NMBAQC

NE Atlantic Marine Biological Analytical Quality Control Scheme

NMBAQC Scheme 2024/25

PS92 Report

Lydia McIntyre-Brown

Client: **North East Atlantic Marine Biological Analytical Quality Control Scheme**

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Component Manager: **Claire Mason (Cefas)**

Project Manager: **David Hall (Apem Ltd)**

Component Administrator: **Lydia McIntyre-Brown (Apem Ltd)**

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Revision and Amendment Register

Version Number	Version Type	Date	Section(s)	Page(s)	Summary of Changes	Approved by
1.0	Interim	07/03/2025	All	All		LMB
2.0	Final	19/05/2025	All	All		LMB

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Abbreviations

a/d – awaiting data – Deadline Extension Agreed

n/p – not participating at the current time.

n/r – no response from participant/ no data submitted.

"-" – no data submitted.

1. BENCHMARK DATA

Table 1 Summary data for the Benchmark replicates distributed as PS92.

Sample	Method	% Gravel	% Sand	% Mud	Sediment Description
PSA_3136 BM REP 1	NMBAQC	0.00	98.06	1.94	Sand
PSA_3137 BM REP2	NMBAQC	0.00	98.07	1.93	Sand
PSA_3138 BM REP 3	NMBAQC	0.00	98.05	1.95	Sand
PSA_3139 BM REP 4	NMBAQC	0.00	98.10	1.90	Sand
PSA_3140 BM REP 5	NMBAQC	0.00	98.14	1.86	Sand
BM Rep Average	NMBAQC	0.00	98.09	1.91	Sand

Table 2 Summary of the sieve data the Benchmark replicates distributed as PS92.

Phi Interval; microns	PSA_3036 BM REP 1	PSA_3037 BM REP2	PSA_3038 BM REP 3	PSA_3039 BM REP 4	PSA_3040 BM REP 5	BM Rep Average
Starting Weight	No material greater than 1mm recorded					
-6.50 to -6.00; 63 mm -6.00 to -5.50; 45 mm -5.50 to -5.00; 31.5 mm -5.00 to -4.50; 22.4 mm -4.50 to -4.00; 16 mm -4.00 to -3.50; 11.2 mm -3.50 to -3.00; 8 mm -3.00 to -2.50; 5.6 mm -2.50 to -2.00; 4 mm -2.00 to -1.50; 2.8 mm -1.50 to -1.00; 2 mm -1.00 to -0.50; 1.4 mm -0.50 to 0.00; 1.0 mm						

Summary Data

>1.0mm							
<1.0mm	Base Pan						
	Oven dried						
	Total						
Total Weight							
% increase/ decrease							

Table 3 Summary of the final laser data for the Benchmark replicates distributed as PS92.

Phi Interval; microns	PSA_3136 BM REP 1	PSA_3137 BM REP2	PSA_3138 BM REP 3	PSA_3139 BM REP 4	PSA_3140 BM REP 5	BM Rep Average
0.00 to 0.50; (707 µm)	1.65	1.04	1.36	1.27	1.72	1.41
0.50 to 1.00; (500 µm)	3.77	3.10	3.38	3.39	3.84	3.49
1.00 to 1.50; (353.6 µm)	6.56	6.35	6.62	6.05	6.47	6.41
1.50 to 2.00; (250 µm)	21.06	20.95	20.92	20.34	20.60	20.78
2.00 to 2.50; (176.8 µm)	38.70	39.43	38.88	38.92	38.69	38.92
2.50 to 3.00; (125 µm)	22.39	23.29	23.00	23.80	22.93	23.08
3.00 to 3.50; (88.39 µm)	3.47	3.47	3.44	3.78	3.40	3.51
3.50 to 4.00; (62.5 µm)	0.47	0.45	0.45	0.55	0.49	0.48
4.00 to 4.50; (44.19 µm)	0.18	0.16	0.19	0.17	0.13	0.17
4.50 to 5.00; (31.25 µm)	0.15	0.15	0.15	0.16	0.15	0.15
5.00 to 5.50; (22.097 µm)	0.16	0.17	0.16	0.14	0.15	0.15
5.50 to 6.00; (15.625 µm)	0.16	0.15	0.13	0.13	0.13	0.14
6.00 to 6.50; (11.049 µm)	0.13	0.13	0.13	0.13	0.13	0.13
6.50 to 7.00; (7.813 µm)	0.12	0.12	0.13	0.12	0.12	0.12
7.00 to 7.50; (5.524 µm)	0.10	0.10	0.11	0.10	0.10	0.10
7.50 to 8.00; (3.906 µm)	0.08	0.08	0.08	0.08	0.08	0.08
8.00 to 8.50; (2.762 µm)	0.06	0.06	0.06	0.06	0.06	0.06
8.50 to 9.00; (1.953 µm)	0.06	0.06	0.06	0.06	0.06	0.06
9.00 to 9.50; (1.381 µm)	0.08	0.08	0.08	0.08	0.08	0.08
9.50 to 10.00; (0.977 µm)	0.10	0.10	0.10	0.10	0.10	0.10
10.00 to 10.50; (0.691 µm)	0.11	0.11	0.11	0.11	0.11	0.11
10.50 to 11.00; (0.488 µm)	0.10	0.10	0.10	0.10	0.10	0.10
11.00 to 11.50; (0.345 µm)	0.09	0.09	0.09	0.09	0.09	0.09
11.50 to 12.00; (0.244 µm)	0.08	0.08	0.08	0.08	0.08	0.08
12.00 to 12.50; (0.173 µm)	0.07	0.07	0.07	0.07	0.07	0.07
12.50 to 13.00; (0.122 µm)	0.05	0.05	0.05	0.05	0.05	0.05
13.00 to 13.50; (0.086 µm)	0.04	0.04	0.04	0.04	0.04	0.04
13.50 to 14.00; (0.061 µm)	0.02	0.02	0.02	0.02	0.02	0.02
14.00 to 14.50; (0.043 µm)	0.00	0.00	0.00	0.00	0.00	0.00
>14.50; (0.01 µm)	0.00	0.00	0.00	0.00	0.00	0.00
Total	100.00	100.00	100.00	100.00	100.00	100.00
Summary Data						
Mean	218.20	215.21	216.75	214.25	217.79	216.43
Sorting	1.54	1.51	1.53	1.53	1.54	1.53
Skewness	0.11	0.09	0.10	0.10	0.13	0.10
Kurtosis	1.17	1.13	1.14	1.16	1.17	1.15
Mode	Unimodal	Unimodal	Unimodal	Unimodal	Unimodal	Unimodal
Primary Mode	213.4	213.4	213.4	213.4	213.4	213.4

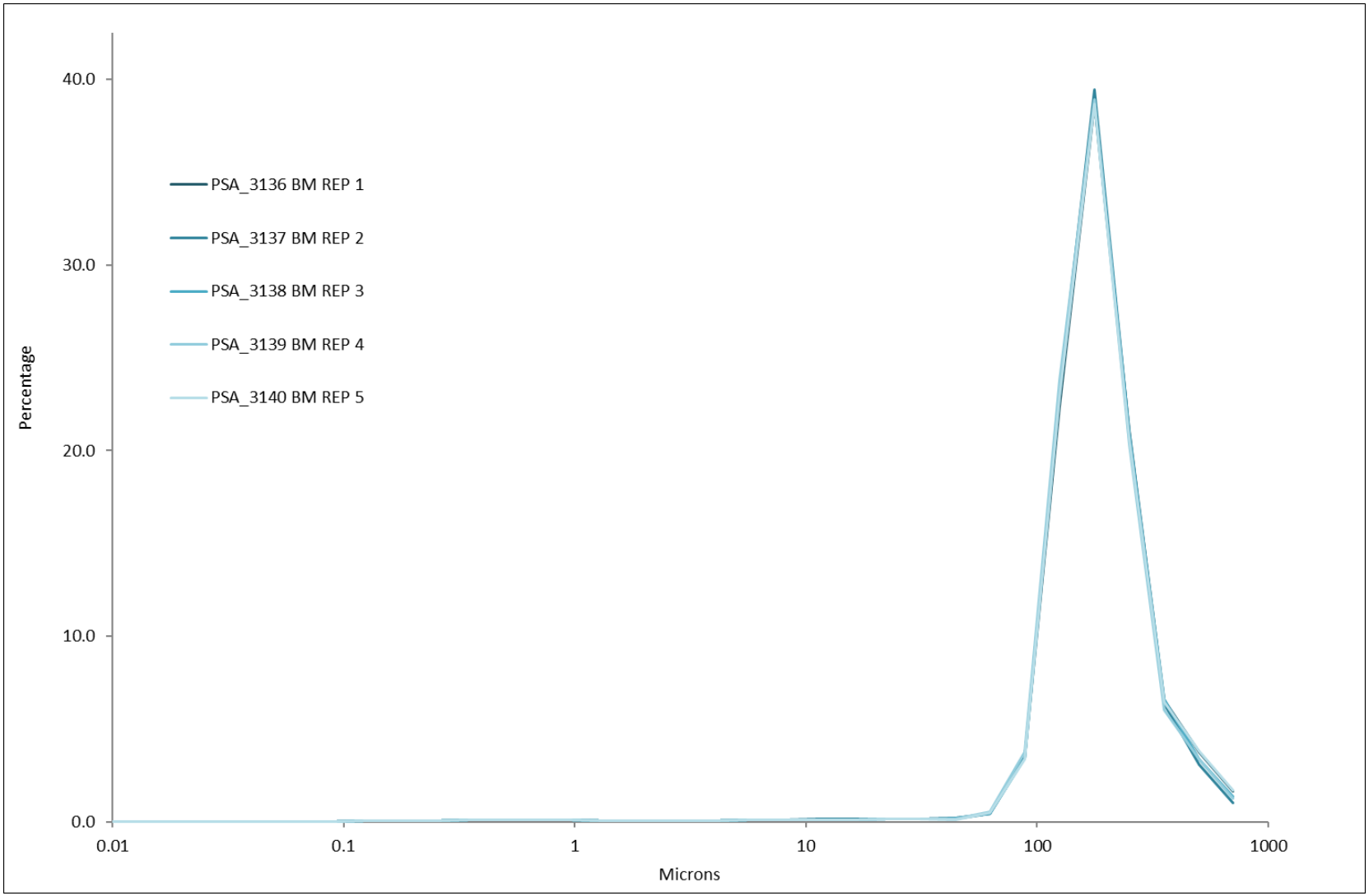


Figure 1 Particle size distribution curves resulting from final laser analysis of 5 replicate samples of sediment distributed as PS92 (Benchmark Data)

Table 4 Summary of Coefficient of Variation for Benchmark laser replicates for PS92.

		PSA_3136 BM REP 1	PSA_3137 BM REP2	PSA_3138 BM REP 3	PSA_3139 BM REP 4	PSA_3140 BM REP 5
D_{10}	Sub-sample 1	0.03	0.06	0.04	0.02	0.05
	Sub-sample 2	0.11	0.08	0.34	0.10	0.06
	Sub-sample 3	0.10	0.07	0.10	0.00	0.03
D_{50}	Sub-sample 1	0.15	0.06	0.06	0.11	0.02
	Sub-sample 2	0.03	0.13	0.04	0.09	0.07
	Sub-sample 3	0.10	0.03	0.07	0.04	0.11
D_{90}	Sub-sample 1	1.49	0.54	0.73	0.99	0.30
	Sub-sample 2	0.55	1.03	0.32	0.72	0.55
	Sub-sample 3	0.58	0.33	0.52	0.63	0.79

$$COV = \left(\frac{StDev}{Mean}\right) * 100$$

ISO 133020 defines good reproducibility when: COV is <3% for D50

COV is <5% for D10 and D90

All limits double when the D50 is <10microns.

In reality 3% and 5% are low and greater variability is expected for natural sediment samples therefore a maximum of 20% (based on three replicates being measured) will be used as a guide.

The Benchmark replicates show good reproducibility.

Table 5 Laser Metadata for the Benchmark replicates for PS92.

	Benchmark Lab
Laser used:	Beckman Coulter LS 13320
Dispersion Unit:	Universal Liquid Module
Analysis model:	Mie
Dispersion Used	Water (RI – 1.33)
Particle Refractive Index	1.55
Particle Absorption Index:	0.1
Fines extension	PIDS system
Obscuration	10%
Pump Speed (% or rpm)	80%
Stirrer speed (% or rpm)	n/a
Ultrasonic duration	20
Ultrasonic level	2

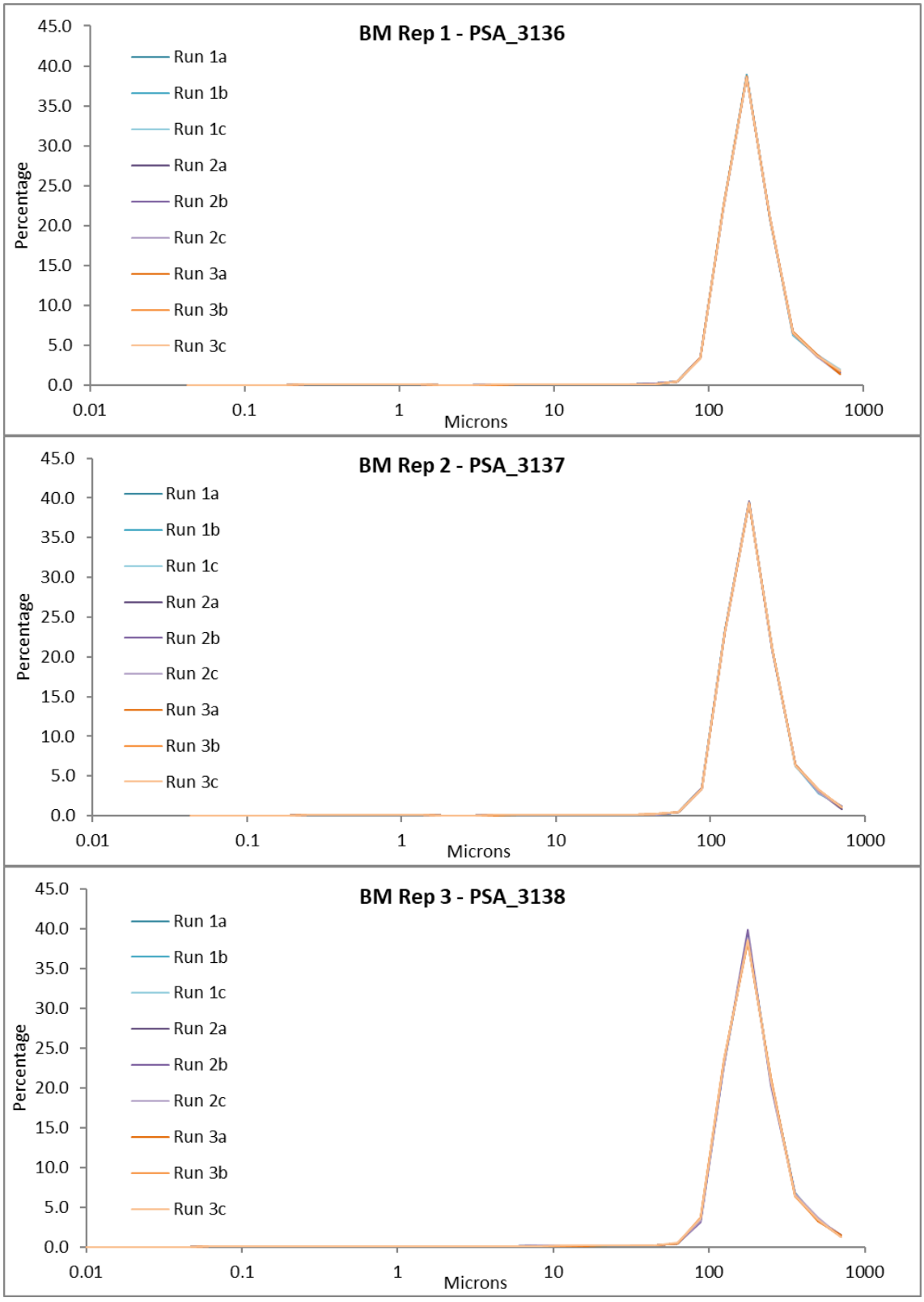


Figure 2 Particle size distribution curves resulting from laser analysis of five replicate samples of sediment distributed as PS92.

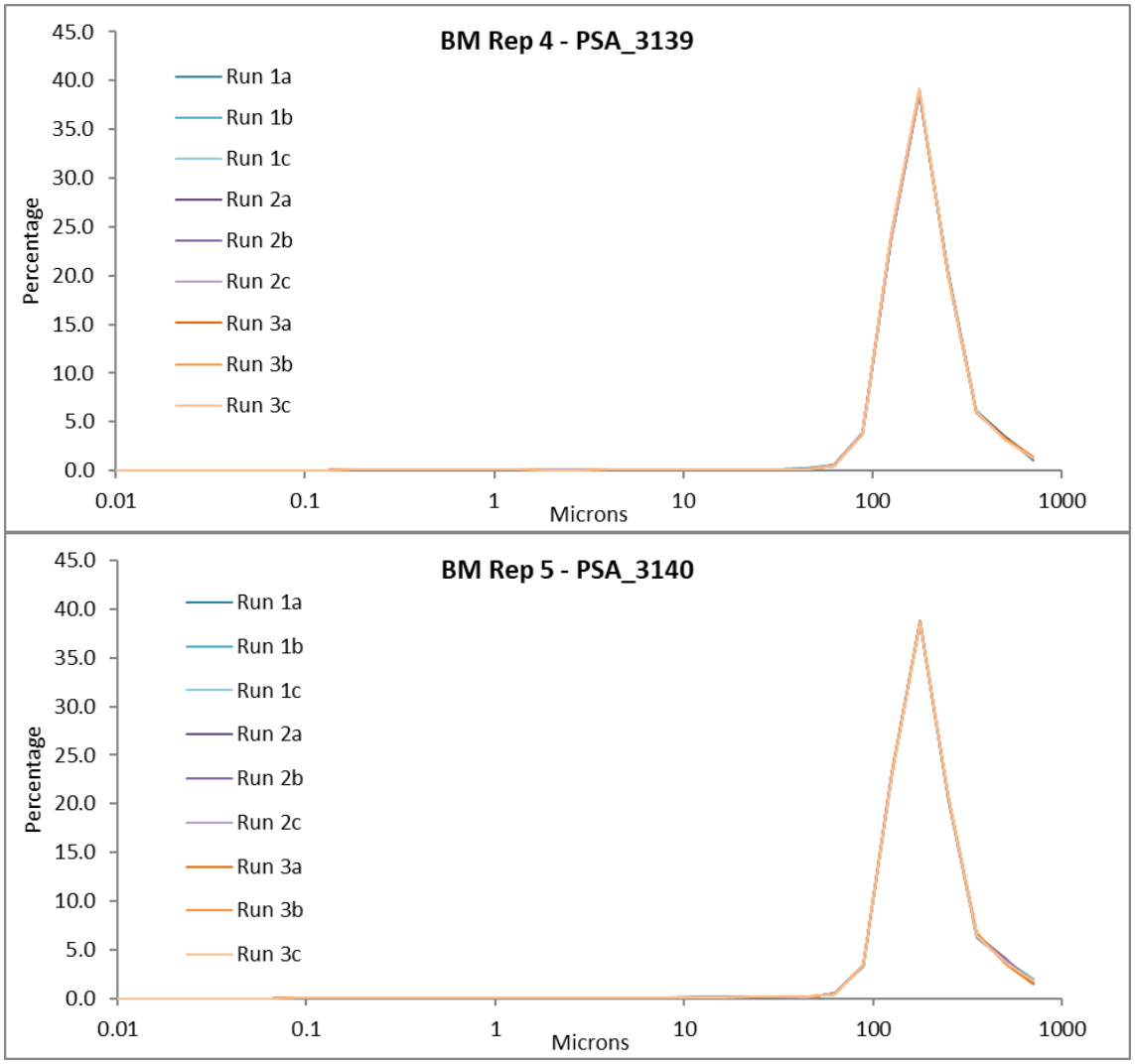


Figure 2 Particle size distribution curves resulting from laser analysis of five replicate samples of sediment distributed as PS92.

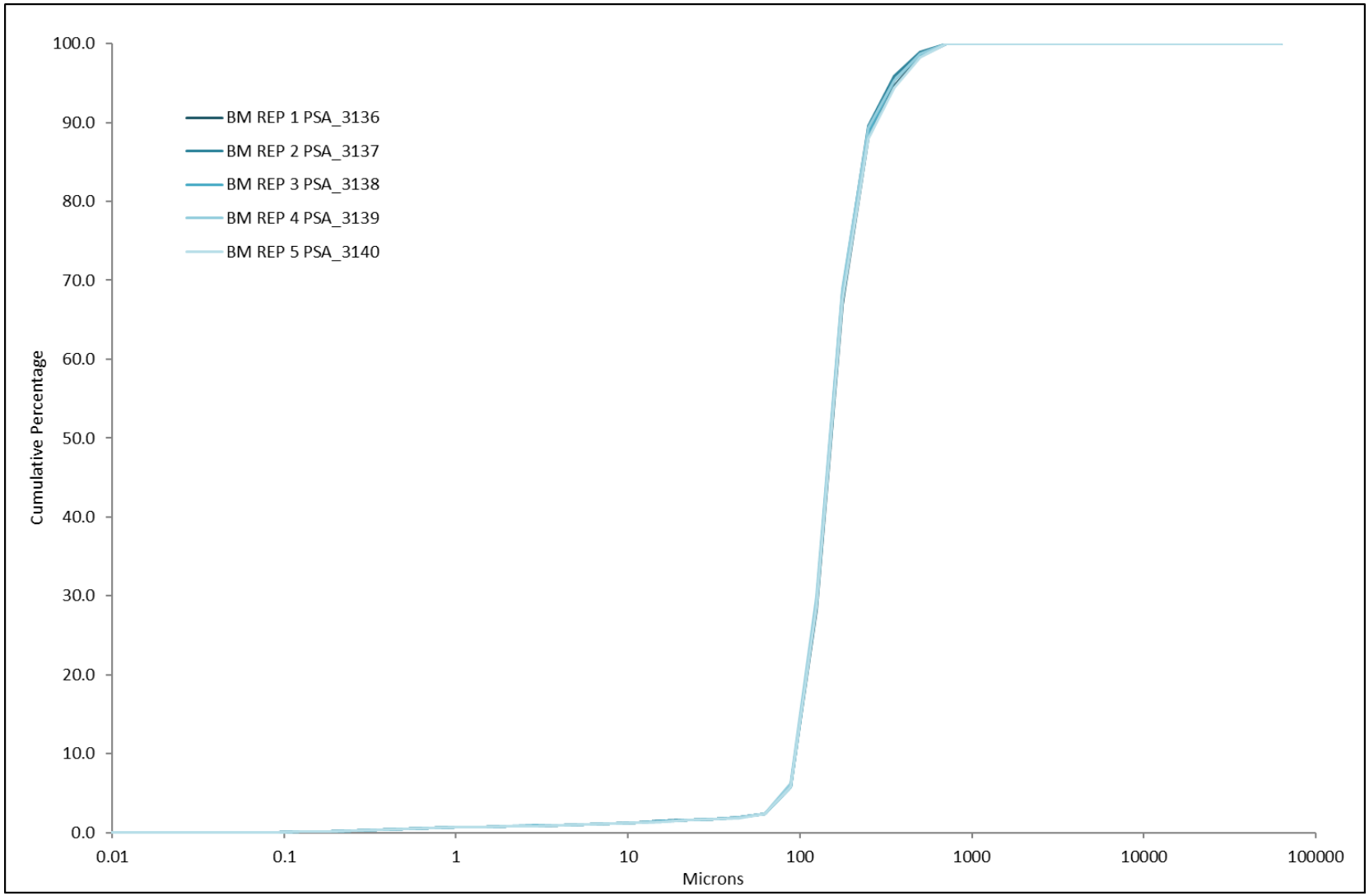


Figure 3 Particle size distribution curves resulting from analysis of 5 replicate samples of sediment distributed as PS92 (Benchmark Data).

2. PARTICIPANT DATA

Table 6 Summary of equipment and methods used by participants and sample summary data provided by participants for sediment distributed as PS92.

Lab	Equipment Used		Method Used	Chemical Dispersant	Peroxide pre-treatment	Summary Data			Sediment Description	
	Sieves	Laser				% Gravel	% Sand	% Mud	(post analysis)	Gradistat Textural Group
BM Average	No	Yes	NMBAQC	No	No	0.00	98.09	1.91	Sand	Sand
PSA_3101	Yes	Yes	NMBAQC	No	No	0.00	96.33	3.67	Sand	Sand
PSA_3102	No	Yes	NMBAQC	No	No	0.00	99.80	0.20	Sand	Sand
PSA_3103	No	Yes	NMBAQC	No	No	0.00	100.00	0.00	Sand	Sand
PSA_3104	Yes	Yes	NMBAQC	No	No	0.00	97.19	2.81	-	Sand
PSA_3105	No	Yes	NMBAQC	No	No	0.00	99.67	0.18	Sand	Sand
PSA_3106	No	Yes	NMBAQC	No	No	0.00	97.69	2.31	Sand	Sand
PSA_3107	No	Yes	NMBAQC	No	No	0.00	97.76	2.24	Sand	Sand
PSA_3108_a	Yes	Yes	NMBAQC	No	No	0.00	100.00	0.00	Sand	Sand
PSA_3108_b	Yes	Yes	NMBAQC	No	No	0.00	100.00	0.00	Sand	Sand
PSA_3109	No	Yes	Other	No	No	0.00	100.00	0.00	Sand	Sand
PSA_3110	Yes	Yes	NMBAQC	No	No	0.00	100.00	0.00	Sand	Sand
PSA_3111	No	Yes	Other	No	No	0.00	100.00	0.00	Sand	Sand
PSA_3112	No	Yes	Other	No	No	0.00	98.71	1.29	Sand	Sand
PSA_3113	No	Yes	NMBAQC	No	No	0.00	100.00	0.00	Sand	Sand
PSA_3114	No	Yes	NMBAQC	No	No	0.00	99.65	0.35	Sand	Sand
PSA_3115	No	Yes	NMBAQC	No	No	0.00	95.50	4.50	Sand	Sand
PSA_3116	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r
PSA_3117	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r	n/r

Table 7 Summary of the sieve data provided by participants for sediment distributed as PS92.

Phi interval (explicit); Sieve mesh (mm)		PSA_3101	PSA_3104	PSA_3108_a	PSA_3108_b	PSA_3110	PSA_3116	PSA_3117
Starting weight (>1.0mm)		0.06	0.07	0.09	0.10	0.02	n/r	n/r
-6.50 to -6.00; 63 mm		0.0000	0.00	0.000	0.000	0.00	n/r	n/r
-6.00 to -5.50; 45 mm		0.0000	0.00	0.000	0.000	0.00	n/r	n/r
-5.50 to -5.00; 31.5 mm		0.0000	0.00	0.000	0.000	0.00	n/r	n/r
-5.00 to -4.50; 22.4 mm		0.0000	0.00	0.000	0.000	0.00	n/r	n/r
-4.50 to -4.00; 16 mm		0.0000	0.00	0.000	0.000	0.00	n/r	n/r
-4.00 to -3.50; 11.2 mm		0.0000	0.00	0.000	0.000	0.00	n/r	n/r
-3.50 to -3.00; 8 mm		0.0000	0.00	0.000	0.000	0.00	n/r	n/r
-3.00 to -2.50; 5.6 mm		0.0000	0.00	0.000	0.000	0.00	n/r	n/r
-2.50 to -2.00; 4 mm		0.0000	0.00	0.000	0.000	0.00	n/r	n/r
-2.00 to -1.50; 2.8 mm		0.0000	0.00	0.000	0.000	0.00	n/r	n/r
-1.50 to -1.00; 2 mm		0.0000	0.00	0.000	0.000	0.00	n/r	n/r
-1.00 to -0.50; 1.4 mm		0.0000	0.00	0.000	0.001	0.01	n/r	n/r
-0.50 to 0.00; 1 mm		0.0084	0.01	0.002	0.003	0.00	n/r	n/r
Total		0.0084	0.01	0.002	0.004	0.01	n/r	n/r
Summary Data								
>1 mm		0.0084	0.01	0.002	0.004	0.01	n/r	n/r
<1 mm	Base pan	0.0591	0.05	0.095	0.097	0.11	n/r	n/r
	Oven dried	175.52	191.05	164.540	164.570	240.12	n/r	n/r
	Total	175.5791	191.10	164.635	164.667	240.23	n/r	n/r
Total Sample Weight		175.5875	191.11	164.637	164.671	240.24	n/r	n/r
% increase/ decrease		12.5	-14.29	7.78	1.00	50.00	n/r	n/r

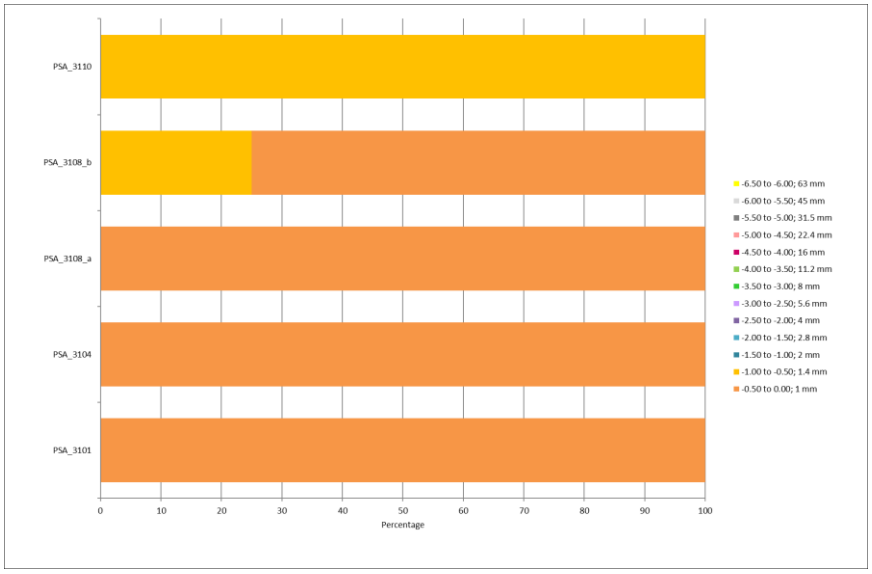


Figure 4 Final sieve data (in percentages) provided by each participant for sediment distributed as PS92.

Table 8 Summary of final laser data for the participants for sediment distributed as PS92 with Gradistat output.

Microns	Benchmark Average	PSA_3101	PSA_3102	PSA_3103	PSA_3104	PSA_3105	PSA_3106	PSA_3107	PSA_3108_a	PSA_3108_b
1400	-	-	-	-	-	-	1.22	-	-	-
1000	-	-	-	-	-	-	1.15	-	-	-
707	1.41	0.00	0.39	0.00	1.91	0.03	0.86	1.28	0.03	0.00
500	3.49	0.57	1.20	0.06	3.50	1.01	4.73	3.26	0.50	0.49
353.6	6.41	6.86	8.55	8.78	5.69	8.60	6.95	6.77	7.41	7.26
250	20.78	23.21	24.73	24.65	19.62	25.11	18.99	21.38	25.18	25.32
176.8	38.92	33.46	33.63	33.60	39.17	34.31	37.59	38.53	35.55	36.00
125	23.08	24.74	24.32	24.56	22.98	24.15	22.60	22.76	24.79	24.75
88.39	3.51	7.14	6.84	8.15	3.71	6.39	3.21	3.33	6.33	6.02
62.5	0.48	0.34	0.28	0.20	0.62	0.21	0.39	0.46	0.20	0.17
44.19	0.17	0.00	0.00	0.00	0.28	0.00	0.27	0.20	0.00	0.00
31.25	0.15	0.00	0.00	0.00	0.16	0.00	0.20	0.17	0.00	0.00
22.097	0.15	0.23	0.00	0.00	0.21	0.00	0.22	0.16	0.00	0.00
15.625	0.14	0.55	0.01	0.00	0.14	0.00	0.21	0.14	0.00	0.00
11.049	0.13	0.59	0.03	0.00	0.18	0.03	0.18	0.16	0.00	0.00
7.813	0.12	0.54	0.02	0.00	0.25	0.07	0.15	0.16	0.00	0.00
5.524	0.10	0.54	0.00	0.00	0.24	0.07	0.12	0.14	0.00	0.00
3.906	0.08	0.51	0.00	0.00	0.19	0.02	0.09	0.11	0.00	0.00
2.762	0.06	0.41	0.00	0.00	0.14	0.00	0.07	0.08	0.00	0.00
1.953	0.06	0.25	0.00	0.00	0.13	0.00	0.07	0.08	0.00	0.00
1.381	0.08	0.04	0.00	0.00	0.14	0.00	0.08	0.09	0.00	0.00
0.977	0.10	0.00	0.00	0.00	0.15	0.00	0.10	0.11	0.00	0.00
0.691	0.11	0.00	0.00	0.00	0.14	0.00	0.10	0.12	0.00	0.00
0.488	0.10	0.00	0.00	0.00	0.12	0.00	0.10	0.12	0.00	0.00
0.345	0.09	0.00	0.00	0.00	0.10	0.00	0.09	0.11	0.00	0.00
0.244	0.08	0.00	0.00	0.00	0.08	0.00	0.08	0.09	0.00	0.00
0.173	0.07	0.00	0.00	0.00	0.06	0.00	0.06	0.08	0.00	0.00
0.122	0.05	0.00	0.00	0.00	0.05	0.00	0.05	0.06	0.00	0.00
0.086	0.04	0.00	0.00	0.00	0.03	0.00	0.03	0.04	0.00	0.00
0.061	0.02	0.00	0.00	0.00	0.02	0.00	0.02	0.02	0.00	0.00
0.043	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.01	0.00	-	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
MEAN:	216.43	204.20	214.55	210.96	213.76	214.74	221.75	216.88	212.37	212.68
SORTING:	1.53	1.54	1.51	1.51	1.57	1.50	1.61	1.53	1.48	1.47
SKEWNESS:	0.10	-0.04	0.03	0.00	0.08	0.02	0.17	0.09	0.02	0.02
KURTOSIS:	1.15	1.03	0.96	0.95	1.27	0.96	1.24	1.14	0.95	0.94
MODE:	Uni	Uni	Uni	Uni	Uni	Uni	Uni	Uni	Uni	Uni
Primary Mode	213.40	213.40	213.40	213.40	213.40	213.40	213.4	213.4	213.4	213.4

Table 8 Summary of final laser data for the participants for sediment distributed as PS92 with Gradistat output.

Microns	Benchmark Average	PSA_3109	PSA_3110	PSA_3111	PSA_3112	PSA_3113	PSA_3114	PSA_3115	PSA_3116	PSA_3117
1400	-	-	-	-	-	-	-	0.10	n/r	n/r
1000	-	-	-	-	-	-	-	1.84	n/r	n/r
707	1.41	0.00	0.65	0.00	0.44	0.00	0.67	7.31	n/r	n/r
500	3.49	0.73	8.79	0.65	6.94	0.50	4.75	10.39	n/r	n/r
353.6	6.41	8.11	26.13	7.91	24.37	6.92	5.88	12.60	n/r	n/r
250	20.78	25.19	35.67	25.56	35.09	24.32	23.82	23.55	n/r	n/r
176.8	38.92	35.63	23.11	35.35	24.99	35.35	39.70	22.28	n/r	n/r
125	23.08	24.05	5.58	24.30	6.64	25.75	21.34	10.43	n/r	n/r
88.39	3.51	6.20	0.06	6.06	0.25	6.90	2.96	5.90	n/r	n/r
62.5	0.48	0.09	0.00	0.19	0.00	0.26	0.52	1.10	n/r	n/r
44.19	0.17	0.00	0.00	0.00	0.00	0.00	0.35	0.05	n/r	n/r
31.25	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.29	n/r	n/r
22.097	0.15	0.00	0.00	0.00	0.12	0.00	0.00	0.66	n/r	n/r
15.625	0.14	0.00	0.00	0.00	0.32	0.00	0.00	0.74	n/r	n/r
11.049	0.13	0.00	0.00	0.00	0.31	0.00	0.00	0.50	n/r	n/r
7.813	0.12	0.00	0.00	0.00	0.25	0.00	0.00	0.53	n/r	n/r
5.524	0.10	0.00	0.00	0.00	0.21	0.00	0.00	0.40	n/r	n/r
3.906	0.08	0.00	0.00	0.00	0.09	0.00	0.00	0.23	n/r	n/r
2.762	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.25	n/r	n/r
1.953	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.19	n/r	n/r
1.381	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.11	n/r	n/r
0.977	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.11	n/r	n/r
0.691	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.09	n/r	n/r
0.488	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.06	n/r	n/r
0.345	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.08	n/r	n/r
0.244	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.08	n/r	n/r
0.173	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.05	n/r	n/r
0.122	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.04	n/r	n/r
0.086	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.01	n/r	n/r
0.061	0.02	0.00	0.00	0.00	0.00	0.00	0.00	-	n/r	n/r
0.043	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	n/r	n/r
0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	n/r	n/r
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	n/r	n/r
MEAN:	216.43	214.44	307.55	214.17	295.23	209.62	222.69	281.52	n/r	n/r
SORTING:	1.53	1.48	1.48	1.48	1.50	1.48	1.50	2.04	n/r	n/r
SKEWNESS:	0.10	0.03	0.03	0.02	-0.01	0.01	0.14	0.00	n/r	n/r
KURTOSIS:	1.15	0.95	0.95	0.95	0.98	0.95	1.15	1.20	n/r	n/r
MODE:	Uni	Uni	Uni	Uni	Uni	Uni	Uni	Uni	n/r	n/r
Primary Mode	213.40	213.4	301.8	213.4	301.8	213.4	213.4	301.8	n/r	n/r

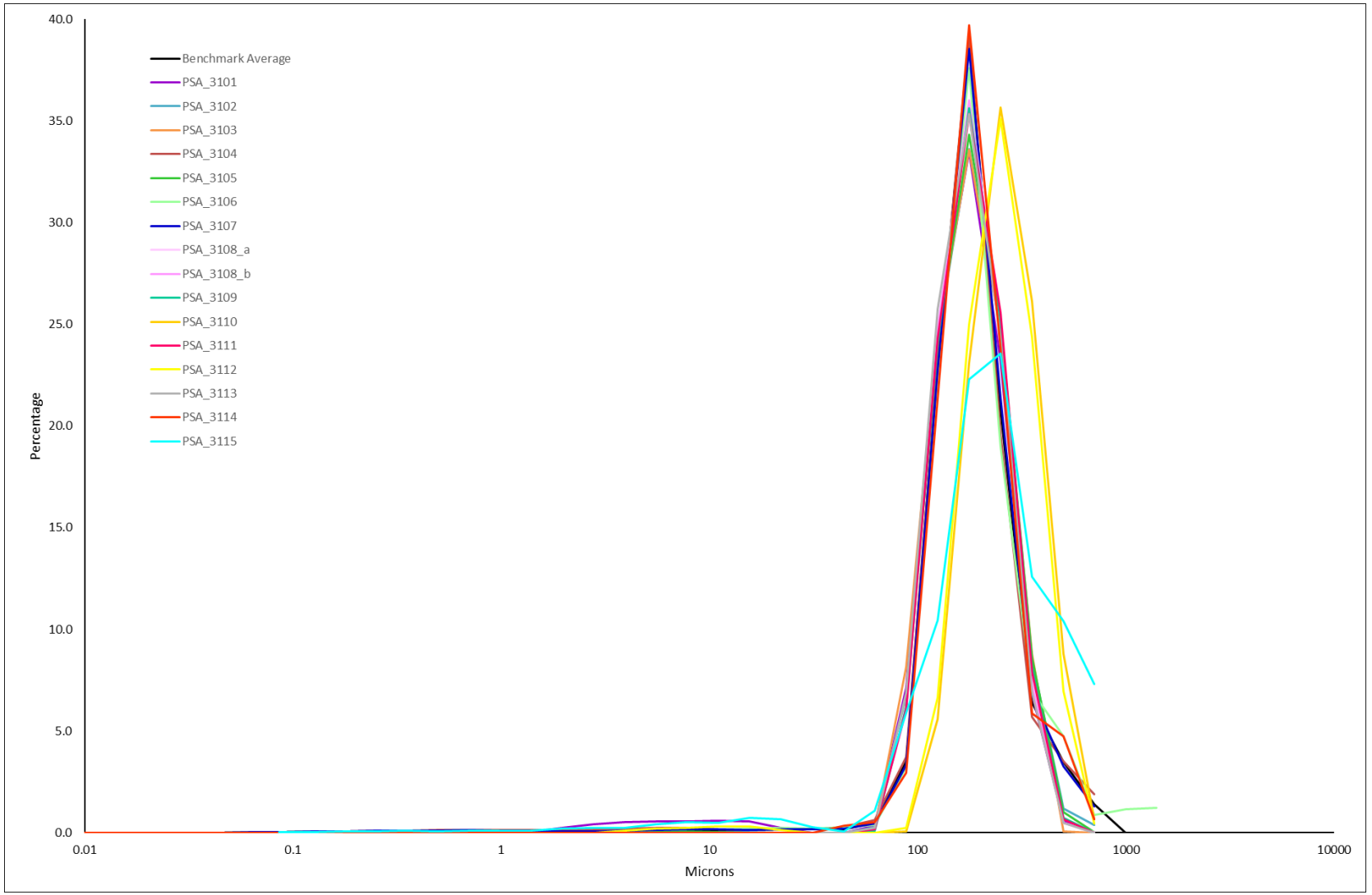


Figure 5 Final laser data (in percentages) provided by each participant and the Benchmark average for sediment distributed as PS92.

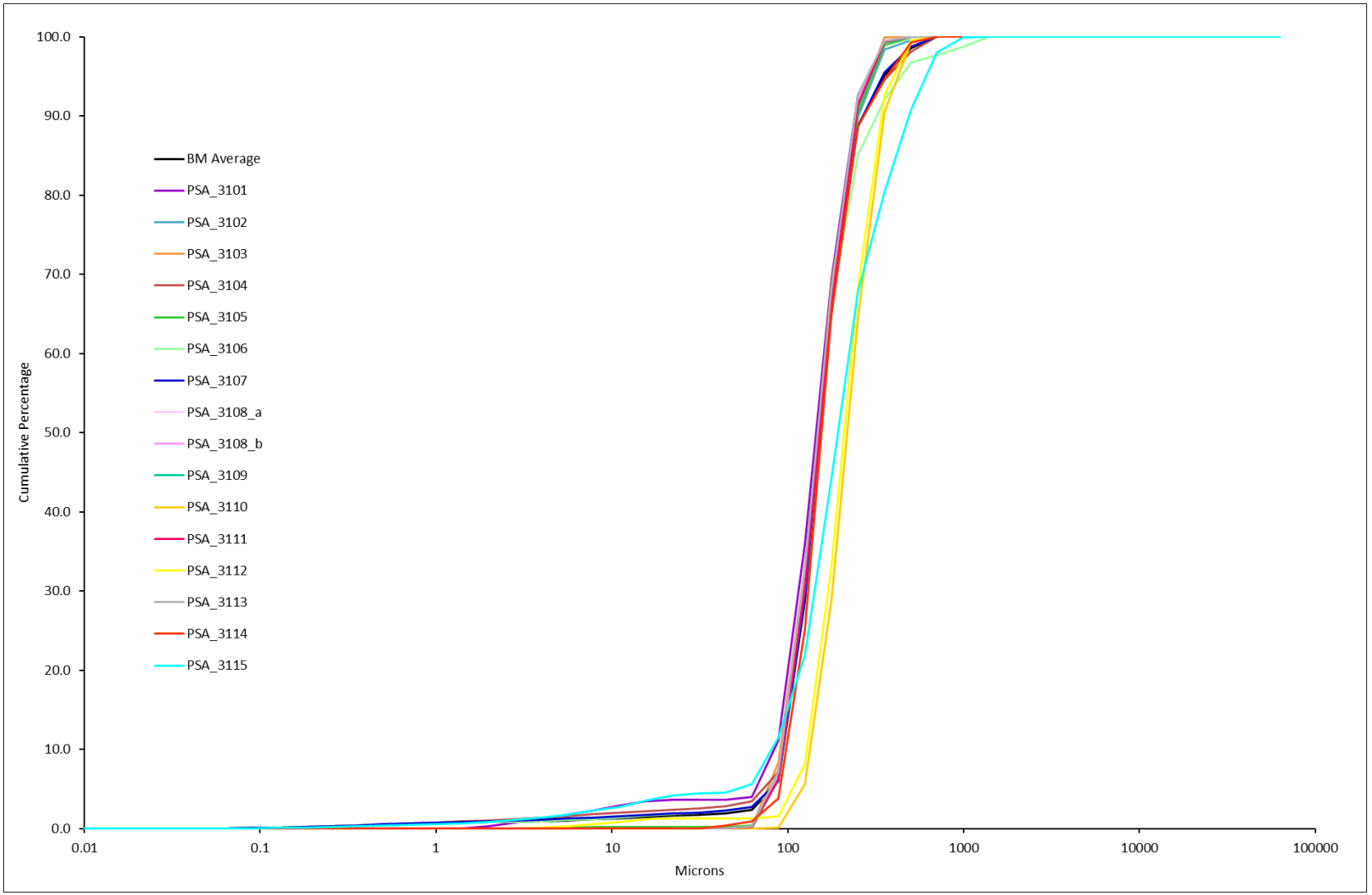


Figure 6 Particle size distribution curves from all participating laboratories and the Benchmark average for sediment distributed as PS92.

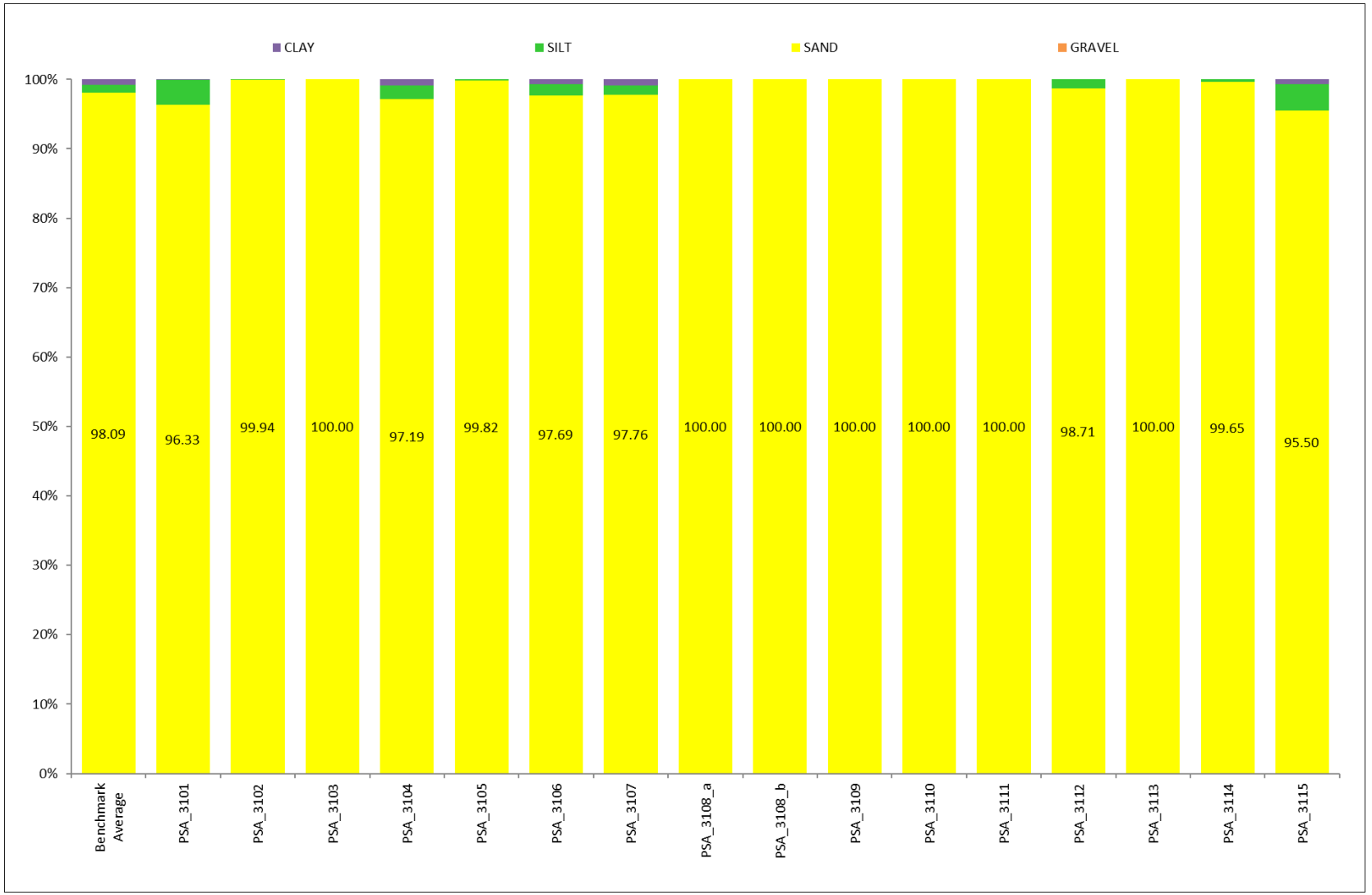
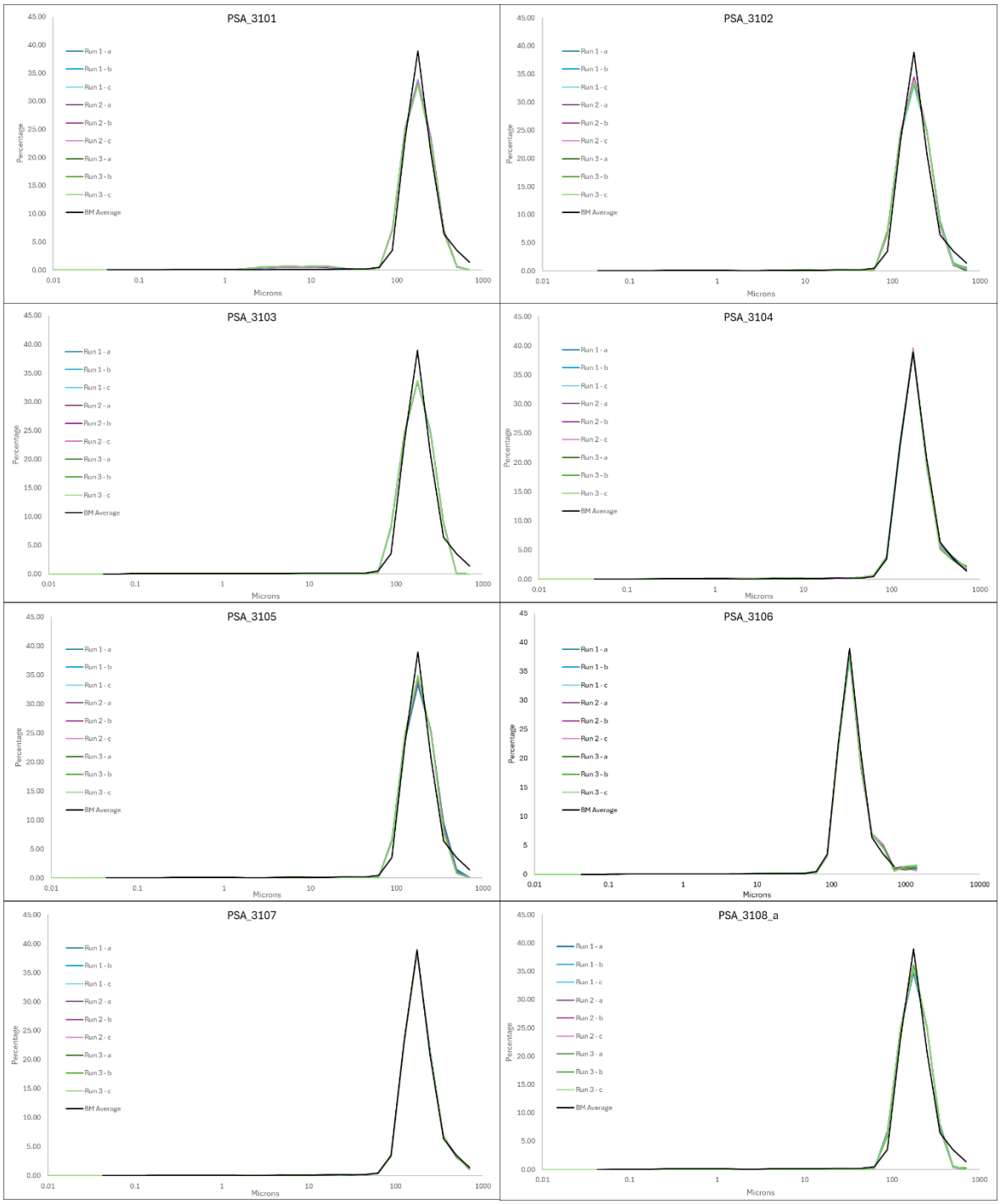


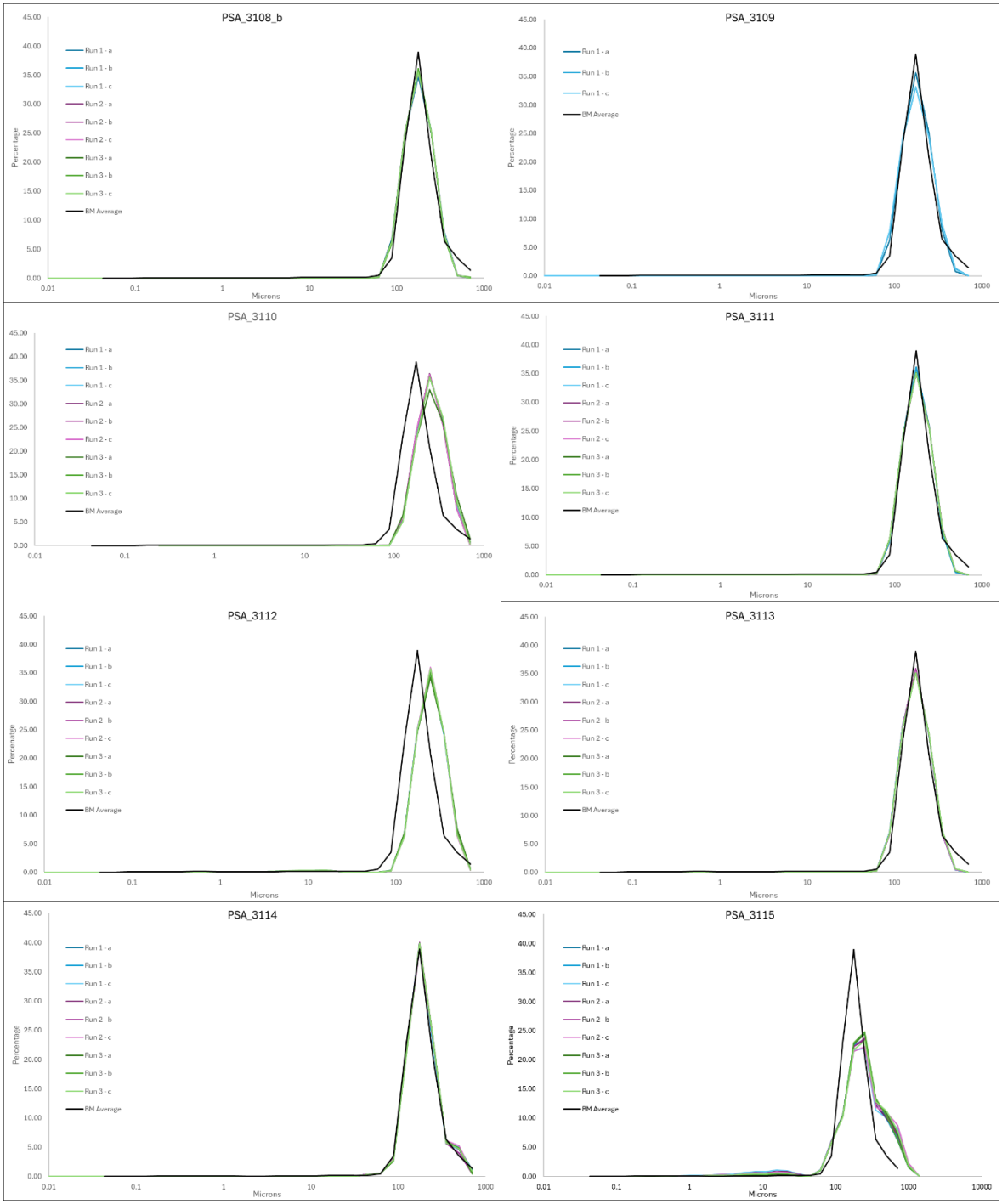
Figure 7 Bar charts showing the percentage gravel, sand, silt and clay recorded by each participating laboratory and the Benchmark average for PS92.

3. APPENDICES

Appendix 1 – Participant Laser Replicate Graphs

Benchmark and Participant laser replicate data can be found in the associated embedded Excel file – PS92 Appendix 1.




PSA_3108_b
PSA_3109
PSA_3110
PSA_3111
PSA_3112
PSA_3113
PSA_3114
PSA_3115
Percentage
Microns
Run 1 - a
Run 1 - b
Run 1 - c
Run 2 - a
Run 2 - b
Run 2 - c
Run 3 - a
Run 3 - b
Run 3 - c
BM Average

Appendix 2 – Gradistat output of size categories based on final merged data provided by each participant and the Benchmark Average for sediment distributed as PS92.

Benchmark and Participant data can be found in the associated embedded Excel file – PS92 Appendix 2.

Appendix 3 – Benchmark Lab and Participant Final Merged Data for sediment distributed as PS92.

Data can be found in the associated embedded Excel file – PS92 Appendix 3.