

The National Marine Biological
Analytical Quality Control Scheme

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Particle Size Results – PS41

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

Appendix 3. Z-score calculations when only data from laboratories following the NMBAQC PSA SOP are included in mean and standard deviation calculations.

Table 1. Summary of the particle size information received from participating laboratories and replicate analysis laboratory for the fortieth particle size distribution - PS41.

Benchmark Data

Sample	Method	%Gravel	%Sand	%Silt	Median ϕ	Mean ϕ	Sediment Description (Post analysis)
PS41 60	L ¹	0.000	89.597	10.403	2.645	2.636	Muddy Sand
PS41 61	L ¹	0.000	91.218	8.782	2.531	2.498	Sand
PS41 62	L ¹	0.000	88.746	11.254	2.710	2.721	Muddy Sand
PS41 63	L ¹	0.000	90.776	9.224	2.611	2.599	Sand
PS41 64	L ¹	0.000	90.620	9.380	2.584	2.568	Sand
PS41 65	L ¹	0.000	91.107	8.893	2.582	2.551	Sand
PS41 66	L ¹	0.000	90.555	9.445	2.592	2.580	Sand
PS41 67	L ¹	0.000	91.270	8.730	2.578	2.557	Sand
PS41 68	L ¹	0.000	91.832	8.168	2.509	2.459	Sand
PS41 69	L ¹	0.000	90.562	9.438	2.596	2.580	Sand
TUM	L ¹	0.000	90.628	9.372	2.595	2.578	Sand

Participant Data

Lab	Method	%Gravel	%Sand	%Silt	Sediment Description (Post analysis)
LB1801	WS/DS/L*	0.00	88.57	11.43	Fine Sand
LB1802	L*	0.00	91.41	8.59	Sand
LB1803	L*	0.00	92.52	7.48	Sand
LB1804	WS/DS/L*	0.00	87.54	12.46	Muddy Sand
LB1806	L*	0.00	93.61	6.39	Sand
LB1809	L*	0.00	82.08	17.92	Muddy Sand
LB1811	L*	0.00	84.24	15.76	Muddy Sand
LB1814	WS/DS/L	0.00	87.73	12.27	Muddy Sand
LB1816	L*	0.00	81.06	18.94	Fine Sand
LB1818	L*	0.00	87.53	12.47	Muddy Sand
LB1830	L	0.00	84.93	15.07	Silty SANDS

Key to methods:

L¹ - Replicate analysis by Malvern MS2000+Hydro-G 0.02-2000 μ m; no blue laser (NMBAQC PSA SOP)

L - Laser analysis

WS - Wet Sieve

DS - Dry Sieve

* - NMBAQC PSA SOP stated as method.

Figure 1. Particle size distribution curves resulting from analysis of ten replicate samples of sediment distributed as PS41 (Benchmark Data). All ten replicates analysed by Malvern Mastersizer 2000.

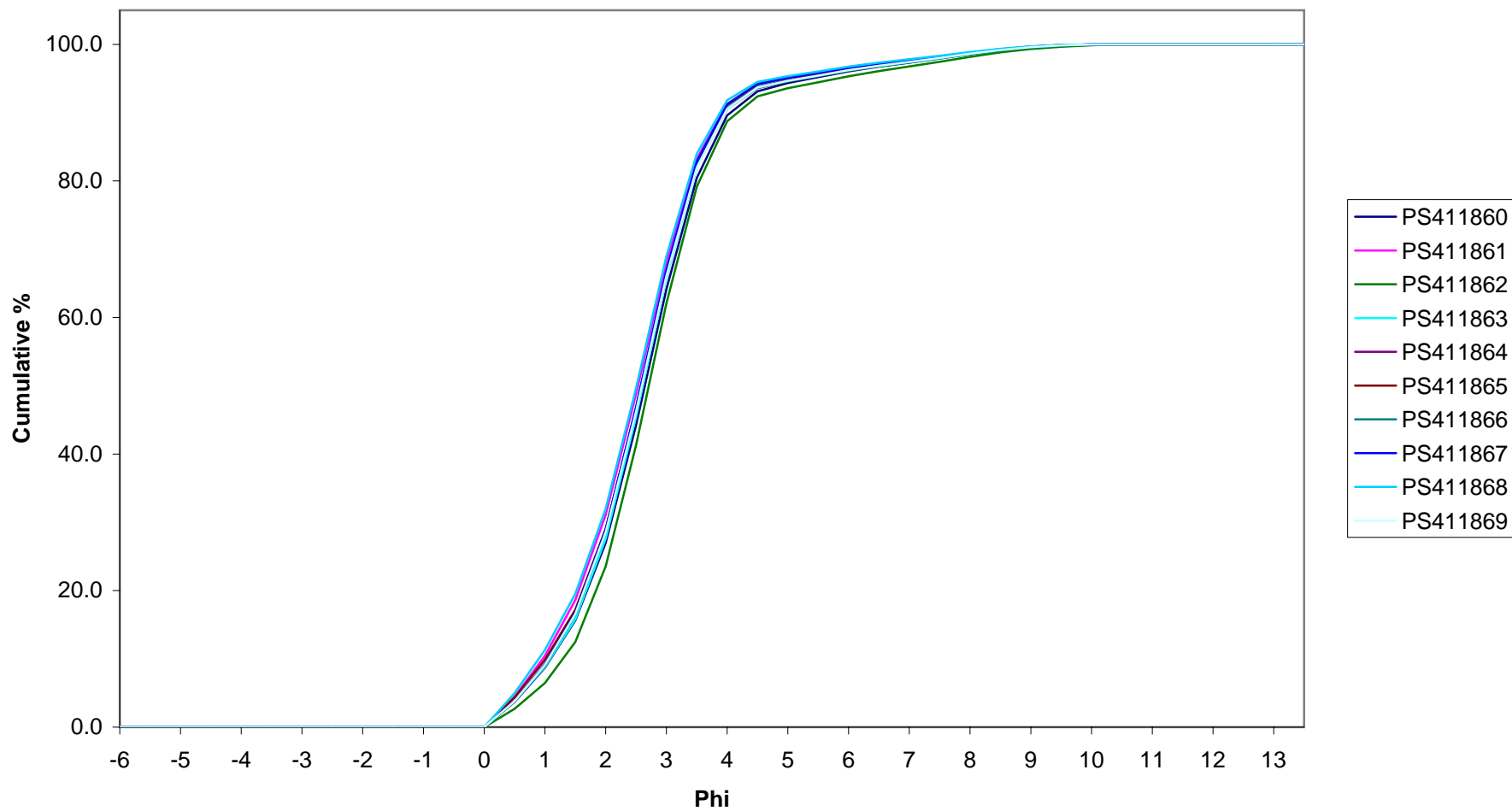


Figure 2. Particle size distribution curves from all participating laboratories for sediment samples distributed as PS41.

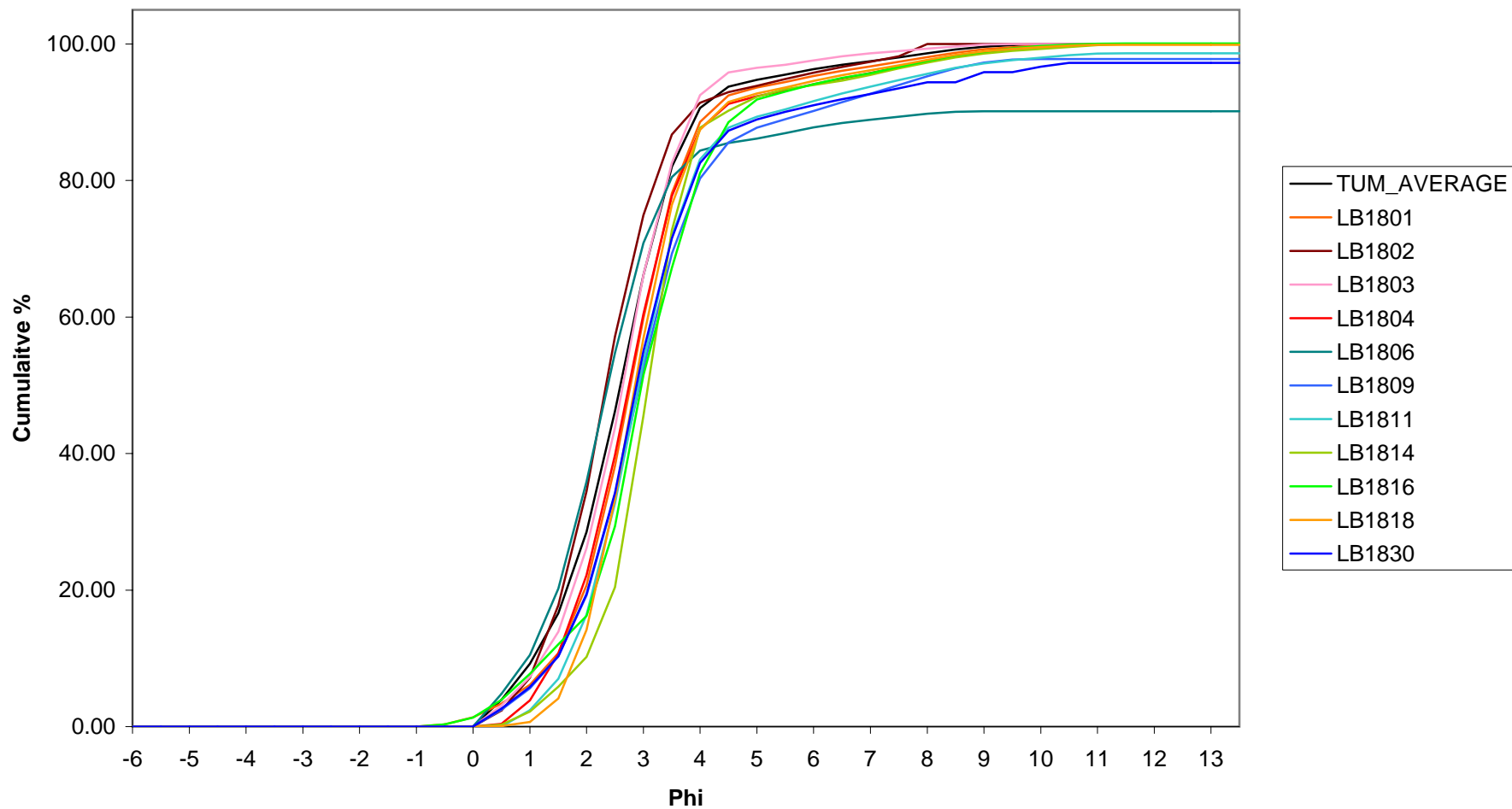


Figure 3. Particle size distribution curves from all participating laboratories following the NMBAQc PSA SOP for sediment samples distributed as PS41 (with laser data re-scaled for those laboratories who didn't re-scale).

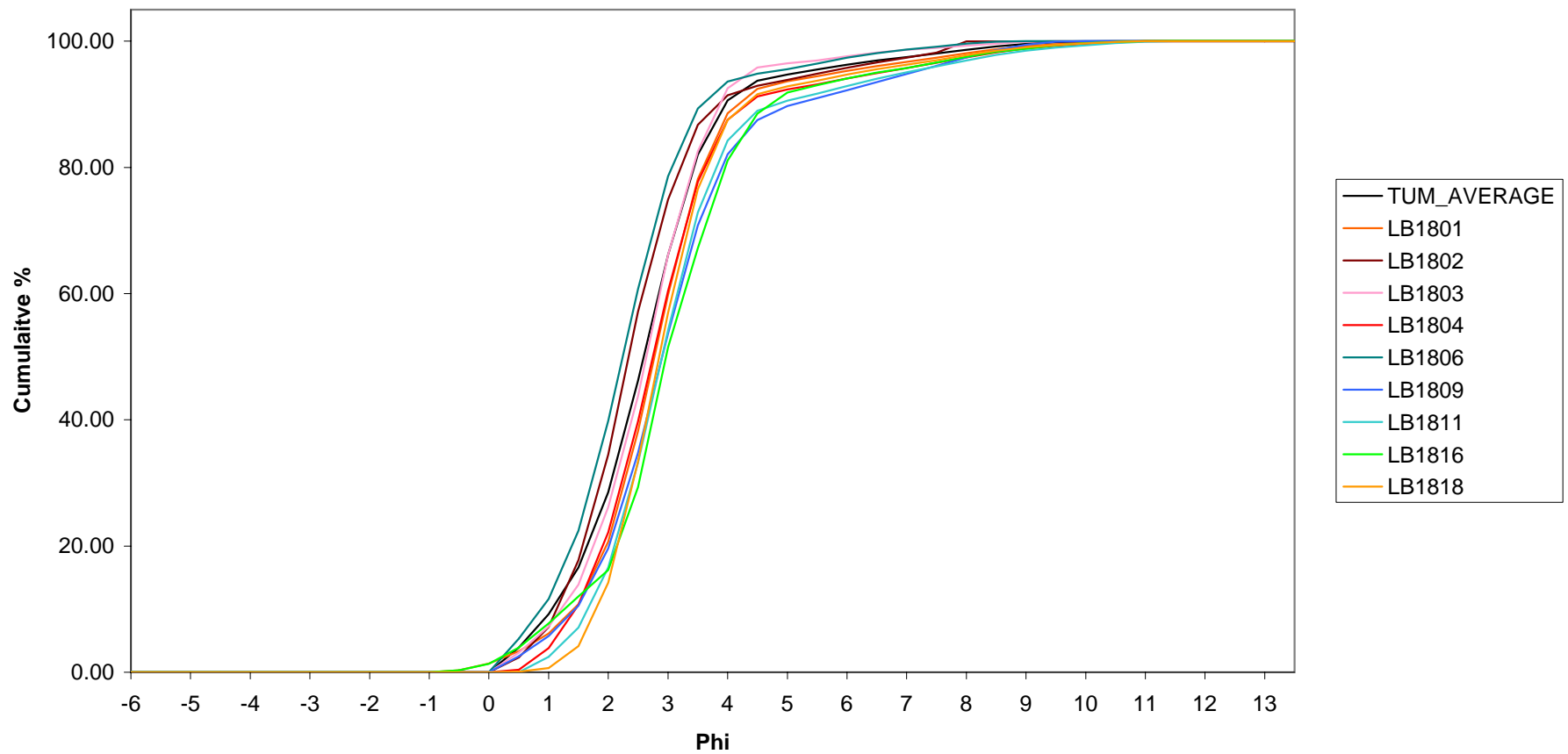


Table 2. Summary of z-scores for each phi-interval for PS41; all participating laboratories included in mean and standard deviation calculations..

	-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	-0.43	-0.43	1.19	1.28	0.62	0.42	0.31	-0.34	-0.26
LB1801	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.24	2.15	-0.04	-0.46	-0.54	-0.11	0.26	0.34	0.32
LB1802	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.43	-0.43	0.20	0.94	2.00	1.70	1.87	-1.21	-1.21
LB1803	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.43	-0.43	0.67	0.51	0.30	0.52	0.28	0.64	-0.12
LB1804	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.43	-0.41	-1.06	0.00	0.39	0.31	0.27	-0.03	0.07
LB1806	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.43	-0.43	1.75	1.56	1.62	1.42	0.67	-1.87	-1.72
LB1809	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.43	-0.43	0.28	-0.22	-0.51	-0.39	-0.59	-0.92	-0.05
LB1811	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.43	-0.43	-1.31	-0.71	-0.56	-0.25	-0.11	-0.02	0.34
LB1814	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.43	-0.43	-1.14	-1.03	-0.97	-1.59	-2.03	1.73	2.41
LB1816	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.04	2.13	0.34	0.27	-0.68	-1.64	-1.12	0.55	-0.29
LB1818	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.43	-0.43	-1.26	-1.96	-1.04	-0.08	0.79	1.12	0.61
LB1830	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.43	-0.43	0.38	-0.18	-0.61	-0.32	-0.59	-0.01	-0.10

	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	-0.45	-0.40	-0.60	-0.73	-0.72	-0.97	-0.89	-0.81	-0.67	-0.10	-0.35	-0.08	-0.44	-0.86	-0.84	-0.44	-0.29	0.00	0.00	0.00
LB1801	0.12	0.07	-0.39	-0.56	-0.22	-0.39	-0.44	-0.43	-0.41	0.22	-0.12	0.18	-0.14	0.05	-0.01	-0.44	-0.29	0.00	0.00	0.00
LB1802	-1.68	-1.31	-0.70	0.18	0.15	-0.01	0.02	0.08	2.44	-1.64	-1.42	-1.37	-1.02	-0.96	-0.84	-0.44	-0.29	0.00	0.00	0.00
LB1803	-0.03	-0.27	-1.04	-2.19	-1.46	-1.20	-1.45	-1.71	-1.34	-0.66	-0.71	-0.90	-1.02	-0.96	-0.84	-0.44	-0.29	0.00	0.00	0.00
LB1804	-0.07	-0.05	-0.44	-0.54	0.03	0.13	0.21	0.19	-0.02	0.64	0.22	0.72	0.27	0.50	1.01	-0.44	-0.29	0.00	0.00	0.00
LB1806	-1.92	-1.56	-1.08	-0.56	-0.53	-0.91	-1.08	-1.32	-1.16	-0.77	-1.26	-1.37	-1.02	-0.96	-0.84	-0.44	-0.29	0.00	0.00	0.00
LB1809	0.30	0.90	0.93	1.40	1.57	2.05	2.27	2.04	1.09	1.64	0.81	0.87	-0.64	-0.96	-0.84	-0.44	-0.29	0.00	0.00	0.00
LB1811	0.37	0.52	0.18	0.59	1.48	1.53	1.15	0.69	0.18	0.82	0.38	1.00	0.53	0.90	1.60	0.75	-0.29	0.00	0.00	0.00
LB1814	1.55	-0.75	0.72	0.79	-1.60	-0.89	0.41	0.60	0.03	0.46	0.07	0.60	0.30	0.68	1.70	2.94	3.18			
LB1816	1.20	2.15	2.45	1.04	0.79	0.52	-0.25	0.58	0.03	0.63	-0.07	1.30	0.56	0.04	0.43	0.24	-0.29	0.00	0.00	0.00
LB1818	0.29	0.17	-0.28	-0.23	0.23	0.04	-0.10	-0.16	-0.22	0.40	0.03	0.44	0.09	0.29	0.32	-0.42	-0.29	0.00	0.00	0.00
LB1830	0.32	0.54	0.26	0.81	0.29	0.10	0.14	0.27	0.06	-1.64	2.43	-1.37	2.54	2.23	-0.84	-0.44	-0.29	0.00	0.00	0.00

$$z = \frac{X - \mu}{\sigma}$$

All data values equal zero ∴ z-scores uncalculatable (cannot divide by zero)
 Combined Intervals >11.50
 No data provided for these phi-intervals
 Missing data values were entered as zero to calculate z-scores and excluded from μ and σ calculations.

Table 3. Summary of z-scores for each phi-interval for PS41; only participating laboratories following the NMBAQC PSA SOP 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	-0.47	-0.48	1.09	1.12	0.45	0.24	0.06	-0.18	-0.03
LB1801	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.99	1.91	-0.11	-0.56	-0.69	-0.32	-0.01	0.56	0.76
LB1802	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.47	-0.48	0.12	0.78	1.80	1.60	2.00	-1.12	-1.36
LB1803	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.47	-0.48	0.58	0.37	0.13	0.35	0.03	0.88	0.15
LB1804	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.47	-0.46	-1.10	-0.11	0.23	0.13	0.01	0.15	0.42
LB1806	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.47	-0.48	1.63	1.38	1.43	1.30	0.51	-1.84	-2.07
LB1809	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.47	-0.48	0.20	-0.32	-0.66	-0.61	-1.06	-0.80	0.26
LB1811	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.47	-0.48	-1.35	-0.80	-0.71	-0.47	-0.47	0.17	0.79
LB1814	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.47	-0.47	-1.18	-1.11	-1.10	-1.89	-2.85	2.06	3.68
LB1816	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.80	1.89	0.25	0.14	-0.82	-1.94	-1.72	0.78	-0.09
LB1818	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.47	-0.48	-1.30	-2.00	-1.17	-0.29	0.65	1.40	1.17
LB1830	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.47	-0.48	0.29	-0.29	-0.75	-0.55	-1.06	0.18	0.18

	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	-0.28	-0.40	-0.47	-0.56	-0.90	-0.98	-0.76	-0.67	-0.60	-0.23	-0.14	-0.16	-0.25	-0.78	-0.83	-0.46	0.00	0.00	0.00	0.00
LB1801	0.32	0.04	-0.27	-0.39	-0.37	-0.44	-0.35	-0.32	-0.36	0.10	0.18	0.10	0.23	0.47	0.09	-0.46	0.00	0.00	0.00	0.00
LB1802	-1.57	-1.26	-0.56	0.33	0.02	-0.08	0.07	0.15	2.22	-1.87	-1.66	-1.47	-1.16	-0.92	-0.84	-0.46	0.00	0.00	0.00	0.00
LB1803	0.16	-0.28	-0.88	-1.98	-1.67	-1.20	-1.27	-1.51	-1.20	-0.83	-0.65	-0.99	-1.16	-0.92	-0.84	-0.46	0.00	0.00	0.00	0.00
LB1804	0.13	-0.07	-0.32	-0.37	-0.10	0.05	0.25	0.25	-0.01	0.55	0.66	0.65	0.87	1.10	1.22	-0.46	0.00	0.00	0.00	0.00
LB1806	-1.83	-1.49	-0.92	-0.39	-0.69	-0.94	-0.93	-1.15	-1.04	-0.94	-1.44	-1.47	-1.16	-0.92	-0.84	-0.46	0.00	0.00	0.00	0.00
LB1809	0.51	0.82	0.96	1.52	1.51	1.86	2.12	1.97	0.99	1.62	1.50	0.81	-0.56	-0.92	-0.84	-0.46	0.00	0.00	0.00	0.00
LB1811	0.59	0.47	0.26	0.73	1.41	1.36	1.10	0.72	0.17	0.75	0.89	0.93	1.28	1.65	1.87	2.44	0.00	0.00	0.00	0.00
LB1814	1.82	-0.72	0.77	0.93	-1.82	-0.92	0.42	0.64	0.04	0.37	0.45	0.53	0.92	1.35	1.97	7.81	*			
LB1816	1.46	2.01	2.38	1.17	0.69	0.42	-0.18	0.62	0.03	0.54	0.25	1.24	1.32	0.46	0.57	1.19	0.00	0.00	0.00	0.00
LB1818	0.50	0.14	-0.17	-0.07	0.10	-0.04	-0.04	-0.07	-0.19	0.30	0.40	0.37	0.60	0.80	0.45	-0.42	0.00	0.00	0.00	0.00
LB1830	0.53	0.49	0.34	0.94	0.16	0.02	0.18	0.33	0.07	-1.87	3.79	-1.47	4.45	3.49	-0.84	-0.46	0.00	0.00	0.00	0.00

$$z = \frac{X - \mu}{\sigma}$$

All data values equal zero ∴ z-scores uncalculatable (cannot divide by zero)
 Laboratories not following the NMBAQC PSA SOP ∴ excluded from μ and σ calculations.
 *** z-score uncalculatable, all labs included in mean and stdev calculations recorded zero.

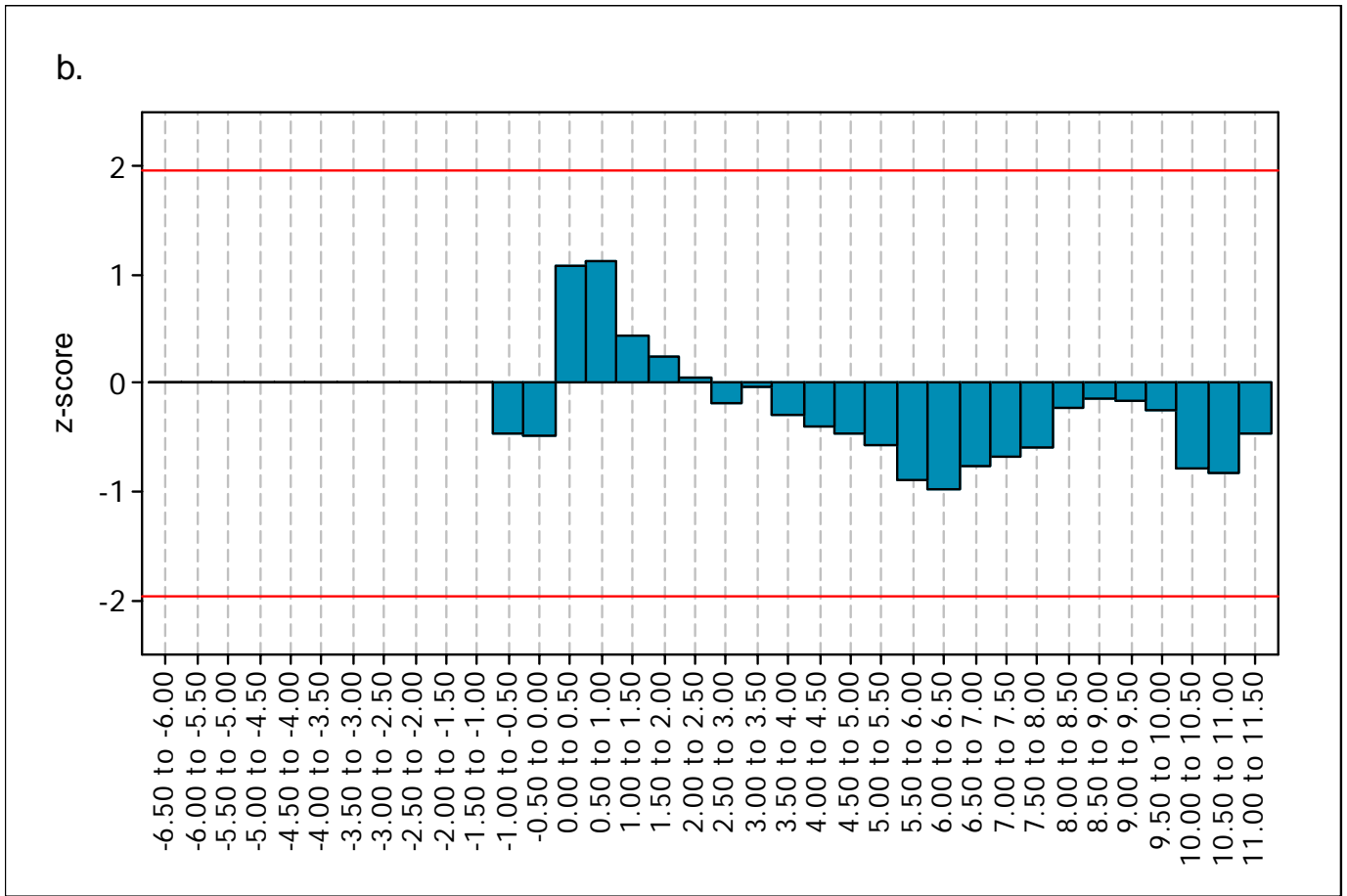
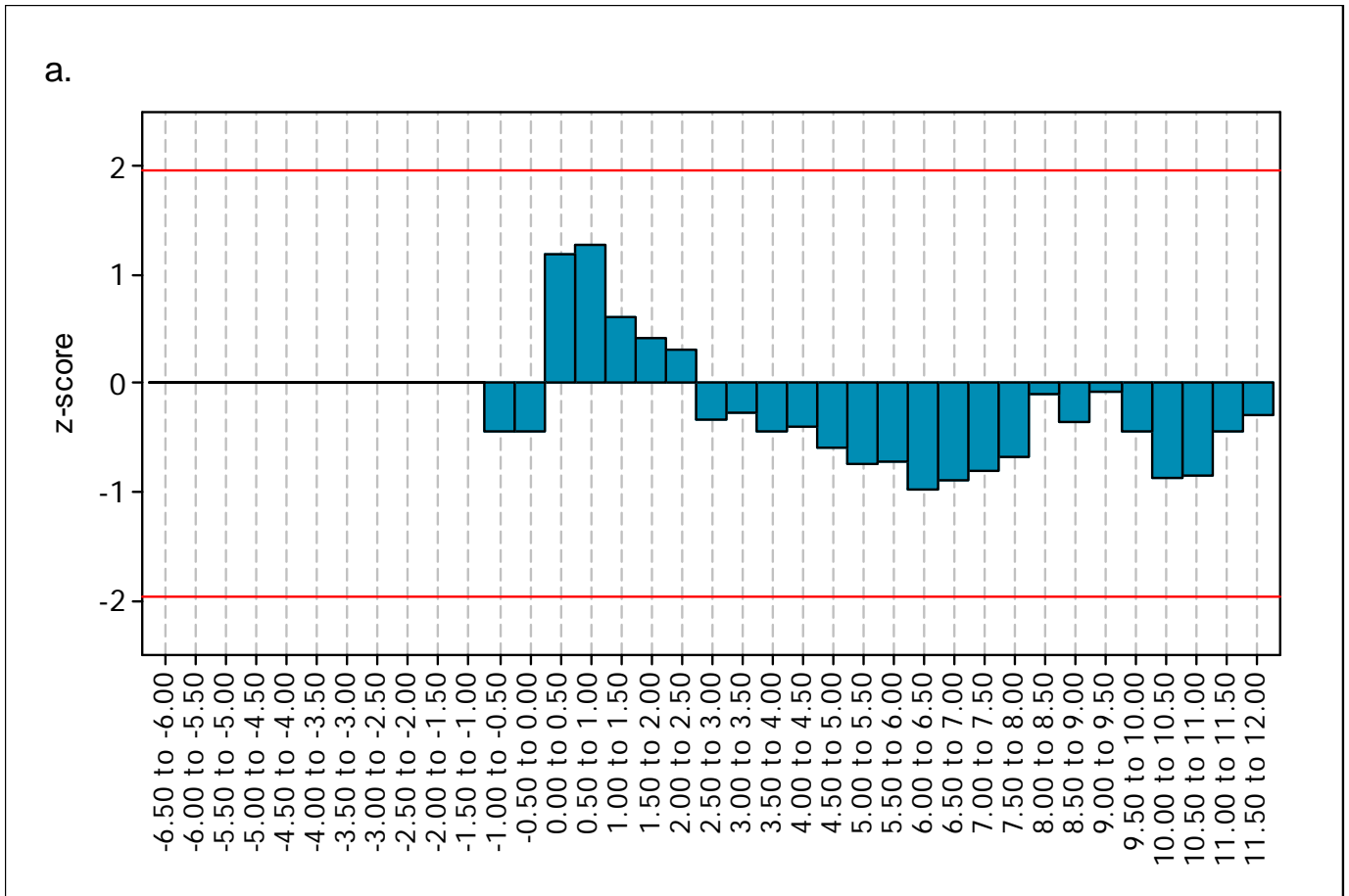


Figure 4. z-score summary for the benchmark data for PS41; (a) when all participating laboratories data are included in the mean and standard deviation calculations, and (b) when only data from laboratories following the NMBAQC PSA SOP are included in the mean and standard deviation calculations. Reference lines (red) shown at the 95% level; ± 1.96

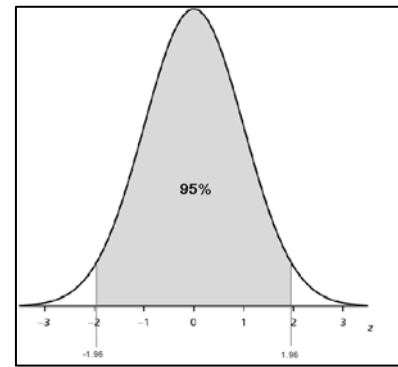
Standard Normal Distribution

$$z = \frac{x - \mu}{\sigma} \quad X \sim N(\mu, \sigma^2)$$

Quantiles of X

$$x = \sigma q_\alpha + \mu \quad \text{where, } q_\alpha \text{ is the } \alpha \text{ - quantile of } Z$$

$$q_{0.975} = 1.96 \quad q_{0.025} = -1.96$$



Phi-interval	μ	σ	$q_{0.025}$	$q_{0.0975}$
-6.50 to -6.00; 63 mm	0.0000	0.0000	0.0000	0.0000
-6.00 to -5.50; 45 mm	0.0000	0.0000	0.0000	0.0000
-5.50 to -5.00; 31.5 mm	0.0000	0.0000	0.0000	0.0000
-5.00 to -4.50; 22.4 mm	0.0000	0.0000	0.0000	0.0000
-4.50 to -4.00; 16 mm	0.0000	0.0000	0.0000	0.0000
-4.00 to -3.50; 11.2 mm	0.0000	0.0000	0.0000	0.0000
-3.50 to -3.00; 8 mm	0.0000	0.0000	0.0000	0.0000
-3.00 to -2.50; 5.6 mm	0.0000	0.0000	0.0000	0.0000
-2.50 to -2.00; 4 mm	0.0000	0.0000	0.0000	0.0000
-2.00 to -1.50; 2.8 mm	0.0000	0.0000	0.0000	0.0000
-1.50 to -1.00; 2 mm	0.0000	0.0000	0.0000	0.0000
-1.00 to -0.50; 1.4 mm	0.0529	0.1237	-0.1895	0.2953
-0.50 to 0.00; 1 mm	0.1733	0.4025	-0.6156	0.9622
0.00 to 0.50; (707 μm)	2.0532	1.5692	-1.0224	5.1287
0.50 to 1.00; (500 μm)	3.4341	1.4463	0.5994	6.2689
1.00 to 1.50; (353.6 μm)	5.9130	2.3583	1.2908	10.5353
1.50 to 2.00; (250 μm)	10.3337	3.7540	2.9758	17.6916
2.00 to 2.50; (176.8 μm)	16.7003	3.1794	10.4687	22.9320
2.50 to 3.00; (125 μm)	20.7781	2.4849	15.9077	25.6485
3.00 to 3.50; (88.39 μm)	16.9576	4.2504	8.6268	25.2885
3.50 to 4.00; (62.5 μm)	10.0398	3.2059	3.7563	16.3234
4.00 to 4.50; (44.19 μm)	3.7827	1.6996	0.4515	7.1140
4.50 to 5.00; (31.25 μm)	1.4632	0.7591	-0.0247	2.9510
5.00 to 5.50; (22.097 μm)	0.9361	0.2250	0.4951	1.3771
5.50 to 6.00; (15.625 μm)	0.9152	0.1838	0.5549	1.2754
6.00 to 6.50; (11.049 μm)	0.8353	0.2003	0.4428	1.2278
6.50 to 7.00; (7.813 μm)	0.7460	0.2257	0.3037	1.1884
7.00 to 7.50; (5.524 μm)	0.7739	0.2521	0.2798	1.2680
7.50 to 8.00; (3.906 μm)	0.8593	0.3888	0.0972	1.6215
8.00 to 8.50; (2.762 μm)	0.5715	0.3488	-0.1121	1.2551
8.50 to 9.00; (1.953 μm)	0.5365	0.3780	-0.2043	1.2774
9.00 to 9.50; (1.381 μm)	0.2774	0.2022	-0.1188	0.6737
9.50 to 10.00; (0.977 μm)	0.2365	0.2311	-0.2164	0.6895
10.00 to 10.50; (0.691 μm)	0.1677	0.1750	-0.1753	0.5106
10.50 to 11.00; (0.488 μm)	0.0853	0.1012	-0.1131	0.2836
11.00 to 11.50; (0.345 μm)	0.0200	0.0457	-0.0696	0.1097
11.50 to 12.00; (0.244 μm)	0.0016	0.0056	-0.0094	0.0127

Table 4. Quartiles for each phi-interval based on mean and standard deviation calculations including all participating laboratories.

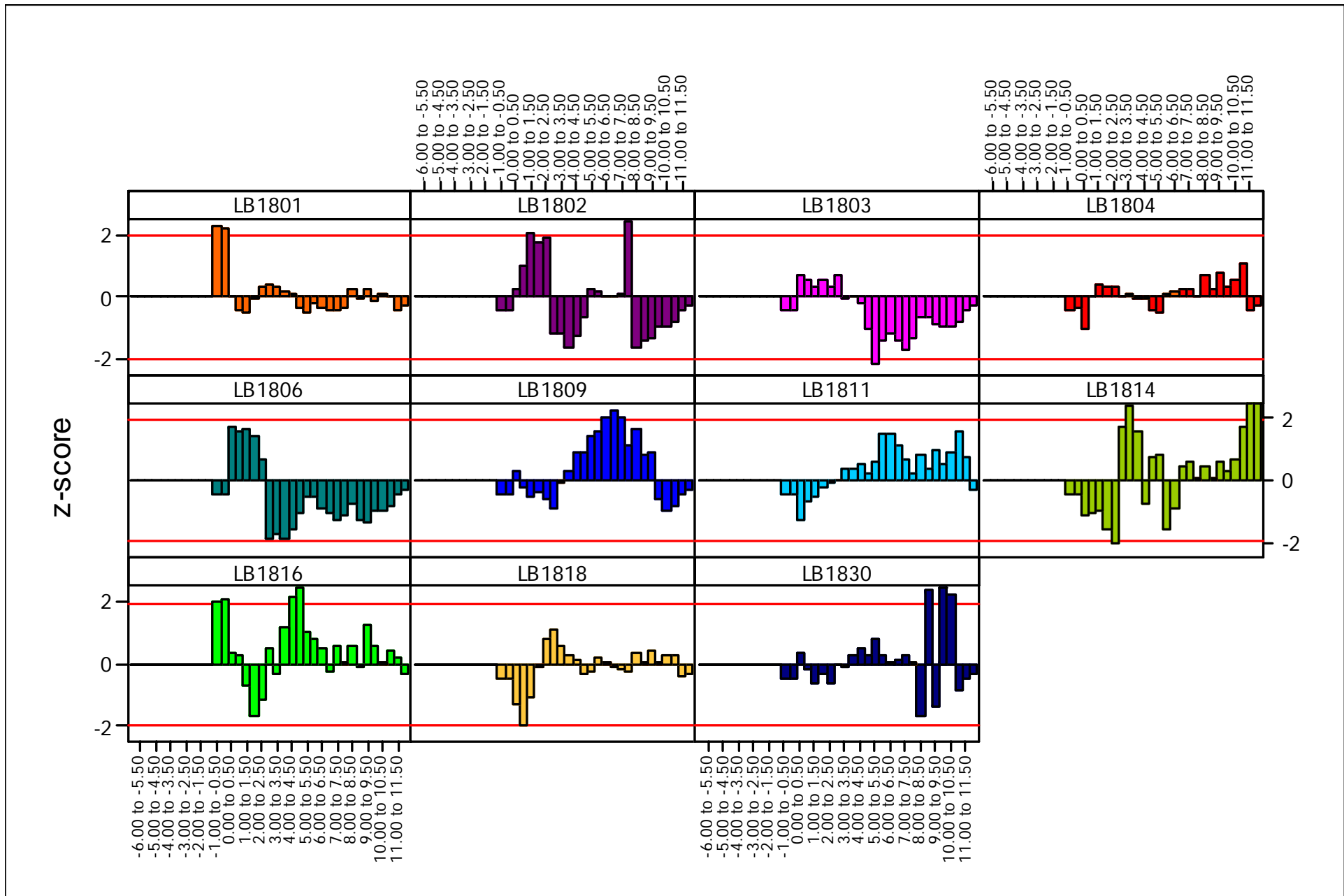


Figure 5. Summary of z-scores when data from all participating laboratories are included in the mean and standard deviation calculations. Reference lines (red) are shown at the 95% level; ± 1.96 .

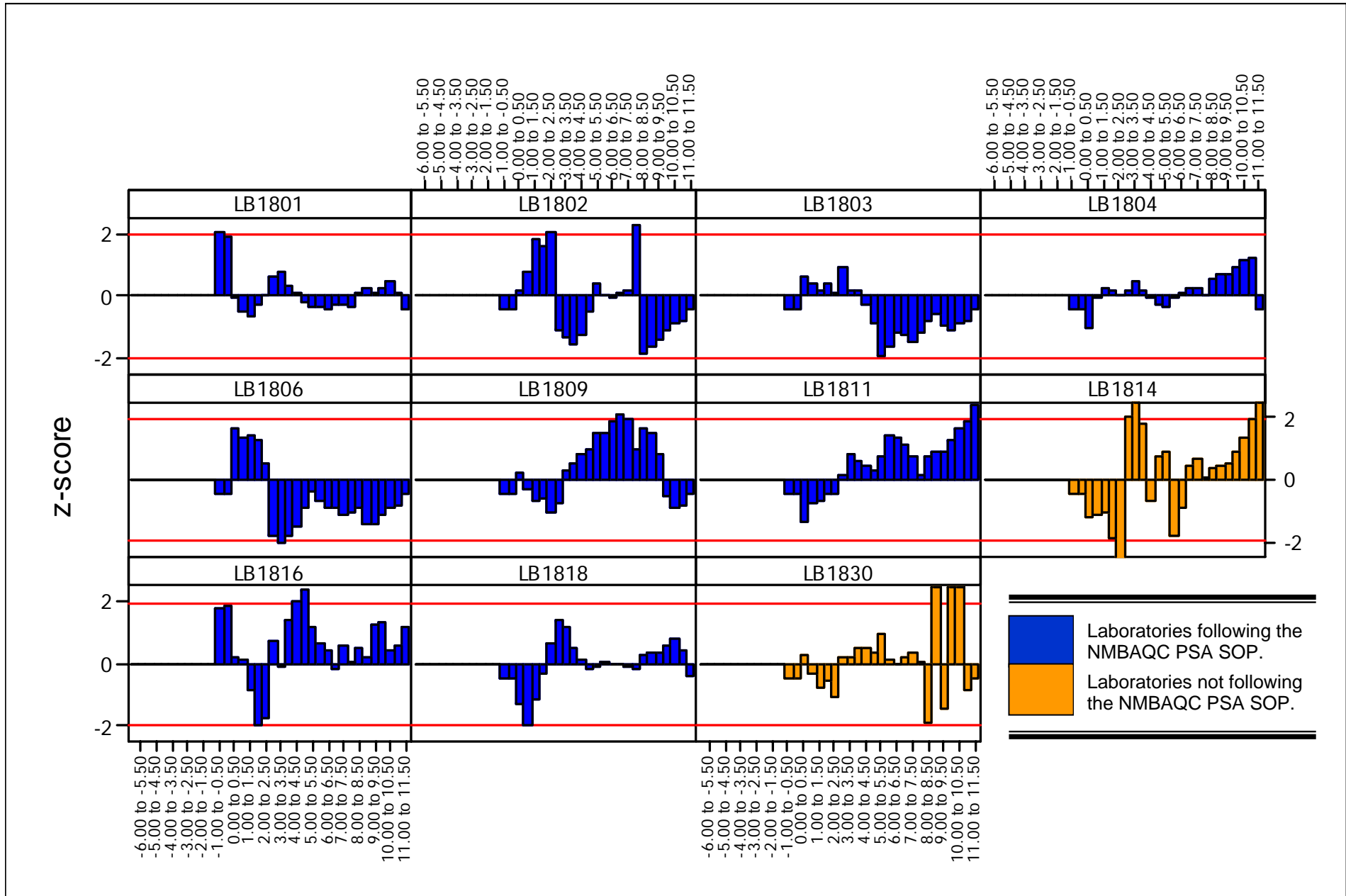


Figure 6. Summary of z-scores when only data from laboratories following the NMBAQC PSA SOP are included in the mean and standard deviation calculations. Reference lines (red) are shown at the 95% level: ± 1.96 .

Results of SIMPROF testing on PSA Ring test PS41 data

Data was entered into PRIMER v. 6.1.13 in half-phi intervals; 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 results are presented as a cluster dendrogram (Figures 7 and 10) and non-metric Multi-Dimensional Scaling (MDS) diagrams (Figures 8 and 9) below.

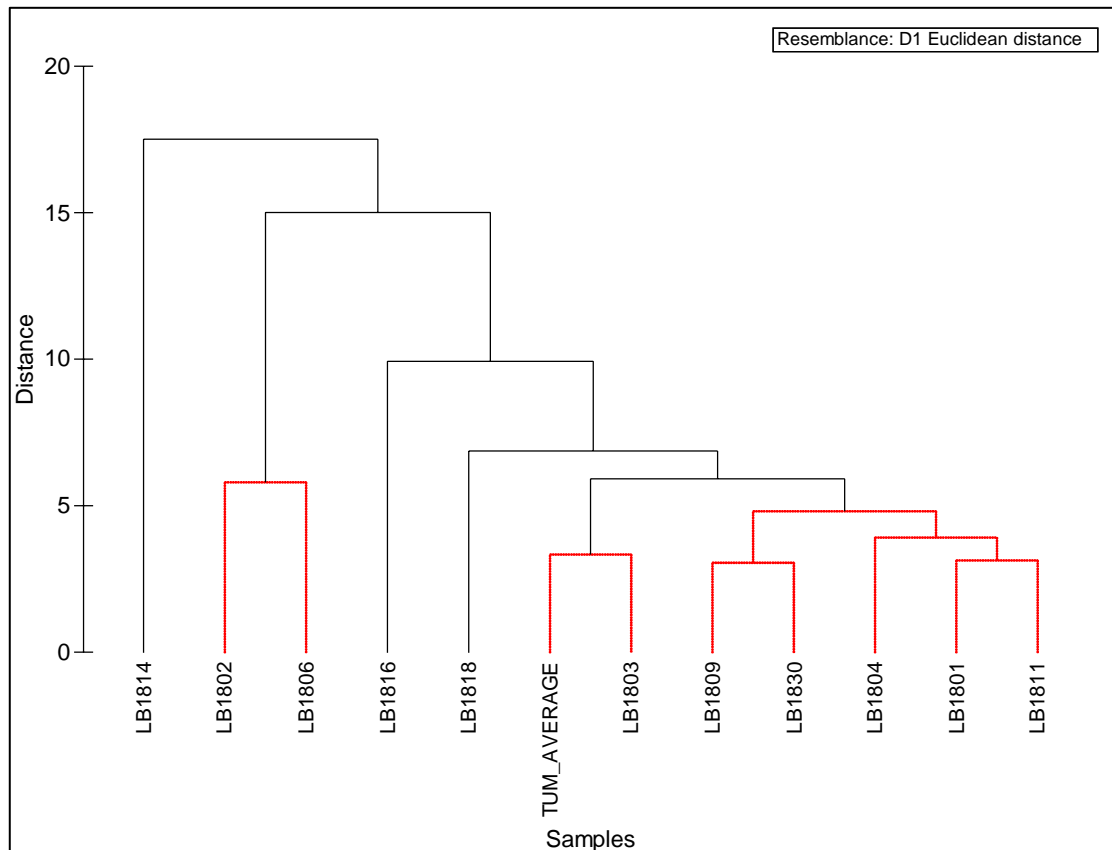


Figure 7. Cluster dendrogram of PS41 including all labs, with the benchmark replicates (TUM AVERAGE) averaged.

The red SIMPROF lines indicate samples that cannot be distinguished from each other at the 5% significance level. The dendrogram shows that LB1803 cannot be distinguished from the benchmark data and LB1802 and LB1806 cannot be distinguished from each other. LB1801, LB1804, LB1809, LB1811 and LB1830 also cannot be distinguished from each other. LB1814, LB1816 and LB1818 do not cluster with other labs or together. The graph in Figure 2 shows that the benchmark (TUM AVERAGE) and LB1803 follow very similar cumulative distribution curves.

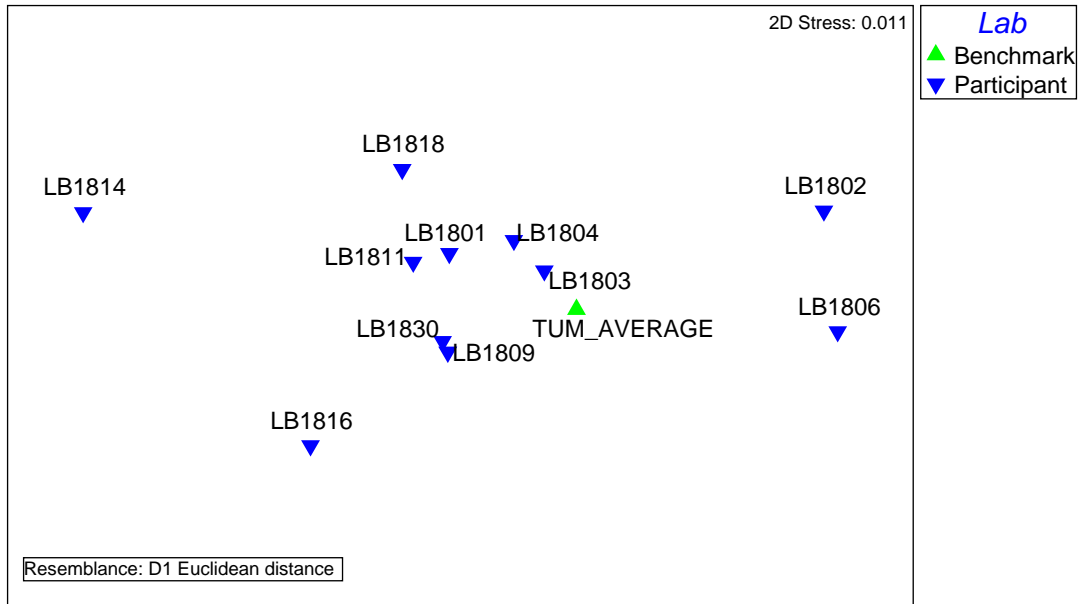


Figure 8. MDS plots of PS41 with the benchmark replicates (TUM AVERAGE) averaged.

As with the dendrogram (Figure.7), the MDS plot in Figure.8a places LB1814 away from the other labs and benchmark data, indicating that this lab is different from the others; the cumulative distribution curves (Figure.2) shows that LB1814 produces slightly lower values between 1.5 and 3.0 phi. LB1802 and LB1806 are also placed away from the other labs; Figure.2 shows that both these labs have higher values between 1.0 and 3.0 phi, and LB1806 is considerably different greater than 4.0 phi, most probably due to laser data 1.0mm and greater being removed and remaining data not re-scaled.

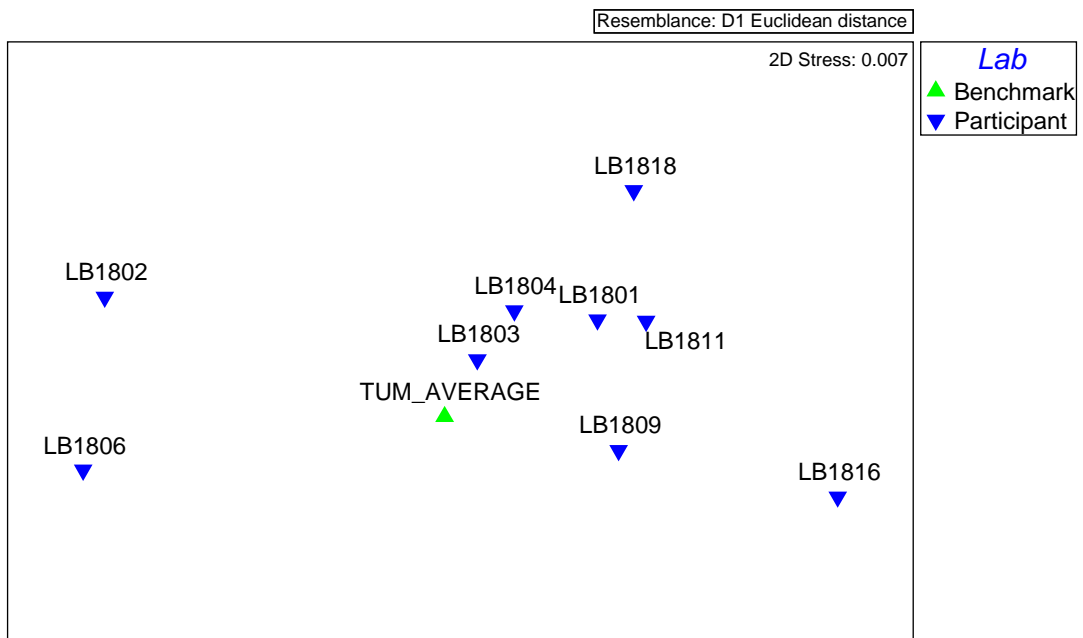


Figure 9. MDS plots of PS41, showing labs that follow the NMBAQC PSA SOP with the benchmark replicates (TUM AVERAGE) averaged.

Figure.9 shows the MDS plots of the averaged benchmark data (TUM AVERAGE) with all the labs that have followed the NMBAQC PSA SOP (all laboratories except, LB1814 and LB1830).

The dendrogram (Figure.10) is very similar to the dendrogram which includes all labs (Figure.7). LB1803 and the Benchmark Data, LB1802 and LB1806 and LB1801, LB1804, LB1809 and LB1811 are still indistinguishable from each other at the 5% level.

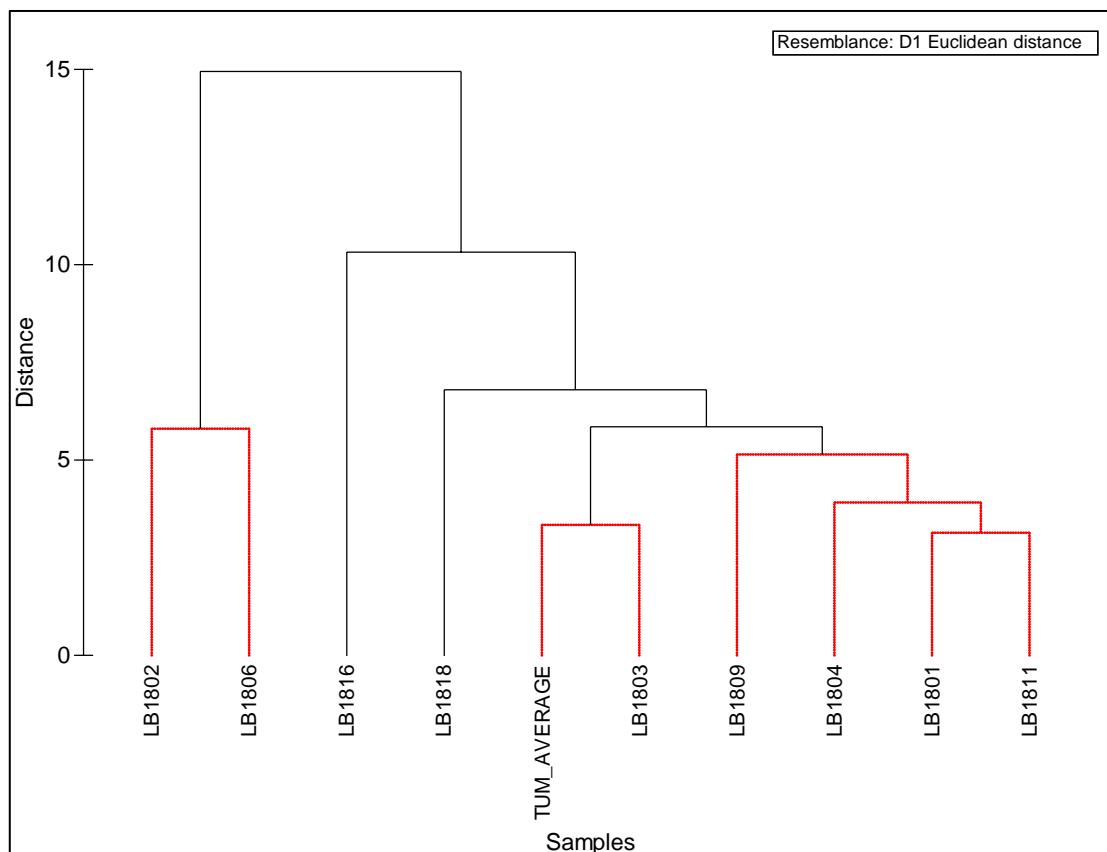


Figure 10. Dendrogram of PS41, showing labs that follow the NMBAQC PSA SOP with the benchmark replicates (TUM AVERAGE) averaged.

Appendices

Appendix 1.

Exercise Code:	PS41
LabCode:	LB1801
Sample Code:	PS411801

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	0.3300
-0.50 to 0.00; 1 mm	1.0400
0.00 to 0.50; (707 µm)	1.9889
0.50 to 1.00; (500 µm)	2.7711
1.00 to 1.50; (353.6 µm)	4.6300
1.50 to 2.00; (250 µm)	9.9344
2.00 to 2.50; (176.8 µm)	17.5122
2.50 to 3.00; (125 µm)	21.6311
3.00 to 3.50; (88.39 µm)	18.3033
3.50 to 4.00; (62.5 µm)	10.4256
4.00 to 4.50; (44.19 µm)	3.8944
4.50 to 5.00; (31.25 µm)	1.1667
5.00 to 5.50; (22.097 µm)	0.8100
5.50 to 6.00; (15.625 µm)	0.8744
6.00 to 6.50; (11.049 µm)	0.7567
6.50 to 7.00; (7.813 µm)	0.6478
7.00 to 7.50; (5.524 µm)	0.6656
7.50 to 8.00; (3.906 µm)	0.7000
8.00 to 8.50; (2.762 µm)	0.6467
8.50 to 9.00; (1.953 µm)	0.4911
9.00 to 9.50; (1.381 µm)	0.3133
9.50 to 10.00; (0.977 µm)	0.2044
10.00 to 10.50; (0.691 µm)	0.1756
10.50 to 11.00; (0.488 µm)	0.0844
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 1.

Exercise Code:	PS41
LabCode:	LB1802
Sample Code:	PS411802

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)	2.3612
0.50 to 1.00; (500 µm)	4.7912
1.00 to 1.50; (353.6 µm)	10.6279
1.50 to 2.00; (250 µm)	16.7068
2.00 to 2.50; (176.8 µm)	22.6521
2.50 to 3.00; (125 µm)	17.7798
3.00 to 3.50; (88.39 µm)	11.8246
3.50 to 4.00; (62.5 µm)	4.6600
4.00 to 4.50; (44.19 µm)	1.5497
4.50 to 5.00; (31.25 µm)	0.9313
5.00 to 5.50; (22.097 µm)	0.9771
5.50 to 6.00; (15.625 µm)	0.9432
6.00 to 6.50; (11.049 µm)	0.8331
6.50 to 7.00; (7.813 µm)	0.7503
7.00 to 7.50; (5.524 µm)	0.7933
7.50 to 8.00; (3.906 µm)	1.8085
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 1.

Exercise Code:	PS41
LabCode:	LB1803
Sample Code:	PS411803

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)	3.1000
0.50 to 1.00; (500 µm)	4.1685
1.00 to 1.50; (353.6 µm)	6.6107
1.50 to 2.00; (250 µm)	12.2851
2.00 to 2.50; (176.8 µm)	17.6013
2.50 to 3.00; (125 µm)	22.3802
3.00 to 3.50; (88.39 µm)	16.4354
3.50 to 4.00; (62.5 µm)	9.9394
4.00 to 4.50; (44.19 µm)	3.3195
4.50 to 5.00; (31.25 µm)	0.6710
5.00 to 5.50; (22.097 µm)	0.4433
5.50 to 6.00; (15.625 µm)	0.6462
6.00 to 6.50; (11.049 µm)	0.5952
6.50 to 7.00; (7.813 µm)	0.4192
7.00 to 7.50; (5.524 µm)	0.3417
7.50 to 8.00; (3.906 µm)	0.3386
8.00 to 8.50; (2.762 µm)	0.3410
8.50 to 9.00; (1.953 µm)	0.2683
9.00 to 9.50; (1.381 µm)	0.0954
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 1.

Exercise Code:	PS41
LabCode:	LB1804
Sample Code:	PS411804

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	0.0200
0.00 to 0.50; (707 µm)	0.9029
0.50 to 1.00; (500 µm)	7.8229
1.00 to 1.50; (353.6 µm)	15.5522
1.50 to 2.00; (250 µm)	26.2078
2.00 to 2.50; (176.8 µm)	39.9895
2.50 to 3.00; (125 µm)	47.1042
3.00 to 3.50; (88.39 µm)	39.3218
3.50 to 4.00; (62.5 µm)	22.3609
4.00 to 4.50; (44.19 µm)	8.3995
4.50 to 5.00; (31.25 µm)	2.5773
5.00 to 5.50; (22.097 µm)	1.8564
5.50 to 6.00; (15.625 µm)	2.0967
6.00 to 6.50; (11.049 µm)	1.9627
6.50 to 7.00; (7.813 µm)	1.8084
7.00 to 7.50; (5.524 µm)	1.8691
7.50 to 8.00; (3.906 µm)	1.9349
8.00 to 8.50; (2.762 µm)	1.8059
8.50 to 9.00; (1.953 µm)	1.4088
9.00 to 9.50; (1.381 µm)	0.9611
9.50 to 10.00; (0.977 µm)	0.6804
10.00 to 10.50; (0.691 µm)	0.5817
10.50 to 11.00; (0.488 µm)	0.4274
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 1.

Exercise Code:	PS41
LabCode:	LB1806
Sample Code:	PS411806

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)	4.7956
0.50 to 1.00; (500 µm)	5.6878
1.00 to 1.50; (353.6 µm)	9.7367
1.50 to 2.00; (250 µm)	15.6678
2.00 to 2.50; (176.8 µm)	18.8400
2.50 to 3.00; (125 µm)	16.1300
3.00 to 3.50; (88.39 µm)	9.6400
3.50 to 4.00; (62.5 µm)	3.8711
4.00 to 4.50; (44.19 µm)	1.1256
4.50 to 5.00; (31.25 µm)	0.6433
5.00 to 5.50; (22.097 µm)	0.8100
5.50 to 6.00; (15.625 µm)	0.8178
6.00 to 6.50; (11.049 µm)	0.6522
6.50 to 7.00; (7.813 µm)	0.5033
7.00 to 7.50; (5.524 µm)	0.4400
7.50 to 8.00; (3.906 µm)	0.4067
8.00 to 8.50; (2.762 µm)	0.3044
8.50 to 9.00; (1.953 µm)	0.0589
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 1.

Exercise Code:	PS41
LabCode:	LB1809
Sample Code:	PS411809

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)	2.4943
0.50 to 1.00; (500 µm)	3.1229
1.00 to 1.50; (353.6 µm)	4.7021
1.50 to 2.00; (250 µm)	8.8875
2.00 to 2.50; (176.8 µm)	14.8095
2.50 to 3.00; (125 µm)	18.5016
3.00 to 3.50; (88.39 µm)	16.7591
3.50 to 4.00; (62.5 µm)	10.9985
4.00 to 4.50; (44.19 µm)	5.3057
4.50 to 5.00; (31.25 µm)	2.1671
5.00 to 5.50; (22.097 µm)	1.2507
5.50 to 6.00; (15.625 µm)	1.2039
6.00 to 6.50; (11.049 µm)	1.2461
6.50 to 7.00; (7.813 µm)	1.2582
7.00 to 7.50; (5.524 µm)	1.2871
7.50 to 8.00; (3.906 µm)	1.2830
8.00 to 8.50; (2.762 µm)	1.1452
8.50 to 9.00; (1.953 µm)	0.8424
9.00 to 9.50; (1.381 µm)	0.4538
9.50 to 10.00; (0.977 µm)	0.0879
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 1.

Exercise Code:	PS41
LabCode:	LB1811
Sample Code:	PS411811

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)	2.4080
1.00 to 1.50; (353.6 µm)	4.5812
1.50 to 2.00; (250 µm)	9.4006
2.00 to 2.50; (176.8 µm)	16.3401
2.50 to 3.00; (125 µm)	20.7327
3.00 to 3.50; (88.39 µm)	18.3939
3.50 to 4.00; (62.5 µm)	11.2303
4.00 to 4.50; (44.19 µm)	4.6704
4.50 to 5.00; (31.25 µm)	1.5972
5.00 to 5.50; (22.097 µm)	1.0688
5.50 to 6.00; (15.625 µm)	1.1870
6.00 to 6.50; (11.049 µm)	1.1410
6.50 to 7.00; (7.813 µm)	1.0049
7.00 to 7.50; (5.524 µm)	0.9481
7.50 to 8.00; (3.906 µm)	0.9284
8.00 to 8.50; (2.762 µm)	0.8579
8.50 to 9.00; (1.953 µm)	0.6798
9.00 to 9.50; (1.381 µm)	0.4788
9.50 to 10.00; (0.977 µm)	0.3589
10.00 to 10.50; (0.691 µm)	0.3252
10.50 to 11.00; (0.488 µm)	0.2472
11.00 to 11.50; (0.345 µm)	0.0542
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 1.

Exercise Code:	PS41
LabCode:	LB1814
Sample Code:	PS411814

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	0.0009
0.00 to 0.50; (707 µm)	0.2668
0.50 to 1.00; (500 µm)	1.9433
1.00 to 1.50; (353.6 µm)	3.6291
1.50 to 2.00; (250 µm)	4.3592
2.00 to 2.50; (176.8 µm)	10.2410
2.50 to 3.00; (125 µm)	25.0838
3.00 to 3.50; (88.39 µm)	27.2027
3.50 to 4.00; (62.5 µm)	15.0033
4.00 to 4.50; (44.19 µm)	2.5129
4.50 to 5.00; (31.25 µm)	2.0127
5.00 to 5.50; (22.097 µm)	1.1145
5.50 to 6.00; (15.625 µm)	0.6203
6.00 to 6.50; (11.049 µm)	0.6564
6.50 to 7.00; (7.813 µm)	0.8381
7.00 to 7.50; (5.524 µm)	0.9252
7.50 to 8.00; (3.906 µm)	0.8712
8.00 to 8.50; (2.762 µm)	0.7330
8.50 to 9.00; (1.953 µm)	0.5633
9.00 to 9.50; (1.381 µm)	0.3980
9.50 to 10.00; (0.977 µm)	0.3064
10.00 to 10.50; (0.691 µm)	0.2869
10.50 to 11.00; (0.488 µm)	0.2568
11.00 to 11.50; (0.345 µm)	0.1547
>11.50; (<0.345 µm)	0.0195

Appendix 1.

Exercise Code:	PS41
LabCode:	LB1816
Sample Code:	PS411816

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	0.3048
-0.50 to 0.00; 1 mm	1.0300
0.00 to 0.50; (707 µm)	2.5800
0.50 to 1.00; (500 µm)	3.8200
1.00 to 1.50; (353.6 µm)	4.3000
1.50 to 2.00; (250 µm)	4.1800
2.00 to 2.50; (176.8 µm)	13.1300
2.50 to 3.00; (125 µm)	22.1500
3.00 to 3.50; (88.39 µm)	15.7100
3.50 to 4.00; (62.5 µm)	13.9000
4.00 to 4.50; (44.19 µm)	7.4400
4.50 to 5.00; (31.25 µm)	3.3200
5.00 to 5.50; (22.097 µm)	1.1700
5.50 to 6.00; (15.625 µm)	1.0600
6.00 to 6.50; (11.049 µm)	0.9400
6.50 to 7.00; (7.813 µm)	0.6900
7.00 to 7.50; (5.524 µm)	0.9200
7.50 to 8.00; (3.906 µm)	0.8700
8.00 to 8.50; (2.762 µm)	0.7900
8.50 to 9.00; (1.953 µm)	0.5100
9.00 to 9.50; (1.381 µm)	0.5400
9.50 to 10.00; (0.977 µm)	0.3650
10.00 to 10.50; (0.691 µm)	0.1750
10.50 to 11.00; (0.488 µm)	0.1290
11.00 to 11.50; (0.345 µm)	0.0308
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 1.

Exercise Code:	PS41
LabCode:	LB1818
Sample Code:	PS411818

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)	0.0817
0.50 to 1.00; (500 µm)	0.5938
1.00 to 1.50; (353.6 µm)	3.4490
1.50 to 2.00; (250 µm)	10.0366
2.00 to 2.50; (176.8 µm)	19.1999
2.50 to 3.00; (125 µm)	23.5570
3.00 to 3.50; (88.39 µm)	19.5413
3.50 to 4.00; (62.5 µm)	10.9631
4.00 to 4.50; (44.19 µm)	4.0771
4.50 to 5.00; (31.25 µm)	1.2501
5.00 to 5.50; (22.097 µm)	0.8838
5.50 to 6.00; (15.625 µm)	0.9576
6.00 to 6.50; (11.049 µm)	0.8428
6.50 to 7.00; (7.813 µm)	0.7228
7.00 to 7.50; (5.524 µm)	0.7330
7.50 to 8.00; (3.906 µm)	0.7738
8.00 to 8.50; (2.762 µm)	0.7106
8.50 to 9.00; (1.953 µm)	0.5474
9.00 to 9.50; (1.381 µm)	0.3661
9.50 to 10.00; (0.977 µm)	0.2584
10.00 to 10.50; (0.691 µm)	0.2178
10.50 to 11.00; (0.488 µm)	0.1176
11.00 to 11.50; (0.345 µm)	0.0008
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 1.

Exercise Code:	PS41
LabCode:	LB1830
Sample Code:	PS411830

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)	2.6474
0.50 to 1.00; (500 µm)	3.1740
1.00 to 1.50; (353.6 µm)	4.4766
1.50 to 2.00; (250 µm)	9.1179
2.00 to 2.50; (176.8 µm)	14.8144
2.50 to 3.00; (125 µm)	20.7559
3.00 to 3.50; (88.39 µm)	16.5362
3.50 to 4.00; (62.5 µm)	11.0657
4.00 to 4.50; (44.19 µm)	4.7043
4.50 to 5.00; (31.25 µm)	1.6622
5.00 to 5.50; (22.097 µm)	1.1180
5.50 to 6.00; (15.625 µm)	0.9681
6.00 to 6.50; (11.049 µm)	0.8559
6.50 to 7.00; (7.813 µm)	0.7774
7.00 to 7.50; (5.524 µm)	0.8428
7.50 to 8.00; (3.906 µm)	0.8838
8.00 to 8.50; (2.762 µm)	
8.50 to 9.00; (1.953 µm)	1.4540
9.00 to 9.50; (1.381 µm)	
9.50 to 10.00; (0.977 µm)	0.8242
10.00 to 10.50; (0.691 µm)	0.5582
10.50 to 11.00; (0.488 µm)	
11.00 to 11.50; (0.345 µm)	
11.50 to 12.00; (0.244 µm)	
12.00 to 12.50; (0.173 µm)	
12.50 to 13.00; (0.122 µm)	
13.00 to 13.50; (0.086 µm)	

Appendix 2. z-score calculations; mean and standard deviation calculated including data from all participating laboratories.

	-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	-0.50 to 0.00	z-score
TUM_AVERAGE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.45	0.0000	-0.45
LB1801	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3300	2.12	1.0400	2.03
LB1802	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.45	0.0000	-0.45
LB1803	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.45	0.0000	-0.45
LB1804	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.45	0.0088	-0.43
LB1806	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.45	0.0000	-0.45
LB1809	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.45	0.0000	-0.45
LB1811	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.45	0.0000	-0.45
LB1814	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.45	0.0009	-0.45
LB1816	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3048	1.92	1.0300	2.01
LB1818	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.45	0.0000	-0.45
LB1830	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.45	0.0000	-0.45
Mean	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.058		0.189	
S.D	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.129		0.418	

All data equals zero ∴ z-score uncalculatable

Appendix 2. z-score calculations; mean and standard deviation calculated including data from all participating laboratories.

	<i>0.00 to 0.50</i>	<i>z-score</i>	<i>0.50 to 1.00</i>	<i>z-score</i>	<i>1.00 to 1.50</i>	<i>z-score</i>	<i>1.50 to 2.00</i>	<i>z-score</i>	<i>2.00 to 2.50</i>	<i>z-score</i>	<i>2.50 to 3.00</i>	<i>z-score</i>	<i>3.00 to 3.50</i>	<i>z-score</i>
TUM_AVERAGE	3.9257	1.34	5.2925	1.46	7.3817	0.66	11.9162	0.44	17.6973	0.33	19.9439	-0.35	15.8724	-0.27
LB1801	1.9889	0.07	2.7711	-0.36	4.6300	-0.47	9.9344	-0.07	17.5122	0.27	21.6311	0.30	18.3033	0.28
LB1802	2.3612	0.31	4.7912	1.10	10.6279	2.00	16.7068	1.67	22.6521	1.82	17.7798	-1.19	11.8246	-1.18
LB1803	3.1000	0.80	4.1685	0.65	6.6107	0.34	12.2851	0.54	17.6013	0.30	22.3802	0.59	16.4354	-0.14
LB1804	0.3966	-0.97	3.4363	0.12	6.8315	0.43	11.5122	0.34	17.5660	0.29	20.6913	-0.06	17.2727	0.05
LB1806	4.7956	1.91	5.6878	1.75	9.7367	1.63	15.6678	1.40	18.8400	0.67	16.1300	-1.82	9.6400	-1.67
LB1809	2.4943	0.40	3.1229	-0.10	4.7021	-0.44	8.8875	-0.33	14.8095	-0.54	18.5016	-0.91	16.7591	-0.07
LB1811	0.0000	-1.23	2.4080	-0.62	4.5812	-0.49	9.4006	-0.20	16.3401	-0.08	20.7327	-0.05	18.3939	0.30
LB1814	0.2668	-1.06	1.9433	-0.95	3.6291	-0.89	4.3592	-1.49	10.2410	-1.92	25.0838	1.63	27.2027	2.28
LB1816	2.5800	0.46	3.8200	0.40	4.3000	-0.61	4.1800	-1.54	13.1300	-1.05	22.1500	0.50	15.7100	-0.30
LB1818	0.0817	-1.18	0.5938	-1.93	3.4490	-0.96	10.0366	-0.04	19.1999	0.78	23.5570	1.04	19.5413	0.56
LB1830	2.6474	0.50	3.1740	-0.07	4.4766	-0.54	9.1179	-0.27	14.8144	-0.54	20.7559	-0.04	16.5362	-0.12
Mean	1.883		3.265		5.780		10.190		16.610		20.854		17.056	
S.D	1.525		1.387		2.425		3.902		3.318		2.592		4.443	

Appendix 2. z-score calculations; mean and standard deviation calculated including data from all participating laboratories.

	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	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	8.5987	-0.47	3.1035	-0.42	1.0042	-0.64	0.7715	-0.78	0.7824	-0.77	0.6419	-1.05	0.5459	-0.96	0.5690	-0.87
LB1801	10.4256	0.08	3.8944	0.03	1.1667	-0.43	0.8100	-0.61	0.8744	-0.28	0.7567	-0.48	0.6478	-0.51	0.6656	-0.50
LB1802	4.6600	-1.66	1.5497	-1.30	0.9313	-0.73	0.9771	0.11	0.9432	0.09	0.8331	-0.10	0.7503	-0.06	0.7933	0.00
LB1803	9.9394	-0.07	3.3195	-0.30	0.6710	-1.07	0.4433	-2.21	0.6462	-1.50	0.5952	-1.29	0.4192	-1.52	0.3417	-1.76
LB1804	9.8224	-0.10	3.6896	-0.09	1.1321	-0.48	0.8155	-0.59	0.9210	-0.03	0.8621	0.05	0.7944	0.13	0.8210	0.11
LB1806	3.8711	-1.89	1.1256	-1.54	0.6433	-1.10	0.8100	-0.61	0.8178	-0.58	0.6522	-1.00	0.5033	-1.15	0.4400	-1.38
LB1809	10.9985	0.25	5.3057	0.83	2.1671	0.85	1.2507	1.30	1.2039	1.47	1.2461	1.97	1.2582	2.17	1.2871	1.94
LB1811	11.2303	0.32	4.6704	0.47	1.5972	0.12	1.0688	0.51	1.1870	1.38	1.1410	1.44	1.0049	1.06	0.9481	0.61
LB1814	15.0033	1.45	2.5129	-0.75	2.0127	0.65	1.1145	0.71	0.6203	-1.63	0.6564	-0.98	0.8381	0.33	0.9252	0.52
LB1816	13.9000	1.12	7.4400	2.03	3.3200	2.32	1.1700	0.95	1.0600	0.71	0.9400	0.44	0.6900	-0.33	0.9200	0.50
LB1818	10.9631	0.24	4.0771	0.13	1.2501	-0.33	0.8838	-0.29	0.9576	0.16	0.8428	-0.05	0.7228	-0.18	0.7330	-0.23
LB1830	11.0657	0.27	4.7043	0.49	1.6622	0.20	1.1180	0.73	0.9681	0.22	0.8559	0.02	0.7774	0.06	0.8428	0.20
Mean	10.171		3.844		1.505		0.951		0.927		0.853		0.764		0.793	
S.D	3.329		1.768		0.782		0.230		0.188		0.200		0.227		0.256	

Appendix 2. z-score calculations; mean and standard deviation calculated including data from all participating laboratories.

	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	10.50 to 11.00	z-score	11.00 to 11.50	z-score
TUM_AVERAGE	0.5982	-0.71	0.5364	-0.10	0.4043	-0.37	0.2615	-0.08	0.1342	-0.47	0.0179	-0.92	0.0005	-0.99	0.0000	-0.49
LB1801	0.7000	-0.46	0.6467	0.20	0.4911	-0.15	0.3133	0.16	0.2044	-0.17	0.1756	-0.03	0.0844	-0.17	0.0000	-0.49
LB1802	1.8085	2.32	0.0000	-1.57	0.0000	-1.39	0.0000	-1.32	0.0000	-1.02	0.0000	-1.03	0.0000	-0.99	0.0000	-0.49
LB1803	0.3386	-1.37	0.3410	-0.64	0.2683	-0.71	0.0954	-0.87	0.0000	-1.02	0.0000	-1.03	0.0000	-0.99	0.0000	-0.49
LB1804	0.8499	-0.08	0.7933	0.60	0.6188	0.18	0.4222	0.68	0.2989	0.22	0.2555	0.42	0.1878	0.83	0.0000	-0.49
LB1806	0.4067	-1.20	0.3044	-0.74	0.0589	-1.24	0.0000	-1.32	0.0000	-1.02	0.0000	-1.03	0.0000	-0.99	0.0000	-0.49
LB1809	1.2830	1.00	1.1452	1.56	0.8424	0.75	0.4538	0.83	0.0879	-0.66	0.0000	-1.03	0.0000	-0.99	0.0000	-0.49
LB1811	0.9284	0.11	0.8579	0.77	0.6798	0.33	0.4788	0.94	0.3589	0.47	0.3252	0.81	0.2472	1.41	0.0542	0.61
LB1814	0.8712	-0.03	0.7330	0.43	0.5633	0.04	0.3980	0.56	0.3064	0.25	0.2869	0.60	0.2568	1.50	0.1547	2.64
LB1816	0.8700	-0.03	0.7900	0.59	0.5100	-0.10	0.5400	1.23	0.3650	0.50	0.1750	-0.04	0.1290	0.26	0.0308	0.14
LB1818	0.7738	-0.27	0.7106	0.37	0.5474	0.00	0.3661	0.41	0.2584	0.05	0.2178	0.21	0.1176	0.15	0.0008	-0.47
LB1830	0.8838	0.00	0.0000	-1.57	1.4540	2.30	0.0000	-1.32	0.8242	2.41	0.5582	2.13	0.0000	-0.99	0.0000	-0.49
Mean	0.883		0.575		0.549		0.279		0.246		0.181		0.102		0.024	
S.D	0.399		0.366		0.394		0.212		0.240		0.177		0.103		0.049	

No data provided- zero entered to calculated z-score, data not used in μ and σ calculations.

Appendix 2. z-score calculations; mean and standard deviation calculated including data from all participating laboratories.

	11.50 to 12.00	z-score	12.00 to 12.50	12.50 to 13.00	13.00 to 13.50
TUM_AVERAGE	0.0000	-0.32	0.0000	0.0000	0.0000
LB1801	0.0000	-0.32	0.0000	0.0000	0.0000
LB1802	0.0000	-0.32	0.0000	0.0000	0.0000
LB1803	0.0000	-0.32	0.0000	0.0000	0.0000
LB1804	0.0000	-0.32	0.0000	0.0000	0.0000
LB1806	0.0000	-0.32	0.0000	0.0000	0.0000
LB1809	0.0000	-0.32	0.0000	0.0000	0.0000
LB1811	0.0000	-0.32	0.0000	0.0000	0.0000
LB1814	0.0195	2.85			
LB1816	0.0000	-0.32	0.0000	0.0000	0.0000
LB1818	0.0000	-0.32	0.0000	0.0000	0.0000
LB1830	0.0000	-0.32	0.0000	0.0000	0.0000
Mean	0.002		0.000	0.000	0.000
S.D	0.006		0.000	0.000	0.000

No data provided- zero entered to calculated z-score, data not used in μ and σ calculations.

All data equals zero \therefore z-score uncalculatable

Combined >11.50 phi

Appendix 3. z-score calculations; mean and standard deviations calculated using data from those laboratories following the NMBAQC PSA SOP only.

	-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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.47
LB1801	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3300	1.99
LB1802	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.47
LB1803	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.47
LB1804	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.47
LB1806	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.47
LB1809	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.47
LB1811	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.47
LB1814	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.47
LB1816	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.3048	1.80
LB1818	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.47
LB1830	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	-0.47
Mean	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.063	
S.D	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.134	

Not following NMBAQC PSA SOP, data excluded from mean and standard deviation calculations
 All data equals zero ∴ z-score uncalculatable

Appendix 3. z-score calculations; mean and standard deviations calculated using data from those laboratories following the NMBAQC PSA SOP only.

	<i>-0.50 to 0.00</i>	<i>z-score</i>	<i>0.00 to 0.50</i>	<i>z-score</i>	<i>0.50 to 1.00</i>	<i>z-score</i>	<i>1.00 to 1.50</i>	<i>z-score</i>	<i>1.50 to 2.00</i>	<i>z-score</i>	<i>2.00 to 2.50</i>	<i>z-score</i>	<i>2.50 to 3.00</i>	<i>z-score</i>
TUM_AVERAGE	0.0000	-0.48	3.9257	1.09	5.2925	1.12	7.3817	0.45	11.9162	0.24	17.6973	0.06	19.9439	-0.18
LB1801	1.0400	1.91	1.9889	-0.11	2.7711	-0.56	4.6300	-0.69	9.9344	-0.32	17.5122	-0.01	21.6311	0.56
LB1802	0.0000	-0.48	2.3612	0.12	4.7912	0.78	10.6279	1.80	16.7068	1.60	22.6521	2.00	17.7798	-1.12
LB1803	0.0000	-0.48	3.1000	0.58	4.1685	0.37	6.6107	0.13	12.2851	0.35	17.6013	0.03	22.3802	0.88
LB1804	0.0088	-0.46	0.3966	-1.10	3.4363	-0.11	6.8315	0.23	11.5122	0.13	17.5660	0.01	20.6913	0.15
LB1806	0.0000	-0.48	4.7956	1.63	5.6878	1.38	9.7367	1.43	15.6678	1.30	18.8400	0.51	16.1300	-1.84
LB1809	0.0000	-0.48	2.4943	0.20	3.1229	-0.32	4.7021	-0.66	8.8875	-0.61	14.8095	-1.06	18.5016	-0.80
LB1811	0.0000	-0.48	0.0000	-1.35	2.4080	-0.80	4.5812	-0.71	9.4006	-0.47	16.3401	-0.47	20.7327	0.17
LB1814	0.0009	-0.47	0.2668	-1.18	1.9433	-1.11	3.6291	-1.10	4.3592	-1.89	10.2410	-2.85	25.0838	2.06
LB1816	1.0300	1.89	2.5800	0.25	3.8200	0.14	4.3000	-0.82	4.1800	-1.94	13.1300	-1.72	22.1500	0.78
LB1818	0.0000	-0.48	0.0817	-1.30	0.5938	-2.00	3.4490	-1.17	10.0366	-0.29	19.1999	0.65	23.5570	1.40
LB1830	0.0000	-0.48	2.6474	0.29	3.1740	-0.29	4.4766	-0.75	9.1179	-0.55	14.8144	-1.06	20.7559	0.18
Mean	0.208		2.172		3.609		6.285		11.053		17.535		20.350	
S.D	0.436		1.612		1.506		2.416		3.538		2.559		2.298	

Not following NMBAQC PSA SOP, data excluded from mean and standard deviation calculations

Appendix 3. z-score calculations; mean and standard deviations calculated using data from those laboratories following the NMBAQC PSA SOP only.

	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	5.50 to 6.00	z-score	6.00 to 6.50	z-score	6.50 to 7.00	z-score
TUM_AVERAGE	15.8724	-0.03	8.5987	-0.28	3.1035	-0.40	1.0042	-0.47	0.7715	-0.56	0.7824	-0.90	0.6419	-0.98	0.5459	-0.76
LB1801	18.3033	0.76	10.4256	0.32	3.8944	0.04	1.1667	-0.27	0.8100	-0.39	0.8744	-0.37	0.7567	-0.44	0.6478	-0.35
LB1802	11.8246	-1.36	4.6600	-1.57	1.5497	-1.26	0.9313	-0.56	0.9771	0.33	0.9432	0.02	0.8331	-0.08	0.7503	0.07
LB1803	16.4354	0.15	9.9394	0.16	3.3195	-0.28	0.6710	-0.88	0.4433	-1.98	0.6462	-1.67	0.5952	-1.20	0.4192	-1.27
LB1804	17.2727	0.42	9.8224	0.13	3.6896	-0.07	1.1321	-0.32	0.8155	-0.37	0.9210	-0.10	0.8621	0.05	0.7944	0.25
LB1806	9.6400	-2.07	3.8711	-1.83	1.1256	-1.49	0.6433	-0.92	0.8100	-0.39	0.8178	-0.69	0.6522	-0.94	0.5033	-0.93
LB1809	16.7591	0.26	10.9985	0.51	5.3057	0.82	2.1671	0.96	1.2507	1.52	1.2039	1.51	1.2461	1.86	1.2582	2.12
LB1811	18.3939	0.79	11.2303	0.59	4.6704	0.47	1.5972	0.26	1.0688	0.73	1.1870	1.41	1.1410	1.36	1.0049	1.10
LB1814	27.2027	3.68	15.0033	1.82	2.5129	-0.72	2.0127	0.77	1.1145	0.93	0.6203	-1.82	0.6564	-0.92	0.8381	0.42
LB1816	15.7100	-0.09	13.9000	1.46	7.4400	2.01	3.3200	2.38	1.1700	1.17	1.0600	0.69	0.9400	0.42	0.6900	-0.18
LB1818	19.5413	1.17	10.9631	0.50	4.0771	0.14	1.2501	-0.17	0.8838	-0.07	0.9576	0.10	0.8428	-0.04	0.7228	-0.04
LB1830	16.5362	0.18	11.0657	0.53	4.7043	0.49	1.6622	0.34	1.1180	0.94	0.9681	0.16	0.8559	0.02	0.7774	0.18
Mean	15.975		9.441		3.818		1.388		0.900		0.939		0.851		0.734	
S.D	3.054		3.051		1.804		0.812		0.231		0.175		0.212		0.247	

Not following NMBAQC PSA SOP, data excluded from mean and standard deviation calculations

Appendix 3. z-score calculations; mean and standard deviations calculated using data from those laboratories following the NMBAQC PSA SOP only.

	7.00 to 7.50	z-score	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	10.50 to 11.00	z-score
TUM_AVERAGE	0.5690	-0.67	0.5982	-0.60	0.5364	-0.23	0.4043	-0.14	0.2615	-0.16	0.1342	-0.25	0.0179	-0.78	0.0005	-0.83
LB1801	0.6656	-0.32	0.7000	-0.36	0.6467	0.10	0.4911	0.18	0.3133	0.10	0.2044	0.23	0.1756	0.47	0.0844	0.09
LB1802	0.7933	0.15	1.8085	2.22	0.0000	-1.87	0.0000	-1.66	0.0000	-1.47	0.0000	-1.16	0.0000	-0.92	0.0000	-0.84
LB1803	0.3417	-1.51	0.3386	-1.20	0.3410	-0.83	0.2683	-0.65	0.0954	-0.99	0.0000	-1.16	0.0000	-0.92	0.0000	-0.84
LB1804	0.8210	0.25	0.8499	-0.01	0.7933	0.55	0.6188	0.66	0.4222	0.65	0.2989	0.87	0.2555	1.10	0.1878	1.22
LB1806	0.4400	-1.15	0.4067	-1.04	0.3044	-0.94	0.0589	-1.44	0.0000	-1.47	0.0000	-1.16	0.0000	-0.92	0.0000	-0.84
LB1809	1.2871	1.97	1.2830	0.99	1.1452	1.62	0.8424	1.50	0.4538	0.81	0.0879	-0.56	0.0000	-0.92	0.0000	-0.84
LB1811	0.9481	0.72	0.9284	0.17	0.8579	0.75	0.6798	0.89	0.4788	0.93	0.3589	1.28	0.3252	1.65	0.2472	1.87
LB1814	0.9252	0.64	0.8712	0.04	0.7330	0.37	0.5633	0.45	0.3980	0.53	0.3064	0.92	0.2869	1.35	0.2568	1.97
LB1816	0.9200	0.62	0.8700	0.03	0.7900	0.54	0.5100	0.25	0.5400	1.24	0.3650	1.32	0.1750	0.46	0.1290	0.57
LB1818	0.7330	-0.07	0.7738	-0.19	0.7106	0.30	0.5474	0.40	0.3661	0.37	0.2584	0.60	0.2178	0.80	0.1176	0.45
LB1830	0.8428	0.33	0.8838	0.07	0.0000	-1.87	1.4540	3.79	0.0000	-1.47	0.8242	4.45	0.5582	3.49	0.0000	-0.84
Mean	0.752		0.856		0.613		0.442		0.293		0.171		0.117		0.077	
S.D	0.272		0.430		0.328		0.267		0.199		0.147		0.127		0.091	

Not following NMBAQC PSA SOP, data excluded from mean and standard deviation calculations

Appendix 3. z-score calculations; mean and standard deviations calculated using data from those laboratories following the NMBAQC PSA SOP only.

	11.00 to 11.50	z-score	11.50 to 12.00	z-score	12.00 to 12.50	12.50 to 13.00	13.00 to 13.50
TUM_AVERAGE	0.0000	-0.46	0.0000	-	0.0000	0.0000	0.0000
LB1801	0.0000	-0.46	0.0000	-	0.0000	0.0000	0.0000
LB1802	0.0000	-0.46	0.0000	-	0.0000	0.0000	0.0000
LB1803	0.0000	-0.46	0.0000	-	0.0000	0.0000	0.0000
LB1804	0.0000	-0.46	0.0000	-	0.0000	0.0000	0.0000
LB1806	0.0000	-0.46	0.0000	-	0.0000	0.0000	0.0000
LB1809	0.0000	-0.46	0.0000	-	0.0000	0.0000	0.0000
LB1811	0.0542	2.44	0.0000	-	0.0000	0.0000	0.0000
LB1814	0.1547	7.81	0.0195	*			
LB1816	0.0308	1.19	0.0000	-	0.0000	0.0000	0.0000
LB1818	0.0008	-0.42	0.0000	-	0.0000	0.0000	0.0000
LB1830	0.0000	-0.46	0.0000	-	0.0000	0.0000	0.0000
Mean	0.009		0.000		0.000	0.000	0.000
S.D	0.019		0.000		0.000	0.000	0.000

Not following NMBAQC PSA SOP, data excluded from mean and standard deviation calculations

All data equals zero ∴ z-score uncalculatable

*** z-score uncalculatable