



NMBAQC

NE Atlantic Marine Biological Analytical Quality Control Scheme

NMBAQC Scheme 2024/25

PS94 Report

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Revision and Amendment Register

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1.0	Interim	03/05/2025	All	All	-	LMB
1.1	Interim	12/05/2025	All	All	PSA_3115 results added	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 PS94.

Sample	Method	% Gravel	% Sand	% Mud	Sediment Description
PSA_3136 BM REP 1	NMBAQC	0.00	45.01	54.99	Sandy Mud
PSA_3137 BM REP2	NMBAQC	0.00	44.47	55.53	Sandy Mud
PSA_3138 BM REP 3	NMBAQC	0.00	43.71	56.29	Sandy Mud
PSA_3139 BM REP 4	NMBAQC	0.00	44.62	55.38	Sandy Mud
PSA_3140 BM REP 5	NMBAQC	0.00	43.90	56.10	Sandy Mud
BM Rep Average	NMBAQC	0.00	44.34	55.66	Sandy Mud

Table 2 Summary of the sieve data the Benchmark replicates distributed as PS94.

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 PS94.

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)	0.47	0.48	0.56	0.59	0.63	0.55
0.50 to 1.00; (500 μm)	1.81	2.01	1.64	1.87	1.71	1.81
1.00 to 1.50; (353.6 μm)	2.36	2.50	2.43	2.55	2.61	2.49
1.50 to 2.00; (250 μm)	2.79	2.69	2.59	2.68	2.66	2.68
2.00 to 2.50; (176.8 μm)	3.85	4.08	3.80	3.93	3.89	3.91
2.50 to 3.00; (125 μm)	9.35	8.89	9.36	9.18	9.02	9.16
3.00 to 3.50; (88.39 μm)	13.77	13.53	13.42	13.67	13.29	13.53
3.50 to 4.00; (62.5 μm)	10.62	10.29	9.93	10.16	10.08	10.22
4.00 to 4.50; (44.19 μm)	7.43	7.15	7.27	7.24	7.35	7.29
4.50 to 5.00; (31.25 μm)	6.82	7.04	7.10	6.95	7.07	7.00
5.00 to 5.50; (22.097 μm)	5.48	5.74	5.78	5.62	5.74	5.67
5.50 to 6.00; (15.625 μm)	4.76	4.64	4.69	4.55	4.68	4.67
6.00 to 6.50; (11.049 μm)	4.42	4.39	4.47	4.37	4.53	4.43
6.50 to 7.00; (7.813 μm)	3.88	4.04	3.97	3.89	4.14	3.98
7.00 to 7.50; (5.524 μm)	3.82	4.06	3.98	3.93	4.12	3.98
7.50 to 8.00; (3.906 μm)	3.70	3.94	3.97	3.92	3.99	3.90
8.00 to 8.50; (2.762 μm)	3.17	3.33	3.44	3.39	3.36	3.34
8.50 to 9.00; (1.953 μm)	2.52	2.57	2.68	2.65	2.57	2.60
9.00 to 9.50; (1.381 μm)	1.97	1.92	2.01	1.99	1.91	1.96
9.50 to 10.00; (0.977 μm)	1.50	1.41	1.45	1.43	1.39	1.44
10.00 to 10.50; (0.691 μm)	1.17	1.08	1.10	1.08	1.06	1.10
10.50 to 11.00; (0.488 μm)	1.01	0.94	0.96	0.95	0.93	0.96
11.00 to 11.50; (0.345 μm)	0.93	0.88	0.91	0.91	0.87	0.90
11.50 to 12.00; (0.244 μm)	0.83	0.80	0.84	0.84	0.80	0.82
12.00 to 12.50; (0.173 μm)	0.66	0.65	0.69	0.68	0.64	0.66
12.50 to 13.00; (0.122 μm)	0.49	0.49	0.52	0.52	0.49	0.50
13.00 to 13.50; (0.086 μm)	0.31	0.31	0.33	0.32	0.31	0.31
13.50 to 14.00; (0.061 μm)	0.12	0.12	0.13	0.13	0.12	0.13
14.00 to 14.50; (0.043 μm)	0.02	0.02	0.02	0.02	0.02	0.02
>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	31.89	31.70	30.67	31.47	31.45	31.43
Sorting	5.98	5.97	6.02	6.06	5.93	5.99
Skewness	-0.37	-0.34	-0.34	-0.35	-0.33	-0.35
Kurtosis	1.02	1.00	0.99	1.00	1.00	1.00
Mode	Unimodal	Bimodal	Bimodal	Bimodal	Unimodal	Unimodal
Primary Mode	106.70	106.70	106.70	106.70	106.70	106.70
Secondary Mode	-	6.7	6.7	6.7	-	-

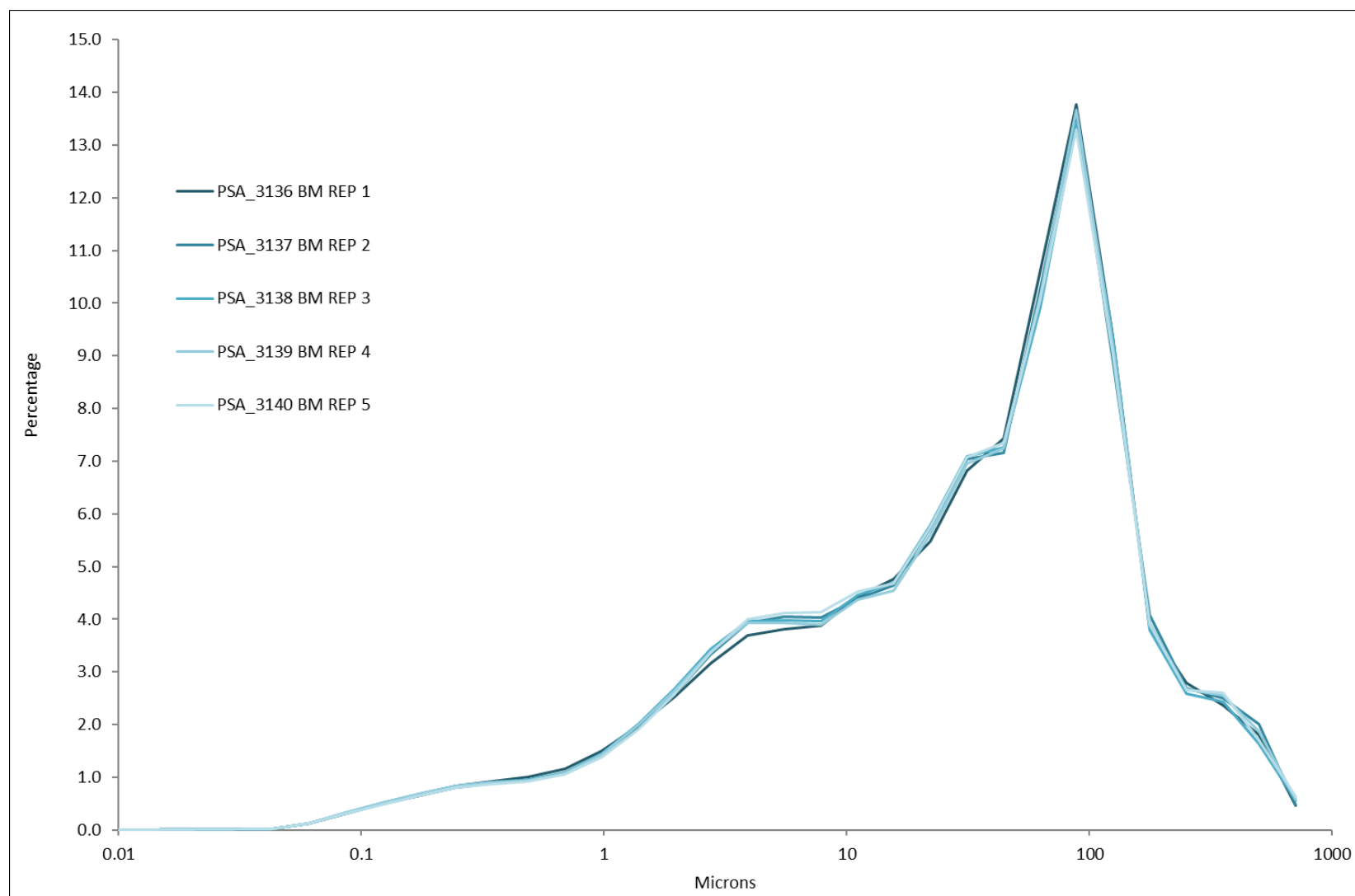


Figure 1 Particle size distribution curves resulting from final laser analysis of 5 replicate samples of sediment distributed as PS94 (Benchmark Data)

Table 4 Summary of Coefficient of Variation for Benchmark laser replicates for PS94.

		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	0.47	2.27	0.72	0.73	1.42
	Sub-sample 2	2.27	1.01	3.30	0.99	1.29
	Sub-sample 3	2.75	0.48	1.10	2.03	1.81
D ₅₀	Sub-sample 1	0.51	2.06	1.23	0.52	1.93
	Sub-sample 2	0.87	1.93	1.23	0.44	1.53
	Sub-sample 3	0.97	1.16	2.04	1.02	1.78
D ₉₀	Sub-sample 1	1.67	3.36	2.84	2.12	4.40
	Sub-sample 2	1.53	4.75	3.12	2.58	2.83
	Sub-sample 3	4.00	3.14	7.13	3.60	5.03

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

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 PS94.

	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

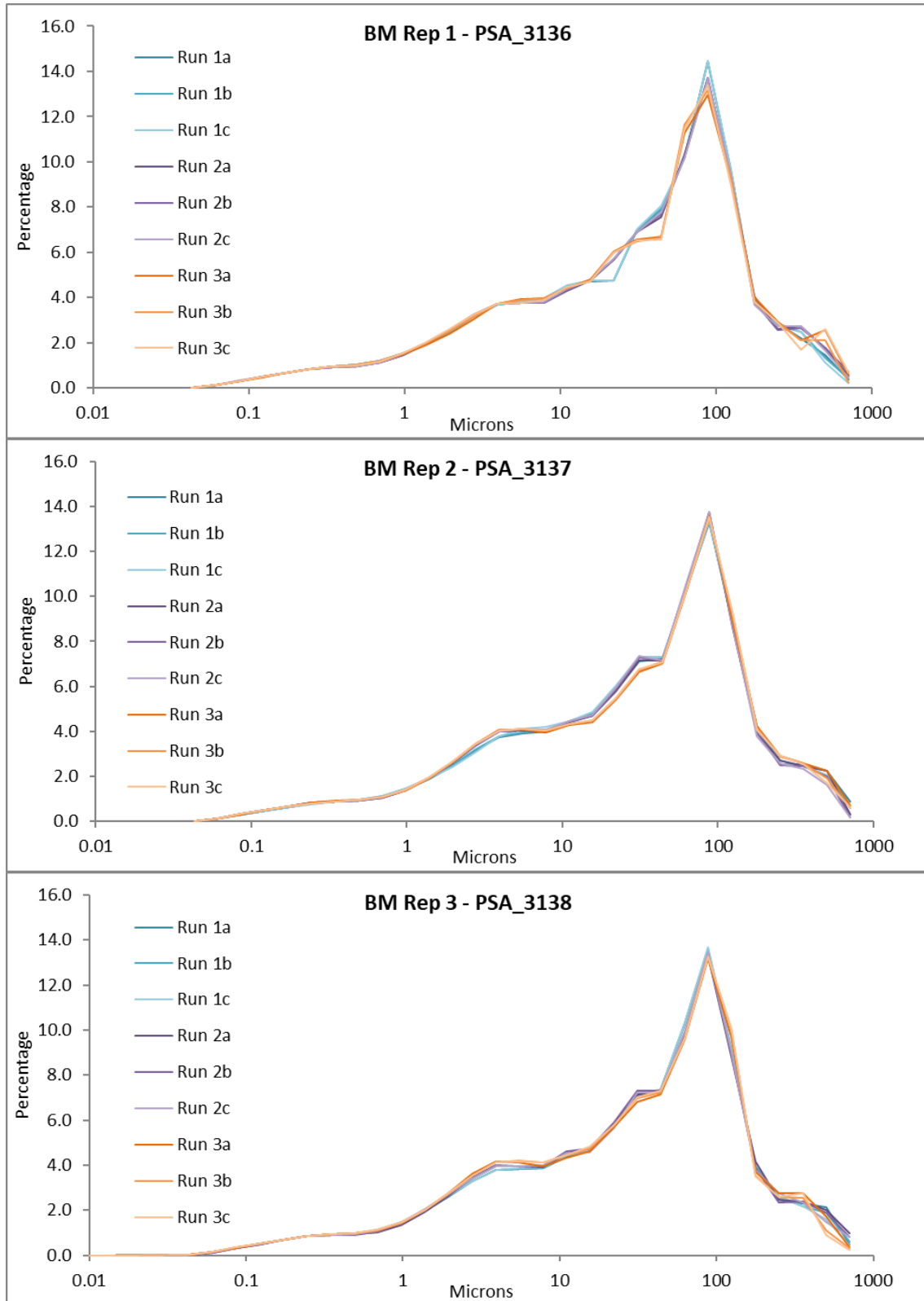


Figure 2 Particle size distribution curves resulting from laser analysis of five replicate samples of sediment distributed as PS94.

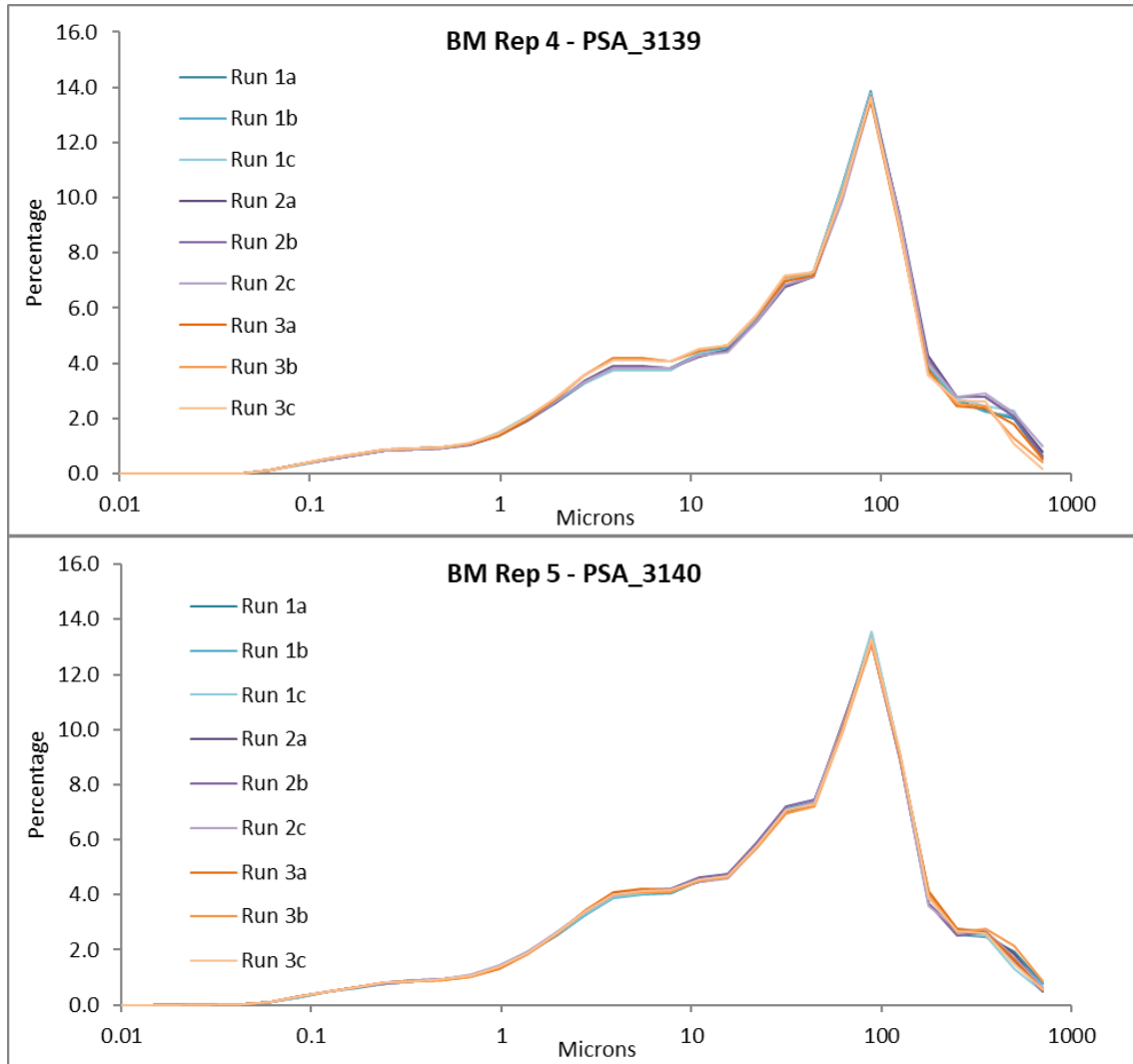


Figure 2 Particle size distribution curves resulting from laser analysis of five replicate samples of sediment distributed as PS94.

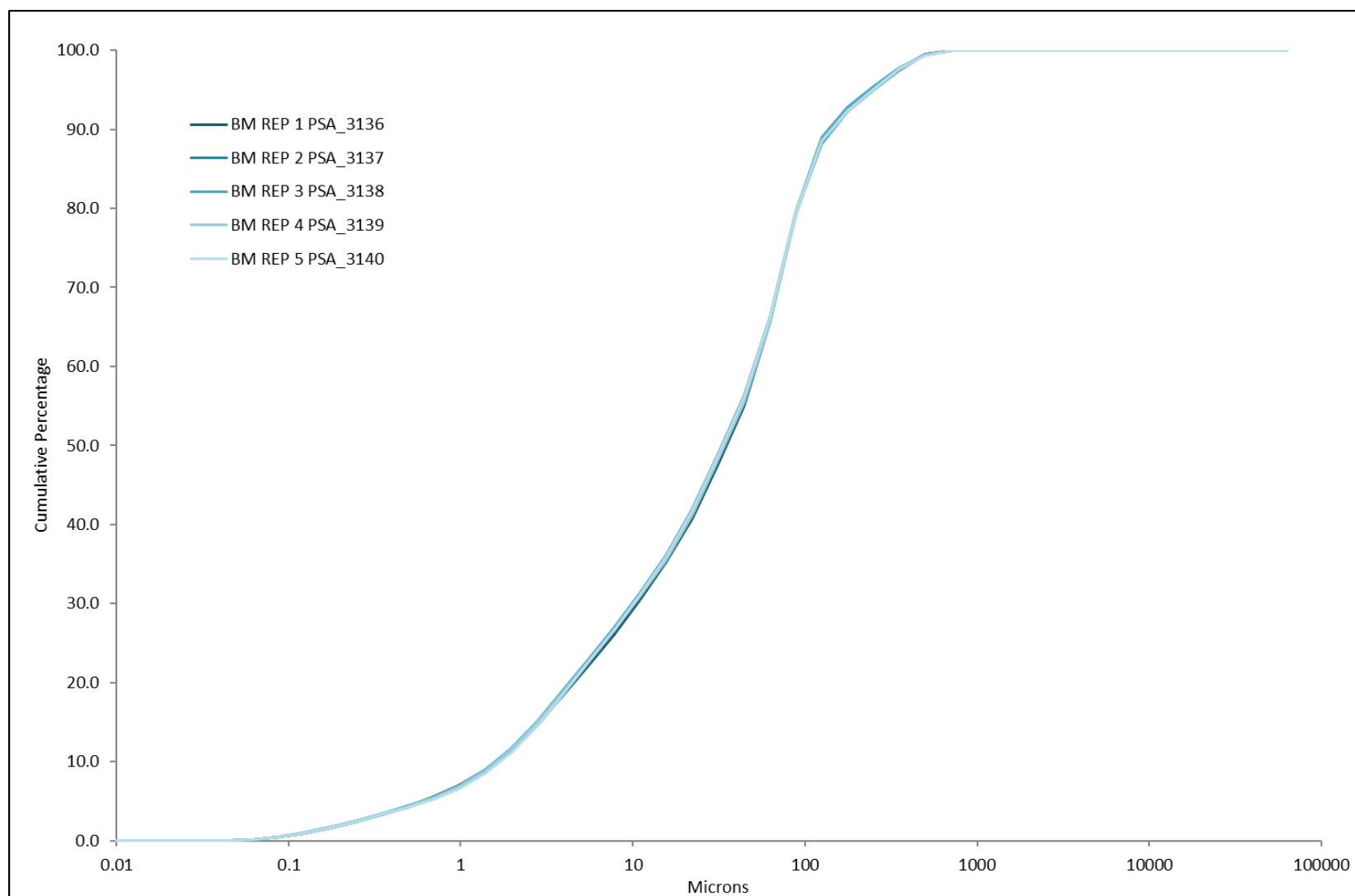


Figure 3 Particle size distribution curves resulting from analysis of 5 replicate samples of sediment distributed as PS94 (Benchmark Data).

2. PARTICIPANT DATA

Table 6 Summary of equipment and methods used by participants and sample summary data provided by participants for sediment distributed as PS94.

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	44.34	55.66	Sandy Mud	Sandy Mud
PSA_3101	Yes	Yes	NMBAQC	No	No	0.00	49.96	50.04	Sandy Mud	Sandy Mud
PSA_3102	No	Yes	NMBAQC	No	No	0.00	44.90	55.20	Sandy Mud	Sandy Mud
PSA_3103	No	Yes	NMBAQC	No	No	0.00	37.78	62.22	Sandy Mud	Sandy Mud
PSA_3104	No	Yes	NMBAQC	No	No	0.00	42.04	57.96	Mud and sandy mud	Sandy Mud
PSA_3105	No	Yes	NMBAQC	No	No	0.00	44.08	55.92	Sandy Mud	Sandy Mud
PSA_3106	No	Yes	NMBAQC	No	No	0.00	43.03	56.97	Sandy Mud	Sandy Mud
PSA_3107	No	Yes	NMBAQC	No	No	0.00	44.72	55.28	Sandy Mud	Sandy Mud
PSA_3108_a	No	Yes	NMBAQC	No	No	0.00	49.04	50.96	Sandy Mud	Sandy Mud
PSA_3108_b	No	Yes	NMBAQC	No	No	0.00	48.03	51.97	Sandy Mud	Sandy Mud
PSA_3109	No	Yes	OTHER	No	No	0.00	27.99	72.01	Sandy Mud	Sandy Mud
PSA_3110	a/d	a/d	a/d	a/d	a/d	a/d	a/d	a/d	a/d	a/d
PSA_3111	No	Yes	OTHER	No	No	0.00	39.93	60.07	Sandy Mud	Sandy Mud
PSA_3112	No	Yes	OTHER	No	No	0.00	45.65	54.35	Sandy Mud	Sandy Mud
PSA_3113	No	Yes	NMBAQC	No	No	0.00	44.27	55.73	Sandy Mud	Sandy Mud
PSA_3114	No	Yes	NMBAQC	No	No	0.00	47.28	52.72	Sandy Mud	Sandy Mud
PSA_3115	No	Yes	NMBAQC	No	No	0.00	42.62	57.38	Sandy Mud	Sandy Mud
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 PS94.

Phi interval (explicit); Sieve mesh (mm)	PSA_3101	PSA_3110
Starting weight (>1.0mm)	0.22	a/d
-6.50 to -6.00; 63 mm	0.0000	a/d
-6.00 to -5.50; 45 mm	0.0000	a/d
-5.50 to -5.00; 31.5 mm	0.0000	a/d
-5.00 to -4.50; 22.4 mm	0.0000	a/d
-4.50 to -4.00; 16 mm	0.0000	a/d
-4.00 to -3.50; 11.2 mm	0.0000	a/d
-3.50 to -3.00; 8 mm	0.0000	a/d
-3.00 to -2.50; 5.6 mm	0.0000	a/d
-2.50 to -2.00; 4 mm	0.0000	a/d
-2.00 to -1.50; 2.8 mm	0.0000	a/d
-1.50 to -1.00; 2 mm	0.0000	a/d
-1.00 to -0.50; 1.4 mm	0.0028	a/d
-0.50 to 0.00; 1 mm	0.0070	a/d
Total	0.0098	a/d
Summary Data		
>1 mm	0.0098	a/d
<1 mm	Base pan	0.0848
	Oven dried	118.13
	Total	118.2148
Total Sample Weight	118.2246	a/d
% increase/ decrease	-57.00	a/d

Table 8 Summary of final laser data for the participants for sediment distributed as PS94 with Gradistat output.

Microns	BM Average	PSA_3101	PSA_3102	PSA_3103	PSA_3104	PSA_3105	PSA_3106	PSA_3107	PSA_3108_a	PSA_3108_b
707	0.55	0.23	0.04	0.00	0.24	0.00	0.03	0.72	0.37	0.06
500	1.81	1.25	0.67	0.00	1.25	0.15	1.36	1.34	1.29	1.12
353.6	2.49	1.94	1.71	0.10	1.63	1.17	1.88	2.58	2.08	2.10
250	2.68	2.62	2.53	0.94	1.12	2.70	0.87	2.73	3.17	2.91
176.8	3.91	5.50	4.83	3.55	3.75	5.21	3.86	3.80	5.99	5.52
125	9.16	10.68	9.47	8.18	8.26	9.55	9.83	9.50	10.35	10.09
88.39	13.53	14.41	13.09	12.25	14.01	13.01	14.24	13.84	13.34	13.47
62.5	10.22	13.33	12.24	12.76	11.78	12.29	10.95	10.20	12.45	12.76
44.19	7.29	9.69	8.87	10.41	7.76	9.23	7.63	7.23	9.14	9.36
31.25	7.00	6.89	6.41	7.98	6.75	6.92	7.09	6.95	6.43	6.53
22.097	5.67	5.72	5.64	6.70	6.68	5.94	5.75	5.47	5.25	5.31
15.625	4.67	5.04	5.13	5.97	4.28	5.27	5.27	4.46	4.70	4.78
11.049	4.43	4.29	4.43	5.23	3.76	4.57	4.62	4.27	4.14	4.21
7.813	3.98	3.75	4.31	4.54	4.20	4.14	3.91	3.87	3.62	3.68
5.524	3.98	3.57	4.32	4.11	4.01	4.02	3.54	3.96	3.41	3.46
3.906	3.90	3.41	4.22	3.87	3.60	3.84	3.20	3.97	3.38	3.43
2.762	3.34	2.94	4.04	3.59	3.21	3.55	2.78	3.45	3.17	3.23
1.953	2.60	2.21	2.77	3.06	2.91	2.84	2.46	2.68	2.61	2.67
1.381	1.96	1.22	1.77	2.33	2.45	1.81	2.15	2.00	1.88	1.93
0.977	1.44	0.43	1.35	1.72	1.84	1.42	1.74	1.45	1.30	1.34
0.691	1.10	0.30	1.55	1.35	1.38	1.69	1.44	1.11	0.98	1.02
0.488	0.96	0.38	0.60	0.98	1.17	0.70	1.36	0.97	0.70	0.73
0.345	0.90	0.20	0.00	0.41	1.08	0.01	1.33	0.91	0.26	0.28
0.244	0.82	0.00	0.00	0.00	0.98	0.00	1.15	0.84	0.00	0.00
0.173	0.66	0.00	0.00	0.00	0.78	0.00	0.78	0.68	0.00	0.00
0.122	0.50	0.00	0.00	0.00	0.59	0.00	0.47	0.52	0.00	0.00
0.086	0.31	0.00	0.00	0.00	0.36	0.00	0.23	0.33	0.00	0.00
0.061	0.13	0.00	0.00	0.00	0.14	0.00	0.07	0.13	0.00	0.00
0.043	0.02	0.00	0.00	0.00	0.02	0.00	0.01	0.02	0.00	0.00
0.01	0.00	0.00	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:	31.43	43.88	33.73	28.40	26.94	33.83	28.76	31.22	39.85	38.30
SORTING:	5.99	4.10	4.75	4.51	5.94	4.69	5.92	6.04	4.79	4.76
SKEWNESS:	-0.35	-0.35	-0.36	-0.37	-0.42	-0.37	-0.42	-0.36	-0.37	-0.38
KURTOSIS:	1.00	1.02	0.89	0.91	0.95	0.92	1.01	0.99	1.01	1.00
MODE:	Unimodal	Unimodal	Bimodal	Unimodal	Bimodal	Unimodal	Unimodal	Bimodal	Unimodal	Unimodal
MODE 1 (µm)	106.70	106.70	106.70	75.45	106.70	106.70	106.7	106.7	106.7	106.7
MODE 2 (µm)	-	-	6.67	-	9.43	-	-	4.72	-	-

Table 8 Summary of final laser data for the participants for sediment distributed as PS94 with Gradistat output.

Microns	BM Average	PSA_3109	PSA_3110	PSA_3111	PSA_3112	PSA_3113	PSA_3114	PSA_3115	PSA_3116	PSA_3117
1400	-	-	a/d	-	0.00	-	-	-	n/r	n/r
1000	-	-	a/d	-	0.01	-	-	-	n/r	n/r
707	0.55	0.00	a/d	0.25	0.42	0.24	0.75	3.14	n/r	n/r
500	1.81	0.14	a/d	1.43	1.58	0.89	2.30	5.46	n/r	n/r
353.6	2.49	0.23	a/d	2.31	1.96	1.51	1.93	3.56	n/r	n/r
250	2.68	1.05	a/d	2.55	2.12	2.26	3.00	3.57	n/r	n/r
176.8	3.91	3.75	a/d	4.22	4.67	4.81	3.78	4.15	n/r	n/r
125	9.16	6.53	a/d	7.87	9.62	9.48	8.93	4.63	n/r	n/r
88.39	13.53	7.83	a/d	10.82	13.14	12.91	14.76	8.34	n/r	n/r
62.5	10.22	8.45	a/d	10.48	12.14	12.18	11.83	9.77	n/r	n/r
44.19	7.29	9.40	a/d	8.43	8.97	9.14	8.90	7.37	n/r	n/r
31.25	7.00	10.45	a/d	6.86	6.74	6.77	8.09	8.83	n/r	n/r
22.097	5.67	10.57	a/d	6.12	5.87	5.88	6.93	7.08	n/r	n/r
15.625	4.67	9.28	a/d	5.58	5.16	5.36	5.54	5.29	n/r	n/r
11.049	4.43	7.28	a/d	5.22	4.34	4.76	4.75	3.13	n/r	n/r
7.813	3.98	5.61	a/d	5.26	3.82	4.32	4.57	3.63	n/r	n/r
5.524	3.98	4.64	a/d	5.42	3.70	4.39	4.49	3.51	n/r	n/r
3.906	3.90	4.08	a/d	5.20	3.66	4.26	4.03	2.65	n/r	n/r
2.762	3.34	3.47	a/d	4.40	3.43	3.75	3.08	3.51	n/r	n/r
1.953	2.60	2.64	a/d	3.08	2.74	2.69	1.78	3.18	n/r	n/r
1.381	1.96	1.77	a/d	1.72	1.69	1.58	0.56	2.03	n/r	n/r
0.977	1.44	1.19	a/d	1.14	1.40	1.15	0.00	2.14	n/r	n/r
0.691	1.10	0.91	a/d	1.18	1.85	1.22	0.00	1.55	n/r	n/r
0.488	0.96	0.60	a/d	0.45	0.94	0.44	0.00	0.87	n/r	n/r
0.345	0.90	0.11	a/d	0.00	0.04	0.00	0.00	0.90	n/r	n/r
0.244	0.82	0.00	a/d	0.00	0.00	0.00	0.00	0.71	n/r	n/r
0.173	0.66	0.00	a/d	0.00	0.00	0.00	0.00	0.42	n/r	n/r
0.122	0.50	0.00	a/d	0.00	0.00	0.00	0.00	0.40	n/r	n/r
0.086	0.31	0.00	a/d	0.00	0.00	0.00	0.00	0.19	n/r	n/r
0.061	0.13	0.00	a/d	0.00	0.00	0.00	0.00	0.00	n/r	n/r
0.043	0.02	0.00	a/d	0.00	0.00	0.00	0.00	0.00	n/r	n/r
0.01	0.00	0.00	a/d	0.00	0.00	0.00	0.00	0.00	n/r	n/r
Total	100.00	100.00	a/d	100.00	100.00	100.00	100.00	100.00	n/r	n/r
MEAN:	31.43	26.31	a/d	30.78	35.22	34.74	42.53	34.98	n/r	n/r
SORTING:	5.99	4.00	a/d	4.89	4.97	4.54	4.01	7.48	n/r	n/r
SKEWNESS:	-0.35	-0.15	a/d	-0.22	-0.35	-0.34	-0.25	-0.17	n/r	n/r
KURTOSIS:	1.00	0.99	a/d	0.85	0.99	0.89	1.00	1.07	n/r	n/r
MODE:	Unimodal	Unimodal	a/d	Bimodal	Unimodal	Bimodal	Bimodal	Polymodal	n/r	n/r
MODE 1 (µm)	106.70	26.7	a/d	106.7	106.7	106.7	106.7	75.4	n/r	n/r
MODE 2 (µm)	-	-	a/d	6.67	-	6.7	603.5	37.7	n/r	n/r

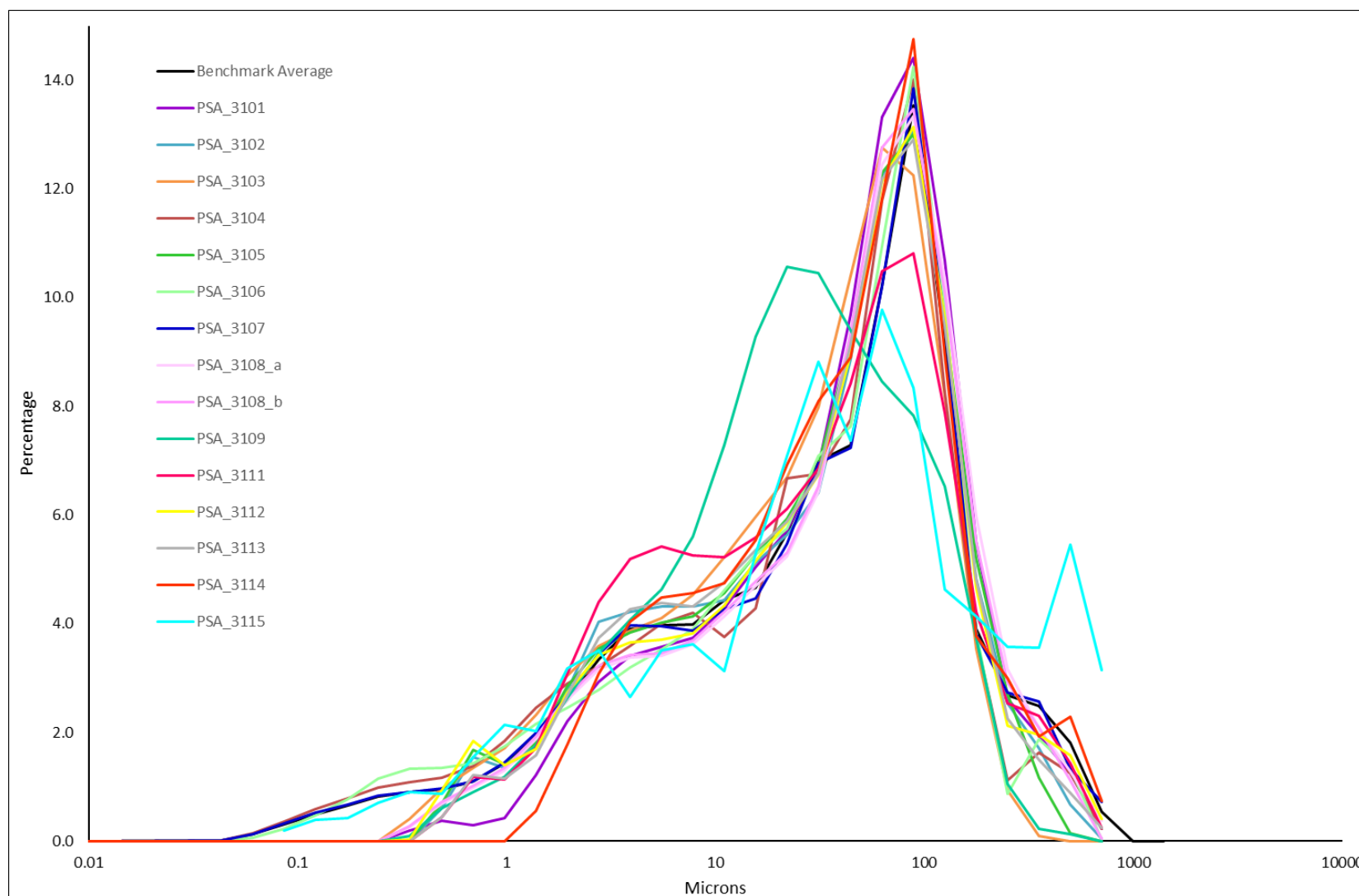


Figure 4 Final laser data (in percentages) provided by each participant and the Benchmark average for sediment distributed as PS94.

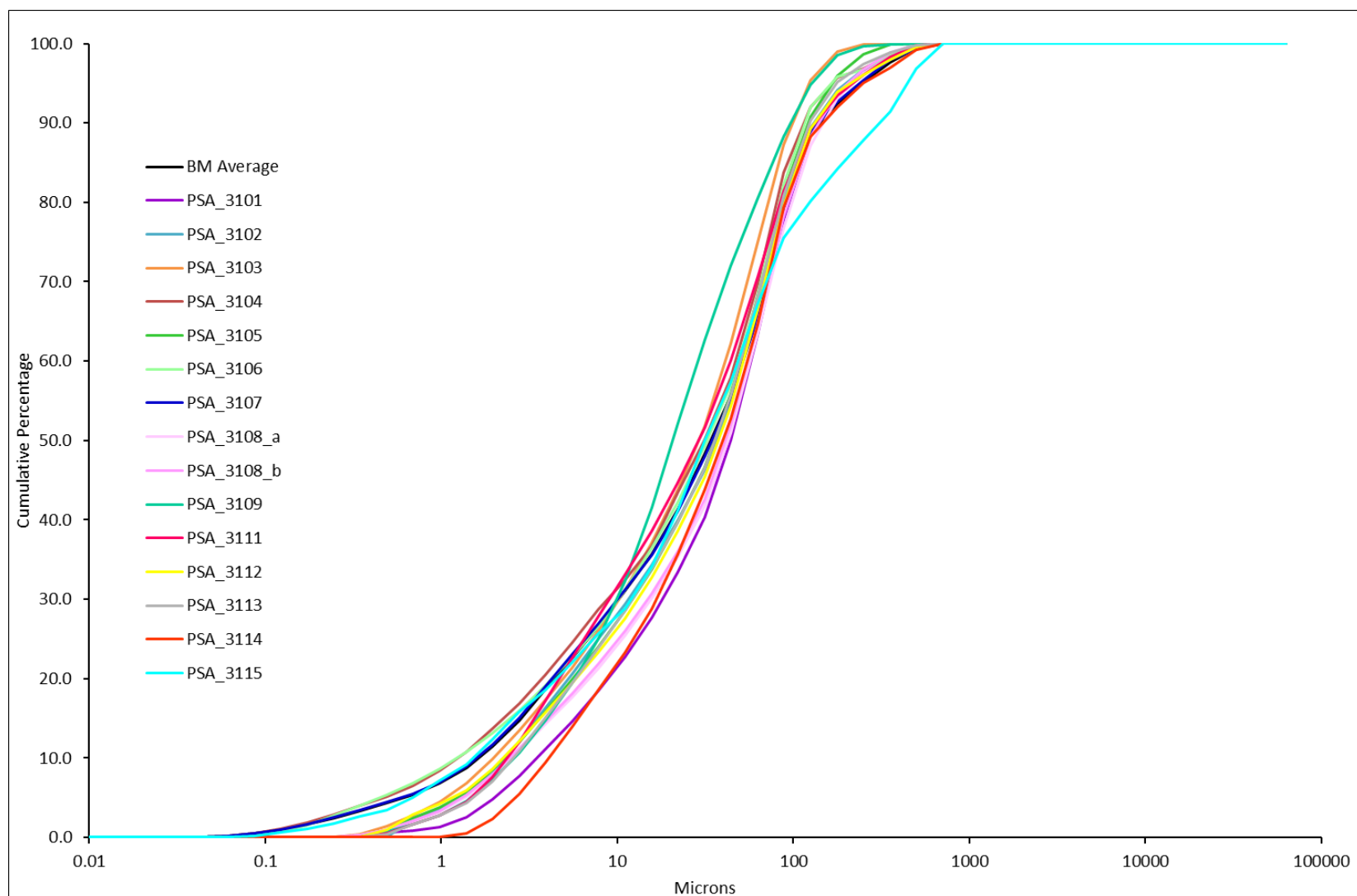


Figure 5 Particle size distribution curves from all participating laboratories and the Benchmark average for sediment distributed as PS94.

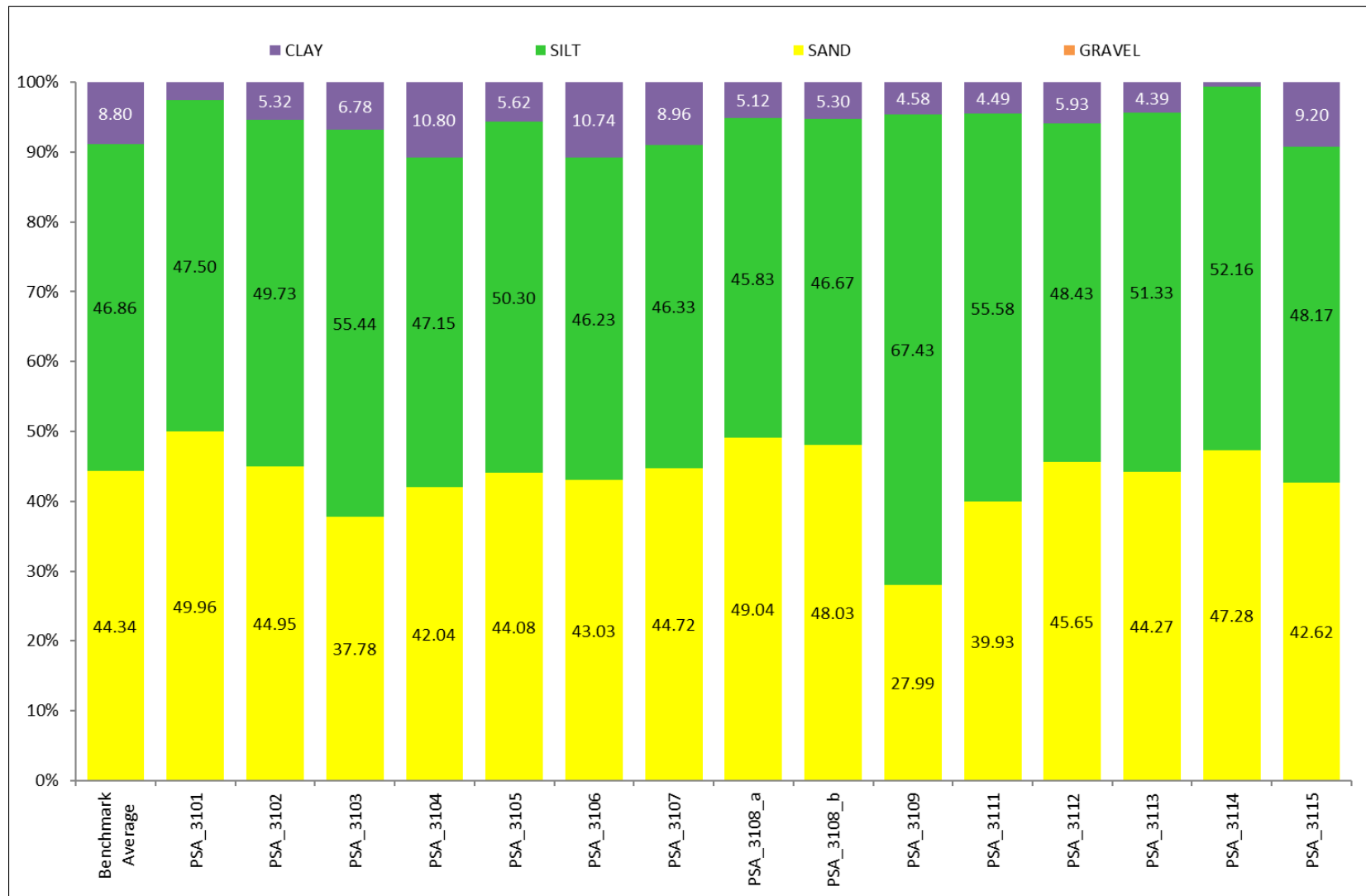
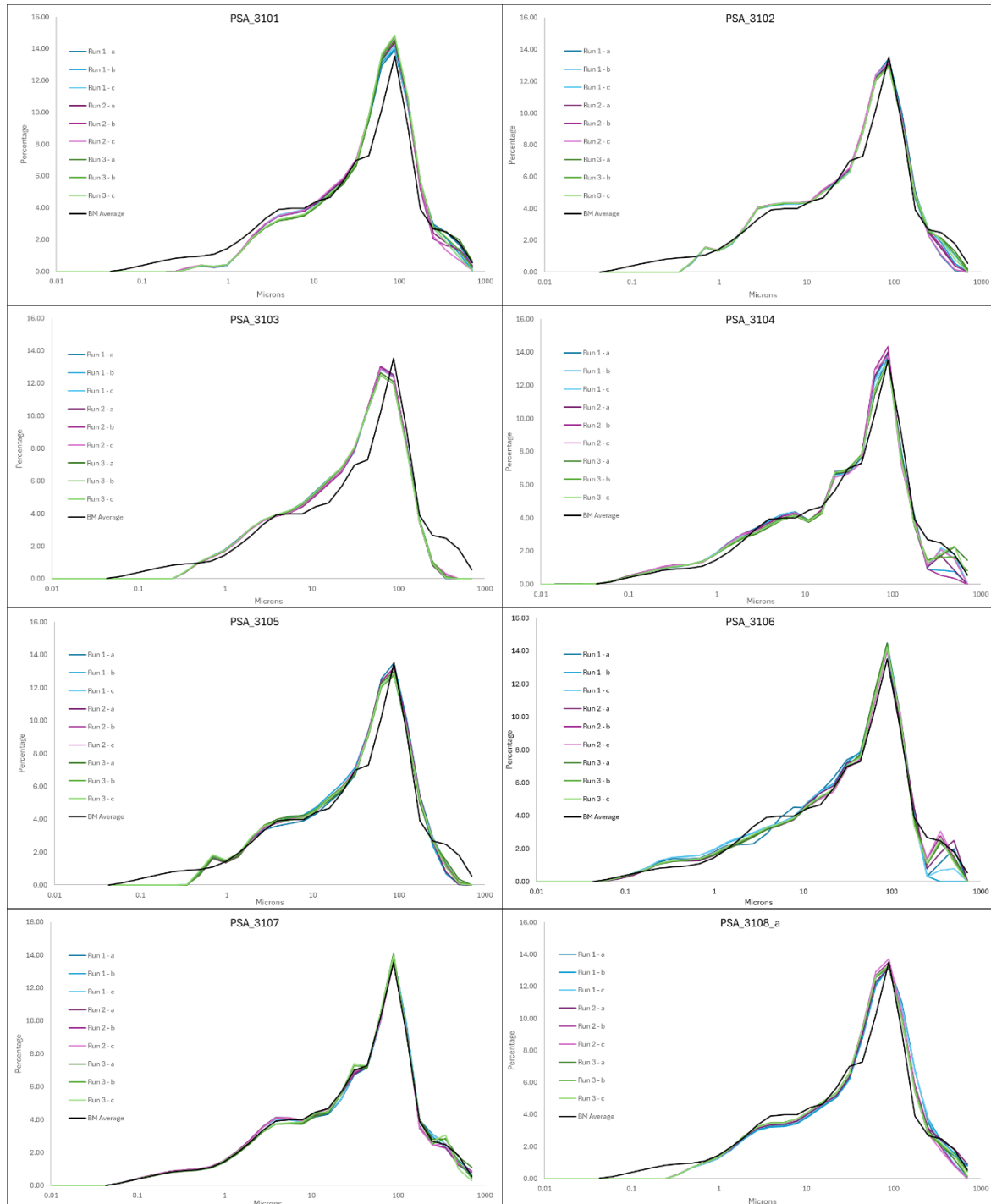


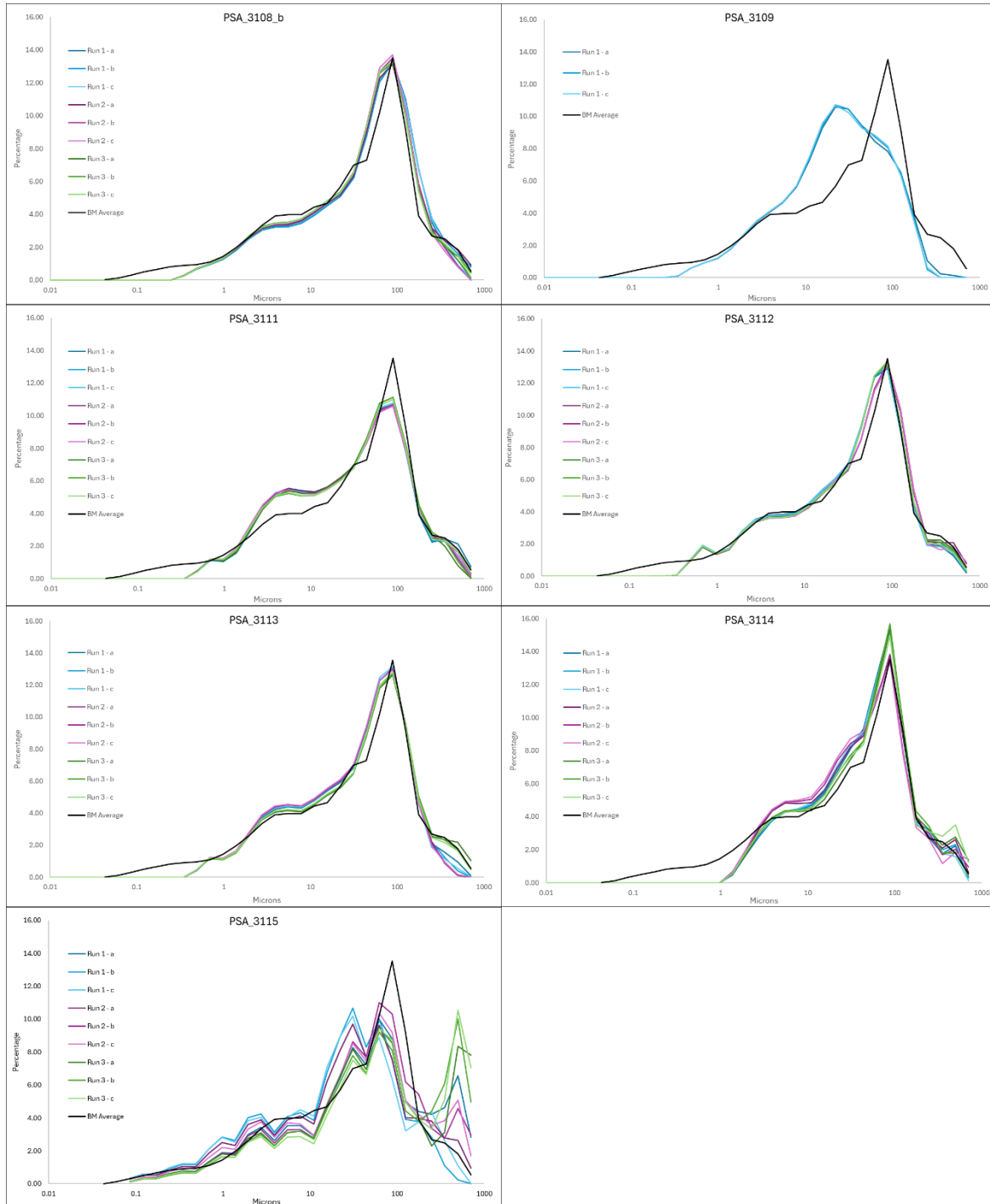
Figure 6 Bar charts showing the percentage gravel, sand, silt and clay recorded by each participating laboratory and the Benchmark average for PS94.

3. APPENDICES

Appendix 1 – Participant Laser Replicate Graphs

Benchmark and Participant laser replicate data can be found in the associated embedded Excel file – PS94 Appendix 1.





Appendix 2 – Gradistat output of size categories based on final merged data provided by each participant and the Benchmark Average for sediment distributed as PS94.

Benchmark and Participant data can be found in the associated embedded Excel file – PS94 Appendix 2.

Appendix 3 – Benchmark Lab and Participant Final Merged Data for sediment distributed as PS94.

Data can be found in the associated embedded Excel file – PS94 Appendix 3.