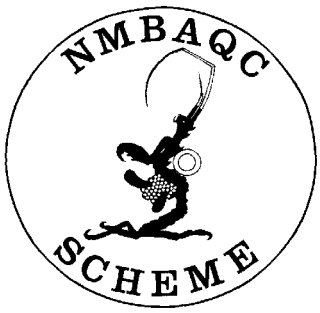


The National Marine Biological
Analytical Quality Control Scheme
www.nmbaqcs.org

Particle Size Results – PS38

Lydia Finbow and David Hall
July 2011
E-mail: davidhall@unicomarine.com

thomson unicomarine

Contents

Tables

Figures

Appendices

Table 1. Summary of the particle size information received from participating laboratories and replicate analysis laboraory for the thirty-eighth particle size distribution - PS38,

Benchmark Data

Sample	Method	%<63µm	Median	Mean	Sort	IGS (Ski)
PS38 60	DS	0.00	-3.01	-2.97	0.25	1.04
PS38 61	DS	0.00	-3.01	-2.96	0.30	1.00
PS38 62	DS	0.00	-3.00	-2.95	0.28	0.99
PS38 63	DS	0.00	-3.00	-2.96	0.27	1.00
PS38 64	DS	0.00	-3.03	-2.97	0.32	1.00
PS38 65	DS	0.00	-3.01	-2.94	0.33	0.98
PS38 66	DS	0.00	-3.02	-2.97	0.30	1.01
PS38 67	DS	0.00	-3.00	-2.95	0.29	1.00
PS38 68	DS	0.00	-3.02	-2.97	0.29	1.00
PS38 69	DS	0.00	-3.02	-2.97	0.29	1.00
AVERAGE	DS	**0.00**	**-3.01**	**-2.96**	**0.29**	**1.00**

Participant Data

Lab	Method	%<63µm	Median	Mean	Sort	IGS (Ski)
LB1701	L	0.00	-2.98	-2.94	0.45	0.31
LB1702	DS	0.00	-	-	-	-
LB1705	DS/L	0.00	-	-	-	-
LB1707	WS/DS/L	0.00	-3.03	-2.98	0.44	0.31
LB1712	DS	0.00	-	-	-	-
LB1713	DS	0.00	-2.97	-2.93	0.447	0.27
LB1715	DS	0.00	-2.98	-2.96	0.68	0.09
LB1716	DS	0.00	-	-	-	-
LB1726	L	0.00	-	-	-	-

Key to methods:
L - Laser analysis
S - Sieve
WS - Wet Sieve
DS - Dry Sieve

"-" - No data provided

Table 2. Summary of z-scores for each phi-interval for PS38.

	phi interval															
	-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
LB1701	0.00	0.00	0.00	0.00	-0.32	-0.32	0.10	0.78	-0.74	0.70	-0.64	0.83	-0.44	1.43	-0.46	-0.46
LB1702	0.00	0.00	0.00	0.00	-0.32	-0.24	-0.03	0.86	-0.79	0.49	-0.51	0.60	-0.37	0.64	-0.46	-0.46
LB1705	0.00	0.00	0.00	0.00	-0.32	-0.59	0.69	0.73	-0.78	0.48	-0.61	0.44	-0.47	2.02	-0.15	2.38
LB1707	0.00	0.00	0.00	0.00	-0.32	-0.01	0.56	0.71	-0.86	0.72	-0.63	0.54	-0.49	-0.35	-0.26	1.29
LB1712	0.00	0.00	0.00	0.00	2.85	2.66	-2.56	-1.16	1.31	-1.44	1.24	-1.75	1.53	-0.62	0.41	-0.46
LB1713	0.00	0.00	0.00	0.00	-0.32	-0.27	-0.33	0.86	-0.72	0.73	-0.59	0.77	-0.44	-0.62	-0.46	-0.46
LB1715	0.00	0.00	0.00	0.00	-0.32	-0.59	0.18	-1.16	1.19	-1.44	1.67	-1.75	2.20	-0.62	2.74	-0.46
LB1716	0.00	0.00	0.00	0.00	-0.32	-0.59	0.49	-1.16	1.15	0.64	-0.68	-0.57	-0.66	-0.62	-0.46	-0.46
LB1726	0.00	0.00	0.00	0.00	-0.32	-0.59	1.10	-1.16	0.98	-1.44	1.41	0.37	-0.40	-0.62	-0.46	-0.46
BENCHMARK	0.00	0.00	0.00	0.00	-0.32	0.53	-0.19	0.71	-0.74	0.58	-0.65	0.53	-0.47	-0.62	-0.46	-0.46

	phi interval														
	1.50 to 2.00	2.00 to 2.50	2.50 to 3.00	3.00 to 3.50	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
LB1701	-0.50	-0.46	-0.61	-0.42	-0.48	-0.55	-0.32	-0.32	-0.32	-0.32	-0.32	-0.32	-0.32	-0.32	0.00
LB1702	-0.50	-0.46	-0.61	-0.42	-0.48	-0.55	-0.32	-0.32	-0.32	-0.32	-0.32	-0.32	-0.32	-0.32	0.00
LB1705	-0.29	2.32	-0.06	2.66	0.24	2.09	2.85	2.85	2.85	2.85	2.85	2.85	2.85	2.85	0.00
LB1707	-0.28	1.38	0.03	0.72	-0.25	0.20	-0.32	-0.32	-0.32	-0.32	-0.32	-0.32	-0.32	-0.32	0.00
LB1712	1.06	-0.46	1.67	-0.42	0.18	1.58	-0.32	-0.32	-0.32	-0.32	-0.32	-0.32	-0.32	-0.32	0.00
LB1713	-0.50	-0.46	-0.61	-0.42	-0.48	-0.55	-0.32	-0.32	-0.32	-0.32	-0.32	-0.32	-0.32	-0.32	0.00
LB1715	2.49	-0.46	2.00	-0.42	2.73	-0.55	-0.32	-0.32	-0.32	-0.32	-0.32	-0.32	-0.32	-0.32	0.00
LB1716	-0.50	-0.46	-0.61	-0.42	-0.48	-0.55	-0.32	-0.32	-0.32	-0.32	-0.32	-0.32	-0.32	-0.32	0.00
LB1726	-0.50	-0.46	-0.61	-0.42	-0.48	-0.55	-0.32	-0.32	-0.32	-0.32	-0.32	-0.32	-0.32	-0.32	0.00
BENCHMARK	-0.50	-0.46	-0.61	-0.42	-0.48	-0.55	-0.32	-0.32	-0.32	-0.32	-0.32	-0.32	-0.32	-0.32	0.00

* Intervals left blank or marked '-' (not analysed) have been entered as 0 to calculate z-scores.

Figure 1. Particle distribution curves resulting from analysis from ten replicate samples of sediment distributed as PS38 (Benchmark Data).

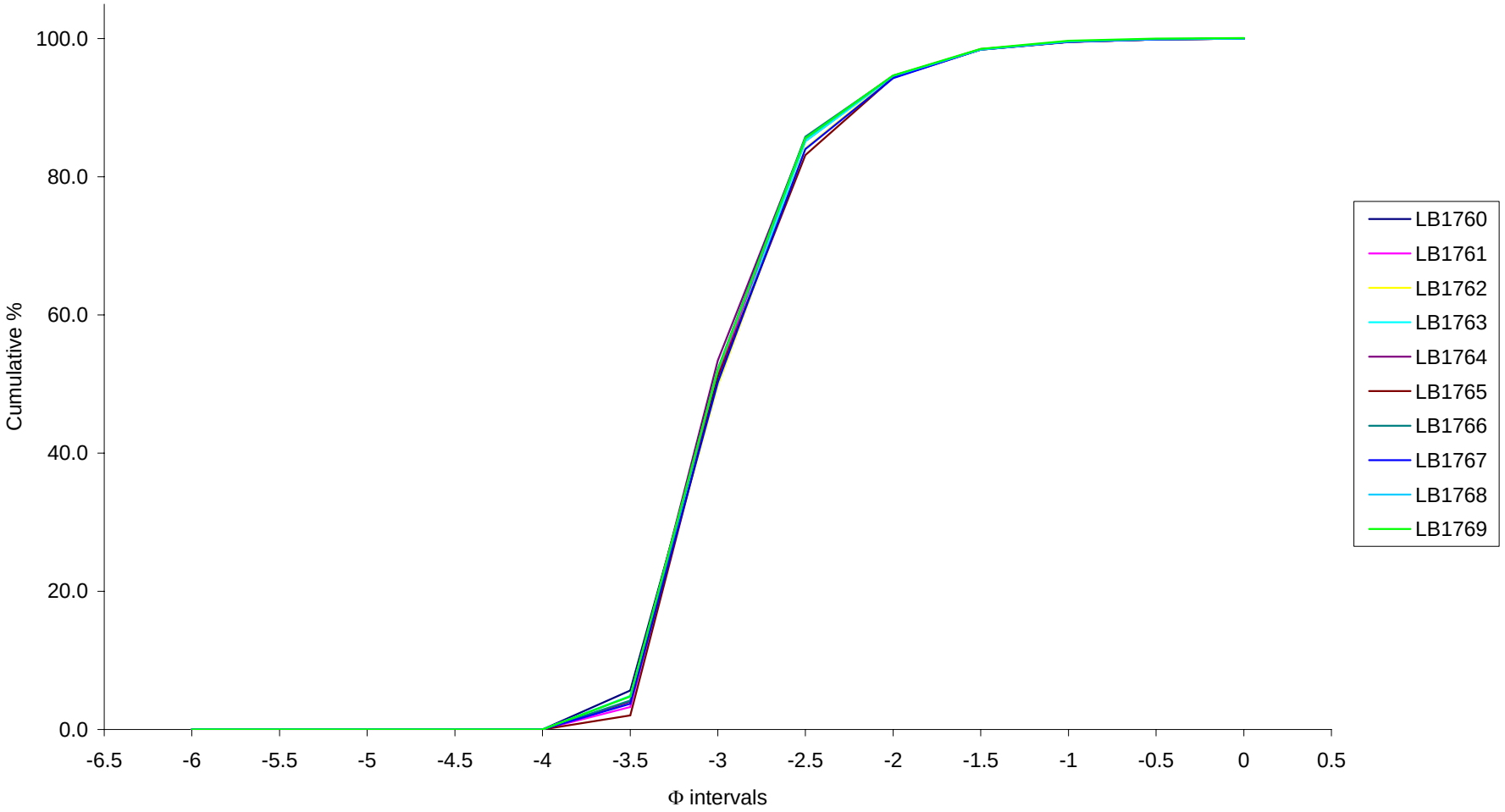
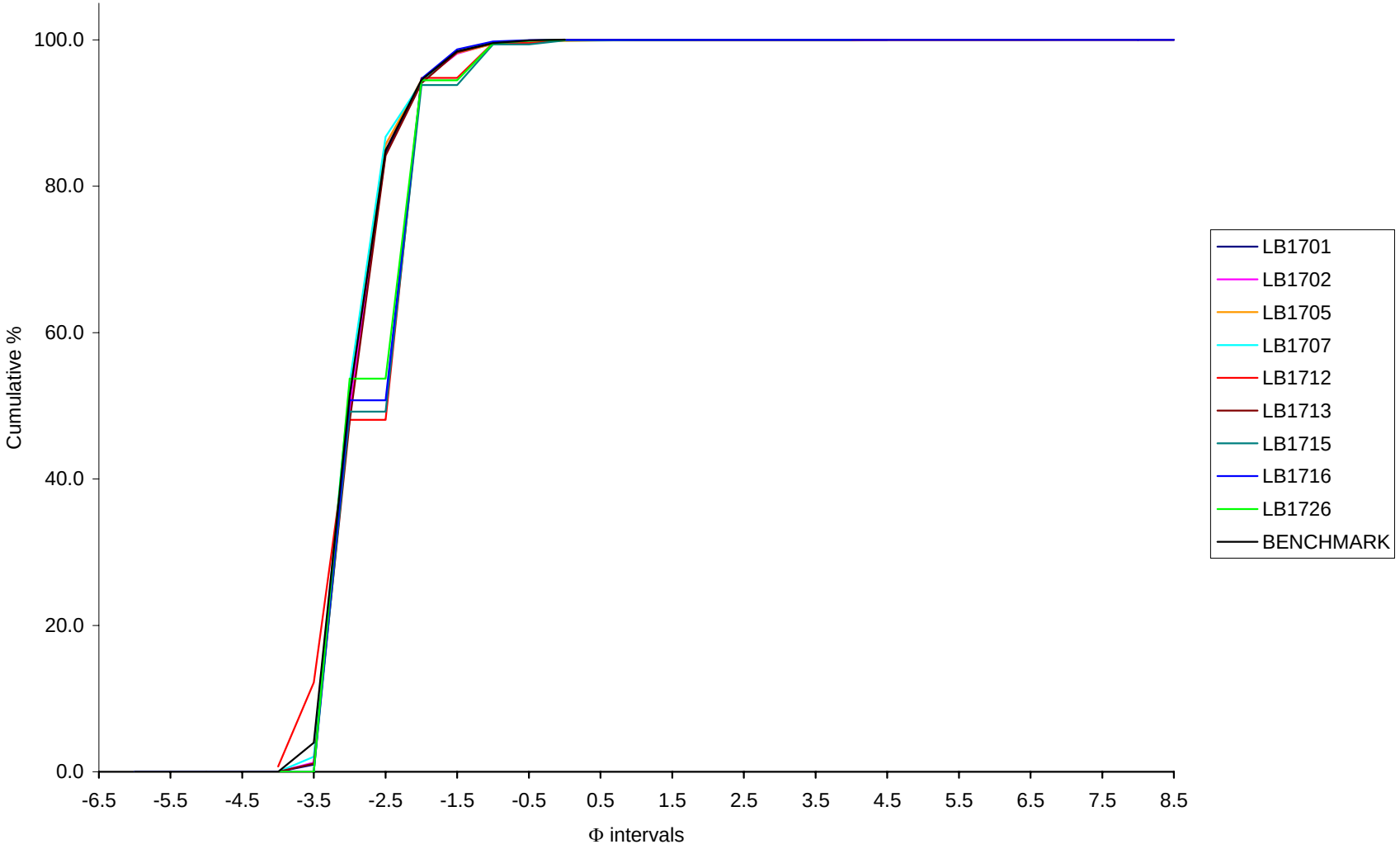


Figure 2. Particle size distribution curves from participating laboratories for sediment samples from PS38.



Results of SIMPROF testing on PSA Ring test PS38 data

Sediment fractions were first reduced to lowest common denominators to allow full comparison between test labs:

- All fractions between -4.0φ and 4.0φ were combined into 1φ intervals rather than 0.5φ intervals.

The data was then entered into PRIMER v.6.1.13 and used to create a Manhattan distance matrix. From this distance matrix cluster analysis was carried out, including a SIMPROF test at a 5% significance level. These results are presented as cluster dendrograms below:

Figure 3. Replicates from the control lab kept separate.

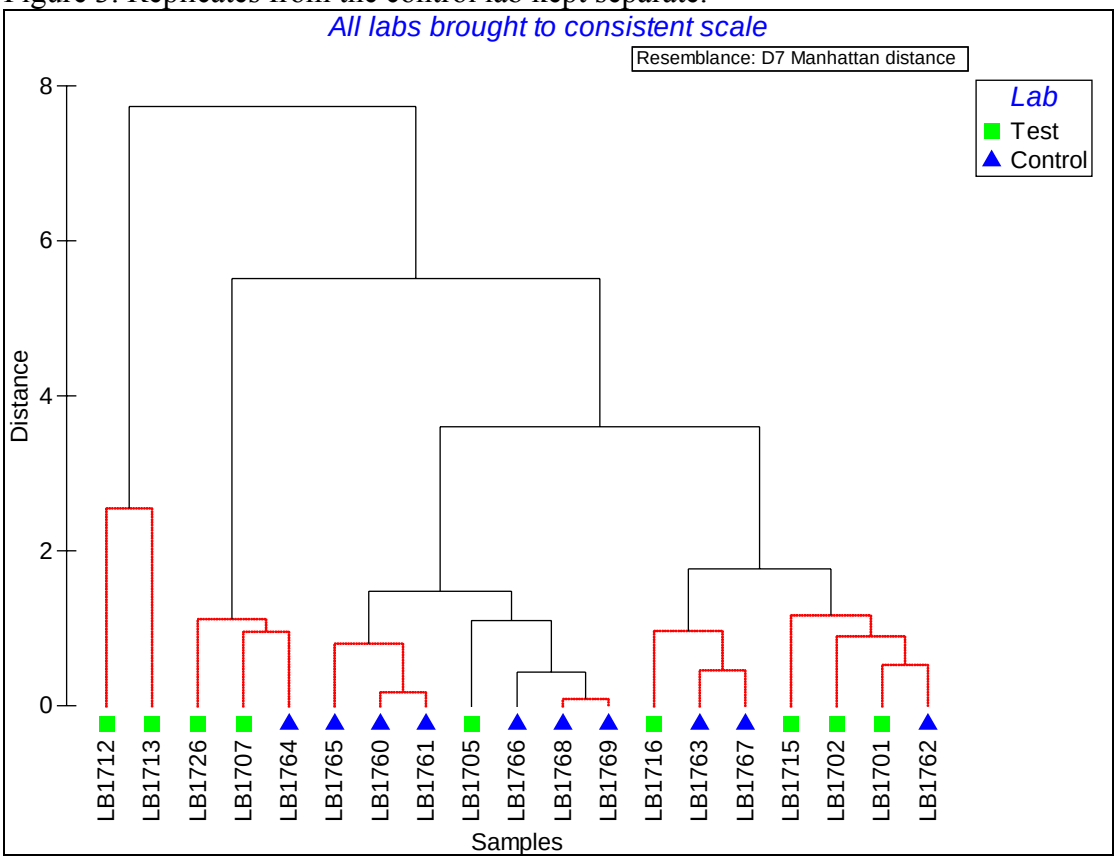


Figure 4. Replicates from control data averaged.

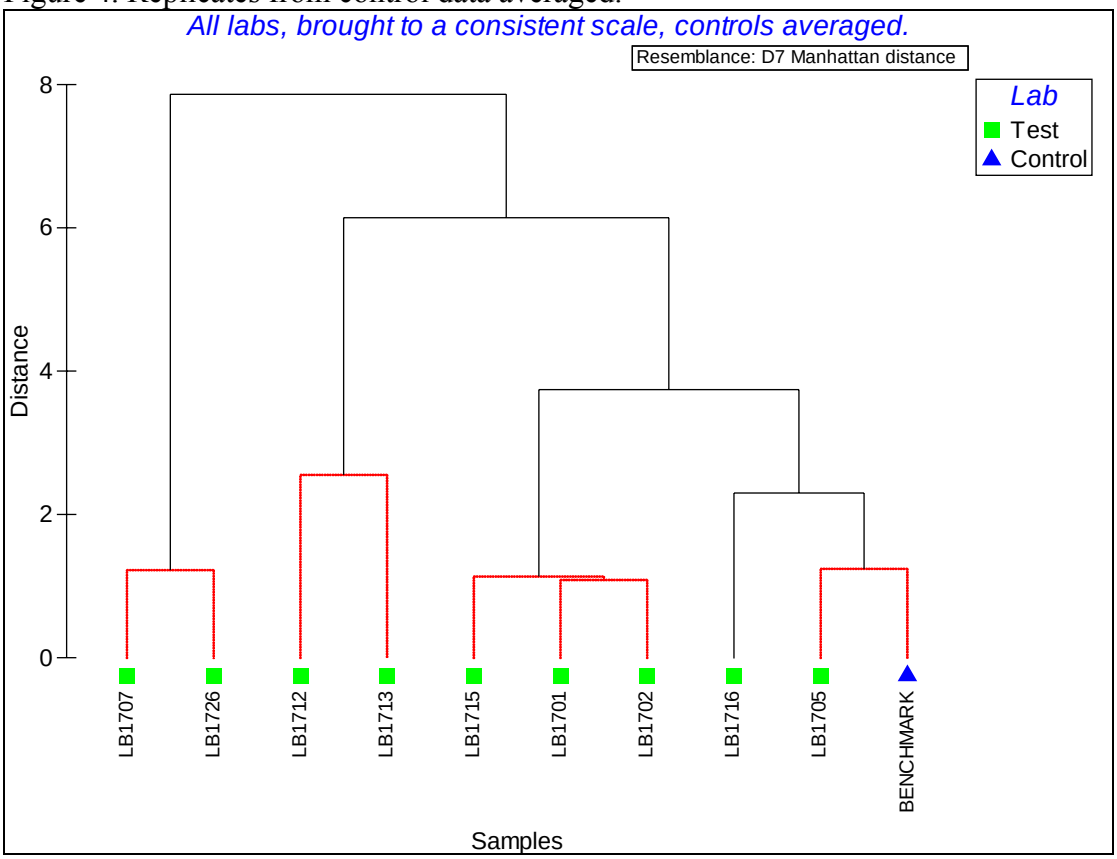
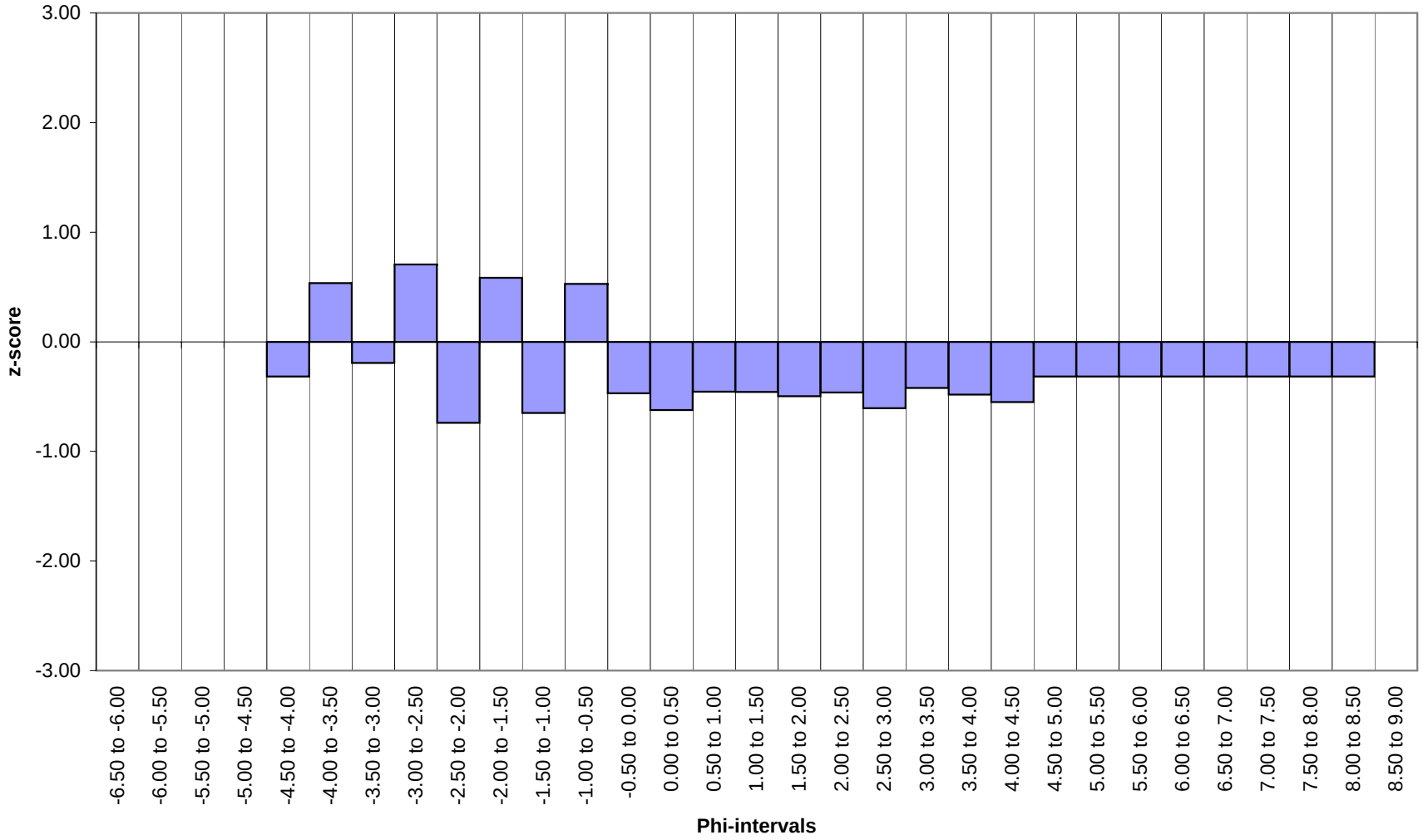
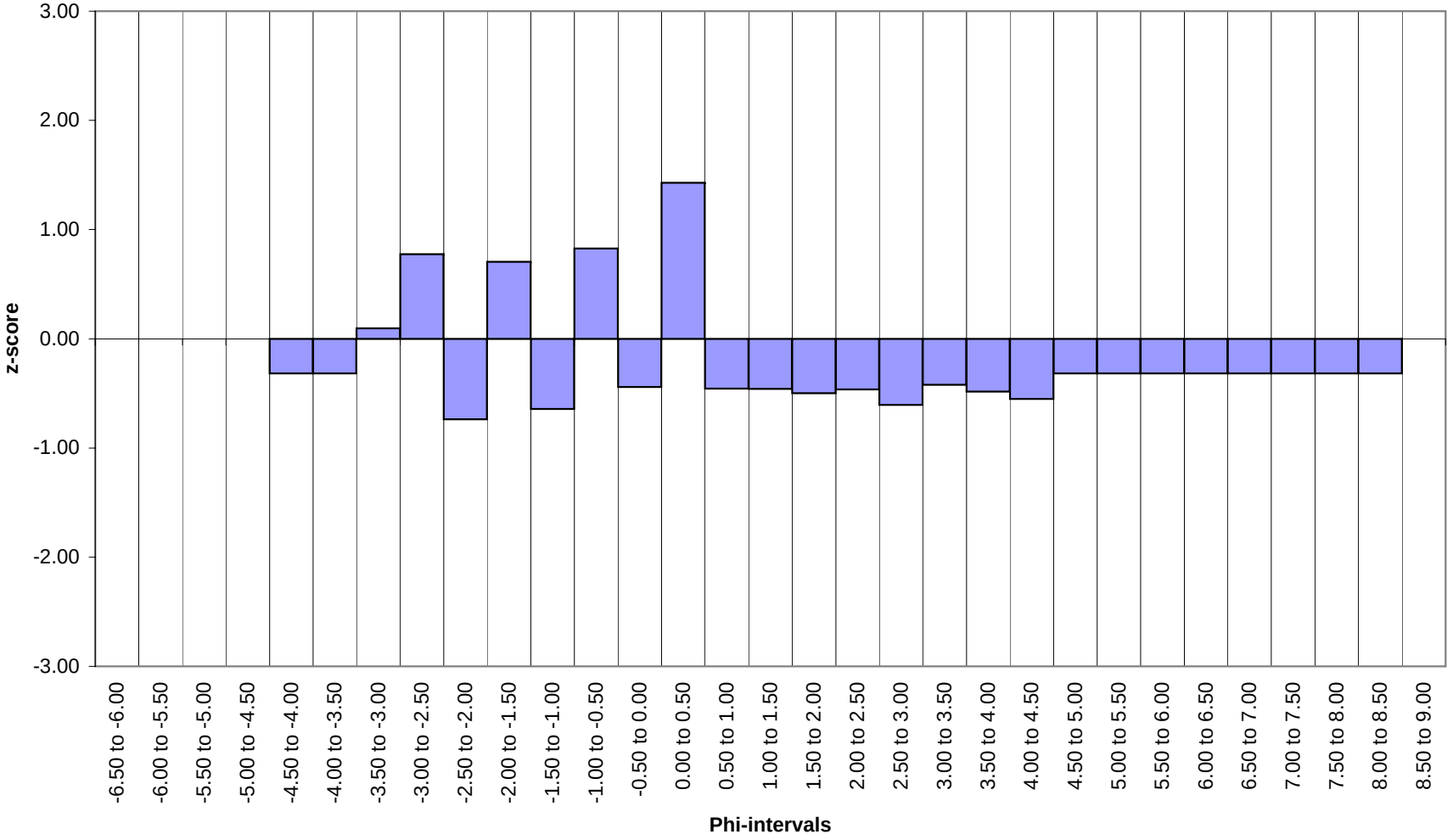


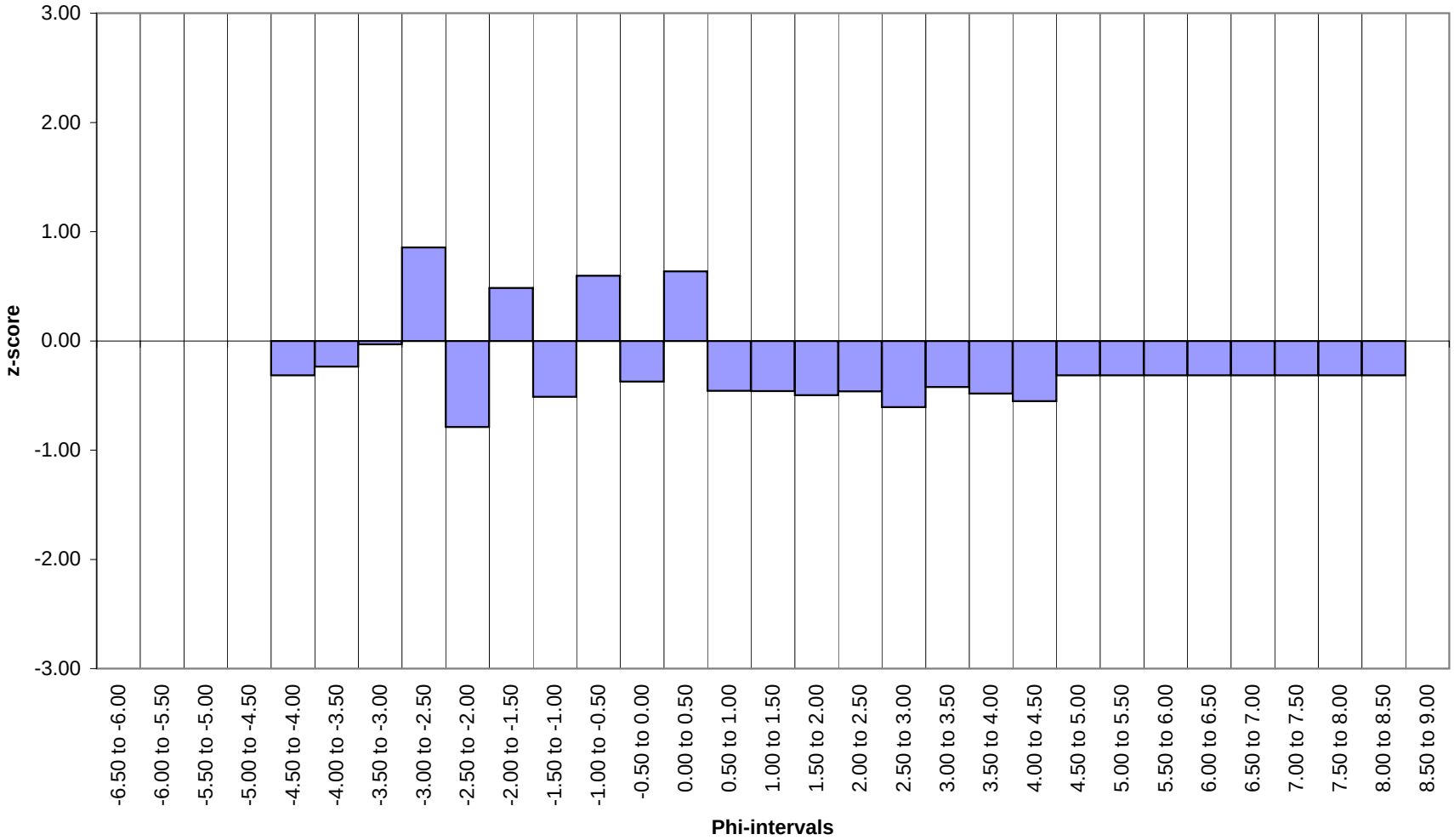
Figure 5. z-scores for each phi interval for the benchmark data for the sediment PS38.



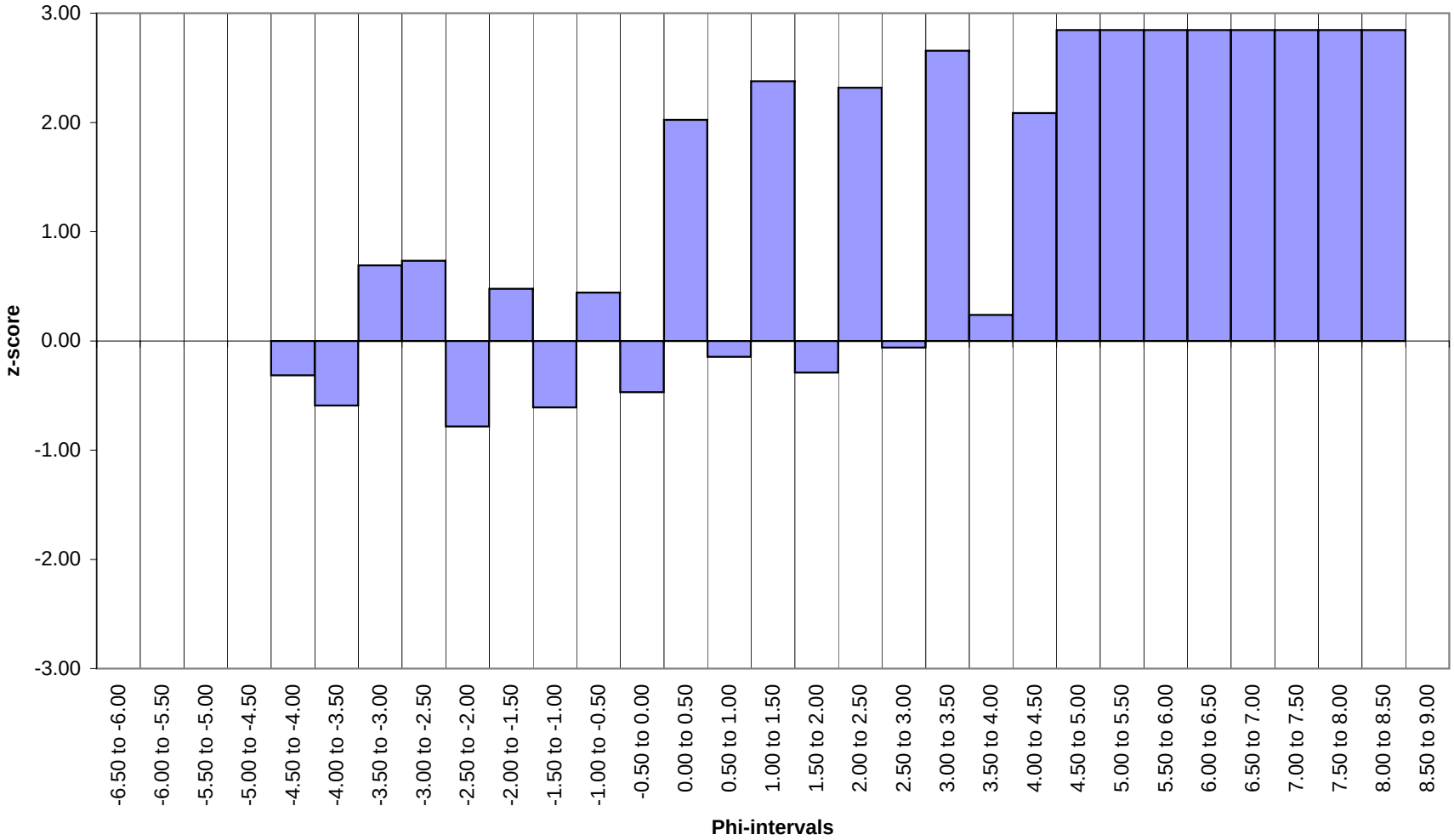
LB1701


3.00
2.00
1.00
0.00
-1.00
-2.00
-3.00
z-score
-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
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
Phi-intervals

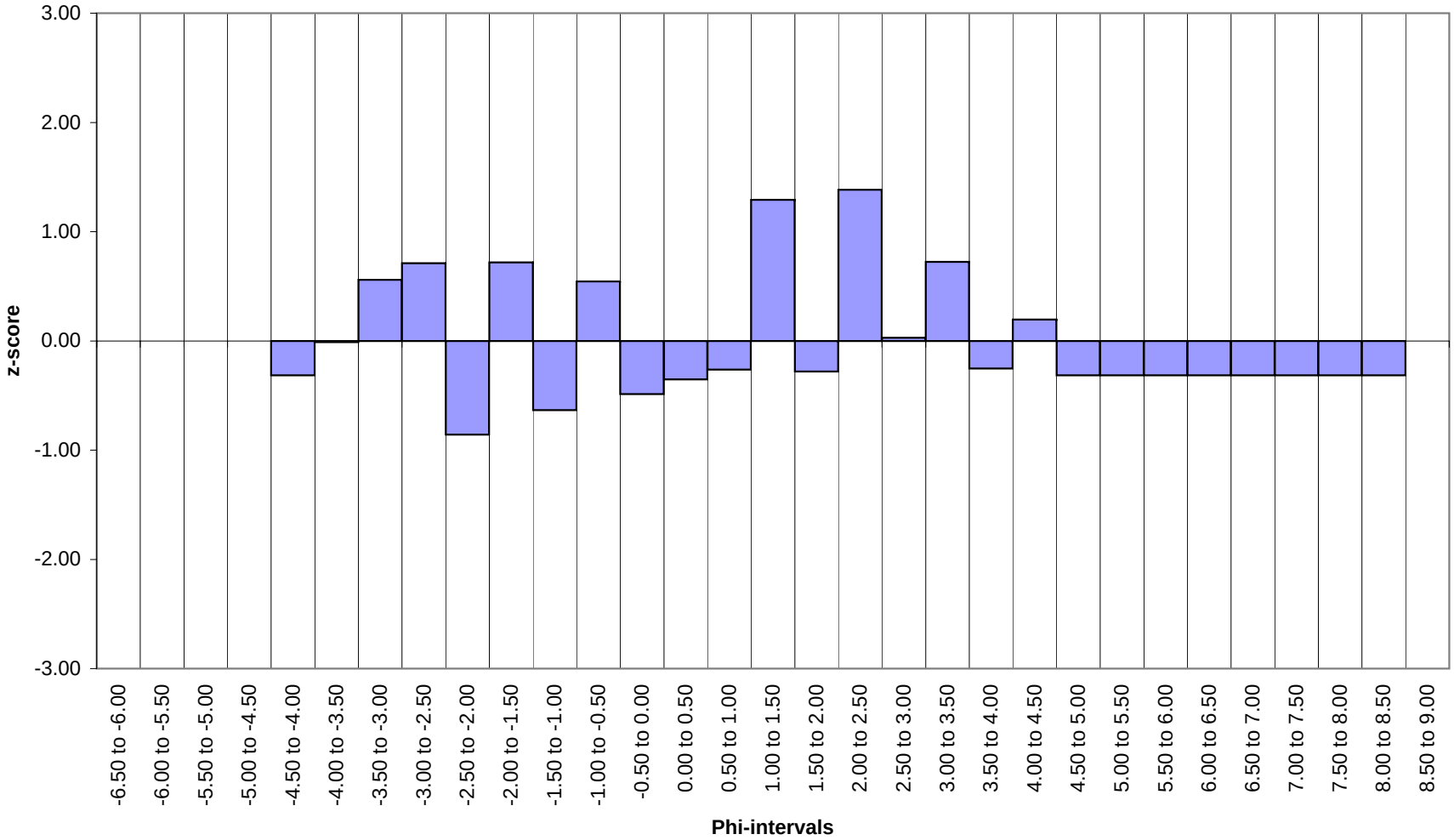
LB1702


3.00
2.00
1.00
0.00
-1.00
-2.00
-3.00
z-score
-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
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
Phi-intervals

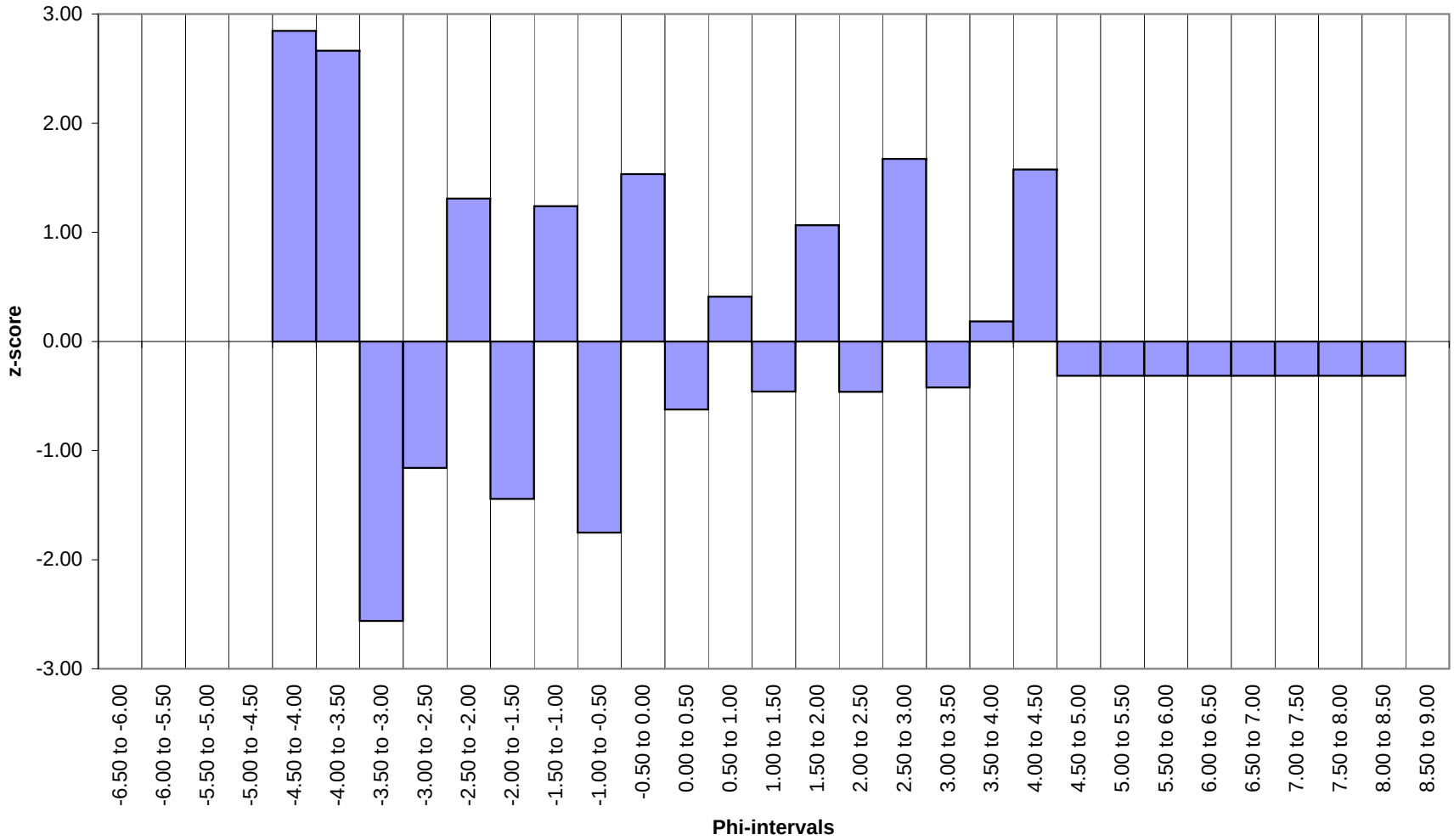
LB1705


3.00
2.00
1.00
0.00
-1.00
-2.00
-3.00
z-score
-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
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
Phi-intervals

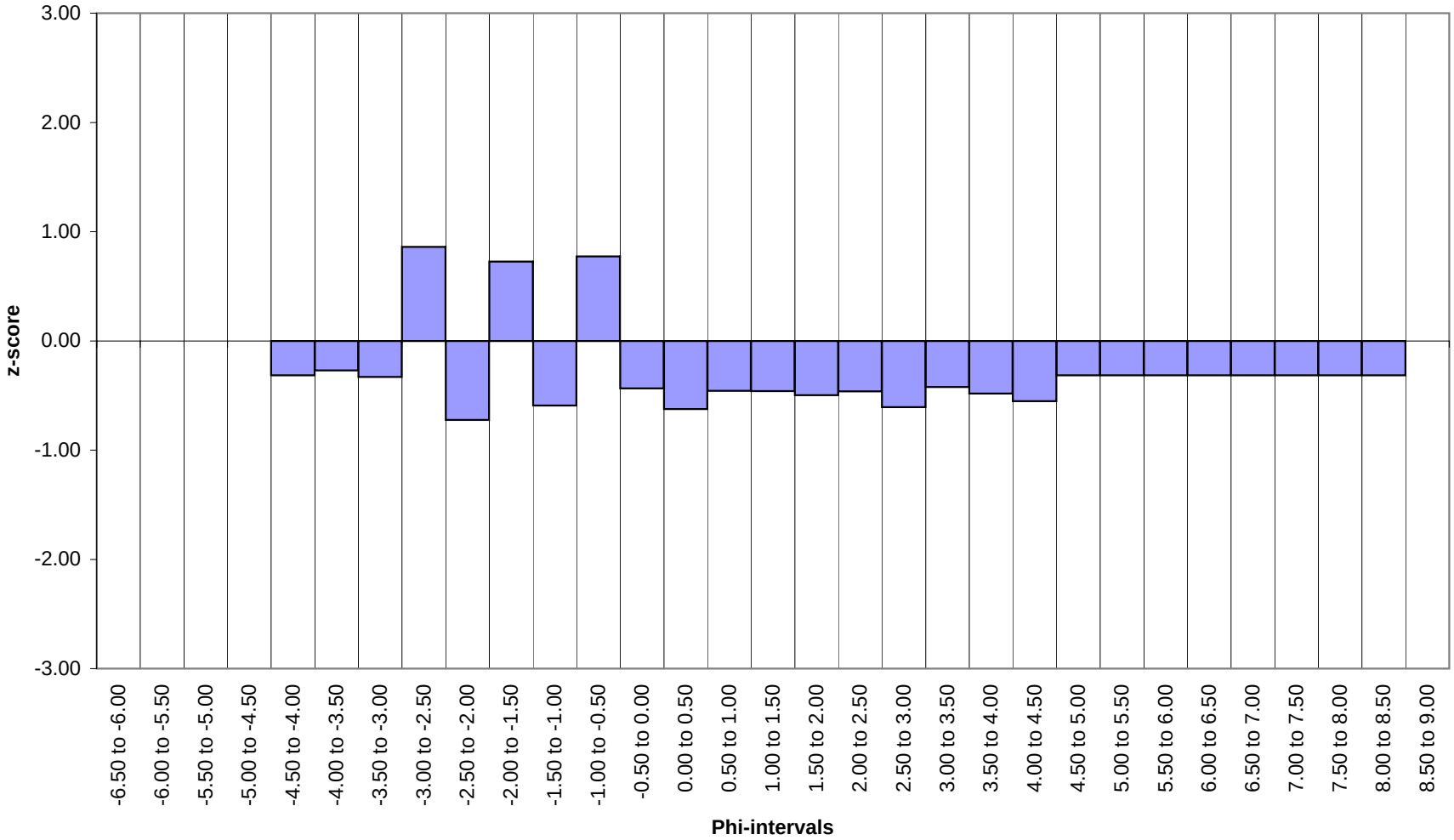
LB1707


3.00
2.00
1.00
0.00
-1.00
-2.00
-3.00
z-score
-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
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
Phi-intervals

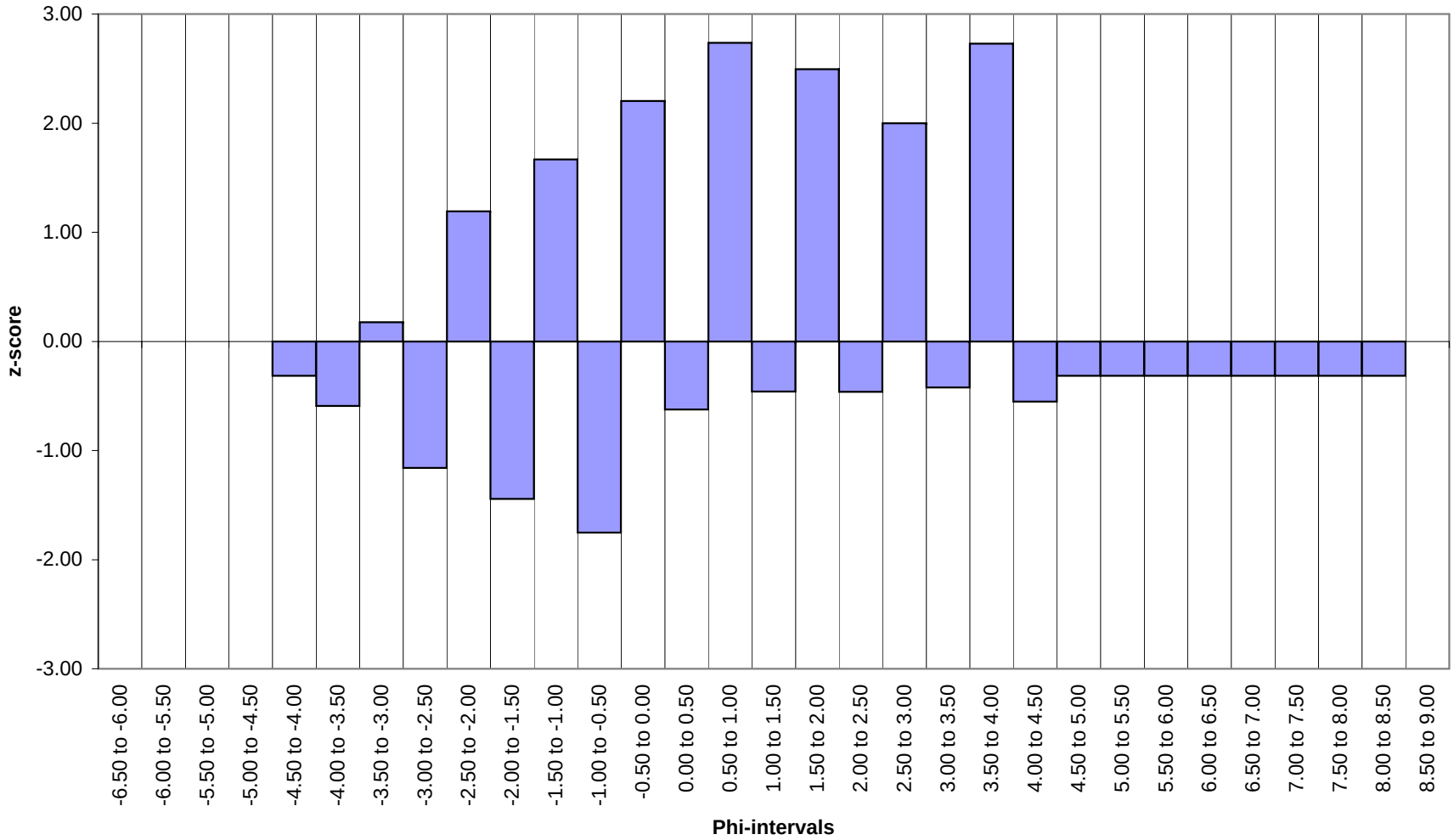
LB1712


3.00
2.00
1.00
0.00
-1.00
-2.00
-3.00
z-score
-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
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
Phi-intervals

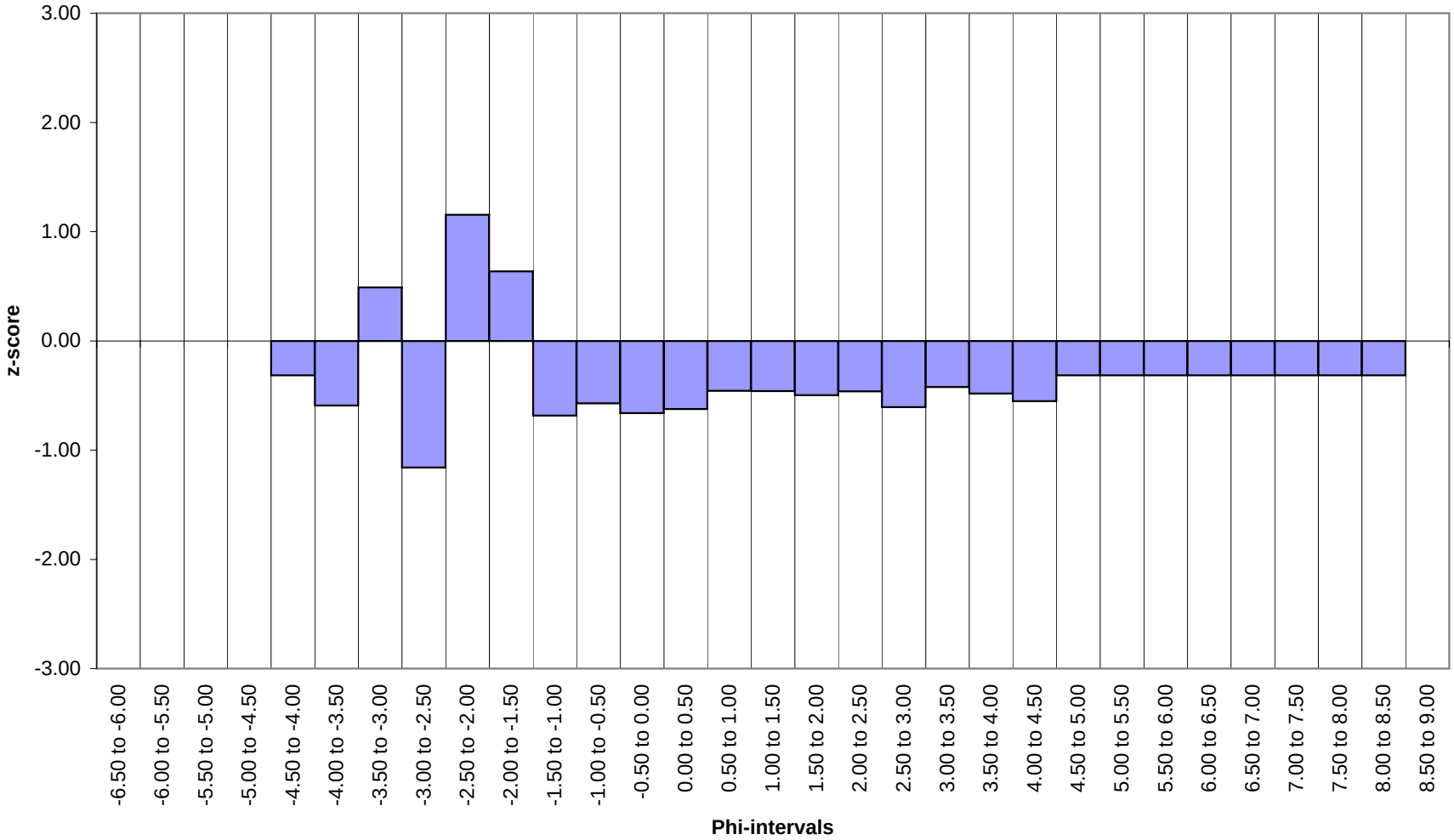
LB1713


3.00
2.00
1.00
0.00
-1.00
-2.00
-3.00
z-score
-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
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
Phi-intervals

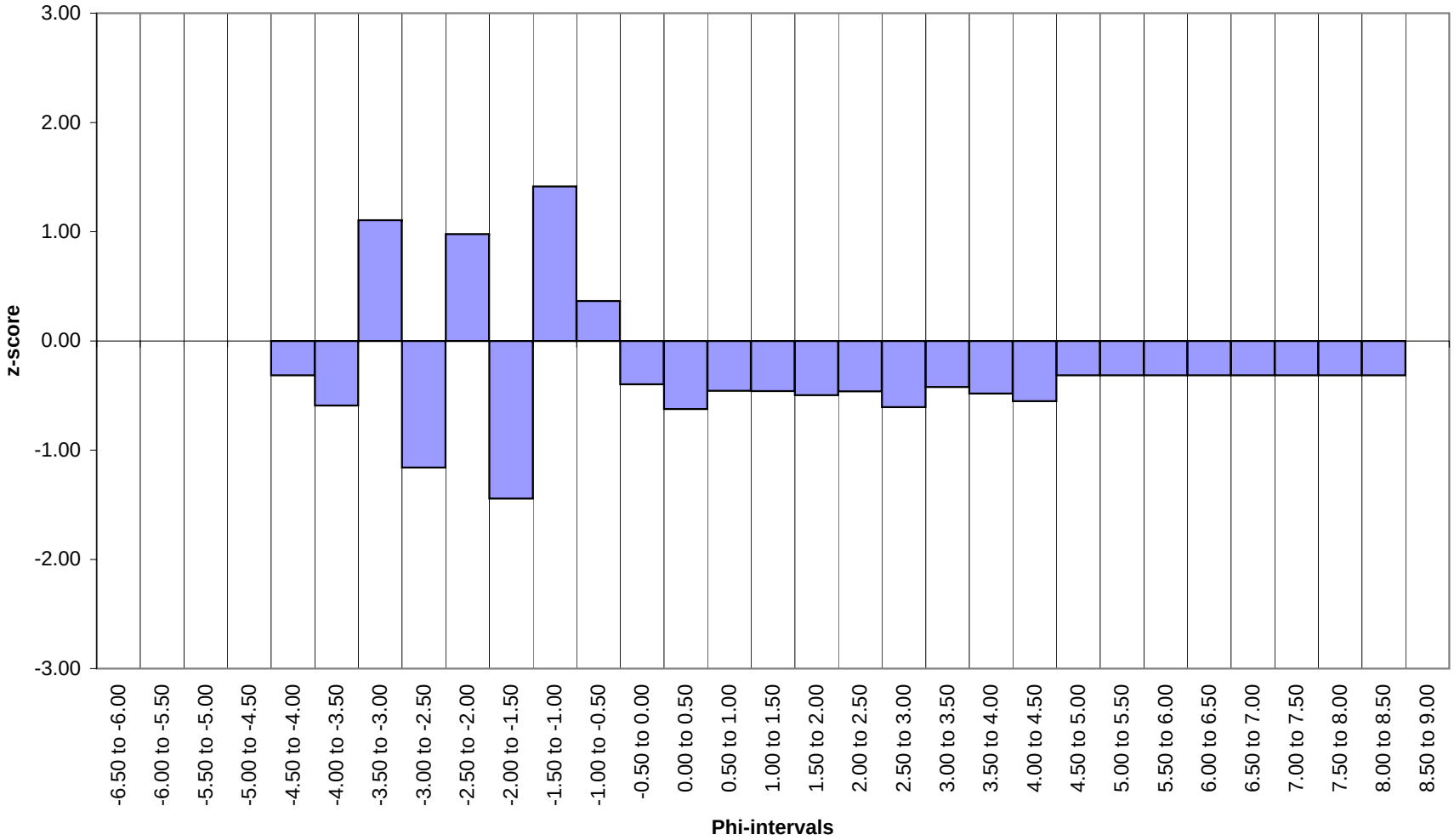
LB1715


3.00
2.00
1.00
0.00
-1.00
-2.00
-3.00
z-score
-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
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
Phi-intervals

LB1716


3.00
2.00
1.00
0.00
-1.00
-2.00
-3.00
z-score
-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
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
Phi-intervals

LB1726


3.00
2.00
1.00
0.00
-1.00
-2.00
-3.00
z-score
-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
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
Phi-intervals

Appendices.

NMBAQCS - PS Exercise Data Workbook
(Page 2 - Final Merged Data Submission)

Return to Unicomarine Ltd. by 29-04-11

Exercise Code:	**PS38**
LabCode:	**LB1701**
Sample Code:	**PS381701**

Phi interval (explicit) + sieve mesh (theoretical sieves shown in brackets)	**Volume/Weight (mark as "-" for not analysed; "0" for no material)**
-6.50 to -6.00; 63 mm	**0.00**
-6.00 to -5.50; 45 mm	**0.00**
-5.50 to -5.00; 31.5 mm	**0.00**
-5.00 to -4.50; 22.4 mm	**0.00**
-4.50 to -4.00; 16 mm	**0.00**
-4.00 to -3.50; 11.2 mm	**0.97**
-3.50 to -3.00; 8 mm	**48.82**
-3.00 to -2.50; 5.6 mm	**34.77**
-2.50 to -2.00; 4 mm	**9.62**
-2.00 to -1.50; 2.8 mm	**4.16**
-1.50 to -1.00; 2 mm	**1.12**
-1.00 to -0.50; 1.4 mm	*0.41*
-0.50 to 0.00; 1 mm	*0.10*
0.00 to 0.50; (707 µm)	*0.04*
0.50 to 1.00; (500 µm)	-
1.00 to 1.50; (353.6 µm)	-
1.50 to 2.00; (250 µm)	-
2.00 to 2.50; (176.8 µm)	-
2.50 to 3.00; (125 µm)	-
3.00 to 3.50; (88.39 µm)	-
3.50 to 4.00; (62.5 µm)	-
4.00 to 4.50; (44.19 µm)	-
4.50 to 5.00; (31.25 µm)	-
5.00 to 5.50; (22.097 µm)	-
5.50 to 6.00; (15.625 µm)	-
6.00 to 6.50; (11.049 µm)	-
6.50 to 7.00; (7.813 µm)	-
7.00 to 7.50; (5.524 µm)	-
7.50 to 8.00; (3.906 µm)	-
8.00 to 8.50; (2.762 µm)	-
8.50 to 9.00; (1.953 µm)	-
9.00 to 9.50; (1.381 µm)	-
9.50 to 10.00; (0.977 µm)	-
10.00 to 10.50; (0.691 µm)	-
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 1. Final Summary Data sheets as supplied by participating laboratories.

NMBAQCS - PS Exercise Data Workbook
(Page 2 - Final Merged Data Submission)

Return to Unicomarine Ltd. by 29-04-11

Exercise Code:	**PS38**
LabCode:	**LB1702**
Sample Code:	**PS381702**

Phi interval (explicit) **+ sieve mesh (theoretical sieves shown in brackets)**	**Volume/Weight** **(mark as "-" for not analysed; "0" for no material)**
-6.50 to -6.00; 63 mm	*0.00*
-6.00 to -5.50; 45 mm	*0.00*
-5.50 to -5.00; 31.5 mm	*0.00*
-5.00 to -4.50; 22.4 mm	*0.00*
-4.50 to -4.00; 16 mm	*0.00*
-4.00 to -3.50; 11.2 mm	*6.50*
-3.50 to -3.00; 8 mm	*250.53*
-3.00 to -2.50; 5.6 mm	*188.23*
-2.50 to -2.00; 4 mm	*45.32*
-2.00 to -1.50; 2.8 mm	*19.41*
-1.50 to -1.00; 2 mm	*7.16*
-1.00 to -0.50; 1.4 mm	*1.93*
-0.50 to 0.00; 1 mm	*0.56*
0.00 to 0.50; (707 µm)	*0.13*
0.50 to 1.00; (500 µm)	*–*
1.00 to 1.50; (353.6 µm)	
1.50 to 2.00; (250 µm)	
2.00 to 2.50; (176.8 µm)	
2.50 to 3.00; (125 µm)	
3.00 to 3.50; (88.39 µm)	
3.50 to 4.00; (62.5 µm)	
4.00 to 4.50; (44.19 µm)	
4.50 to 5.00; (31.25 µm)	
5.00 to 5.50; (22.097 µm)	
5.50 to 6.00; (15.625 µm)	
6.00 to 6.50; (11.049 µm)	
6.50 to 7.00; (7.813 µm)	
7.00 to 7.50; (5.524 µm)	
7.50 to 8.00; (3.906 µm)	
8.00 to 8.50; (2.762 µm)	
8.50 to 9.00; (1.953 µm)	
9.00 to 9.50; (1.381 µm)	
9.50 to 10.00; (0.977 µm)	
10.00 to 10.50; (0.691 µm)	
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 1. Final Summary Data sheets as supplied by participating laboratories.

NMBAQCS - PS Exercise Data Workbook
(Page 2 - Final Merged Data Submission)

Return to Unicomarine Ltd. by 29-04-11

Exercise Code:	**PS38**
LabCode:	**LB1705**
Sample Code:	**PS381705**

Phi interval (explicit) + sieve mesh (theoretical sieves shown in brackets)	**Volume/Weight (mark as "-" for not analysed; "0" for no material)**
-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	**268.4600**
-3.00 to -2.50; 5.6 mm	**176.5000**
-2.50 to -2.00; 4 mm	**45.6700**
-2.00 to -1.50; 2.8 mm	**19.3000**
-1.50 to -1.00; 2 mm	**6.1800**
-1.00 to -0.50; 1.4 mm	**1.8000**
-0.50 to 0.00; 1 mm	**0.4800**
0.00 to 0.50; (707 µm)	*0.2727*
0.50 to 1.00; (500 µm)	*0.0193*
1.00 to 1.50; (353.6 µm)	*0.0130*
1.50 to 2.00; (250 µm)	*0.0124*
2.00 to 2.50; (176.8 µm)	*0.0120*
2.50 to 3.00; (125 µm)	*0.0146*
3.00 to 3.50; (88.39 µm)	*0.0134*
3.50 to 4.00; (62.5 µm)	*0.0157*
4.00 to 4.50; (44.19 µm)	*0.0177*
4.50 to 5.00; (31.25 µm)	*0.0233*
5.00 to 5.50; (22.097 µm)	*0.0339*
5.50 to 6.00; (15.625 µm)	*0.0393*
6.00 to 6.50; (11.049 µm)	*0.0431*
6.50 to 7.00; (7.813 µm)	*0.0451*
7.00 to 7.50; (5.524 µm)	*0.0427*
7.50 to 8.00; (3.906 µm)	*0.0408*
8.00 to 8.50; (2.762 µm)	*0.0811*
8.50 to 9.00; (1.953 µm)	-
9.00 to 9.50; (1.381 µm)	-
9.50 to 10.00; (0.977 µm)	-
10.00 to 10.50; (0.691 µm)	-
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 1. Final Summary Data sheets as supplied by participating laboratories.

NMBAQCS - PS Exercise Data Workbook
(Page 2 - Final Merged Data Submission)

Return to Unicomarine Ltd. by 29-04-11

Exercise Code:	**PS38**
LabCode:	**LB1707**
Sample Code:	**PS381707**

Phi interval (explicit) + sieve mesh (theoretical sieves shown in brackets)	**Volume % (mark as "-" for not analysed; "0" for no material)**
-6.50 to -6.00; 63 mm	0.00
-6.00 to -5.50; 45 mm	0.00
-5.50 to -5.00; 31.5 mm	0.00
-5.00 to -4.50; 22.4 mm	0.00
-4.50 to -4.00; 16 mm	0.00
-4.00 to -3.50; 11.2 mm	2.04
-3.50 to -3.00; 8 mm	51.08
-3.00 to -2.50; 5.6 mm	33.64
-2.50 to -2.00; 4 mm	7.45
-2.00 to -1.50; 2.8 mm	4.19
-1.50 to -1.00; 2 mm	1.14
-1.00 to -0.50; 1.4 mm	0.36
-0.50 to 0.00; 1 mm	0.09
0.00 to 0.50; (707 µm)	0.01
0.50 to 1.00; (500 µm)	0.00
1.00 to 1.50; (353.6 µm)	0.00
1.50 to 2.00; (250 µm)	0.00
2.00 to 2.50; (176.8 µm)	0.00
2.50 to 3.00; (125 µm)	0.00
3.00 to 3.50; (88.39 µm)	0.00
3.50 to 4.00; (62.5 µm)	0.00
4.00 to 4.50; (44.19 µm)	0.00
4.50 to 5.00; (31.25 µm)	-
5.00 to 5.50; (22.097 µm)	-
5.50 to 6.00; (15.625 µm)	-
6.00 to 6.50; (11.049 µm)	-
6.50 to 7.00; (7.813 µm)	-
7.00 to 7.50; (5.524 µm)	-
7.50 to 8.00; (3.906 µm)	-
8.00 to 8.50; (2.762 µm)	-
8.50 to 9.00; (1.953 µm)	-
9.00 to 9.50; (1.381 µm)	-
9.50 to 10.00; (0.977 µm)	-
10.00 to 10.50; (0.691 µm)	-
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 1. Final Summary Data sheets as supplied by participating laboratories.

NMBAQCS - PS Exercise Data Workbook
(Page 3 - Final Sieve Data)*

Return to Unicomarine Ltd. by 29-04-11

Exercise Code:	**PS38**
LabCode:	**LB1712**
Sample Code:	**PS381712**
Does the PS exercise replicate contain material >1 mm or did your visual observation record a gravel component?	< 5% material <1mm. Dry sieved only. Complete sieve data below

Phi interval (explicit) + sieve mesh (theoretical sieves shown in brackets)	**Weight (g) (mark as "-" for not analysed; "0" for no material)**
>14 mm	3.6729
>10 mm	59.7698
>8 mm	187.0242
> 4 mm	243.4532
>2 mm	24.6873
>1 mm	2.1582
>500 µm	0.0543
>250 µm	0.0940
>125 µm	0.0612
>63 µm	0.0145
<63mm	0.0143

Summary Data

Phi; sieve mesh	**Weight (g)**
< 0.00; >1 mm	520.7656
> 0.00; <1 mm	2.3965
Total	523.1621

* Final worksheet not submitted

Appendix 1. Final Summary Data sheets as supplied by participating laboratories.

NMBAQCS - PS Exercise Data Workbook
(Page 2 - Final Merged Data Submission)

Return to Unicomarine Ltd. by 29-04-11

Exercise Code:	**PS38**
LabCode:	**LB1713**
Sample Code:	**PS381713**

Phi interval (explicit) + sieve mesh (theoretical sieves shown in brackets)	**Volume/Weight (mark as "-" for not analysed; "0" for 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	**5.8800**
-3.50 to -3.00; 8 mm	**243.6700**
-3.00 to -2.50; 5.6 mm	**189.2100**
-2.50 to -2.00; 4 mm	**51.5500**
-2.00 to -1.50; 2.8 mm	**21.8800**
-1.50 to -1.00; 2 mm	**6.3700**
-1.00 to -0.50; 1.4 mm	*2.0800*
-0.50 to 0.00; 1 mm	*0.5100*
0.00 to 0.50; (707 µm)	*0.0000*
0.50 to 1.00; (500 µm)	*0.0000*
1.00 to 1.50; (353.6 µm)	*0.0000*
1.50 to 2.00; (250 µm)	*0.0000*
2.00 to 2.50; (176.8 µm)	*0.0000*
2.50 to 3.00; (125 µm)	*0.0000*
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*

Appendix 1. Final Summary Data sheets as supplied by participating laboratories.

NMBAQCS - PS Exercise Data Workbook
(Page 2 - Final Merged Data Submission)

Return to Unicomarine Ltd. by 29-04-11

Exercise Code:	**PS38**
LabCode:	**LB1715**
Sample Code:	**PS381715**

Phi interval (explicit) **+ sieve mesh (theoretical sieves shown in brackets)**	**Volume/Weight** **(mark as "-" for not analysed; "0" for no material)**
-6.50 to -6.00; 63 mm	**0.0000**
-6.00 to -5.50; 45 mm	**-**
-5.50 to -5.00; 31.5 mm	**0.0000**
-5.00 to -4.50; 22.4 mm	**-**
-4.50 to -4.00; 16 mm	**0.0000**
-4.00 to -3.50; 11.2 mm	**-**
-3.50 to -3.00; 8 mm	**256.4300**
-3.00 to -2.50; 5.6 mm	**-**
-2.50 to -2.00; 4 mm	**232.4300**
-2.00 to -1.50; 2.8 mm	**-**
-1.50 to -1.00; 2 mm	**28.9700**
-1.00 to -0.50; 1.4 mm	*-*
-0.50 to 0.00; 1 mm	*2.7200*
0.00 to 0.50; (707 µm)	*-*
0.50 to 1.00; (500 µm)	*0.2000*
1.00 to 1.50; (353.6 µm)	*-*
1.50 to 2.00; (250 µm)	*0.1800*
2.00 to 2.50; (176.8 µm)	*-*
2.50 to 3.00; (125 µm)	*0.0700*
3.00 to 3.50; (88.39 µm)	*-*
3.50 to 4.00; (62.5 µm)	*0.0700*
4.00 to 4.50; (44.19 µm)	*-*
4.50 to 5.00; (31.25 µm)	*-*
5.00 to 5.50; (22.097 µm)	*-*
5.50 to 6.00; (15.625 µm)	*-*
6.00 to 6.50; (11.049 µm)	*-*
6.50 to 7.00; (7.813 µm)	*-*
7.00 to 7.50; (5.524 µm)	*-*
7.50 to 8.00; (3.906 µm)	*-*
8.00 to 8.50; (2.762 µm)	*-*
8.50 to 9.00; (1.953 µm)	*-*
9.00 to 9.50; (1.381 µm)	*-*
9.50 to 10.00; (0.977 µm)	*-*
10.00 to 10.50; (0.691 µm)	*-*
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 1. Final Summary Data sheets as supplied by participating laboratories.

NMBAQCS - PS Exercise Data Workbook
(Page 2 - Final Merged Data Submission)

Return to Unicomarine Ltd. by 29-04-11

Exercise Code:	**PS38**
LabCode:	**LB1716**
Sample Code:	**PS381716**

Phi interval (explicit) + sieve mesh (theoretical sieves shown in brackets)	**Volume/Weight (mark as "-" for not analysed; "0" for 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	**-**
-3.50 to -3.00; 8 mm	**50.7359**
-3.00 to -2.50; 5.6 mm	**-**
-2.50 to -2.00; 4 mm	**43.9421**
-2.00 to -1.50; 2.8 mm	**4.0271**
-1.50 to -1.00; 2 mm	**1.0471**
-1.00 to -0.50; 1.4 mm	*0.1864*
-0.50 to 0.00; 1 mm	*0.0615*
0.00 to 0.50; (707 µm)	*0.0000*
0.50 to 1.00; (500 µm)	*0.0000*
1.00 to 1.50; (353.6 µm)	*0.0000*
1.50 to 2.00; (250 µm)	*0.0000*
2.00 to 2.50; (176.8 µm)	*0.0000*
2.50 to 3.00; (125 µm)	*0.0000*
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*

Appendix 1. Final Summary Data sheets as supplied by participating laboratories.

NMBAQCS - PS Exercise Data Workbook
(Page 2 - Final Merged Data Submission)

Return to Unicomarine Ltd. by 29-04-11

Exercise Code:	**PS38**
LabCode:	**LB1726**
Sample Code:	**PS381726**

Phi interval (explicit) + sieve mesh (theoretical sieves shown in brackets)	**Volume/Weight (mark as "-" for not analysed; "0" for no material)**
-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	**0.0000**
-4.00 to -3.50; 11.2 mm	-
-3.50 to -3.00; 8 mm	**53.7201**
-3.00 to -2.50; 5.6 mm	-
-2.50 to -2.00; 4 mm	**40.7407**
-2.00 to -1.50; 2.8 mm	-
-1.50 to -1.00; 2 mm	**5.0717**
-1.00 to -0.50; 1.4 mm	*0.3348*
-0.50 to 0.00; 1 mm	*0.1039*
0.00 to 0.50; (707 µm)	
0.50 to 1.00; (500 µm)	
1.00 to 1.50; (353.6 µm)	
1.50 to 2.00; (250 µm)	
2.00 to 2.50; (176.8 µm)	
2.50 to 3.00; (125 µm)	
3.00 to 3.50; (88.39 µm)	
3.50 to 4.00; (62.5 µm)	
4.00 to 4.50; (44.19 µm)	
4.50 to 5.00; (31.25 µm)	
5.00 to 5.50; (22.097 µm)	
5.50 to 6.00; (15.625 µm)	
6.00 to 6.50; (11.049 µm)	
6.50 to 7.00; (7.813 µm)	
7.00 to 7.50; (5.524 µm)	
7.50 to 8.00; (3.906 µm)	
8.00 to 8.50; (2.762 µm)	
8.50 to 9.00; (1.953 µm)	
9.00 to 9.50; (1.381 µm)	
9.50 to 10.00; (0.977 µm)	
10.00 to 10.50; (0.691 µm)	
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.

	-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	z-score	-4.00 to -3.50	z-score	-3.50 to -3.00	z-score	-3.00 to -2.50	z-score	-2.50 to -2.00	z-score
LB1701	0.0000	0.0000	0.0000	0.0000	0.0000	-0.32	0.9684	-0.32	48.8202	0.10	34.7686	0.78	9.6170	-0.74
LB1702	0.0000	0.0000	0.0000	0.0000	0.0000	-0.32	1.2506	-0.24	48.2002	-0.03	36.2141	0.86	8.7192	-0.79
LB1705	0.0000	0.0000	0.0000	0.0000	0.0000	-0.32	0.0000	-0.59	51.7134	0.69	33.9992	0.73	8.7974	-0.78
LB1707	0.0000	0.0000	0.0000	0.0000	0.0000	-0.32	2.0394	-0.01	51.0791	0.56	33.6353	0.71	7.4454	-0.86
LB1712	0.0000	0.0000	0.0000	0.0000	0.7050	2.85	11.4720	2.66	35.8969	-2.56	0.0000	-1.16	46.7277	1.31
LB1713	0.0000	0.0000	0.0000	0.0000	0.0000	-0.32	1.1283	-0.27	46.7562	-0.33	36.3062	0.86	9.8916	-0.72
LB1715	0.0000	0.0000	0.0000	0.0000	0.0000	-0.32	0.0000	-0.59	49.2122	0.18	0.0000	-1.16	44.6063	1.19
LB1716	0.0000	0.0000	0.0000	0.0000	0.0000	-0.32	0.0000	-0.59	50.7359	0.49	0.0000	-1.16	43.9421	1.15
LB1726	0.0000	0.0000	0.0000	0.0000	0.0000	-0.32	0.0000	-0.59	53.7201	1.10	0.0000	-1.16	40.7407	0.98
BENCHMARK	0.0000	0.0000	0.0000	0.0000	0.0000	-0.32	3.9672	0.53	47.4175	-0.19	33.5208	0.71	9.6193	-0.74
mean	0.0000	0.0000	0.0000	0.0000	0.0705		2.0826		48.3552		20.8444		23.0107	
St.Dev	0.0000	0.0000	0.0000	0.0000	0.2229		3.5262		4.8622		17.9644		18.1375	

	-2.00 to -1.50	z-score	-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
LB1701	4.1566	0.70	1.1236	-0.64	0.4079	0.83	0.0968	-0.44	0.0407	1.43	0.0000	-0.46	0.0000	-0.46
LB1702	3.7343	0.49	1.3775	-0.51	0.3713	0.60	0.1077	-0.37	0.0250	0.64	0.0000	-0.46	0.0000	-0.46
LB1705	3.7178	0.48	1.1905	-0.61	0.3467	0.44	0.0925	-0.47	0.0525	2.02	0.0037	-0.15	0.0025	2.38
LB1707	4.1854	0.72	1.1436	-0.63	0.3629	0.54	0.0894	-0.49	0.0054	-0.35	0.0023	-0.26	0.0015	1.29
LB1712	0.0000	-1.44	4.7384	1.24	0.0000	-1.75	0.4142	1.53	0.0000	-0.62	0.0104	0.41	0.0000	-0.46
LB1713	4.1984	0.73	1.2223	-0.59	0.3991	0.77	0.0979	-0.44	0.0000	-0.62	0.0000	-0.46	0.0000	-0.46
LB1715	0.0000	-1.44	5.5597	1.67	0.0000	-1.75	0.5220	2.20	0.0000	-0.62	0.0384	2.74	0.0000	-0.46
LB1716	4.0271	0.64	1.0471	-0.68	0.1864	-0.57	0.0615	-0.66	0.0000	-0.62	0.0000	-0.46	0.0000	-0.46
LB1726	0.0000	-1.44	5.0717	1.41	0.3348	0.37	0.1039	-0.40	0.0000	-0.62	0.0000	-0.46	0.0000	-0.46
BENCHMARK	3.9247	0.58	1.1091	-0.65	0.3605	0.53	0.0922	-0.47	0.0000	-0.62	0.0000	-0.46	0.0000	-0.46
mean	2.7944		2.3584		0.2770		0.1678		0.0124		0.0055		0.0004	
St.Dev	1.9357		1.9198		0.1582		0.1608		0.0198		0.0120		0.0009	

z-score = 0

Appendix 2. Z-score 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	5.00 to 5.50	z-score
LB1701	0.0000	-0.50	0.0000	-0.46	0.0000	-0.61	0.0000	-0.42	0.0000	-0.48	0.0000	-0.55	0.0000	-0.32	0.0000	-0.32
LB1702	0.0000	-0.50	0.0000	-0.46	0.0000	-0.61	0.0000	-0.42	0.0000	-0.48	0.0000	-0.55	0.0000	-0.32	0.0000	-0.32
LB1705	0.0024	-0.29	0.0023	2.32	0.0028	-0.06	0.0026	2.66	0.0030	0.24	0.0034	2.09	0.0045	2.85	0.0065	2.85
LB1707	0.0025	-0.28	0.0015	1.38	0.0033	0.03	0.0010	0.72	0.0010	-0.25	0.0010	0.20	0.0000	-0.32	0.0000	-0.32
LB1712	0.0180	1.06	0.0000	-0.46	0.0117	1.67	0.0000	-0.42	0.0028	0.18	0.0027	1.58	0.0000	-0.32	0.0000	-0.32
LB1713	0.0000	-0.50	0.0000	-0.46	0.0000	-0.61	0.0000	-0.42	0.0000	-0.48	0.0000	-0.55	0.0000	-0.32	0.0000	-0.32
LB1715	0.0345	2.49	0.0000	-0.46	0.0134	2.00	0.0000	-0.42	0.0134	2.73	0.0000	-0.55	0.0000	-0.32	0.0000	-0.32
LB1716	0.0000	-0.50	0.0000	-0.46	0.0000	-0.61	0.0000	-0.42	0.0000	-0.48	0.0000	-0.55	0.0000	-0.32	0.0000	-0.32
LB1726	0.0000	-0.50	0.0000	-0.46	0.0000	-0.61	0.0000	-0.42	0.0000	-0.48	0.0000	-0.55	0.0000	-0.32	0.0000	-0.32
BENCHMARK	0.0000	-0.50	0.0000	-0.46	0.0000	-0.61	0.0000	-0.42	0.0000	-0.48	0.0000	-0.55	0.0000	-0.32	0.0000	-0.32
mean	0.0057		0.0004		0.0031		0.0004		0.0020		0.0007		0.0004		0.0007	
St.Dev	0.0115		0.0008		0.0052		0.0008		0.0042		0.0013		0.0014		0.0021	

	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	8.50 to 9.00
LB1701	0.0000	-0.32	0.0000	-0.32	0.0000	-0.32	0.0000	-0.32	0.0000	-0.32	0.0000	-0.32	0.0000
LB1702	0.0000	-0.32	0.0000	-0.32	0.0000	-0.32	0.0000	-0.32	0.0000	-0.32	0.0000	-0.32	0.0000
LB1705	0.0076	2.85	0.0083	2.85	0.0087	2.85	0.0082	2.85	0.0079	2.85	0.0156	2.85	0.0000
LB1707	0.0000	-0.32	0.0000	-0.32	0.0000	-0.32	0.0000	-0.32	0.0000	-0.32	0.0000	-0.32	0.0000
LB1712	0.0000	-0.32	0.0000	-0.32	0.0000	-0.32	0.0000	-0.32	0.0000	-0.32	0.0000	-0.32	0.0000
LB1713	0.0000	-0.32	0.0000	-0.32	0.0000	-0.32	0.0000	-0.32	0.0000	-0.32	0.0000	-0.32	0.0000
LB1715	0.0000	-0.32	0.0000	-0.32	0.0000	-0.32	0.0000	-0.32	0.0000	-0.32	0.0000	-0.32	0.0000
LB1716	0.0000	-0.32	0.0000	-0.32	0.0000	-0.32	0.0000	-0.32	0.0000	-0.32	0.0000	-0.32	0.0000
LB1726	0.0000	-0.32	0.0000	-0.32	0.0000	-0.32	0.0000	-0.32	0.0000	-0.32	0.0000	-0.32	0.0000
BENCHMARK	0.0000	-0.32	0.0000	-0.32	0.0000	-0.32	0.0000	-0.32	0.0000	-0.32	0.0000	-0.32	0.0000
mean	0.0008		0.0008		0.0009		0.0008		0.0008		0.0016		0.0000
St.Dev	0.0024		0.0026		0.0027		0.0026		0.0025		0.0049		0.0000

z-score=0