_B	0.0212	2.25	0.0171	1.87	0.0133	0.92	0.0098	0.32	0.0078	0.11	0.0076	0.10
LB1909	0.0000	-0.54	0.0000	-0.54	0.0000	-0.46	0.0000	-0.38	0.0000	-0.35	0.0000	-0.35
LB1910	0.0000	-0.54	0.0000	-0.54	0.0000	-0.46	0.0000	-0.38	0.0000	-0.35	0.0000	-0.35
LB1917	0.0000	-0.54	0.0000	-0.54	0.0000	-0.46	0.0000	-0.38	0.0000	-0.35	0.0000	-0.35
LB1921	0.0000	-0.54	0.0000	-0.54	0.0000	-0.46	0.0000	-0.38	0.0000	-0.35	0.0000	-0.35
LB1955	0.0142	1.34	0.0179	1.99	0.0317	2.84	0.0484	3.09	0.0583	3.14	0.0581	3.14
LB1958	0.0000	-0.54	0.0000	-0.54	0.0000	-0.46	0.0000	-0.38	0.0000	-0.35	0.0000	-0.35
μ	0.0041		0.0038		0.0044		0.0053		0.0059		0.0059	
σ	0.0076		0.0071		0.0096		0.0139		0.0167		0.0166	

	10.50 to 11.00	z-score	11.00 to 11.50	z-score	11.50 to 12.00	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	0.0000	-0.35	0.0000	-0.33	0.0000	-0.30	0.0000	-0.29	0.0000	-0.29	0.0000	-0.29
LB1901	0.0000	-0.35	0.0000	-0.33	0.0000	-0.30	0.0000	-0.29	0.0000	-0.29	0.0000	-0.29
LB1903	0.0000	-0.35	0.0000	-0.33	0.0000	-0.30	0.0000	-0.29	0.0000	-0.29	0.0000	-0.29
LB1904	0.0000	-0.35	0.0000	-0.33	0.0000	-0.30	0.0000	-0.29	0.0000	-0.29	0.0000	-0.29
LB1905	0.0000	-0.35	0.0000	-0.33	0.0000	-0.30	0.0000	-0.29	0.0000	-0.29	0.0000	-0.29
LB1908_A	0.0043	-0.07	0.0026	-0.14	0.0003	-0.27	0.0000	-0.29	0.0000	-0.29	0.0000	-0.29
LB1908_B	0.0070	0.11	0.0043	-0.01	0.0006	-0.25	0.0000	-0.29	0.0000	-0.29	0.0000	-0.29
LB1909	0.0000	-0.35	0.0000	-0.33	0.0000	-0.30	0.0000	-0.29	0.0000	-0.29	0.0000	-0.29
LB1910	0.0000	-0.35	0.0000	-0.33	0.0000	-0.30	0.0000	-0.29	0.0000	-0.29	0.0000	-0.29
LB1917	0.0000	-0.35	0.0000	-0.33	0.0000	-0.30	0.0000	-0.29	0.0000	-0.29	0.0000	-0.29
LB1921	0.0000	-0.35	0.0000	-0.33	0.0000	-0.30	0.0000	-0.29	0.0000	-0.29	0.0000	-0.29
LB1955	0.0528	3.14	0.0455	3.16	0.0379	3.18	0.0298	3.18	0.0231	3.18	0.0157	3.18
LB1958	0.0000	-0.35	0.0000	-0.33	0.0000	-0.30	0.0000	-0.29	0.0000	-0.29	0.0000	-0.29
μ	0.0053		0.0044		0.0032		0.0025		0.0019		0.0013	
σ	0.0151		0.0130		0.0109		0.0086		0.0067		0.0045	

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.

	4.50 to 5.00	z-score	5.00 to 5.50	z-score	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
TUM AVERAGE	0.0000	-4.19	0.0000	-2.93	0.0000	-1.86	0.0000	-0.71	0.0000	-0.65	0.0000	-0.52
LB1901	0.0000	-4.19	0.0000	-2.93	0.0000	-1.86	0.0000	-0.71	0.0000	-0.65	0.0000	-0.52
LB1903	0.0000	-4.19	0.0000	-2.93	0.0000	-1.86	0.0000	-0.71	0.0000	-0.65	0.0000	-0.52
LB1904	0.0000	-4.19	0.0000	-2.93	0.0000	-1.86	0.0000	-0.71	0.0000	-0.65	0.0000	-0.52
LB1905	0.0000	-4.19	0.0000	-2.93	0.0000	-1.86	0.0000	-0.71	0.0000	-0.65	0.0000	-0.52
LB1908_A	0.0296	-4.19	0.0244	-2.93	0.0205	-1.85	0.0190	-0.68	0.0179	-0.45	0.0160	-0.05
LB1908_B	0.0383	-4.19	0.0291	-2.93	0.0265	-1.85	0.0279	-0.66	0.0279	-0.34	0.0253	0.22
LB1909	0.0000	-4.19	0.0000	-2.93	0.0000	-1.86	0.0000	-0.71	0.0000	-0.65	0.0000	-0.52
LB1910	0.0000	-4.19	0.0000	-2.93	0.0000	-1.86	0.0000	-0.71	0.0000	-0.65	0.0000	-0.52
LB1917	0.0000	-4.19	0.0000	-2.93	0.0000	-1.86	0.0000	-0.71	0.0000	-0.65	0.0000	-0.52
LB1921	0.0000	-4.19	0.0000	-2.93	0.0000	-1.86	0.0000	-0.71	0.0000	-0.65	0.0000	-0.52
LB1955	0.0344	-4.19	0.0373	-2.93	0.0257	-1.85	0.0195	-0.68	0.0207	-0.42	0.0178	0.00
LB1958	0.0000	-4.19	0.0000	-2.93	0.0000	-1.86	0.0000	-0.71	0.0000	-0.65	0.0000	-0.52
μ	0.0085		0.0076		0.0061		0.0055		0.0055		0.0049	
σ	0.0155		0.0140		0.0111		0.0102		0.0103		0.0092	

	7.50 to 8.00	z-score	8.00 to 8.50	z-score	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
TUM AVERAGE	0.0000	-0.55	0.0000	-0.54	0.0000	-0.55	0.0000	-0.54	0.0000	-0.54	0.0000	-0.54
LB1901	0.0000	-0.55	0.0000	-0.54	0.0000	-0.55	0.0000	-0.54	0.0000	-0.54	0.0000	-0.54
LB1903	0.0000	-0.55	0.0000	-0.54	0.0000	-0.55	0.0000	-0.54	0.0000	-0.54	0.0000	-0.54
LB1904	0.0000	-0.55	0.0000	-0.54	0.0000	-0.55	0.0000	-0.54	0.0000	-0.54	0.0000	-0.54
LB1905	0.0000	-0.55	0.0000	-0.54	0.0000	-0.55	0.0000	-0.54	0.0000	-0.54	0.0000	-0.54
LB1908_A	0.0135	0.32	0.0108	0.23	0.0082	0.19	0.0060	0.04	0.0048	-0.07	0.0047	-0.03
LB1908_B	0.0212	0.81	0.0171	0.68	0.0133	0.65	0.0098	0.41	0.0078	0.22	0.0076	0.29
LB1909	0.0000	-0.55	0.0000	-0.54	0.0000	-0.55	0.0000	-0.54	0.0000	-0.54	0.0000	-0.54
LB1910	0.0000	-0.55	0.0000	-0.54	0.0000	-0.55	0.0000	-0.54	0.0000	-0.54	0.0000	-0.54
LB1917	0.0000	-0.55	0.0000	-0.54	0.0000	-0.55	0.0000	-0.54	0.0000	-0.54	0.0000	-0.54
LB1921	0.0000	-0.55	0.0000	-0.54	0.0000	-0.55	0.0000	-0.54	0.0000	-0.54	0.0000	-0.54
LB1955	0.0142	0.37	0.0179	0.74	0.0317	2.32	0.0484	4.19	0.0583	5.14	0.0581	5.81
LB1958	0.0000	-0.55	0.0000	-0.54	0.0000	-0.55	0.0000	-0.54	0.0000	-0.54	0.0000	-0.54
μ	0.0041		0.0038		0.0044		0.0053		0.0059		0.0059	
σ	0.0076		0.0071		0.0096		0.0139		0.0167		0.0166	

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.

	10.50 to 11.00	z-score	11.00 to 11.50	z-score	11.50 to 12.00	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	0.0000	-0.54	0.0000	-0.54	0.0000	-0.46	0.0000	-0.38	0.0000	-0.35	0.0000	-0.35
LB1901	0.0000	-0.54	0.0000	-0.54	0.0000	-0.46	0.0000	-0.38	0.0000	-0.35	0.0000	-0.35
LB1903	0.0000	-0.54	0.0000	-0.54	0.0000	-0.46	0.0000	-0.38	0.0000	-0.35	0.0000	-0.35
LB1904	0.0000	-0.54	0.0000	-0.54	0.0000	-0.46	0.0000	-0.38	0.0000	-0.35	0.0000	-0.35
LB1905	0.0000	-0.54	0.0000	-0.54	0.0000	-0.46	0.0000	-0.38	0.0000	-0.35	0.0000	-0.35
LB1908_A	0.0043	0.02	0.0026	-0.17	0.0003	-0.43	0.0000	-0.38	0.0000	-0.35	0.0000	-0.35
LB1908_B	0.0070	0.38	0.0043	0.06	0.0006	-0.40	0.0000	-0.38	0.0000	-0.35	0.0000	-0.35
LB1909	0.0000	-0.54	0.0000	-0.54	0.0000	-0.46	0.0000	-0.38	0.0000	-0.35	0.0000	-0.35
LB1910	0.0000	-0.54	0.0000	-0.54	0.0000	-0.46	0.0000	-0.38	0.0000	-0.35	0.0000	-0.35
LB1917	0.0000	-0.54	0.0000	-0.54	0.0000	-0.46	0.0000	-0.38	0.0000	-0.35	0.0000	-0.35
LB1921	0.0000	-0.54	0.0000	-0.54	0.0000	-0.46	0.0000	-0.38	0.0000	-0.35	0.0000	-0.35
LB1955	0.0528	6.42	0.0455	5.88	0.0379	3.48	0.0298	1.76	0.0231	1.03	0.0157	0.59
LB1958	0.0000	-0.54	0.0000	-0.54	0.0000	-0.46	0.0000	-0.38	0.0000	-0.35	0.0000	-0.35
μ	0.0053		0.0044		0.0032		0.0025		0.0019		0.0013	
σ	0.0151		0.0130		0.0109		0.0086		0.0067		0.0045	

z-score >1.96 or <-1.96

All values equal zero