

Summary statistics of bottom sediment quality of typhoon shelters, 2001 – 2005

Parameter	Tuen Mun NS5	Cheung Chau SS7	Hei Ling Chau SS8 ¹⁰	Rambler Channel VS17	Government Dockyard VS21 ¹⁰	Yau Ma Tei VS19	Causeway Bay VS12
Number of samples	10	10	6	10	6	10	10
Particle Size Fractionation <63µm (%w/w)	75 (59 - 92)	69 (22 - 98)	95 (84 - 100)	79 (56 - 98)	99 (98 - 100)	77 (48 - 97)	86 (48 - 99)
Electrochemical Potential (mV)	-181 ((-286) - (-69))	-190 ((-300) - (90))	-161 ((-232) - (-25))	-295 ((-404) - (-90))	-307 ((-388) - (-97))	-346 ((-407) - (-190))	-328 ((-407) - (-173))
Total Solids (%w/w)	48 (39 - 57)	48 (34 - 68)	38 (34 - 41)	45 (39 - 53)	37 (31 - 44)	51 (43 - 59)	44 (33 - 68)
Total Volatile Solids (%w/w)	6.9 (6.2 - 8.4)	7.1 (3.8 - 8.5)	8.2 (7.4 - 8.8)	8.3 (7 - 8.9)	8.4 (7.4 - 9.3)	7 (6 - 8.1)	8.6 (3.9 - 11.0)
Chemical Oxygen Demand (mg/kg)	19000 (15000 - 23000)	21000 (10000 - 28000)	14000 (13000 - 15000)	30000 (21000 - 41000)	16000 (9900 - 21000)	22000 (13000 - 26000)	30000 (26000 - 32000)
Total Carbon (%w/w)	0.6 (0.4 - 0.9)	0.8 (0.5 - 1.7)	0.5 (0.5 - 0.6)	0.9 (0.8 - 1.1)	0.6 (0.5 - 0.8)	0.8 (0.5 - 0.9)	0.9 (0.7 - 1.0)
Ammonical Nitrogen (mg/kg)	10 (1 - 28)	10 (2 - 20)	12 (4 - 22)	21 (4 - 37)	14 (4 - 29)	31 (11 - 48)	31 (4 - 67)
Total Kjeldahl Nitrogen (mg/kg)	334 (170 - 580)	412 (180 - 550)	430 (290 - 540)	503 (320 - 640)	350 (310 - 410)	415 (300 - 520)	586 (290 - 780)
Total Phosphorus (mg/kg)	191 (86 - 330)	401 (230 - 1100)	186 (160 - 220)	227 (160 - 300)	204 (180 - 230)	205 (160 - 230)	227 (150 - 300)
Total Sulphide (mg/kg)	131 (0 - 370)	197 (18 - 520)	111 (68 - 200)	865 (110 - 2500)	205 (8 - 630)	365 (26 - 1200)	368 (180 - 630)
Total Cyanide (mg/kg)	0.2 (0.1 - 0.3)	0.2 (0.1 - 0.3)	0.1 (0.1 - 0.1)	0.4 (0.1 - 0.8)	0.2 (0.1 - 0.3)	0.1 (0.1 - 0.2)	0.2 (0.1 - 0.3)
Arsenic (mg/kg)	8.9 (7.0 - 11.0)	8.7 (4.4 - 11.0)	8.6 (7.4 - 12.0)	8.4 (5.2 - 10.0)	8.8 (7.3 - 9.7)	6.4 (4.0 - 8.8)	8.3 (2.9 - 12.0)
Cadmium (mg/kg)	0.2 (0.1 - 0.4)	0.2 (0.1 - 0.3)	0.1 (0.1 - 0.1)	1.2 (0.5 - 2.0)	0.3 (0.1 - 0.5)	0.5 (0.1 - 0.9)	0.9 (0.2 - 1.2)
Chromium (mg/kg)	34 (24 - 49)	56 (14 - 73)	43 (34 - 58)	229 (85 - 470)	53 (50 - 56)	42 (26 - 54)	71 (15 - 95)
Copper (mg/kg)	47 (14 - 83)	156 (41 - 250)	41 (34 - 55)	395 (130 - 850)	119 (29 - 180)	97 (33 - 170)	272 (48 - 410)
Lead (mg/kg)	45 (27 - 60)	75 (27 - 190)	54 (41 - 78)	83 (54 - 110)	49 (34 - 65)	55 (24 - 82)	85 (24 - 120)
Mercury (mg/kg)	<0.05 (<0.05 - 0.12)	0.32 (0.1 - 0.6)	0.18 (0.12 - 0.39)	0.42 (0.14 - 1.5)	0.14 (<0.05 - 0.20)	0.31 (0.1 - 0.74)	0.84 (0.18 - 1.7)
Nickel (mg/kg)	19 (14 - 22)	17 (6 - 23)	27 (22 - 33)	99 (39 - 210)	32 (28 - 36)	23 (18 - 30)	27 (7 - 39)
Silver (mg/kg)	<1.0 (<1.0 - <1.0)	<1.0 (<1.0 - <1.0)	<1.0 (<1.0 - <1.0)	10.3 (3.0 - 18.0)	1.6 (<1.0 - 2.4)	1.9 (<1.0 - 3.7)	6.8 (<1.0 - 9.0)
Zinc (mg/kg)	136 (74 - 200)	188 (65 - 400)	143 (120 - 160)	323 (170 - 530)	204 (110 - 270)	202 (99 - 340)	298 (66 - 380)
Total Polychlorinated Biphenyls (PCBs) (µg/kg) ^{(3) (4)}	18 (18 - 18)	18 (18 - 19)	18 (18 - 18)	30 (18 - 48)	21 (18 - 25)	21 (18 - 26)	22 (18 - 32)
Low Molecular Weight Polycyclic Aromatic Hydrocarbons (PAHs) (µg/kg) ^{(5) (6)}	90 (90 - 90)	99 (90 - 108)	90 (90 - 90)	124 (96 - 142)	99 (90 - 117)	119 (110 - 132)	118 (90 - 150)
High Molecular Weight Polycyclic Aromatic Hydrocarbons (PAHs) (µg/kg) ^{(7) (8)}	143 (20 - 292)	491 (0 - 1427)	85 (38 - 151)	983 (366 - 2141)	197 (49 - 285)	1026 (65 - 3185)	590 (169 - 999)

Note: 1. Data presented are arithmetic means ; data in brackets indicate ranges.

2. All data are based on the analyses of bulk (unsieved) sediment and are reported on a dry weight basis unless stated otherwise.

3. The Technical Circular 'ETWB (W) No. 34/2002 Management of Dredged / Excavated Sediment' issued in 2002 has revised the definition of 'Total PCBs' as the summation of 18 specific PCB congeners. Following the new definition, the monitoring of these 18 PCB congeners started in 2002 and the Total PCBs results only refer to 2002 – 2005.

4. Total PCBs results are derived from the summation of 18 congeners. If the concentration of a congener is below report limit (RL), the result will be taken as 0.5xRL in the calculation.

5. Low molecular weight polyaromatic hydrocarbons (PAHs) include 6 congeners of molecular weight below 200, namely : Acenaphthene, Acenaphthylene, Anthracene, Flourene, Naphthalene and Phenanthrene.

6. As the monitoring of Naphthalene only started in 2002, the Low Molecular Weight PAHs results are based on sediments samples collected in 2002 – 2005.

7. High molecular weight polyaromatic hydrocarbons (PAHs) include 10 congeners of molecular weight above 200, namely : Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Dibenzo(a,h)anthracene, Benzo(g,h,i)perylene and Indeno(1,2,3-cd)pyrene.

8. Low and high molecular weight PAHs results are derived from the summation of the corresponding congeners. If the concentration of a congener is below report limit (RL), the result will be taken as 0.5xRL in the calculation.

Summary statistics of bottom sediment quality of typhoon shelters, 2001 – 2005 (continued)

Parameter	To Kwa Wan VS20	Kwun Tong VS14	Sam Ka Tsuen VS13	Aldrich Bay (Shau Kei Wan) ES5 ¹⁰	Chai Wan ES3	Hebe Haven PS4	Yim Tin Tsai PS2	Shuen Wan TS7
Number of samples	10	10	10	10	10	10	9	10
Particle Size Fractionation <63µm (%w/w)	80 (53 - 99)	79 (66 - 99)	95 (87 - 99)	95 (83 - 100)	86 (69 - 98)	94 (80 - 100)	83 (13 - 100)	70 (52 - 85)
Electrochemical Potential (mV)	-363 ((-433) - (-182))	-388 ((-437) - (-309))	-370 ((-417) - (-276))	-378 ((-422) - (-324))	-311 ((-394) - (-133))	-249 ((-354) - (-13))	-196 ((-286) - (-75))	-324 ((-392) - (-113))
Total Solids (%w/w)	46 (34 - 63)	39 (33 - 43)	41 (39 - 44)	34 (30 - 36)	43 (40 - 48)	37 (34 - 46)	49 (40 - 75)	41 (29 - 54)
Total Volatile Solids (%w/w)	7.9 (5.3 - 10.0)	10.3 (8.9 - 11.0)	10 (8.7 - 11.0)	10.9 (9.7 - 12.0)	8.2 (7.4 - 9.2)	9.8 (8.2 - 11.0)	10.2 (4.3 - 12.0)	8.5 (5.6 - 12.0)
Chemical Oxygen Demand (mg/kg)	31000 (29000 - 36000)	40000 (29000 - 45000)	27000 (22000 - 32000)	26000 (18000 - 31000)	24000 (18000 - 29000)	23000 (19000 - 26000)	17000 (7100 - 24000)	27000 (20000 - 32000)
Total Carbon (%w/w)	1 (0.8 - 1.5)	1.3 (1.1 - 1.5)	0.8 (0.7 - 0.9)	0.9 (0.7 - 1.0)	0.8 (0.7 - 1.0)	0.7 (0.5 - 0.9)	1.4 (0.6 - 4.4)	0.8 (0.5 - 1.0)
Ammonical Nitrogen (mg/kg)	25 (1 - 53)	47 (17 - 66)	24 (9 - 49)	36 (14 - 61)	10 (4 - 15)	7 (2 - 14)	13 (6 - 28)	12 (1 - 25)
Total Kjeldahl Nitrogen (mg/kg)	564 (390 - 740)	779 (680 - 950)	494 (420 - 600)	551 (470 - 640)	479 (400 - 540)	544 (450 - 620)	482 (180 - 630)	584 (310 - 780)
Total Phosphorus (mg/kg)	222 (170 - 260)	300 (260 - 360)	238 (180 - 370)	240 (190 - 390)	240 (200 - 270)	194 (160 - 240)	154 (48 - 200)	203 (140 - 270)
Total Sulphide (mg/kg)	360 (100 - 1300)	1281 (220 - 2500)	1173 (510 - 2300)	1173 (690 - 2800)	232 (21 - 420)	100 (8 - 210)	54 (15 - 110)	242 (15 - 460)
Total Cyanide (mg/kg)	0.2 (0.1 - 0.3)	0.3 (0.1 - 0.7)	0.3 (0.1 - 0.6)	0.2 (0.1 - 0.4)	0.2 (0.1 - 0.3)	0.2 (0.1 - 0.2)	0.1 (0.1 - 0.2)	0.2 (0.1 - 0.4)
Arsenic (mg/kg)	7.7 (6.3 - 9.0)	8.1 (5.9 - 10.0)	7.1 (5.8 - 8.9)	8.5 (6.9 - 11.0)	10.2 (8.4 - 11.0)	10.3 (8.6 - 12.0)	5.2 (0.6 - 9.1)	10 (7.0 - 13.0)
Cadmium (mg/kg)	1 (0.4 - 1.6)	4.2 (3.0 - 5.3)	0.7 (0.5 - 1.1)	0.7 (0.5 - 1.6)	0.6 (0.4 - 0.7)	0.2 (0.1 - 0.3)	0.1 (0.1 - 0.1)	0.5 (0.2 - 0.9)
Chromium (mg/kg)	100 (64 - 130)	405 (250 - 560)	73 (36 - 200)	72 (63 - 89)	110 (83 - 180)	37 (25 - 51)	17 (<5 - 24)	24 (15 - 33)
Copper (mg/kg)	629 (410 - 810)	2640 (1700 - 4000)	196 (97 - 450)	312 (250 - 370)	320 (240 - 400)	49 (31 - 58)	15 (1 - 20)	134 (37 - 310)
Lead (mg/kg)	99 (77 - 130)	154 (100 - 230)	118 (84 - 150)	92 (68 - 130)	85 (64 - 140)	45 (39 - 52)	30 (9 - 39)	104 (77 - 140)
Mercury (mg/kg)	1.12 (0.65 - 1.4)	1.03 (0.77 - 1.4)	0.57 (0.34 - 1.3)	0.37 (0.29 - 0.54)	0.48 (0.42 - 0.58)	0.16 (0.09 - 0.22)	0.05 (<0.05 - 0.09)	0.13 (0.07 - 0.21)
Nickel (mg/kg)	36 (29 - 40)	113 (68 - 170)	21 (11 - 48)	26 (21 - 36)	29 (20 - 37)	9 (7 - 15)	11 (<5 - 14)	12 (6 - 19)
Silver (mg/kg)	5.7 (3.0 - 9.0)	11.9 (8.0 - 16.0)	3.3 (2.0 - 6.0)	5.7 (5.0 - 7.0)	9.9 (6.0 - 18.0)	<1.0 (<1.0 - <1.0)	<1.0 (<1.0 - <1.0)	<1.0 (<1.0 - 1.0)
Zinc (mg/kg)	264 (180 - 320)	526 (420 - 670)	280 (210 - 360)	355 (280 - 480)	283 (220 - 340)	158 (120 - 170)	70 (24 - 91)	272 (170 - 400)
Total Polychlorinated Biphenyls (PCBs) (µg/kg) ^{(3) (4)}	78 (18 - 120)	186 (35 - 293)	32 (22 - 41)	19 (18 - 20)	41 (34 - 54)	19 (18 - 20)	18 (18 - 18)	18 (18 - 19)
Low Molecular Weight Polycyclic Aromatic Hydrocarbons (PAHs) (µg/kg) ^{(5) (6)}	8544 (2974 - 17405)	164 (145 - 191)	96 (94 - 98)	101 (94 - 113)	118 (108 - 127)	91 (90 - 93)	90 (90 - 90)	92 (90 - 98)
High Molecular Weight Polycyclic Aromatic Hydrocarbons (PAHs) (µg/kg) ^{(7) (8)}	62412 (2137 - 132600)	1429 (1052 - 2058)	420 (231 - 535)	714 (515 - 993)	613 (341 - 776)	100 (74 - 190)	67 (22 - 116)	107 (46 - 193)

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