

Appendix A1

Site A water samples : Sulphite Reducing Clostridia CFU of two water sample replicates on TSC media, water sample replicates MBCC, and Site MBCC (Average)

Sampling Date	Sampling Point (River sections)	Site A TSC 1 CFU (1/100 Dilution of 10 ml)	Site A TSC 1 MBCC (CFU/100ml)	Site A TSC 2 CFU (1/100 Dilution of 10 ml)	Site A TSC 2 MBCC (CFU/100ml)	Site A TSC MBCC (CFU/100ml)	Site A MBCC (CFU/100ml)
02.04.2007							
16.04.2007	A1	5	550	1	110	330	220
	A2	1	110	1	110	110	
	A3	1	110	3	330	220	
07.05.2007							
21.05.2007	A1	40	4400	40	4400	4400	2365
	A2	25	2750	15	1650	2200	
	A3	5	550	4	440	495	
04.06.2007							
15.06.2007	A1	2	220	3	330	275	183
	A2	1	110	3	330	220	
	A3	1	110	0	0	55	
30.07.2007	A1	1	110	5	550	330	257
	A2	2	220	1	110	165	
	A3	4	440	1	110	275	
17.08.2007	A1	1	110	1	110	110	183
	A2	1	110	2	220	165	
	A3	3	330	2	220	275	
04.09.2007	A1	10	1100	3	330	715	1283
	A2	4	440	2	220	330	
	A3	25	2750	26	2860	2805	
01.10.2007	A1	1	110	2	220	165	202
	A2	3	330	3	330	330	
	A3	2	220	0	0	110	
17.10.2007	A1	2	220	1	110	165	348
	A2	6	660	6	660	660	
	A3	2	220	2	220	220	
27.10.2007	A1	9	990	4	440	715	862
	A2	2	220	8	880	550	
	A3	13	1430	11	1210	1320	
27.11.2007	A1	3	330	11	1210	770	807
	A2	7	770	17	1870	1320	
	A3	0	0	6	660	330	
11.12.2007	A1	18	1980	45	4950	3465	3465
21.01.2008	A1	3	330	2	220	275	660
	A2	9	990	4	440	715	
	A3	8	880	10	1100	990	

Appendix A2

Site B water samples : Sulphite Reducing Clostridia CFU of two water sample replicates on TSC media, water sample replicates MBCC, and Site MBCC (Average)

Sampling Date	Sampling Point (River sections)	Site B	Site B	Site B	Site B	Site B	Site B
		TSC 1 CFU (1/100 Dilution of 10 ml)	TSC 1 MBCC (CFU/100ml)	TSC 2 CFU (1/100 Dilution of 10 ml)	TSC 2 MBCC (CFU/100ml)	TSC MBCC (CFU/100ml)	MBCC (CFU/100ml)
02.04.2007							
16.04.2007	B1	19	2090	14	1540	1815	917
	B2	8	880	4	440	660	
	B3	3	330	2	220	275	
07.05.2007							
21.05.2007	B1	27	2970	17	1870	2420	1503
	B2	13	1430	16	1760	1595	
	B3	2	220	7	770	495	
04.06.2007							
15.06.2007	B1	6	660	8	880	770	770
	B2	10	1100	8	880	990	
	B3	7	770	3	330	550	
30.07.2007	B1	20	2200	19	2090	2145	1980
	B2	19	2090	20	2200	2145	
	B3	16	1760	14	1540	1650	
17.08.2007	B1	13	1430	20	2200	1815	1118
	B2	8	880	8	880	880	
	B3	6	660	6	660	660	
04.09.2007	B1	100	11000	123	13530	12265	10303
	B2	88	9680	91	10010	9845	
	B3	80	8800	80	8800	8800	
01.10.2007	B1	2	220	0	0	110	642
	B2	7	770	9	990	880	
	B3	5	550	12	1320	935	
17.10.2007	B1	23	2530	28	3080	2805	2163
	B2	16	1760	11	1210	1485	
	B3	23	2530	17	1870	2200	
27.10.2007	B1	68	7480	70	7700	7590	6105
	B2	41	4510	51	5610	5060	
	B3	70	7700	33	3630	5665	
27.11.2007	B1	28	3080	39	4290	3685	3190
	B2	50	5500	9	990	3245	
	B3	38	4180	10	1100	2640	
11.12.2007	B1	61	6710	73	8030	7370	7370
21.01.2008	B1	24	2640	27	2970	2805	2823
	B2	11	1210	15	1650	1430	
	B3	48	5280	29	3190	4235	

Appendix A3

Site C water samples : Sulphite Reducing Clostridia CFU of two water sample replicates on TSC media, water sample replicates MBCC, and Site MBCC (Average)

Sampling Date	Sampling Point (River sections)	Site C	Site C	Site C	Site C	Site C	Site C
		TSC 1 CFU (1/100 Dilution of 10 ml)	TSC 1 MBCC (CFU/100ml)	TSC 2 CFU (1/100 Dilution of 10 ml)	TSC 2 MBCC (CFU/100ml)	TSC MBCC (CFU/100ml)	Site C MBCC (CFU/100ml)
02.04.2007							
16.04.2007	C1	30	3300	34	3740	3520	3603
	C2	39	4290	28	3080	3685	
07.05.2007							
21.05.2007	C1	20	2200	14	1540	1870	1513
	C2	8	880	13	1430	1155	
04.06.2007							
15.06.2007	C1	20	2200	26	2860	2530	2347
	C2	12	1320	32	3520	2420	
	C3	20	2200	18	1980	2090	
30.07.2007	C1	23	2530	25	2750	2640	2182
	C2	23	2530	19	2090	2310	
	C3	20	2200	9	990	1595	
17.08.2007	C1	11	1210	14	1540	1375	1577
	C2	13	1430	14	1540	1485	
	C3	14	1540	20	2200	1870	
04.09.2007	C1	53	5830	44	4840	5335	4803
	C2	70	7700	45	4950	6325	
	C3	25	2750	25	2750	2750	
01.10.2007	C1	15	1650	11	1210	1430	1128
	C2	4	440	11	1210	825	
17.10.2007							
27.10.2007	C1	27	2970	41	4510	3740	3740
27.11.2007	C1	30	3300	34	3740	3520	4088
	C2	20	2200	35	3850	3025	
	C3	53	5830	51	5610	5720	
11.12.2007							
21.01.2008	C1	43	4730	17	1870	3300	2603
	C2	10	1100	26	2860	1980	
	C3	26	2860	20	2200	2530	

Appendix A4

Site D1D2E water samples : Sulphite Reducing Clostridia CFU of two water sample replicates on TSC media, water sample replicates MBCC, and Site MBCC (Average)

Sampling Date	Sampling Point (River sections)	Site D1D2E	Site D1D2E	Site D1D2E	Site D1D2E	Site D1D2E	Site D1D2E
		TSC 1 CFU (1/100 Dilution of 10 ml)	TSC 1 MBCC (CFU/100ml)	TSC 2 CFU (1/100 Dilution of 10 ml)	TSC 2 MBCC (CFU/100ml)	TSC MBCC (CFU/100ml)	MBCC (CFU/100ml)
02.04.2007							
16.04.2007	D1	9	990	14	1540	1265	1503
	D2	10	1100	9	990	1045	
	E	10	1100	30	3300	2200	
07.05.2007	D1	12	1320	9	990	1155	1412
	D2	18	1980	15	1650	1815	
	E	13	1430	10	1100	1265	
21.05.2007							
04.06.2007	D1	11	1210	21	2310	1760	2695
	D2	23	2530	28	3080	2805	
	E	28	3080	36	3960	3520	
15.06.2007	D1	8	880	10	1100	990	1027
	D2	13	1430	8	880	1155	
	E	4	440	13	1430	935	
30.07.2007	D1	36	3960	41	4510	4235	3667
	D2	34	3740	37	4070	3905	
	E	23	2530	29	3190	2860	
17.08.2007	D1	23	2530	9	990	1760	2493
	D2	27	2970	22	2420	2695	
	E	29	3190	26	2860	3025	
04.09.2007	D1	80	8800	80	8800	8800	8983
	D2	110	12100	100	11000	11550	
	E	60	6600	60	6600	6600	
01.10.2007							
17.10.2007	D1	32	3520	27	2970	3245	3337
	D2	24	2640	28	3080	2860	
	E	34	3740	37	4070	3905	
27.10.2007	D1	41	4510	80	8800	6655	3997
	D2	5	550	24	2640	1595	
	E	30	3300	38	4180	3740	
27.11.2007	D1	50	5500	50	5500	5500	6362
	D2	80	8800	80	8800	8800	
	E	47	5170	40	4400	4785	
11.12.2007	D1	80	8800	71	7810	8305	8012
	D2	77	8470	50	5500	6985	
	E	92	10120	67	7370	8745	
21.01.2008	D1	54	5940	100	11000	8470	6948
	D2	77	8470	48	5280	6875	
	E	50	5500	53	5830	5665	

Appendix A5

Site F water samples : Sulphite Reducing Clostridia CFU of two water sample replicates on TSC media, water sample replicates MBCC, and Site MBCC (Average)

Sampling Date	Sampling Point (River sections)	Site F	Site F	Site F	Site F	Site F	Site F
		TSC 1 CFU (1/100 Dilution of 10 ml)	TSC 1 MBCC (CFU/100ml)	TSC 2 CFU (1/100 Dilution of 10 ml)	TSC 2 MBCC (CFU/100ml)	TSC MBCC (CFU/100ml)	MBCC (CFU/100ml)
02.04.2007	1	29	3190	38	4180	3685	3685
16.04.2007	1	25	2750	20	2200	2475	2475
07.05.2007							
21.05.2007							
04.06.2007	1	95	10450	68	7480	8965	8965
15.06.2007	1	52	5720	53	5830	5775	5775
30.07.2007	1	42	4620	31	3410	4015	4015
17.08.2007	1	36	3960	50	5500	4730	4730
04.09.2007	1	81	8910	69	7590	8250	8250
01.10.2007	1	18	1980	25	2750	2365	2365
17.10.2007	1	38	4180	51	5610	4895	4895
27.10.2007	1	95	10450	33	3630	7040	7040
27.11.2007	1	101	11110	105	11550	11330	11330
11.12.2007	1	105	11550	123	13530	12540	12540
21.01.2008	1	55	6050	43	4730	5390	5390

Appendix A6

Site G water samples : Sulphite Reducing Clostridia CFU of two water sample replicates on TSC media, water sample replicates MBCC, and Site MBCC (Average)

Sampling Date	Sampling Point (River sections)	Site G	Site G	Site G	Site G	Site G	Site G
		TSC 1 CFU (1/100 Dilution of 10 ml)	TSC 1 MBCC (CFU/100ml)	TSC 2 CFU (1/100 Dilution of 10 ml)	TSC 2 MBCC (CFU/100ml)	TSC MBCC (CFU/100ml)	Site G MBCC (CFU/100ml)
02.04.2007	G1	40	4400	30	3300	3850	3942
	G2	39	4290	32	3520	3905	
	G3	40	4400	34	3740	4070	
16.04.2007							
07.05.2007							
21.05.2007	G1	50	5500	60	6600	6050	6233
	G2	50	5500	70	7700	6600	
	G3	60	6600	50	5500	6050	
04.06.2007	G1	82	9020	96	10560	9790	10780
	G2	125	13750	100	11000	12375	
	G3	96	10560	89	9790	10175	
15.06.2007	G1	23	2530	27	2970	2750	2750
30.07.2007	G1	36	3960	53	5830	4895	4565
G2	31	3410	40	4400	3905		
G3	45	4950	44	4840	4895		
17.08.2007	G1	89	9790	70	7700	8745	8562
	G2	89	9790	70	7700	8745	
	G3	70	7700	79	8690	8195	
04.09.2007	G1	60	6600	70	7700	7150	7150
01.10.2007							
17.10.2007	G1	75	8250	56	6160	7205	6838
	G2	62	6820	60	6600	6710	
	G3	52	5720	68	7480	6600	
27.10.2007	G1	84	9240	110	12100	10670	10028
	G2	69	7590	114	12540	10065	
	G3	60	6600	110	12100	9350	
27.11.2007	G1	102	11220	120	13200	12210	9698
	G2	67	7370	50	5500	6435	
	G3	80	8800	110	12100	10450	
11.12.2007	G1	146	16060	171	18810	17435	17435
21.01.2008	G1	88	9680	84	9240	9460	9460

Appendix A7

Site A water samples (A1, A2 & A3) : Number of presumptive CP selected for biochemical confirmation tests, number of confirmed CP by alpha toxin gene detection, CP IRt and CP Prevalence

Site A									
Sampling Date	A1 Number of Black Colonies	A2 Number of Black Colonies	A3 Number of Black Colonies	Total Number of Black Colonies (Nt)	A1 Number of CP	A2 Number of CP	A3 Number of CP	Total Number of CP	Site A CP Isolation Rate (IRt, %)
02.04.07	-	-	-	-	-	-	-	-	-
16.04.07	17	14	15	46	-	-	-	-	-
07.05.07	-	-	-	-	-	-	-	-	-
21.05.07	21	19	20	60	0	0	0	0	0.00
04.06.07	-	-	-	-	-	-	-	-	-
15.06.07	14	14	11	39	0	1	1	2	5.13
30.07.07	15	17	18	50	0	0	0	0	0.00
17.08.07	18	20	19	57	0	0	0	0	0.00
04.09.07	21	18	21	60	0	0	0	0	0.00
01.10.07	21	20	18	59	1	2	0	3	5.08
17.10.07	21	19	20	60	2	1	1	4	6.67
27.10.07	8	10	13	31	0	0	0	0	0.00
27.11.07	16	15	12	43	0	0	0	0	0.00
11.12.07	21	-	-	21	0	-	-	0	0.00
21.01.08	20	21	16	57	0	0	0	0	0.00

CP Prevalence = 3/11 = 27.3 %

Appendix A8

Site B water samples (B1, B2 & B3) : Number of presumptive CP selected for biochemical confirmation tests, number of confirmed CP by alpha toxin gene detection, CP IRt and CP Prevalence

Site B									
Sampling Date	B1 Number of Black Colonies	B2 Number of Black Colonies	B3 Number of Black Colonies	Total Number of Black Colonies (Nt)	B1 Number of CP	B2 Number of CP	B3 Number of CP	Total Number of CP	Site B CP Isolation Rate (IRt, %)
02.04.07	-	-	-	-	-	-	-	-	-
16.04.07	14	10	15	39	-	-	-	-	-
07.05.07	-	-	-	-	-	-	-	-	-
21.05.07	19	19	17	55	1	5	0	6	10.91
04.06.07	-	-	-	-	-	-	-	-	-
15.06.07	16	14	16	46	1	4	2	7	15.22
30.07.07	16	16	19	51	1	0	0	1	1.96
17.08.07	21	20	15	56	1	0	0	1	1.79
04.09.07	18	20	17	55	2	0	0	2	3.64
01.10.07	21	19	20	60	13	4	4	21	35.00
17.10.07	18	16	17	51	3	5	2	10	19.61
27.10.07	16	20	20	56	2	3	2	7	12.50
27.11.07	17	16	15	48	1	0	0	1	2.08
11.12.07	21	-	-	21	1	-	-	1	4.76
21.01.08	17	18	18	53	7	1	2	10	18.87

CP Prevalence = 11/11 = 100 %

Appendix A9

Site C water samples (C1, C2 & C3) : Number of presumptive CP selected for biochemical confirmation tests, number of confirmed CP by alpha toxin gene detection, CP IRt and CP Prevalence

Site C									
Sampling Date	C1 Number of Black Colonies	C2 Number of Black Colonies	C3 Number of Black Colonies	Total Number of Black Colonies (Nt)	C1 Number of CP	C2 Number of CP	C3 Number of CP	Total Number of CP	Site C CP Isolation Rate (IRt, %)
02.04.07	-	-	-	-	-	-	-	-	-
16.04.07	10	13	-	23	-	-	-	-	-
07.05.07	-	-	-	-	-	-	-	-	-
21.05.07	14	17	-	31	3	1	-	4	12.90
04.06.07	-	-	-	-	-	-	-	-	-
15.06.07	17	14	11	42	1	2	1	4	9.52
30.07.07	18	19	20	57	0	0	0	0	0.00
17.08.07	20	18	18	56	1	1	0	2	3.57
04.09.07	20	16	16	52	0	0	0	0	0.00
01.10.07	20	19	-	39	7	1	0	8	20.51
17.10.07	-	-	-	-	-	-	-	-	-
27.10.07	17	-	-	17	2	-	-	2	11.76
27.11.07	20	20	19	59	1	0	1	2	3.39
11.12.07	-	-	-	-	-	-	-	-	-
21.01.08	18	18	17	53	1	1	1	3	5.66
CP Prevalence = 7/9 = 77.8 %									

Appendix A10

Site D1D2E water samples (D1, D2 & E) : Number of presumptive CP selected for biochemical confirmation tests, number of confirmed CP by alpha toxin gene detection, CP IRT and CP Prevalence

Site D1D2E									
Sampling Date	D1 Number of Black Colonies	D2 Number of Black Colonies	E Number of Black Colonies	Total Number of Black Colonies (Nt)	D1 Number of CP	D2 Number of CP	E Number of CP	Total Number of CP	Site D1D2E CP Isolation Rate (IRT, %)
02.04.07	-	-	-	-	-	-	-	-	-
16.04.07	15	17	14	46	-	-	-	-	-
07.05.07	16	17	10	43	2	0	0	2	4.65
21.05.07	-	-	-	-	-	-	-	-	-
04.06.07	3	7	7	17	0	0	0	0	0.00
15.06.07	10	17	12	39	1	1	2	4	10.26
30.07.07	17	19	19	55	1	1	0	2	3.64
17.08.07	17	19	17	53	0	2	1	3	5.66
04.09.07	17	21	21	59	1	0	0	1	1.69
01.10.07	-	-	-	-	-	-	-	-	-
17.10.07	19	19	12	50	2	0	0	2	4.00
27.10.07	21	14	15	50	1	0	0	1	2.00
27.11.07	20	19	21	60	0	2	0	2	3.33
11.12.07	21	20	20	61	0	0	1	1	1.64
21.01.08	17	15	10	42	0	0	0	0	0.00

CP Prevalence = 9/11 = 81.9 %

Appendix A11

**Site F water sample : Number of presumptive CP selected for biochemical confirmation tests,
number of confirmed CP by alpha toxin gene detection, CP IRT and CP Prevalence**

Site F			
Sampling Date	Site F Number of Black Colonies (Nt)	Total Number of CP	Site F CP Isolation Rate (IRT, %)
02.04.07	26	-	-
16.04.07	17	-	-
07.05.07	-	-	-
21.05.07	-	-	-
04.06.07	5	0	0
15.06.07	11	0	0
30.07.07	19	0	0
17.08.07	18	0	0
04.09.07	19	1	5.26
01.10.07	19	0	0.00
17.10.07	18	0	0.00
27.10.07	18	0	0.00
27.11.07	18	0	0.00
11.12.07	21	0	0.00
21.01.08	21	3	14.29
CP Prevalence = 2/11 = 18.2 %			

Appendix A12

Site G water samples (G1, G2 & G3) : Number of presumptive CP selected for biochemical confirmation tests, number of confirmed CP by alpha toxin gene detection, CP IRT and CP Prevalence

Site G									
Sampling Date	G1 Number of Black Colonies	G2 Number of Black Colonies	G3 Number of Black Colonies	Total Number of Black Colonies (Nt)	G1 Number of CP	G2 Number of CP	G3 Number of CP	Total Number of CP	Site G CP Isolation Rate (IRT, %)
02.04.07	18	24	14	56	-	-	-	-	-
16.04.07	-	-	-	-	-	-	-	-	-
07.05.07	-	-	-	-	-	-	-	-	-
21.05.07	12	17	16	45	0	2	0	2	4.44
04.06.07	5	1	6	12	2	0	1	3	25.00
15.06.07	9	-	-	9	0	-	-	0	0.00
30.07.07	17	18	14	49	0	0	0	0	0.00
17.08.07	19	18	20	57	1	0	1	2	3.51
04.09.07	19	-	-	19	0	-	-	0	0.00
01.10.07	-	-	-	-	-	-	-	-	-
17.10.07	17	19	18	54	0	0	1	1	1.85
27.10.07	18	19	15	52	1	6	3	10	19.23
27.11.07	20	17	20	57	0	0	0	0	0.00
11.12.07	16	-	-	16	1	-	-	1	6.25
21.01.08	20	-	-	20	0	-	-	0	0.00

CP Prevalence = 6/11 = 54.6 %

Appendix B

Mean River Discharge Normality and Statistics

Tests of Normality

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Site A River Discharge (m3/s)	.183	24	.036	.921	24	.068
Site B River Discharge (m3/s)	.157	24	.130	.875	24	.010**
Site C River Discharge (m3/s)	.195	23	.023	.846	23	.010**
Site D1D2E River Discharge (m3/s)	.081	23	.200*	.954	23	.411
Site F River Discharge (m3/s)	.230	25	.001	.854	25	.010**
Site G River Discharge (m3/s)	.249	19	.003	.746	19	.010**

** . This is an upper bound of the true significance.

* . This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Statistics

	Site A Mean River Discharge	Site B Mean River Discharge	Site C Mean River Discharge	Site D1D2E Mean River Discharge	Site F Mean River Discharge	Site G Mean River Discharge
N Valid	12	12	9	12	13	10
Missing	3	3	6	3	2	5
Mean	10.22483	11.77067	71.24911	14.3423	46.39985	75.14420
Std. Error of Mean	1.26415	2.01699	14.27227	1.7742	7.87696	15.76521
Std. Deviation	4.37913	6.98707	42.81681	6.1460	28.40079	49.85396
Variance	19.17679	48.81911	1833.27883	37.7734	806.60510	2485.41731
Skewness	-.087	1.382	.796	.070	.911	.819
Std. Error of Skewness	.637	.637	.717	.637	.616	.687
Kurtosis	-1.064	2.642	.342	-1.754	-.459	-.371
Std. Error of Kurtosis	1.232	1.232	1.400	1.232	1.191	1.334
Range	13.586	25.209	131.413	16.68	83.631	145.018

Appendix C

Statistical Difference of Water Sample Replicates

Site A

Tests of Normality

	Kolmogorov-Smirnov(a)			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Site A TSC 1	.243	25	.001	.775	25	.000
Site A TSC 2	.260	25	.000	.640	25	.000
Site A OPSP 1	.150	25	.148	.878	25	.006
Site A OPSP 2	.254	25	.000	.817	25	.000

a Lilliefors Significance Correction

Test Statistics(c)

	Site A TSC 2 - Site A TSC 1	Site A OPSP 2 - Site A OPSP 1
Z	-.419(a)	-1.116(b)
Asymp. Sig. (2-tailed)	.675	.265

a Based on negative ranks.

b Based on positive ranks.

c Wilcoxon Signed Ranks Test

Friedman Test

Ranks

	Mean Rank
Site A TSC 1	2.14
Site A TSC 2	2.26
Site A OPSP 1	2.92
Site A OPSP 2	2.68

Test Statistics^a

N	25	
Chi-Square	6.266	
df	3	
Asymp. Sig.	.099	
Monte Carlo Sig.	.099	
Sig.	99% Confidence	Lower Bound
	Interval	Upper Bound
		.106

a. Friedman Test

Appendix C

Statistical Difference of Water Sample Replicates

Site B

Tests of Normality

	Kolmogorov-Smirnov(a)			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Site B TSC 1	.205	25	.008	.889	25	.011
Site B TSC 2	.225	25	.002	.814	25	.000
Site B OPSP 1	.264	25	.000	.683	25	.000
Site B OPSP 2	.216	25	.004	.763	25	.000

a Lilliefors Significance Correction

Test Statistics(c)

	Site B TSC 2 - Site B TSC 1	Site B OPSP 2 - Site B OPSP 1
Z	-.406(a)	-.135(b)
Asymp. Sig. (2-tailed)	.685	.893

a Based on negative ranks.

b Based on positive ranks.

c **Wilcoxon Signed Ranks Test**

Friedman Test

Ranks

	Mean Rank
Site B TSC 1	2.60
Site B TSC 2	2.82
Site B OPSP 1	2.46
Site B OPSP 2	2.12

Test Statistics^a

N			25
Chi-Square			4.021
df			3
Asymp. Sig.			.259
Monte Carlo Sig.			.258
Sig.	99% Confidence	Lower Bound	.247
	Interval	Upper Bound	.270

a. Friedman Test

Appendix C

Statistical Difference of Water Sample Replicates

Site C

Tests of Normality

	Kolmogorov-Smirnov(a)			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Site C TSC 1	.220	17	.029	.865	17	.019
Site C TSC 2	.170	17	.200(*)	.920	17	.149
Site C OPSP 1	.159	17	.200(*)	.882	17	.034
Site C OPSP 2	.198	17	.077	.927	17	.195

* This is a lower bound of the true significance.

a Lilliefors Significance Correction

Test Statistics(b)

	Site C TSC 2 - Site C TSC 1	Site C OPSP 2 - Site C OPSP 1
Z	-.118(a)	-.752(a)
Asymp. Sig. (2-tailed)	.906	.452

a Based on positive ranks.

b Wilcoxon Signed Ranks Test

Friedman Test

Ranks

	Mean Rank
Site C TSC 1	2.91
Site C TSC 2	2.88
Site C OPSP 1	2.26
Site C OPSP 2	1.94

Test Statistics^a

N	17
Chi-Square	7.096
df	3
Asymp. Sig.	.069
Monte Carlo Sig.	.064
Sig. 99% Confidence Interval	Lower Bound .058 Upper Bound .071

a. Friedman Test

Appendix C

Statistical Difference of Water Sample Replicates

Site D1D2E

Tests of Normality

	Kolmogorov-Smirnov(a)			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
D1D2E TSC 1	.142	23	.200(*)	.945	23	.227
D1D2E TSC 2	.122	23	.200(*)	.945	23	.231
D1D2E OPSP 1	.070	23	.200(*)	.990	23	.996
D1D2E OPSP 2	.154	23	.165	.919	23	.064

* This is a lower bound of the true significance.

a Lilliefors Significance Correction

Paired Samples Test

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
D1D2E TSC 1 - D1D2E TSC 2	-.08	17.252	3.522	-7.37	7.20	-.024	23	.981
D1D2E OPSP 1 - D1D2E OPSP 2	-1.91	12.986	2.708	-7.53	3.70	-.707	22	.487

Friedman Test

Ranks

	Mean Rank
Site D1D2E TSC 1	2.98
Site D1D2E TSC 2	2.74
Site D1D2E OPSP 1	2.13
Site D1D2E OPSP 2	2.15

Test Statistics^a

N			23
Chi-Square			7.841
df			3
Asymp. Sig.			.049
Monte Carlo Sig.			.046
Sig.	99% Confidence	Lower Bound	.041
	Interval	Upper Bound	.052

a. Friedman Test

Appendix C

Statistical Difference of Water Sample Replicates

Site F

Tests of Normality

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Site F TSC1	.190	9	.200(*)	.903	9	.271
Site F TSC2	.258	9	.086	.860	9	.096
Site F OPSP1	.164	9	.200(*)	.908	9	.299
Site F OPSP2	.267	9	.064	.899	9	.245

* This is a lower bound of the true significance.

Paired Samples Test

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
F TSC1 – F TSC2	4.56	24.546	8.182	-14.31	23.42	.557	8	.593
F OPSP1 - F OPSP2	1.44	12.330	4.110	-8.03	10.92	.351	8	.734

Friedman Test

Ranks

	Mean Rank
Site F TSC1	2.83
Site F TSC2	2.78
Site F OPSP1	2.17
Site F OPSP2	2.22

Test Statistics^a

N				9
Chi-Square				2.056
df				3
Asymp. Sig.				.561
Monte Carlo Sig.				.587
Sig.	99% Confidence Interval	Lower Bound		.574
		Upper Bound		.600

a. Friedman Test

Appendix C

Statistical Difference of Water Sample Replicates

Site G

Tests of Normality

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Site G TSC 1	.156	18	.200(*)	.933	18	.222
Site G TSC 2	.195	18	.067	.901	18	.060
Site G OPSP 1	.205	18	.044	.865	18	.015
Site G OPSP 2	.126	18	.200(*)	.962	18	.646

* This is a lower bound of the true significance.

Paired Samples Test

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
G TSC1 – G TSC2	-9.67	21.099	4.973	-20.16	.83	-1.944	17	.069
G OPSP1 – G OPSP2	2.67	18.824	4.437	-6.69	12.03	.601	17	.556

Friedman Test

Ranks

	Mean Rank
Site G TSC 1	2.50
Site G TSC 2	2.92
Site G OPSP 1	2.25
Site G OPSP 2	2.33

Test Statistics^a

N				18
Chi-Square				3.000
df				3
Asymp. Sig.				.392
Monte Carlo Sig.				.395
Sig.	99% Confidence Interval	Lower Bound		.383
		Upper Bound		.408

a. Friedman Test

Appendix D MBCC Difference Among First, Mid and Third Quarter Point Sampling

Site A

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Site A TSC First Quarter Sampling Mean Black Colonies (cfu/100ml)	11	6136.36	10095.001	900	36000
Site A TSC Mid Point Sampling Mean Black Colonies (cfu/100ml)	11	5031.82	5177.223	900	18000
Site A TSC Third Quarter Sampling Mean Black Colonies (cfu/100ml)	11	5277.27	6662.708	450	22950

Site B

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Site B TSC First Quarter Sampling Mean Black Colonies (cfu/100ml)	11	28431.82	28598.071	900	100350
Site B TSC Mid Point Sampling Mean Black Colonies (cfu/100ml)	11	20986.36	22413.680	5400	80550
Site B TSC Third Quarter Sampling Mean Black Colonies (cfu/100ml)	11	20904.55	21973.057	2250	72000

Friedman Test

Ranks

	Mean Rank
Site A TSC First Quarter Sampling Mean Black Colonies (cfu/100ml)	2.09
Site A TSC Mid Point Sampling Mean Black Colonies (cfu/100ml)	1.91
Site A TSC Third Quarter Sampling Mean Black Colonies (cfu/100ml)	2.00

Friedman Test

Ranks

	Mean Rank
Site B TSC First Quarter Sampling Mean Black Colonies (cfu/100ml)	2.59
Site B TSC Mid Point Sampling Mean Black Colonies (cfu/100ml)	1.86
Site B TSC Third Quarter Sampling Mean Black Colonies (cfu/100ml)	1.55

Test Statistics^a

N	11
Chi-Square	.182
df	2
Asymp. Sig.	.913
Monte Carlo Sig.	.976
Sig. 99% Confidence Interval Lower Bound	.972
Sig. 99% Confidence Interval Upper Bound	.980

a. Friedman Test

Test Statistics^a

N	11
Chi-Square	6.465
df	2
Asymp. Sig.	.039
Monte Carlo Sig.	.036
Sig. 99% Confidence Interval Lower Bound	.032
Sig. 99% Confidence Interval Upper Bound	.041

a. Friedman Test

Appendix D MBCC Difference Among First, Mid and Third Quarter Point Sampling

Site C

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Site C TSC First Quarter Sampling Mean Black Colonies (cfu/100ml)	6	25500.00	10806.248	11250	43650
Site C TSC Mid Point Sampling Mean Black Colonies (cfu/100ml)	6	23925.00	14251.342	12150	51750
Site C TSC Third Quarter Sampling Mean Black Colonies (cfu/100ml)	6	22575.00	12361.220	13050	46800

Friedman Test

Ranks

	Mean Rank
Site C TSC First Quarter Sampling Mean Black Colonies (cfu/100ml)	2.33
Site C TSC Mid Point Sampling Mean Black Colonies (cfu/100ml)	1.83
Site C TSC Third Quarter Sampling Mean Black Colonies (cfu/100ml)	1.83

Test Statistics^a

N	6
Chi-Square	1.000
df	2
Asymp. Sig.	.607
Monte Carlo Sig.	.735
Sig. 99% Confidence Interval	Lower Bound .723 Upper Bound .746

a. Friedman Test

Site D1D2E

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Site D1 Grab Sampling Mean Black Colonies Count (cfu/100ml)	12	35550.00	25244.522	8100	72000
Site D2 Grab Sampling Mean Black Colonies Count (cfu/100ml)	12	35400.00	27783.187	8550	94500
Site E Grab Sampling Mean Black Colonies Count (cfu/100ml)	12	32212.50	18342.885	7650	71550

Friedman Test

Ranks

	Mean Rank
Site D1 Grab Sampling Mean Black Colonies Count (cfu/100ml)	2.00
Site D2 Grab Sampling Mean Black Colonies Count (cfu/100ml)	2.00
Site E Grab Sampling Mean Black Colonies Count (cfu/100ml)	2.00

Test Statistics^a

N	12
Chi-Square	.000
df	2
Asymp. Sig.	1.000
Monte Carlo Sig.	1.000
Sig. 99% Confidence Interval	Lower Bound 1.000 Upper Bound 1.000

a. Friedman Test

Appendix D MBCC Difference Among First, Mid and Third Quarter Point Sampling

Site G

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Site G TSC First Quarter Sampling Mean Black Colonies (cf u/100ml)	8	64856.25	23927.427	31500	99900
Site G TSC Mid Point Sampling Mean Black Colonies (cf u/100ml)	8	60075.00	23976.417	31950	101250
Site G TSC Third Quarter Sampling Mean Black Colonies (cf u/100ml)	8	61143.75	19854.622	33300	85500

Friedman Test

Ranks

	Mean Rank
Site G TSC First Quarter Sampling Mean Black Colonies (cfu/100ml)	2.19
Site G TSC Mid Point Sampling Mean Black Colonies (cfu/100ml)	2.06
Site G TSC Third Quarter Sampling Mean Black Colonies (cfu/100ml)	1.75

Test Statistics^a

N	8	
Chi-Square	.897	
df	2	
Asymp. Sig.	.639	
Monte Carlo Sig.	.691	
Sig. 99% Confidence Interval	Lower Bound	.680
	Upper Bound	.703

a. Friedman Test

Appendix E Temporal difference of Sulphite Reducing Clostridia CFU in First, Mid and Third Point Sampling

Site A

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Site A First Quarter Point Sampling	44	8.11	11.614	1	45
Site A Mid Point Sampling	40	6.30	5.810	1	25
Site A Third Quarter Point Sampling	40	9.67	9.539	0	36
DATE	45	6.80	3.388	1	12

Kruskal-Wallis Test

Test Statistics(b,c)

	Site A First Quarter Point Sampling	Site A Mid Point Sampling	Site A Third Quarter Point Sampling
Chi-Square	21.026	21.535	17.335
Df	11	10	10
Asymp. Sig.	.033	.018	.067
Monte Carlo Sig. Sig.	.012(a)	.004(a)	.041(a)
99% Confidence Interval Lower Bound	.009	.002	.036
Upper Bound	.015	.005	.046

a Based on 10000 sampled tables with starting seed 624387341.

b Kruskal Wallis Test

c Grouping Variable: Sampling

Site B

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Site B First Quarter Point Sampling	45	33.84	30.892	0	123
Site B Mid Point Sampling	40	22.63	22.221	4	91
Site B Third Quarter Point Sampling	40	21.25	23.456	2	80
DATE	45	6.80	3.388	1	12

Kruskal-Wallis Test

Test Statistics(b,c)

	Site B First Quarter Point Sampling	Site B Mid Point Sampling	Site B Third Quarter Point Sampling
Chi-Square	31.174	32.005	30.601
df	11	10	10
Asymp. Sig.	.001	.000	.001
Monte Carlo Sig. Sig.	.000(a)	.000(a)	.000(a)
99% Confidence Interval Lower Bound	.000	.000	.000
Upper Bound	.000	.000	.000

a Based on 10000 sampled tables with starting seed 743671174.

b Kruskal Wallis Test

c Grouping Variable: DATE

Appendix E Temporal difference of Sulphite Reducing Clostridia CFU in First, Mid and Third Point Sampling

Site C

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Site C First Quarter Point Sampling	35	23.86	12.737	2	53
Site C Mid Point Sampling	32	25.38	17.155	4	70
Site C Third Quarter Point Sampling	23	22.61	11.873	8	53
DATE	37	5.78	2.830	1	10

Kruskal-Wallis Test

	Site C First Quarter Point Sampling	Site C Mid Point Sampling	Site C Third Quarter Point Sampling
Chi-Square	26.479	22.726	16.047
df	9	8	5
Asymp. Sig.	.002	.004	.007
Monte Carlo Sig.	.000(a)	.000(a)	.000(a)
99% Confidence Interval	Lower Bound	.000	.000
	Upper Bound	.000	.000

Test Statistics(b,c)

- a Based on 10000 sampled tables with starting seed 221623949.
- b Kruskal Wallis Test
- c Grouping Variable: DATE

Site D1D2E

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Site D1 Grab Sampling	43	40.30	26.753	8	100
Site D2 Grab Sampling	43	38.56	27.471	5	110
Site E Grab Sampling	42	32.93	19.507	1	92
DATE	48	6.50	3.489	1	12

Kruskal-Wallis Test

Test Statistics(b,c)

	Site D1 Grab Sampling	Site D2 Grab Sampling	Site E Grab Sampling
Chi-Square	34.674	37.194	26.570
df	11	11	11
Asymp. Sig.	.000	.000	.005
Monte Carlo Sig.	.000(a)	.000(a)	.000(a)
99% Confidence Interval	Lower Bound	.000	.000
	Upper Bound	.000	.000

- a Based on 10000 sampled tables with starting seed 2000000.
- b Kruskal Wallis Test
- c Grouping Variable: DATE

Appendix E Temporal difference Sulphite Reducing Clostridia CFU in First, Mid and Third Point Sampling

Site F

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Site F TSC1	46	54.39	25.509	18	123
DATE	52	7.00	3.778	1	13

Kruskal-Wallis Test

Test Statistics(b,c)

	Site F TSC1
Chi-Square	36.395
Df	12
Asymp. Sig.	.000
Monte Carlo Sig. Sig.	.000(a)
99% Lower Bound	.000
Confidence Interval	
Upper Bound	.000

a Based on 10000 sampled tables with starting seed 1314643744.

b Kruskal Wallis Test

c Grouping Variable: DATE

Site G

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Site G First Quarter Point Sampling	43	74.12	33.008	23	171
Site G Mid Point Sampling	28	65.36	24.345	31	125
Site G Third Quarter Point Sampling	27	67.19	22.124	34	110
DATE	44	6.86	3.400	1	12

Kruskal-Wallis Test

Test Statistics(b,c)

	Site G First Quarter Point Sampling	Site G Mid Point Sampling	Site G Third Quarter Point Sampling
Chi-Square	32.105	19.878	19.535
df	11	7	7
Asymp. Sig.	.001	.006	.007
Monte Carlo Sig. Sig.	.000(a)	.000(a)	.000(a)
99% Lower Bound	.000	.000	.000
Confidence Interval			
Upper Bound	.000	.001	.000

a Based on 10000 sampled tables with starting seed 2000000.

b Kruskal Wallis Test

c Grouping Variable: DATE

Appendix F

Site A: Nonparametric Correlations

Correlations

			Site A TSC Total Mean Black Colonies (cf u/100ml)	Site A Total Mean CP Colonies (cf u/100ml)	Site A TSC First Quarter Sampling Mean Black Colonies (cf u/100ml)	Site A TSC Mid Point Sampling Mean Black Colonies (cf u/100ml)	Site A TSC Third Quarter Sampling Mean Black Colonies (cf u/100ml)	Site A First Quarter Sampling MCPC (cf u/100ml)	Site A Mid Point Sampling MCPC (cf u/10ml)	Site A Third Quarter Point Smpling MCPC (cf u/100ml)	Site A Mean River Discharge (m3/s)
Spearman's rho	Site A TSC Total Mean Black Colonies (cf u/100ml)	Correlation Coefficient	1.000	-.501	.841**	.703*	.817**	-.284	-.471	-.360	-.070
		Sig. (2-tailed)	.	.116	.001	.016	.002	.398	.169	.307	.829
		N	12	11	12	11	11	11	10	10	12
	Site A Total Mean CP Colonies (cf u/100ml)	Correlation Coefficient	-.501	1.000	-.568	-.090	-.755*	.857**	1.000**	.766**	-.272
		Sig. (2-tailed)	.116	.	.069	.805	.012	.001	.	.010	.419
		N	11	11	11	10	10	11	10	10	11
	Site A TSC First Quarter Sampling Mean Black Colonies (cf u/100ml)	Correlation Coefficient	.841**	-.568	1.000	.449	.583	-.523	-.557	-.367	.130
		Sig. (2-tailed)	.001	.069	.	.166	.060	.099	.094	.297	.687
		N	12	11	12	11	11	11	10	10	12
	Site A TSC Mid Point Sampling Mean Black Colonies (cf u/100ml)	Correlation Coefficient	.703*	-.090	.449	1.000	.436	.065	-.090	-.052	.023
	Sig. (2-tailed)	.016	.805	.166	.	.180	.858	.805	.886	.947	
	N	11	10	11	11	11	10	10	10	11	
Site A TSC Third Quarter Sampling Mean Black Colonies (cf u/100ml)	Correlation Coefficient	.817**	-.755*	.583	.436	1.000	-.512	-.755*	-.590	.123	
	Sig. (2-tailed)	.002	.012	.060	.180	.	.130	.012	.073	.718	
	N	11	10	11	11	11	10	10	10	11	
Site A First Quarter Sampling MCPC (cf u/100ml)	Correlation Coefficient	-.284	.857**	-.523	.065	-.512	1.000	.862**	.500	-.405	
	Sig. (2-tailed)	.398	.001	.099	.858	.130	.	.001	.141	.217	
	N	11	11	11	10	10	11	10	10	11	
Site A Mid Point Sampling MCPC (cf u/10ml)	Correlation Coefficient	-.471	1.000**	-.557	-.090	-.755*	.862**	1.000	.766**	-.350	
	Sig. (2-tailed)	.169	.	.094	.805	.012	.001	.	.010	.321	
	N	10	10	10	10	10	10	10	10	10	
Site A Third Quarter Point Smpling MCPC (cf u/100ml)	Correlation Coefficient	-.360	.766**	-.367	-.052	-.590	.500	.766**	1.000	-.311	
	Sig. (2-tailed)	.307	.010	.297	.886	.073	.141	.010	.	.381	
	N	10	10	10	10	10	10	10	10	10	
Site A Mean River Discharge (m3/s)	Correlation Coefficient	-.070	-.272	.130	.023	.123	-.405	-.350	-.311	1.000	
	Sig. (2-tailed)	.829	.419	.687	.947	.718	.217	.321	.381	.	
	N	12	11	12	11	11	11	10	10	12	

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Appendix F

Site B: Nonparametric Correlations

Correlations

			Site B TSC Total Mean Black Colonies (cf u/100ml)	Site B Total Mean CP Colonies (cf u/100ml)	Site B TSC First Quarter Sampling Mean Black Colonies (cf u/100ml)	Site B TSC Mid Point Sampling Mean Black Colonies (cf u/100ml)	Site B TSC Third Quarter Sampling Mean Black Colonies (cf u/100ml)	Site B First Quarter Sampling MCPC (cf u/100ml)	Site B Mid Point Sampling MCPC (cf u/10ml)	Site B Third Quarter Point Smpling MCPC (cf u/100ml)	Site B Mean River Discharge (m3/s)
Spearman's rho	Site B TSC Total Mean Black Colonies (cf u/100ml)	Correlation Coefficient	1.000	.509	.982**	.861**	.855**	.873**	-.081	.097	.322
		Sig. (2-tailed)	.	.110	.000	.001	.001	.000	.823	.790	.308
		N	12	11	12	11	11	11	10	10	12
	Site B Total Mean CP Colonies (cf u/100ml)	Correlation Coefficient	.509	1.000	.569	.292	.588	.718*	.638*	.808**	.255
		Sig. (2-tailed)	.110	.	.067	.413	.074	.013	.047	.005	.450
		N	11	11	11	10	10	11	10	10	11
	Site B TSC First Quarter Sampling Mean Black Colonies (cf u/100ml)	Correlation Coefficient	.982**	.569	1.000	.854**	.799**	.875**	.013	.091	.358
		Sig. (2-tailed)	.000	.067	.	.001	.003	.000	.973	.803	.253
		N	12	11	12	11	11	11	10	10	12
	Site B TSC Mid Point Sampling Mean Black Colonies (cf u/100ml)	Correlation Coefficient	.861**	.292	.854**	1.000	.743**	.705*	-.041	-.136	.811**
		Sig. (2-tailed)	.001	.413	.001	.	.009	.023	.911	.708	.002
		N	11	10	11	11	11	10	10	10	11
Site B TSC Third Quarter Sampling Mean Black Colonies (cf u/100ml)	Correlation Coefficient	.855**	.588	.799**	.743**	1.000	.891**	-.125	.330	.727*	
	Sig. (2-tailed)	.001	.074	.003	.009	.	.001	.731	.352	.011	
	N	11	10	11	11	11	10	10	10	11	
Site B First Quarter Sampling MCPC (cf u/100ml)	Correlation Coefficient	.873**	.718*	.875**	.705*	.891**	1.000	-.044	.239	.355	
	Sig. (2-tailed)	.000	.013	.000	.023	.001	.	.904	.506	.285	
	N	11	11	11	10	10	11	10	10	11	
Site B Mid Point Sampling MCPC (cf u/10ml)	Correlation Coefficient	-.081	.638*	.013	-.041	-.125	-.044	1.000	.700*	.069	
	Sig. (2-tailed)	.823	.047	.973	.911	.731	.904	.	.024	.850	
	N	10	10	10	10	10	10	10	10	10	
Site B Third Quarter Point Smpling MCPC (cf u/100ml)	Correlation Coefficient	.097	.808**	.091	-.136	.330	.239	.700*	1.000	.187	
	Sig. (2-tailed)	.790	.005	.803	.708	.352	.506	.024	.	.604	
	N	10	10	10	10	10	10	10	10	10	
Site B Mean River Discharge (m3/s)	Correlation Coefficient	.322	.255	.358	.811**	.727*	.355	.069	.187	1.000	
	Sig. (2-tailed)	.308	.450	.253	.002	.011	.285	.850	.604	.	
	N	12	11	12	11	11	11	10	10	12	

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Appendix F

Site C: Nonparametric Correlations

Correlations

			Site C TSC Total Mean Black Colonies (cf u/100ml)	Site C Total Mean CP Colonies (cf u/100ml)	Site C TSC First Quarter Sampling Mean Black Colonies (cf u/100ml)	Site C TSC Mid Point Sampling Mean Black Colonies (cf u/100ml)	Site C TSC Third Quarter Sampling Mean Black Colonies (cf u/100ml)	Site C First Quarter Sampling MCPC (cf u/100ml)	Site C Mid Point Sampling MCPC (cf u/10ml)	Site C Third Quarter Point Smpling MCPC (cf u/100ml)	Site C Mean River Discharge (m3/s)
Spearman's rho	Site C TSC Total Mean Black Colonies (cf u/100ml)	Correlation Coefficient	1.000	-.276	.930**	.933**	.886*	-.360	-.244	.334	.483
		Sig. (2-tailed)	.	.472	.000	.000	.019	.342	.560	.518	.187
		N	10	9	10	9	6	9	8	6	9
	Site C Total Mean CP Colonies (cf u/100ml)	Correlation Coefficient	-.276	1.000	-.151	-.563	.203	.882**	.565	.770	-.335
		Sig. (2-tailed)	.472	.	.699	.146	.700	.002	.145	.073	.417
		N	9	9	9	8	6	9	8	6	8
	Site C TSC First Quarter Sampling Mean Black Colonies (cf u/100ml)	Correlation Coefficient	.930**	-.151	1.000	.879**	.771	-.184	-.464	.152	.544
		Sig. (2-tailed)	.000	.699	.	.002	.072	.635	.247	.774	.130
		N	10	9	10	9	6	9	8	6	9
	Site C TSC Mid Point Sampling Mean Black Colonies (cf u/100ml)	Correlation Coefficient	.933**	-.563	.879**	1.000	.657	-.683	-.342	.273	.550
	Sig. (2-tailed)	.000	.146	.002	.	.156	.062	.408	.600	.125	
	N	9	8	9	9	6	8	8	6	9	
Site C TSC Third Quarter Sampling Mean Black Colonies (cf u/100ml)	Correlation Coefficient	.886*	.203	.771	.657	1.000	.435	-.213	.577	-.371	
	Sig. (2-tailed)	.019	.700	.072	.156	.	.389	.686	.231	.468	
	N	6	6	6	6	6	6	6	6	6	
Site C First Quarter Sampling MCPC (cf u/100ml)	Correlation Coefficient	-.360	.882**	-.184	-.683	.435	1.000	.319	.770	-.551	
	Sig. (2-tailed)	.342	.002	.635	.062	.389	.	.441	.073	.157	
	N	9	9	9	8	6	9	8	6	8	
Site C Mid Point Sampling MCPC (cf u/10ml)	Correlation Coefficient	-.244	.565	-.464	-.342	-.213	.319	1.000	.290	-.146	
	Sig. (2-tailed)	.560	.145	.247	.408	.686	.441	.	.577	.729	
	N	8	8	8	8	6	8	8	6	8	
Site C Third Quarter Point Smpling MCPC (cf u/100ml)	Correlation Coefficient	.334	.770	.152	.273	.577	.770	.290	1.000	-.152	
	Sig. (2-tailed)	.518	.073	.774	.600	.231	.073	.577	.	.774	
	N	6	6	6	6	6	6	6	6	6	
Site C Mean River Discharge (m3/s)	Correlation Coefficient	.483	-.335	.544	.550	-.371	-.551	-.146	-.152	1.000	
	Sig. (2-tailed)	.187	.417	.130	.125	.468	.157	.729	.774	.	
	N	9	8	9	9	6	8	8	6	9	

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Appendix F

Site D1D2E: Nonparametric Correlations

Correlations

			Site D1D2E TSC Total Mean Black Colonies (cf u/100ml)	Site D1D2E Total Mean CP Colonies (cf u/100ml)	Site D1 Grab Sampling Mean Black Colonies Count (cf u/100ml)	Site D2 Grab Sampling Mean Black Colonies Count (cf u/100ml)	Site E Grab Sampling Mean Black Colonies Count (cf u/100ml)	Site D1 Grab Sampling MCPC (cf u/100ml)	Site D2 Grab Sampling MCPC (cf u/10ml)	Site E Grab Point Smping MCPC (cf u/100ml)	Site D1D2E Mean River Discharge (m3/s)
Spearman's rho	Site D1D2E TSC Total Mean Black Colonies (cf u/100ml)	Correlation Coefficient Sig. (2-tailed) N	1.000 .424 12	.269 .424 11	.984** .000 12	.846** .001 12	.937** .000 12	.076 .824 11	-.253 .453 11	-.150 .659 11	-.329 .297 12
	Site D1D2E Total Mean CP Colonies (cf u/100ml)	Correlation Coefficient Sig. (2-tailed) N	.269 .424 11	1.000 .424 11	.199 .558 11	.478 .137 11	.246 .466 11	.229 .498 11	.570 .067 11	.139 .683 11	-.251 .457 11
	Site D1 Grab Sampling Mean Black Colonies Count (cf u/100ml)	Correlation Coefficient Sig. (2-tailed) N	.984** .000 12	.199 .558 11	1.000 .000 12	.781** .003 12	.907** .000 12	.134 .695 11	-.295 .378 11	-.194 .567 11	-.361 .249 12
	Site D2 Grab Sampling Mean Black Colonies Count (cf u/100ml)	Correlation Coefficient Sig. (2-tailed) N	.846** .001 12	.478 .137 11	.781** .003 12	1.000 .000 12	.818** .001 12	-.057 .867 11	.011 .975 11	-.162 .634 11	-.007 .983 12
	Site E Grab Sampling Mean Black Colonies Count (cf u/100ml)	Correlation Coefficient Sig. (2-tailed) N	.937** .000 12	.246 .466 11	.907** .000 12	.818** .001 12	1.000 .000 12	-.067 .845 11	-.347 .295 11	-.012 .973 11	-.455 .138 12
	Site D1 Grab Sampling MCPC (cf u/100ml)	Correlation Coefficient Sig. (2-tailed) N	.076 .824 11	.229 .498 11	.134 .695 11	-.057 .867 11	-.067 .845 11	1.000 .000 11	-.320 .337 11	-.437 .179 11	.076 .824 11
	Site D2 Grab Sampling MCPC (cf u/10ml)	Correlation Coefficient Sig. (2-tailed) N	-.253 .453 11	.570 .067 11	-.295 .378 11	.011 .975 11	-.347 .295 11	-.320 .337 11	1.000 .000 11	.241 .475 11	.168 .620 11
	Site E Grab Point Smping MCPC (cf u/100ml)	Correlation Coefficient Sig. (2-tailed) N	-.150 .659 11	.139 .683 11	-.194 .567 11	-.162 .634 11	-.012 .973 11	-.437 .179 11	.241 .475 11	1.000 .000 11	-.462 .152 11
	Site D1D2E Mean River Discharge (m3/s)	Correlation Coefficient Sig. (2-tailed) N	-.329 .297 12	-.251 .457 11	-.361 .249 12	-.007 .983 12	-.455 .138 12	.076 .824 11	.168 .620 11	-.462 .152 11	1.000 .000 12

** . Correlation is significant at the 0.01 level (2-tailed).

Appendix F

Site F: Nonparametric Correlations

Correlations

			Site F Grab Sampling Mean Black Colonies Count (cf u/100ml)	Site F Grab Sampling MCPC (cf u/100ml)	Site F Mean River Discharge (m3/s)
Spearman's rho	Site F Grab Sampling Mean Black Colonies Count (cf u/100ml)	Correlation Coefficient	1.000	.054	.681*
		Sig. (2-tailed)	.	.875	.010
		N	13	11	13
	Site F Grab Sampling MCPC (cf u/100ml)	Correlation Coefficient	.054	1.000	.175
		Sig. (2-tailed)	.875	.	.606
		N	11	11	11
	Site F Mean River Discharge (m3/s)	Correlation Coefficient	.681*	.175	1.000
		Sig. (2-tailed)	.010	.606	.
		N	13	11	13

*. Correlation is significant at the 0.05 level (2-tailed).

Appendix F

Site G: Nonparametric Correlations

Correlations

			Site G TSC Total Mean Black Colonies (cf u/100ml)	Site G Total Mean CP Colonies (cf u/100ml)	Site G TSC First Quarter Sampling Mean Black Colonies (cf u/100ml)	Site G TSC Mid Point Sampling Mean Black Colonies (cf u/100ml)	Site G TSC Third Quarter Sampling Mean Black Colonies (cf u/100ml)	Site G First Quarter Sampling MCPC (cf u/100ml)	Site G Mid Point Sampling MCPC (cf u/10ml)	Site G Third Quarter Point Smpling MCPC (cf u/100ml)	Site G Mean River Discharge (m3/s)
Spearman's rho	Site G TSC Total Mean Black Colonies (cf u/100ml)	Correlation Coef ficient Sig. (2-tailed) N	1.000 .000 12	.620* .042 11	.965** .000 12	.850** .007 8	.929** .001 8	.769** .006 11	.089 .849 7	.741 .057 7	.006 .987 10
	Site G Total Mean CP Colonies (cf u/100ml)	Correlation Coef ficient Sig. (2-tailed) N	.620* .042 11	1.000 .000 11	.496 .121 11	.955** .001 7	.324 .478 7	.894** .000 11	.360 .428 7	.860* .013 7	-.191 .622 9
	Site G TSC First Quarter Sampling Mean Black Colonies (cf u/100ml)	Correlation Coef ficient Sig. (2-tailed) N	.965** .000 12	.496 .121 11	1.000 .000 12	.611 .108 8	.976** .000 8	.621* .041 11	.089 .849 7	.445 .317 7	.067 .855 10
	Site G TSC Mid Point Sampling Mean Black Colonies (cf u/100ml)	Correlation Coef ficient Sig. (2-tailed) N	.850** .007 8	.955** .001 7	.611 .108 8	1.000 .000 8	.635 .091 8	.906** .005 7	.223 .631 7	.927** .003 7	-.036 .939 7
	Site G TSC Third Quarter Sampling Mean Black Colonies (cf u/100ml)	Correlation Coef ficient Sig. (2-tailed) N	.929** .001 8	.324 .478 7	.976** .000 8	.635 .091 8	1.000 .000 8	.493 .261 7	-.089 .849 7	.408 .364 7	.286 .535 7
	Site G First Quarter Sampling MCPC (cf u/100ml)	Correlation Coef ficient Sig. (2-tailed) N	.769** .006 11	.894** .000 11	.621* .041 11	.906** .005 7	.493 .261 7	1.000 .000 11	.172 .712 7	.900** .006 7	-.406 .278 9
	Site G Mid Point Sampling MCPC (cf u/10ml)	Correlation Coef ficient Sig. (2-tailed) N	.089 .849 7	.360 .428 7	.089 .849 7	.223 .631 7	-.089 .849 7	.172 .712 7	1.000 .000 7	.277 .547 7	.541 .268 6
	Site G Third Quarter Point Smpling MCPC (cf u/100ml)	Correlation Coef ficient Sig. (2-tailed) N	.741 .057 7	.860* .013 7	.445 .317 7	.927** .003 7	.408 .364 7	.900** .006 7	.277 .547 7	1.000 .000 7	-.516 .295 6
	Site G Mean River Discharge (m3/s)	Correlation Coef ficient Sig. (2-tailed) N	.006 .987 10	-.191 .622 9	.067 .855 10	-.036 .939 7	.286 .535 7	-.406 .278 9	.541 .268 6	-.516 .295 6	1.000 .000 10

*. Correlation is significant at the 0.05 level (2-tailed).

** . Correlation is significant at the 0.01 level (2-tailed).

Appendix G1

MBCC, MCPC and River Discharge Correlations Along Sungai Selangor

Correlations

			Site A TSC Total Mean Black Colonies (cfu/100ml)	Site A Total Mean CP Colonies (cfu/100ml)	Site A Mean River Discharge (m3/s)	Site F Grab Sampling Mean Black Colonies Count (cfu/100ml)	Site F Grab Sampling MCPC (cfu/100ml)	Site F Mean River Discharge (m3/s)	Site G TSC Total Mean Black Colonies (cfu/100ml)	Site G Total Mean CP Colonies (cfu/100ml)	Site G Mean River Discharge (m3/s)
Spearman's rho	Site A TSC Total Mean Black Colonies (cfu/100ml)	Correlation Coefficient Sig. (2-tailed) N	1.000 .116 12	-.501 .116 11	-.070 .829 12	.743** .009 11	.321 .366 10	.410 .210 11	.523 .121 10	.350 .321 10	.250 .516 9
	Site A Total Mean CP Colonies (cfu/100ml)	Correlation Coefficient Sig. (2-tailed) N	-.501 .116 11	1.000 .116 11	-.272 .419 11	-.440 .203 10	-.319 .369 10	-.470 .171 10	-.493 .148 10	-.157 .665 10	-.137 .725 9
	Site A Mean River Discharge (m3/s)	Correlation Coefficient Sig. (2-tailed) N	-.070 .829 12	-.272 .419 11	1.000 .116 11	.164 .631 11	-.225 .532 10	.655* .029 11	.103 .777 10	-.123 .735 10	.333 .381 9
	Site F Grab Sampling Mean Black Colonies Count (cfu/100ml)	Correlation Coefficient Sig. (2-tailed) N	.743** .009 11	-.440 .203 10	.164 .631 11	1.000 .116 11	.054 .875 11	.681* .010 13	.736** .010 11	.278 .437 10	.150 .700 9
	Site F Grab Sampling MCPC (cfu/100ml)	Correlation Coefficient Sig. (2-tailed) N	.321 .366 10	-.319 .369 10	-.225 .532 10	.054 .875 11	1.000 .116 11	.175 .606 11	-.069 .849 10	-.461 .180 10	.078 .854 8
	Site F Mean River Discharge (m3/s)	Correlation Coefficient Sig. (2-tailed) N	.410 .210 11	-.470 .171 10	.655* .029 11	.681* .010 13	.175 .606 11	1.000 .116 11	.427 .190 11	-.097 .790 10	.800** .010 9
	Site G TSC Total Mean Black Colonies (cfu/100ml)	Correlation Coefficient Sig. (2-tailed) N	.523 .121 10	-.493 .148 10	.103 .777 10	.736** .010 11	-.069 .849 10	.427 .190 11	1.000 .116 11	.620* .042 11	.006 .987 10
	Site G Total Mean CP Colonies (cfu/100ml)	Correlation Coefficient Sig. (2-tailed) N	.350 .321 10	-.157 .665 10	-.123 .735 10	.278 .437 10	-.461 .180 10	-.097 .790 10	.620* .042 11	1.000 .116 11	-.191 .622 9
	Site G Mean River Discharge (m3/s)	Correlation Coefficient Sig. (2-tailed) N	.250 .516 9	-.137 .725 9	.333 .381 9	.150 .700 9	.078 .854 8	.800** .010 9	.006 .987 10	-.191 .622 9	1.000 .116 11

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Appendix G2

MBCC, MCPC and River Discharge Correlations Along Sungai Bernam

Correlations

			Site B TSC Total Mean Black Colonies (cfu/100ml)	Site B Total Mean CP Colonies (cfu/100ml)	Site B Mean River Discharge (m3/s)	Site C TSC Total Mean Black Colonies (cfu/100ml)	Site C Total Mean CP Colonies (cfu/100ml)	Site C Mean River Discharge (m3/s)	Site D1D2E TSC Total Mean Black Colonies (cfu/100ml)	Site D1D2E Total Mean CP Colonies (cfu/100ml)	Site D1D2E Mean River Discharge (m3/s)
Spearman's rho	Site B TSC Total Mean Black Colonies (cfu/100ml)	Correlation Coefficient Sig. (2-tailed) N	1.000 .110 12	.509 .110 11	.322 .308 12	.745* .013 10	-.318 .404 9	.383 .308 9	.939** .000 10	.133 .732 9	-.273 .446 10
	Site B Total Mean CP Colonies (cfu/100ml)	Correlation Coefficient Sig. (2-tailed) N	.509 .110 11	1.000 .110 11	.255 .450 11	.333 .381 9	.510 .160 9	.095 .823 8	.383 .308 9	-.550 .125 9	-.150 .700 9
	Site B Mean River Discharge (m3/s)	Correlation Coefficient Sig. (2-tailed) N	.322 .308 12	.255 .450 11	1.000 .450 12	.503 .138 10	-.008 .983 9	.817** .007 9	.127 .726 10	.000 1.000 9	.418 .229 10
	Site C TSC Total Mean Black Colonies (cfu/100ml)	Correlation Coefficient Sig. (2-tailed) N	.745* .013 10	.333 .381 9	.503 .138 10	1.000 .472 10	-.276 .472 9	.483 .187 9	.619 .102 8	.286 .535 7	-.071 .867 8
	Site C Total Mean CP Colonies (cfu/100ml)	Correlation Coefficient Sig. (2-tailed) N	-.318 .404 9	.510 .160 9	-.008 .983 9	-.276 .472 9	1.000 .472 9	-.335 .417 8	-.252 .585 7	-.613 .144 7	-.144 .758 7
	Site C Mean River Discharge (m3/s)	Correlation Coefficient Sig. (2-tailed) N	.383 .308 9	.095 .823 8	.817** .007 9	.483 .187 9	-.335 .417 8	1.000 .417 9	.107 .819 7	-.371 .468 6	.857* .014 7
	Site D1D2E TSC Total Mean Black Colonies (cfu/100ml)	Correlation Coefficient Sig. (2-tailed) N	.939** .000 10	.383 .308 9	.127 .726 10	.619 .102 8	-.252 .585 7	.107 .819 7	1.000 .424 12	.269 .424 11	-.329 .297 12
	Site D1D2E Total Mean CP Colonies (cfu/100ml)	Correlation Coefficient Sig. (2-tailed) N	.133 .732 9	-.550 .125 9	.000 1.000 9	.286 .535 7	-.613 .144 7	-.371 .468 6	.269 .424 11	1.000 .457 11	-.251 .457 11
	Site D1D2E Mean River Discharge (m3/s)	Correlation Coefficient Sig. (2-tailed) N	-.273 .446 10	-.150 .700 9	.418 .229 10	-.071 .867 8	-.144 .758 7	.857* .014 7	-.329 .297 12	-.251 .457 11	1.000 .457 11

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Appendix H

H1

Sulphide reducing Clostridia of various morphologies grown on TSC selective media (taken from a pour plate method)

H2

Sulphide reducing Clostridia growth from the 10^{-1} (upper left), 10^{-2} (upper right), and 10^{-3} (lower center) serial dilution of a water sample in this study with typically low MBCC. Membrane filter grids measure 3 mm x 3mm.

Appendix H

H3

Incidence of the culture plates becoming opaque were more frequent in OPSP compared to TSC

H4

Typical *Clostridium perfringens* morphology. Translucent to semi-opaque, round black-centered, circular to lobate periphery

Appendix H

H5 (left)

Sewage outlet at both side of river bank in Tanjung Malim, the upstream sampling site Bernam River

H6 (below)

Sampling Site at Jambatan Mergastua (Tengi Canal)

Appendix I1 Sequencing Results

Appendix I2 Sequencing Results

Appendix I3 Sequencing Results

Appendix I4 Sequencing Results

Appendix I5 Sequencing Results

