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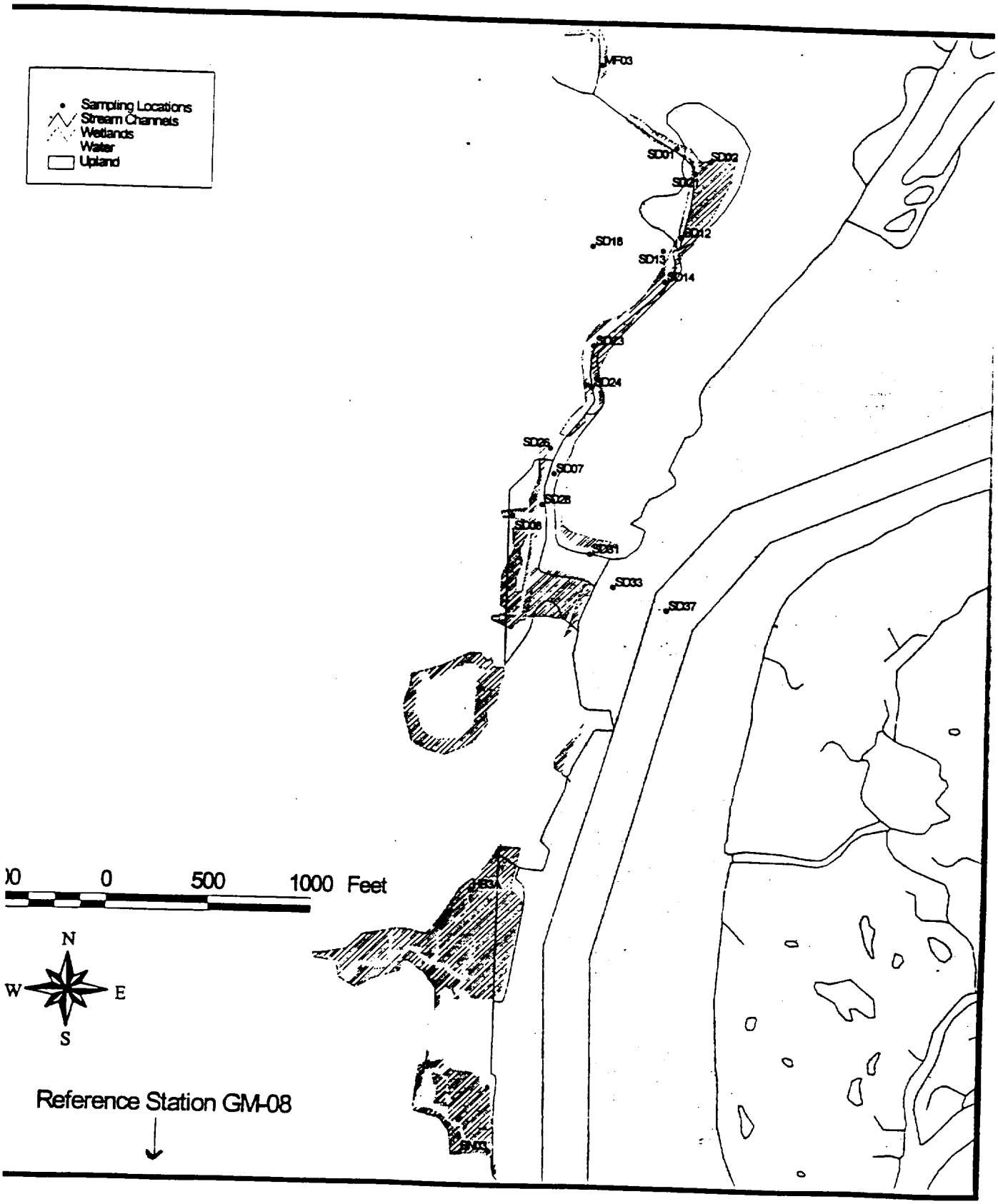
Figure 2-1.1. PRG Sampling Locations in the vicinity of the Raymark Facility Superfund Site in Stratford, CT
All Stations



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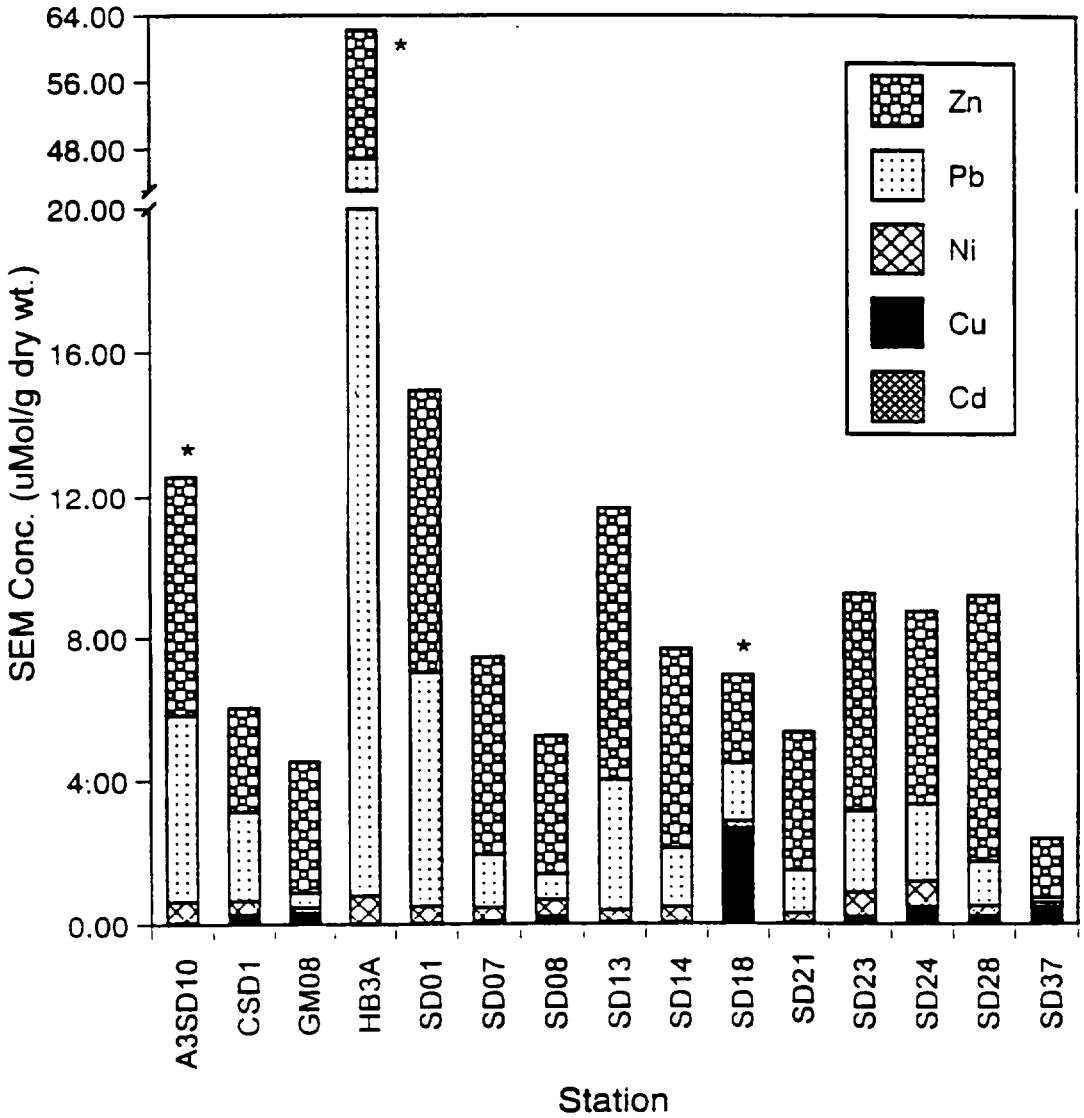


Figure 3.2-1. SEM concentrations (µMol/g dry) of divalent metals in whole sediments collected from Raymark study area. Asterisk indicate SEM-AVS > 0, hence the potential for metal-related toxicity to infauna.

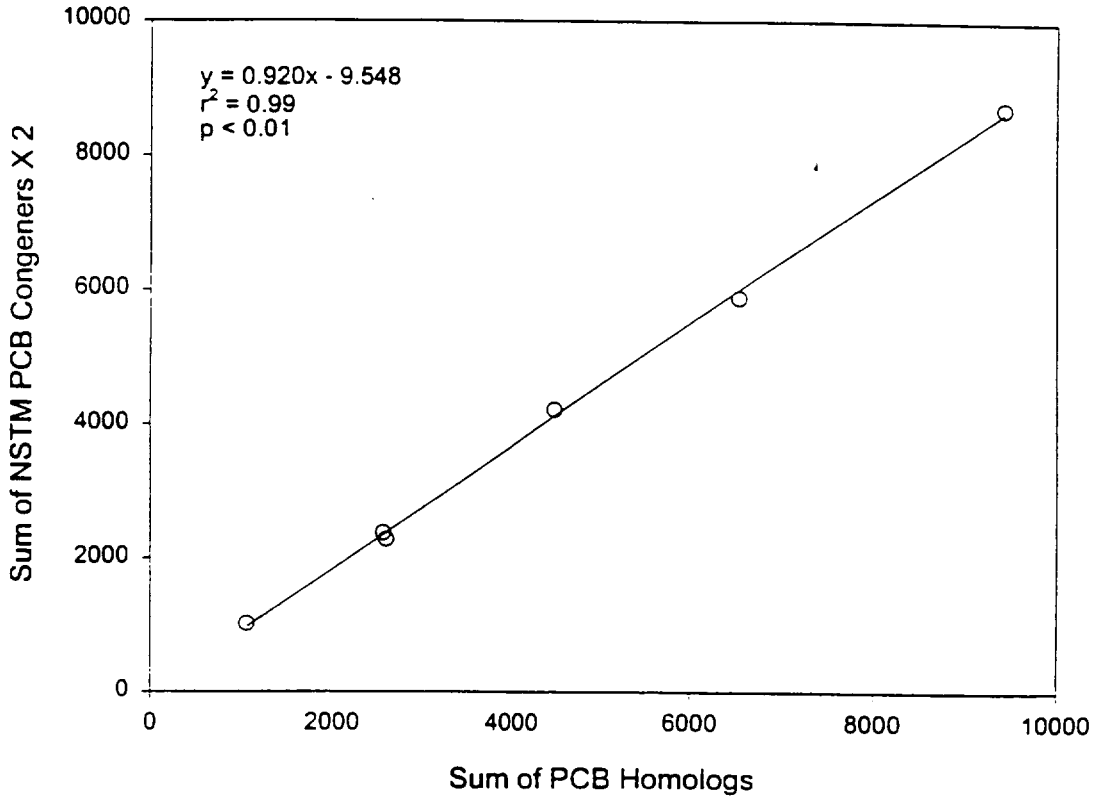
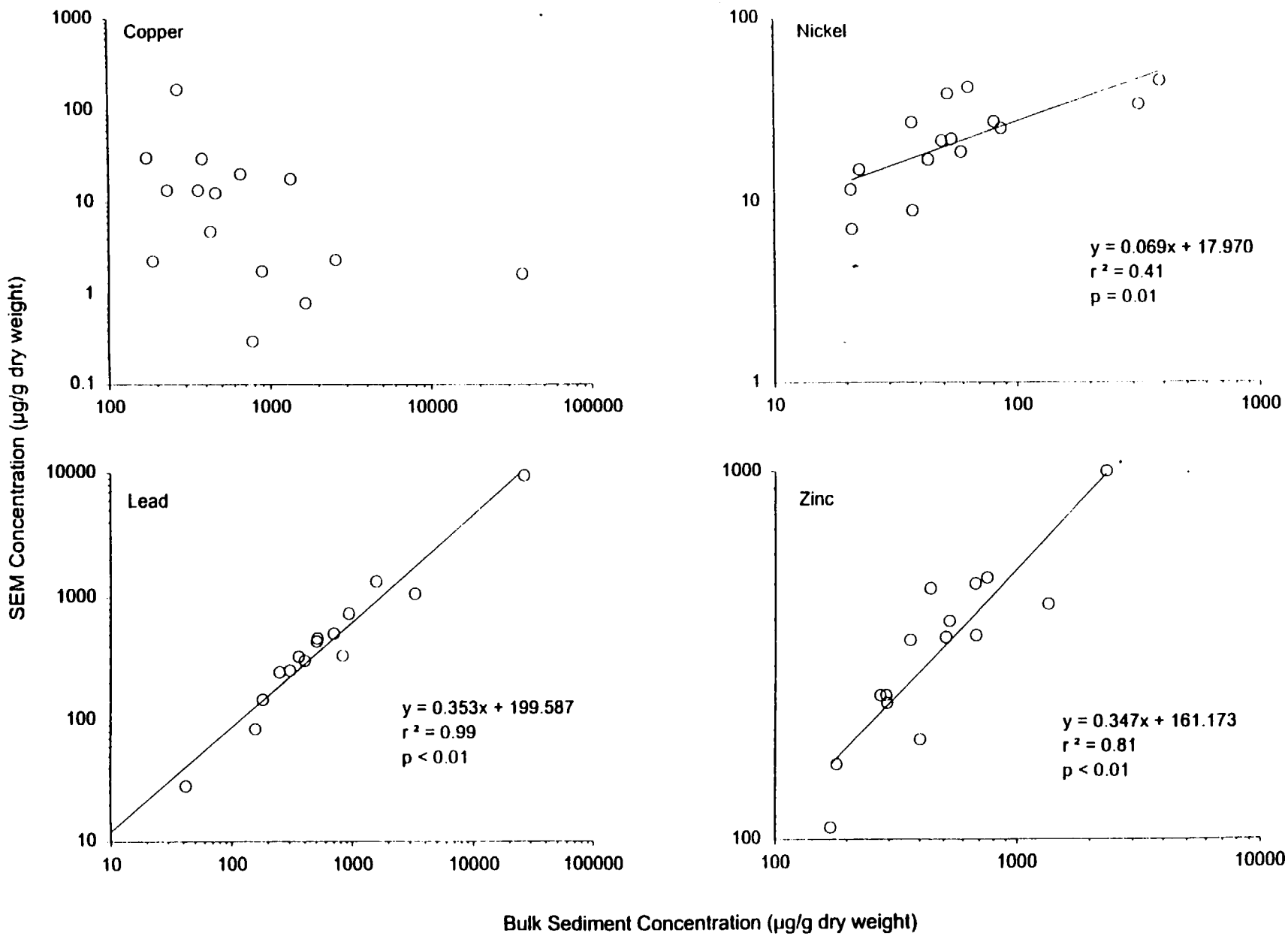


Figure 3.2-2. Relationship between congener-based and homolog-based estimates of Total PCB concentrations in sediments collected from the Raymark study area.


Copper
Nickel
y = 0.069x + 17.970
r² = 0.41
p = 0.01
Lead
y = 0.353x + 199.587
r² = 0.99
p < 0.01
Zinc
y = 0.347x + 161.173
r² = 0.81
p < 0.01
SEM Concentration (µg/g dry weight)
Bulk Sediment Concentration (µg/g dry weight)

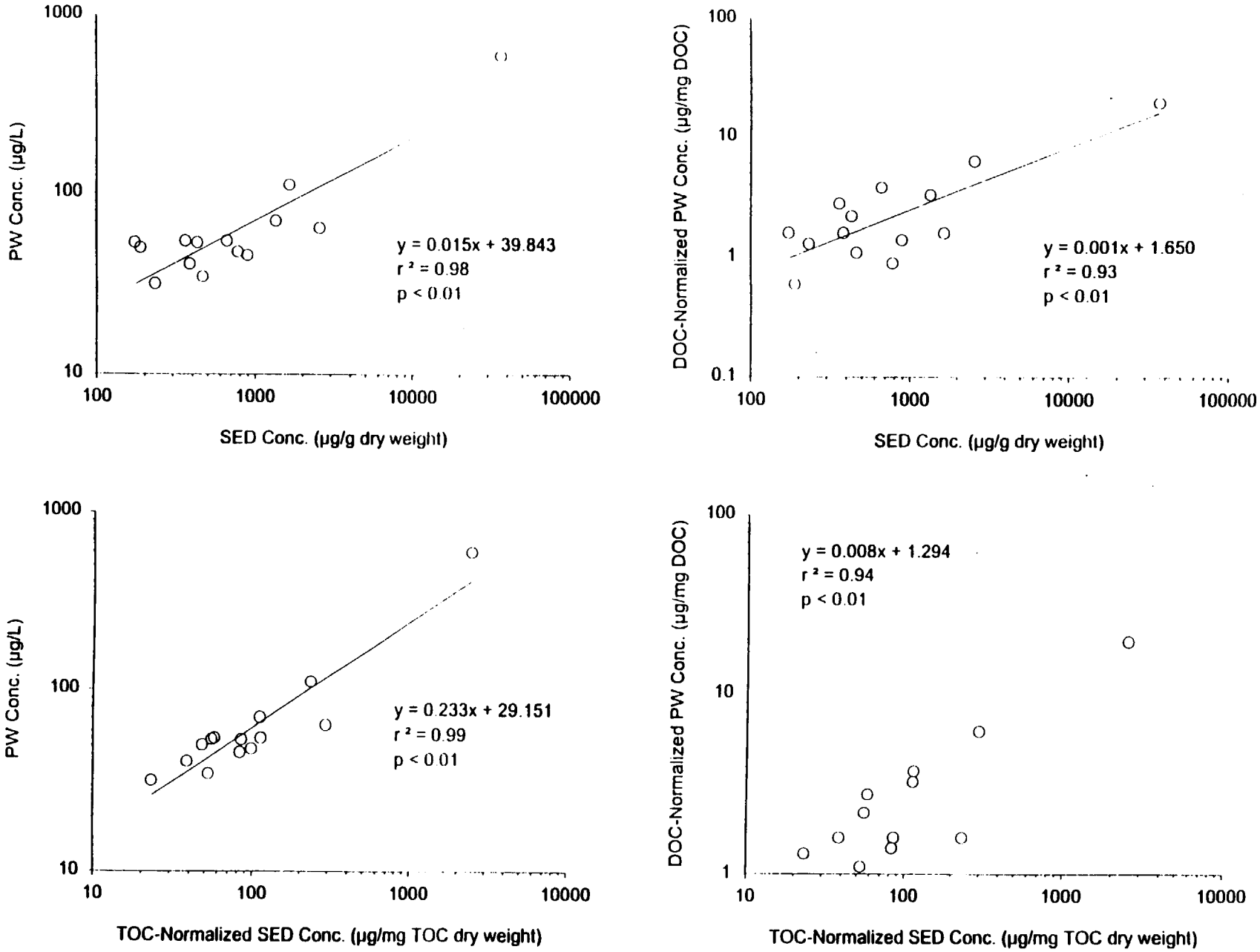


Figure 3.4-2. Whole and DOC-normalized porewater (PW) concentrations versus whole and TOC-normalized sediment (SED)

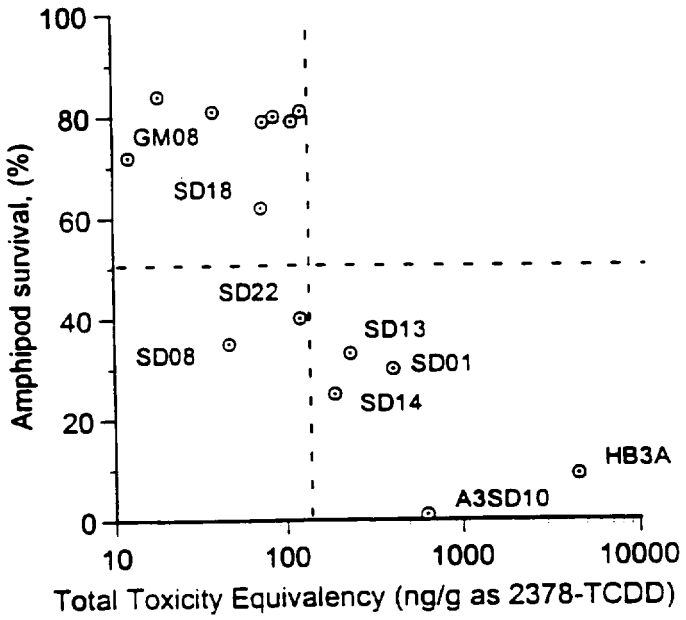


Figure 3.4-3. Exposure - response relationship between amphipod survival and dioxin toxicity relative to 2378-TCDD.

Table 3.1-1. Results of *Ampelisca abdita* survival tests with bulk sediments collected from the Raymark study area.

			Survival	
	Ammonia (mg/L)[1]		Bulk Sediment	
Station	Total	Unionized	% Control[2]	Flag[3]
A3SD10	2.05	0.01	1.00	+++
CSD1	8.92	0.06	81.0	-
GM08	2.04	0.01	72.0	+
HB3A	6.43	0.11	9.00	+++
SD01	6.59	0.10	30.0	++
SD07	26.1	0.38	79.0	+
SD08	23.8	0.20	81.0	-
SD13	18.3	0.27	33.0	++
SD14	13.4	0.16	25.0	++
SD18	7.12	0.02	62.0	+
SD21	8.43	0.08	35.0	++
SD23	6.69	0.08	40.0	++
SD24	3.65	0.05	80.0	-
SD28	15.6	0.43	79.0	+
SD37	8.51	0.11	84.0	-
BN03[4]	6.67	0.09	87.0	-
MF03[4]	17.8	0.21	97.0	-
SD26[4]	8.24	0.12	100	-
SD31[4]	11.8	0.16	95.0	-
SD33[4]	4.47	0.10	86.0	-

1 - Ammonia measurements from overlying water column.
2 - Survival in Long Island Sound sediment used as control response for all treatments.
3 - Rankings for impacts to *Ampelisca* survival:
High (+++) <20 %; Intermediate (++) ≥20 and <50%; Low (+) ≥50 and <80%;
Non-toxic (-) >80%.
4 - Stations with > 85% survival not selected for further TIE analysis.

Table 3.1-2. Results of *Ampelisca abdita* survival tests with sediment porewaters collected from the Raymark study area.

			Survival[1]					
	Whole Porewater Ammonia (mg/L)		Whole Porewater		EDTA-Treated Porewater		C18-Treated Porewater	
Station	Total	Unionized	LC20[2] (%)	Flag[3]	LC20[2] (%)	Flag[3]	LC20[2] (%)	Flag
A3SD10	19.6	0.12	77.3	+	100	-	100	-
CSD1	16.5	0.33	64.3	+	70.0	+	83.3	-
GM08	12.3	0.06	80.0	-	100	-	100	-
HB3A	16.0	0.13	66.7	+	60.0	+	22.7	++
SD01	34.3	0.30	40.0	++	60.0	+	55.6	+
SD07	31.4	0.64	60.0	+	62.5	+	83.3	-
SD08	29.3	0.36	43.5	++	60.0	+	60.0	+
SD13	37.0	0.41	60.0	+	60.0	+	60.0	+
SD14	27.4	0.27	60.0	+	55.6	+	60.0	+
SD18	44.1	0.09	25.0	++	18.0	+++	18.0	+++
SD21	35.6	0.28	60.7	+	60.0	+	60.0	+
SD23	23.5	0.51	60.0	+	60.0	+	60.0	+
SD24	23.3	0.37	51.7	+	61.1	+	60.0	+
SD28	23.0	0.51	100	-	100	-	100	-
SD37	49.6	0.80	28.1	++	57.9	+	55.0	+

Shaded values indicate ≥ 10% change from whole porewater response.

1 - Control value for experiment, assumed for all treatments, is 0% porewater.

2 - Lethal Concentration - 20% (concentration of porewater causing 20% reduction in survival).

3 - Rankings for impacts to *Ampelisca* survival:

High (+++) <20 %; Intermediate (++) ≥20 and <50%; Low (+) ≥50 and <80%; Non-toxic (-) >80%.

Table 3.1-3. Results of *Ampelisca abdita* survival tests with aerated and non-aerated sediment porewaters collected from the Raymark study area.

	Survival			
	Non-Aerated Porewater		Aerated Porewater	
Station	% Control[2]	Flag[3]	% Control[2]	Flag[3]
A3SD10	100	-	100	-
CSD1	100	-	100	-
GM08	100	-	100	-
HB3A	0.00	+++	0.00	+++
SD01	0.00	+++	0.00	+++
SD07	90.0	-	0.00	+++
SD08	80.0	-	80.0	-
SD13	30.0	++	10.0	+++
SD14	10.0	+++	0.00	+++
SD18	0.00	+++	0.00	+++
SD21	20.0	++	10.0	+++
SD23	0.00	+++	0.00	+++
SD24	80.0	-	0.00	+++
SD28	80.0	-	100.0	-
SD37	40.0	++	0.00	+++

Shaded values indicate ≥ 10% change from non-aerated porewater response.

1 - Ammonia measurements from overlying water column.

2 - Survival in Long Island Sound sediment used as control response for all treatments.

3 - Rankings for impacts to *Ampelisca* survival:

High (+++) <20 %; Intermediate (++) ≥20 and <50%; Low (+) ≥50 and <80%;

Non-toxic (-) >80%.

Table 3.1-4. Results of *Mulinia* larval development tests with sediment porewaters collected from the Raymark study area.

			Normal Larval Development[1]					
	Whole Porewater Ammonia (mg/L)		Whole Porewater		EDTA-Treated Porewater		C18-Treated Porewater	
Station	Total	Unionized	EC20[2] (%)	Flag[3]	EC20[2] (%)	Flag[3]	EC20[2] (%)	Flag[3]
A3SD10	19.6	0.12	0.41	+++	17.0	++	2.05	+++
CSD1	16.5	0.33	11.7	++	11.2	++	2.46	+++
GM08	12.3	0.06	14.8	++	58.0	+	15.9	++
HB3A	16.0	0.13	8.26	+++	16.9	++	18.0	++
SD01	34.3	0.30	9.21	+++	15.9	++	18.0	++
SD07	31.4	0.64	7.20	+++	17.2	++	2.63	+++
SD08	29.3	0.36	3.20	+++	2.71	+++	3.09	+++
SD13	37.0	0.41	20.7	++	17.8	++	16.7	++
SD14	27.4	0.27	13.8	++	15.9	++	17.4	++
SD18	44.1	0.09	1.25	+++	2.00	+++	20.6	++
SD21	35.6	0.28	7.58	+++	15.2	++	16.9	++
SD23	23.5	0.51	31.3	++	12.1	++	49.2	+
SD24	23.3	0.37	14.9	++	21.1	++	45.7	+
SD28	23.0	0.51	55.7	+	55.7	+	46.8	+
SD37	49.6	0.80	7.39	+++	10.7	++	10.5	++

Shaded values indicate ≥ 10% change from whole porewater response.

1 - Control value for experiment, assumed for all treatments, is 0% porewater.

2 - Effect Concentration - 20% (concentration of porewater causing 20% reduction in test response).

3 - Rankings for impacts to *Mulinia* normal larval development:

High (+++) <10 %; Intermediate (++) ≥10 and <40%; Low (+) ≥40 and <70%; Non-toxic (-) ≥70%.

Table 3.1-5. Results of *Ampelisca abdita* survival and *Mulinia lateralis* larval development tests with *Ulva lactula* treated porewater collected from the Raymark study area.

			ULVA-treated Porewater Toxicity[1]			
	Ammonia (mg/L)		Amphipod Survival		Bivalve Development	
Station	Total	Unionized	96-H LC20 (%)[2]	Flag[3]	48-H EC20 (%)[4]	Flag[5]
A3SD10	1.38	0.01	100	-	1.25	+++
CSD1	0.47	0.03	100	-	2.67	+++
GM08	0.12	0.00	100	-	1.25	+++
HB3A	1.55	0.03	24.0	++	1.25	+++
SD01	1.11	0.03	72.8	+	2.14	+++
SD07	1.88	0.09	100	-	1.64	+++
SD08	0.53	0.03	100	-	11.1	++
SD13	0.70	0.02	100	-	10.8	++
SD14	1.50	0.04	43.6	++	10.3	++
SD18	4.20	0.09	20.0	+++	5.91	+++
SD21	1.00	0.04	46.9	++	1.25	+++
SD23	2.82	0.04	100	-	0.38	+++
SD24	0.86	0.03	100	-	2.78	+++
SD28	0.86	0.04	100	-	13.8	++
SD37	3.00	0.11	100	-	2.24	+++

Shaded values indicate ≥ 10% change from whole porewater response.

1- See Appendix B-4 for toxicity data.

2 - Lethal Concentration - 50% (concentration of porewater causing 50% mortality in test species).

3 - Rankings for *Ampelisca* survival:

High (+++) < 20 %; Intermediate (++) < 50%; Low (+) < 80%; Non-toxic (-) ≥ 80%.

4 - Effect Concentration - 20% (concentration of porewater causing 20% reduction in test response).

3 - Rankings for impacts to *Mulinia* normal larval development:

High (+++) <10 %; Intermediate (++) ≥10 and <40%; Low (+) ≥40 and <70%; Non-toxic (-) ≥70%.

Table 3.2-1. Summary of sediment chemistry for the Raymark study area. HQ benchmark = ER-M reference data.

Class	Analyte	A3SD10			CSD1			GM08			HB3A			SD01			SD07		
		Conc[1]	HQ[2]	Rank[3]	Conc[1]	HQ[2]	Rank[3]	Conc[1]	HQ[2]	Rank[3]	Conc[1]	HQ[2]	Rank[3]	Conc[1]	HQ[2]	Rank[3]	Conc[1]	HQ[2]	Rank[3]
Metals	Silver	2.00	0.54	-	3.00	0.81	-	3.00	0.81	-	2.40	0.65	-	1.40	0.38	-	1.50	0.41	-
	Arsenic	23.9	0.34	-	11.2	0.16	-	17.9	0.26	-	9.20	0.13	-	7.00	0.10	-	10.60	0.15	-
	Cadmium	8.30	9.2E-3	-	1.20	1.3E-3	-	1.50	1.7E-3	-	1.00	1.1E-3	-	5.50	6.1E-3	-	4.40	4.9E-3	-
	Chromium	463	1.25	+	402	1.09	+	231	0.62	-	290	0.78	-	89.7	0.24	-	99.9	0.27	-
	Copper	2550	9.44	++	1350	5.00	++	661	2.45	++	36400	135	+++	1650	6.11	++	430	1.59	+
	Mercury	0.43	0.61	-	0.77	1.08	+	1.20	1.69	+	0.47	0.66	-	0.22	0.31	-	0.32	0.45	-
	Nickel	317	6.14	++	54.0	1.05	+	37.4	0.72	-	386	7.48	++	80.7	1.56	+	49.2	0.95	-
	Lead	3290	15.1	+++	703	3.22	++	158	0.72	-	26500	122	+++	1570	7.20	++	403	1.85	+
	Zinc	1340	3.27	++	399	0.97	-	292	0.71	-	2320	5.66	++	750	1.83	+	508	1.24	+
	Metals Hazard Index[4]		36.7			13.4			7.99			272			17.7			6.92	
PAHs	2-Methylnaphthalene	1000	1.49	+	660	0.99	-	660	0.99	-	660	0.99	-	710	1.06	+	650	0.97	-
	Acenaphthene	1000	2.00	+	660	1.32	+	660	1.32	+	660	1.32	+	140	0.28	-	160	0.32	-
	Acenaphthylene	190	0.30	-	200	0.31	-	660	1.03	+	660	1.03	+	350	0.55	-	330	0.52	-
	Anthracene	120	0.11	-	190	0.17	-	660	0.60	-	660	0.60	-	520	0.47	-	520	0.47	-
	Benzo(a)anthracene	1500	0.94	-	560	0.35	-	190	0.12	-	660	0.41	-	2500	1.56	+	2700	1.69	+
	Benzo(a)pyrene	1700	1.06	+	660	0.41	-	230	0.14	-	120	0.08	-	2400	1.50	+	2200	1.38	+
	Chrysene	2800	1.00	-	850	0.30	-	400	0.14	-	180	0.06	-	4000	1.43	+	4000	1.43	+
	Dibenz(a,h)anthracene	260	1.00	-	190	0.73	-	74.0	0.28	-	660	2.54	++	460	1.77	+	530	2.04	++
	Fluoranthene	950	0.19	-	470	0.09	-	390	0.08	-	660	0.13	-	1400	0.27	-	4200	0.82	-
	Fluorene	1400	2.59	++	730	1.35	+	220	0.41	-	1100	2.04	++	3800	7.04	++	3900	7.22	++
	Naphthalene	240	0.11	-	660	0.31	-	660	0.31	-	660	0.31	-	430	0.20	-	520	0.25	-
	Phenanthrene	4500	3.00	++	1200	0.80	-	330	0.22	-	280	0.19	-	5600	3.73	++	4500	3.00	++
	Pyrene	1000	0.38	-	660	0.25	-	660	0.25	-	660	0.25	-	190	0.07	-	260	0.10	-
	PAH Hazard Index[4]		14.2			7.40			5.90			9.95			19.9			20.2	
PCBs	Total PCBs	27081	150	+++	6006	33.4	+++	247	1.37	+	317183	1762	+++	20718	115	+++	2355	13.1	+++
	Sum of Aroclors[5]										39526						1760		
PSTs	p,p'-DDE										3.60	0.13	-				7.20	0.27	-

1 - Concentration units: metals = µg/g dry weight; PAHs, PCBs, pesticides = ng/g dry weight. See Appendix A-1-1 for sediment concentrations.

2 - Hazard Quotients calculated as sediment concentration/ER-M benchmark (Long *et al.*, 1995).

3 - HQ Ranking: "-" = HQ<1; "+" = HQ>1; "++" = HQ>2; "+++" = HQ>10.

4 - Hazard Index calculated as sum of analyte-specific Hazard Quotients.

5 - ER-M benchmarks not availabe for these analytes. Rankings reflect concentrations as follows: "-" = <100 ng/g; "+" = >100 ng/g; "++" = >1000 ng/g; +++ = >10000 ng/g

Table 3.2-1 (continued). Summary of sediment chemistry for the Raymark study area. HQ benchmark = ER-M reference data.

Class	Analyte	SD08			SD13			SD14			SD18			SD21			SD23		
		Conc[1]	HQ[2]	Rank[3]	Conc[1]	HQ[2]	Rank[3]	Conc[1]	HQ[2]	Rank[3]	Conc[1]	HQ[2]	Rank[3]	Conc[1]	HQ[2]	Rank[3]	Conc[1]	HQ[2]	Rank[3]
Metals	Silver	1.40	0.38	-	1.40	0.38	-	0.88	0.24	-	0.44	0.12	-	0.54	0.14	-	0.93	0.25	-
	Arsenic	6.50	0.09	-	9.00	0.13	-	9.20	0.13	-	3.70	0.05	-	3.90	0.06	-	8.80	0.13	-
	Cadmium	1.40	1.5E-3	-	7.60	8.4E-3	-	7.60	8.4E-3	-	0.80	8.8E-4	-	3.20	3.5E-3	-	6.30	7.0E-3	-
	Chromium	84.4	0.23	-	91.5	0.25	-	116	0.31	-	31.8	0.09	-	37.3	0.10	-	91.7	0.25	-
	Copper	232	0.86	-	890	3.30	++	775	2.87	++	271	1.00	+	188	0.70	-	462	1.71	+
	Mercury	0.37	0.52	-	0.28	0.39	-	0.49	0.69	-	0.16	0.23	-	0.16	0.22	-	0.28	0.39	-
	Nickel	37.1	0.72	-	59.1	1.15	+	86.3	1.67	+	20.8	0.40	-	22.6	0.44	-	52.1	1.01	+
	Lead	181	0.83	-	934	4.28	++	833	3.82	++	357	1.64	+	249	1.14	+	514	2.36	++
	Zinc	290	0.71	-	671	1.64	+	676	1.65	+	181	0.44	-	274	0.67	-	525	1.28	+
	Metals Hazard Index[4]		4.34			11.5			11.4			3.97			3.46			7.39	
PAHs	2-Methylnaphthalene	660	0.99	-	1000	1.49	+	1700	2.54	++	610	0.91	-	615	0.92	-	990	1.48	+
	Acenaphthene	660	1.32	+	200	0.40	-	200	0.40	-	610	1.22	+	85.0	0.17	-	160	0.32	-
	Acenaphthylene	130	0.20	-	410	0.64	-	440	0.69	-	140	0.22	-	165	0.26	-	340	0.53	-
	Anthracene	140	0.13	-	680	0.62	-	640	0.58	-	250	0.23	-	305	0.28	-	570	0.52	-
	Benzo(a)anthracene	670	0.42	-	4000	2.50	++	3800	2.38	++	800	0.50	-	1450	0.91	-	2900	1.81	+
	Benzo(a)pyrene	640	0.40	-	4000	2.50	++	3600	2.25	++	790	0.49	-	1400	0.88	-	2900	1.81	+
	Chrysene	1000	0.36	-	10000	3.57	++	9200	3.29	++	1200	0.43	-	2000	0.71	-	4500	1.61	+
	Dibenz(a,h)anthracene	190	0.73	-	1100	4.23	++	1000	3.85	++	320	1.23	+	345	1.33	+	940	3.62	++
	Fluoranthene	380	0.07	-	9100	1.78	+	8400	1.65	+	600	0.12	-	895	0.18	-	1800	0.35	-
	Fluorene	990	1.83	+	5300	9.81	++	4800	8.89	++	1100	2.04	++	1950	3.61	++	4400	8.15	++
	Naphthalene	120	0.06	-	610	0.29	-	550	0.26	-	160	0.08	-	270	0.13	-	550	0.26	-
	Phenanthrene	1500	1.00	-	11000	7.33	++	11000	7.33	++	1500	1.00	-	3450	2.30	++	7900	5.27	++
	Pyrene	660	0.25	-	220	0.08	-	360	0.14	-	75.0	0.03	-	140	0.05	-	220	0.08	-
	PAH Hazard Index[4]		7.76			35.3			34.2			8.49			11.7			25.8	
PCBs	Total PCBs	967	5.37	++	8661	48.1	+++	4642	25.79	+++	2428	13.49	+++	1268	7.04	++	4119	22.88	+++
	Sum of Aroclors[5]													954					
PSTs	p,p'-DDE													5.40	0.20	-			

1 - Concentration units: metals = µg/g dry weight; PAHs, PCBs, pesticides = ng/g dry weight. See Appendix A-1-1 for sediment concentrations.

2 - Hazard Quotients calculated as sediment concentration/ER-M benchmark (Long *et al.*, 1995).

3 - HQ Ranking: "-" = HQ<1; "+" = HQ>1; "++" = HQ>2; "+++" = HQ>10.

4 - Hazard Index calculated as sum of analyte-specific Hazard Quotients.

5 - ER-M benchmarks not availabe for these analytes. Rankings reflect concentrations as follows: "-" = <100 ng/g; "+" = >100 ng/g; "++" = >1000 ng/g; +++ = >10000 ng/g.

Table 3.2-1 (continued). Summary of sediment chemistry for the Raymark study area. HQ benchmark = ER-M reference data.

Class	Analyte	SD24			SD28			SD37		
		Conc[1]	HQ[2]	Rank[3]	Conc[1]	HQ[2]	Rank[3]	Conc[1]	HQ[2]	Rank[3]
Metals	Silver	0.62	0.17	-	1.60	0.43	-	0.60	0.16	-
	Arsenic	8.20	0.12	-	8.10	0.12	-	4.50	0.06	-
	Cadmium	2.60	2.9E-3	-	4.20	4.6E-3	-	0.51	5.6E-4	-
	Chromium	97.4	0.26	-	107	0.29	-	59.2	0.16	-
	Copper	383	1.42	+	361	1.34	+	173	0.64	-
	Mercury	0.28	0.39	-	0.27	0.38	-	0.17	0.24	-
	Nickel	63.3	1.23	+	43.4	0.84	-	21.0	0.41	-
	Lead	506	2.32	++	303	1.39	+	42.3	0.19	-
	Zinc	363	0.89	-	439	1.07	+	171	0.42	-
	Metals Hazard Index[4]		6.80			5.86			2.29	
PAHs	2-Methylnaphthalene	660	0.99	-	1000	1.49	+	570	0.85	-
	Acenaphthene	660	1.32	+	1000	2.00	+	570	1.14	+
	Acenaphthylene	110	0.17	-	200	0.31	-	84.0	0.13	-
	Anthracene	150	0.14	-	300	0.27	-	120	0.11	-
	Benzo(a)anthracene	890	0.56	-	1700	1.06	+	430	0.27	-
	Benzo(a)pyrene	960	0.60	-	1900	1.19	+	470	0.29	-
	Chrysene	1600	0.57	-	3400	1.21	+	900	0.32	-
	Dibenz(a,h)anthracene	310	1.19	+	600	2.31	++	150	0.58	-
	Fluoranthene	670	0.13	-	1100	0.22	-	820	0.16	-
	Fluorene	1200	2.22	++	2300	4.26	++	540	1.00	-
	Naphthalene	160	0.08	-	310	0.15	-	570	0.27	-
	Phenanthrene	2400	1.60	+	4900	3.27	++	860	0.57	-
	Pyrene	83.0	0.03	-	130	0.05	-	570	0.22	-
	PAH Hazard Index[4]		9.60			17.8			5.92	
PCBs	Total PCBs	4865	27.03	+++	2383	13.24	+++	104.5	0.58	-
	Sum of Aroclors[5]									
PSTs	p,p'-DDE									

Table 3.2-2. Summary of porewater chemistry for the Raymark study area.

Class	Analyte	A3SD10			CSD1			GM08			HB3A			SD01		
		Conc[1]	HQ[2]	Rank[3]	Conc[1]	HQ[2]	Rank[3]	Conc[1]	HQ[2]	Rank[3]	Conc[1]	HQ[2]	Rank[3]	Conc[1]	HQ[2]	Rank[3]
Metals	Silver	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
	Arsenic	19.9	0.55	-	58.7	1.63	+	20.1	0.56	-	33.5	0.93	-			
	Cadmium	5.60	0.16	-	3.68	0.10	-	0.17	4.7E-3	-	3.17	8.8E-2	-	2.83	7.9E-2	-
	Chromium	1.47	2.9E-2	-	2.64	5.3E-2	-	1.69	3.4E-2	-	0.84	1.7E-2	-	3.24	6.5E-2	-
	Copper	65.0	3.17	++	71.0	3.46	++	55.0	2.68	++	599	29.2	+++	112	5.46	++
	Nickel	244	0.10	-	14.2	5.9E-3	-	32.0	1.3E-2	-	112	4.7E-2	-	27.3	1.1E-2	-
	Lead	1.40	4.6E-4	-	1.44	4.8E-4	-	1.56	5.2E-4	-	13.2	4.4E-3	-	2.80	9.3E-4	-
	Zinc	1540	4.49	++	260	0.76	-	420	1.22	+	170	0.50	-	170	0.50	-
	Metals Hazard Index[4]		8.50			6.01			4.52			30.8			6.12	
PAHs	PAH Hazard Index[4]															
PCBs	Total PCBs				1093	27.3	+++									

1 - Concentration units: µg/L. See Appendix A-1-2 for porewater concentrations.

2 - Hazard Quotients calculated as sediment concentration/WQSV benchmark (see Appendix A-2-2).

3 - HQ Ranking: "-" = HQ<1; "+" = HQ>1; "++" = HQ>2; "+++" = HQ>10.

4 - Hazard Index calculated as sum of analyte-specific Hazard Quotients.

Table 3.2-2 (continued). Summary of porewater chemistry for the Raymark study area.

Class	Analyte	SD07			SD08			SD13			SD14			SD18		
		Conc[1]	HQ[2]	Rank[3]	Conc[1]	HQ[2]	Rank[3]	Conc[1]	HQ[2]	Rank[3]	Conc[1]	HQ[2]	Rank[3]	Conc[1]	HQ[2]	Rank[3]
Metals	Silver	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
	Arsenic	95.2	2.64	++	80.8	2.24	++	73.6	2.04	++	17.5	0.49	-	15.7	0.22	-
	Cadmium	3.86	0.11	-	1.60	4.4E-2	-	2.78	7.7E-2	-	3.27	9.1E-2	-	3.45	1.8E-2	-
	Chromium	1.05	2.1E-2	-				2.81	5.6E-2	-	3.14	6.3E-2	-	1.33	3.8E-2	-
	Copper	54.0	2.63	++	32.0	1.56	+	46.0	2.24	++	48.0	2.34	++	52.0		
	Nickel	15.3	6.4E-3	-	41.0	1.7E-2	-	4.00	1.7E-3	-	31.0	1.3E-2	-	16.4	5.3E-3	-
	Lead	0.75	2.5E-4	-	1.72	5.7E-4	-	0.75	2.5E-4	-	3.56	1.2E-3	-	1.96	3.3E-4	-
	Zinc	150	0.44	-	200	0.58	-	140	0.41	-	270	0.79	-	130	0.12	-
	Metals Hazard Index[4]		5.85			4.45			4.8			3.78			0.40	
PAHs	PAH Hazard Index[4]								40.4	+++						
PCBs	Total PCBs	2084	52.1	+++	2000	50.0	+++	504	12.6	+++						

1 - Concentration units: µg/L. See Appendix A-1-2 for porewater concentrations.

2 - Hazard Quotients calculated as sediment concentration/WQSV benchmark (see Appendix A-2-2).

3 - HQ Ranking: "-" = HQ<1; "+" = HQ>1; "++" = HQ>2; "+++" = HQ>10.

4 - Hazard Index calculated as sum of analyte-specific Hazard Quotients.

Table 3.2-2 (continued). Summary of porewater chemistry for the Raymark study area.

Class	Analyte	SD21			SD23			SD24			SD28			SD37		
		Conc[1]	HQ[2]	Rank[3]	Conc[1]	HQ[2]	Rank[3]	Conc[1]	HQ[2]	Rank[3]	Conc[1]	HQ[2]	Rank[3]	Conc[1]	HQ[2]	Rank[3]
Metals	Silver	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-	0.00	0.00	-
	Arsenic	12.0	0.33	-	34.6	0.96	-	11.8	0.33	-	19.1	0.53	-	18.0	0.50	-
	Cadmium	3.41	9.5E-2	-	3.33	9.2E-2	-	2.80	7.8E-2	-	3.71	0.10	-	2.95	8.2E-2	-
	Chromium	0.67	1.3E-2	-	3.24	6.5E-2	-	2.36	4.7E-2	-						
	Copper	50.5	2.46	++	35.0	1.71	+	41.0	2.00	+	55.0	2.68	++	54.0	2.63	++
	Nickel	15.0	6.3E-3	-	9.50	4.0E-3	-	14.9	6.2E-3	-	7.40	3.1E-3	-			
	Lead	2.26	7.5E-4	-	3.92	1.3E-3	-	4.40	1.5E-3	-	2.76	9.1E-4	-	8.96	3.0E-3	-
	Zinc	115	0.34	-	60.0	0.17	-	50.0	0.15	-	260	0.76	-	50.0	0.15	-
	Metals Hazard Index[4]		3.25			3.01			2.61			4.08			3.37	
PAHs	PAH Hazard Index[4]															
PCBs	Total PCBs				1144	28.6	+++				2212	55.3	+++			

1 - Concentration units: µg/L. See Appendix A-1-2 fo 1 - Concentration units: µg/L. See Appendix A-1-2 for porewater concentrations.

2 - Hazard Quotients calculated as sediment concentration/WQSV benchmark (see Appendix A-2-2).

3 - HQ Ranking: "-" = HQ<1; "+" = HQ>1; "++" = HQ>2; "+++" = HQ>10.

4 - Hazard Index calculated as sum of analyte-specific Hazard Quotients.

Table 3.4-1. Exposure-response analysis for **porewater**-related CoC toxicity: A) *Ampelisca*.

			Interstitial Water Toxic Units (100% Porewater Conc./LC_{50})								
	Toxicity		Metals					Organics			
Station	EC20%	Tox-GRP[2]	Arsenic	Cadmium	Copper	Zinc	$\Sigma IWTU_{PW}$	PCBs	PAHs	$\Sigma IWTU_{PW}$	NH_4-TOT
SD18	25.0	I	0.2	0.0	0.0	0.1	0.4	0.0	0.0	0.0	1.5
SD37	28.1	I	0.5	0.1	2.6	0.1	3.4	0.0	0.0	0.0	**1.7**
SD01	40.0	I	0.0	0.1	**5.5**	0.5	**6.0**	0.0	0.0	0.0	**1.1**
SD08	43.5	I	**2.2**	0.0	1.6	0.6	4.4	50.0	0.0	50.0	1.0
SD24	51.7	L	0.3	0.1	2.0	0.1	2.6	0.0	0.0	0.0	0.8
SD07	60.0	L	**2.6**	0.1	2.6	0.4	**5.8**	52.1	0.0	52.1	1.0
SD13	60.0	L	**2.0**	0.1	2.2	0.4	**4.8**	12.6	0.0	12.6	1.2
SD14	60.0	L	0.5	0.1	2.3	0.8	3.7	0.0	0.0	0.0	0.9
SD23	60.0	L	1.0	0.1	1.7	0.2	2.9	28.6	0.0	28.6	0.8
SD21	60.7	L	0.3	0.1	2.5	0.3	3.2	0.0	0.0	0.0	**1.2**
CSD1	64.3	L	**1.6**	0.1	**3.5**	0.8	**6.0**	27.3	0.0	27.3	0.5
HB3A	66.7	L	0.9	0.1	**29.2**	0.5	**30.7**	0.0	0.0	0.0	0.5
A3SD10	77.3	L	0.6	0.2	**3.2**	**4.5**	**8.4**	0.0	0.0	0.0	0.7
GM08	80.0	N	0.6	0.0	2.7	1.2	4.5	0.0	0.0	0.0	0.4
SD28	100	N	0.5	0.1	2.7	0.8	4.1	55.7	0.0	63.2	0.8
Threshold Effects Quotient[1]			1.0	1.0	2.7	1.2	4.5	55.7	1.0	63.2	1.0
% > TEQ			30.8%	0.0%	30.8%	7.7%	46.2%	0.0%	0.0%	0.0%	23.1%

Bolded values indicate HQs exceeding TEQ.

1- TEQ selected as the greater of 1.0 and the maximum value of least toxic sample group.

2- Toxicity Group Classification:

High (H) <20 %; Intermediate (I) ≥20 and <50%; Low (L) ≥50 and <80%; Non-toxic (N) >80%.

Table 3.4-1 (continued). Exposure-response analysis for **porewater**-related CoC toxicity: B) *Mulinia*.

	Toxicity		Interstitial Water Toxic Units (100% Porewater Conc./LC_{50})								
			Metals					Organics			
Station	EC20%	Tox-GRP[2]	Arsenic	Cadmium	Copper	Zinc	$\Sigma IWTU_{PW}$	PCBs	PAHs	$\Sigma IWTU_{PW}$	NH_4-TOT
A3SD10	0.41	H	0.6	0.2	**3.2**	**4.5**	**8.4**	0.0	0.0	0.0	1.5
SD18	1.25	H	0.2	0.0	0.0	0.1	0.4	0.0	0.0	0.0	**3.3**
SD08	3.20	H	**2.2**	0.0	1.6	0.6	**4.4**	50.0	0.0	50.0	**2.2**
SD07	7.20	H	**2.6**	0.1	2.6	0.4	**5.8**	52.1	0.0	52.1	**2.3**
SD37	7.39	H	0.5	0.1	2.6	0.1	3.4	0.0	0.0	0.0	**3.7**
SD21	7.58	H	0.3	0.1	2.5	0.3	3.2	0.0	0.0	0.0	**2.7**
HB3A	8.26	H	0.9	0.1	**29.2**	0.5	**30.7**	0.0	0.0	0.0	1.2
SD01	9.21	H	0.0	0.1	**5.5**	0.5	**6.0**	0.0	0.0	0.0	**2.6**
CSD1	11.7	I	**1.6**	0.1	**3.5**	0.8	**6.0**	27.3	0.0	27.3	1.2
SD14	13.8	I	0.5	0.1	2.3	0.8	3.7	0.0	0.0	0.0	**2.0**
GM08	14.8	I	0.6	0.0	2.7	**1.2**	**4.5**	0.0	0.0	0.0	0.9
SD24	14.9	I	0.3	0.1	2.0	0.1	2.6	0.0	0.0	0.0	1.7
SD13	20.7	I	**2.0**	0.1	2.2	0.4	**4.8**	12.6	0.0	12.6	**2.8**
SD23	31.3	I	1.0	0.1	1.7	0.2	2.9	28.6	0.0	28.6	1.8
SD28	55.7	L	0.5	0.1	2.7	0.8	4.1	55.7	0.0	55.7	1.7
Threshold Effects Quotient[1]			1.0	1.0	2.7	1.0	4.1	55.7	1.0	55.7	1.8
% > TEQ			28.6%	0.0%	28.6%	14.3%	57.1%	0.0%	0.0%	0.0%	57.1%

Bolded values indicate HQs exceeding TEQ.

1- TEQ selected as the greater of 1.0 and the maximum value of least toxic sample group.

2- Toxicity Group Classification:

High (H) <10 %; Intermediate (I) ≥10 and <40%; Low (L) ≥40 and <70%; Non-toxic (N) ≥70%.

Table 3.4-2. Exposure-response analysis for **C18-treated** (e.g., metals-related) porewater: A) *Ampelisca*.

	Toxicity		Interstitial Water Toxic Units (100% Porewater Conc./LC_{50})				
			Metals				
Station	EC20%	TOX-GRP[2]	Arsenic	Cadmium	Copper	Zinc	$\Sigma IWTU_{PW}$
SD18	18.0	H	0.06	0.03	0.00	0.20	0.29
HB3A	22.7	I	0.03	0.14	**4.10**	0.67	4.95
SD37	55.0	L	0.15	0.16	**1.51**	0.17	2.00
SD01	55.6	L	0.00	0.09	0.73	0.50	1.32
SD08	60.0	L	1.61	0.16	0.93	0.26	2.96
SD13	60.0	L	0.15	0.10	1.02	0.35	1.63
SD14	60.0	L	0.00	0.13	0.88	0.41	1.41
SD21	60.0	L	0.04	0.12	0.54	0.22	0.91
SD23	60.0	L	0.28	0.13	1.37	0.12	1.90
SD24	60.0	L	0.00	0.10	0.88	0.15	1.13
CSD1	83.3	N	1.14	0.24	0.93	0.29	2.59
SD07	83.3	N	1.77	0.15	1.46	0.20	3.58
A3SD10	100	N	0.02	0.26	1.12	7.00	8.40
GM08	100	N	0.06	0.18	1.37	1.49	3.09
SD28	100	N	1.47	0.26	1.27	0.20	3.20
Threshold Effects Quotient[1]			1.77	1.00	1.46	7.00	8.40
% > TEQ			0.0%	0.00%	20.0%	0.00%	0.00%

Bolded values indicate HQs exceeding TEQ.

1- TEQ selected as the greater of 1.0 and the maximum value of least toxic sample group.

2- Toxicity Group Classification:

High (H) <20 %; Intermediate (I) ≥20 and <50%; Low (L) ≥50 and <80%; Non-toxic (N) >80%.

Table 3.4-2 (continued). Exposure-response analysis for **C18-treated** (e.g., metals-related) porewater: B) *Mulinia*.

	Toxicity		Interstitial Water Toxic Units (100% Porewater Conc./LC_{50})				
			Metals				
Station	EC20%	TOX-GRP[2]	Arsenic	Cadmium	Copper	Zinc	$\Sigma IWTU_{PW}$
A3SD10	2.05	H	0.02	0.26	1.12	**7.00**	**8.40**
CSD1	2.46	H	1.14	0.24	0.93	0.29	2.59
SD07	2.63	H	**1.77**	0.15	**1.46**	0.20	**3.58**
SD08	3.09	H	**1.61**	0.16	0.93	0.26	2.96
SD21	16.9	I	0.04	0.12	0.54	0.22	0.91
SD37	10.5	I	0.15	0.16	**1.51**	0.17	2.00
GM08	15.9	I	0.06	0.18	1.37	**1.49**	3.09
SD13	16.7	I	0.15	0.10	1.02	0.35	1.63
SD14	17.4	I	0.00	0.13	0.88	0.41	1.41
HB3A	18.0	I	0.03	0.14	**4.10**	0.67	**4.95**
SD01	18.0	I	0.00	0.09	0.73	0.50	1.32
SD18	20.6	I	0.06	0.03	0.00	0.20	0.29
SD24	45.7	L	0.00	0.10	0.88	0.15	1.13
SD28	46.8	L	1.47	0.26	1.27	0.20	3.20
SD23	49.2	L	0.28	0.13	1.37	0.12	1.90
Threshold Effects Quotient[1]			1.47	1.00	1.37	1.00	3.20
% > TEQ			16.7%	0.00%	25.0%	16.7%	25.0%

Bolded values indicate HQs exceeding TEQ.

1- TEQ selected as the greater of 1.0 and the maximum value of least toxic sample group.

2- Toxicity Group Classification:

High (H) <10 %; Intermediate (I) ≥10 and <40%; Low (L) ≥40 and <70%; Non-toxic (N) ≥70%.

Table 3.4-3. Exposure-response analysis for **EDTA-treated** (e.g., organics-related) porewater:
A) *Ampelisca*.

	Toxicity		Interstitial Water Toxic Units (100% Porewater Conc./LC_{50}) Organics		
Station	EC20%	Tox-GRP[2]	PCBs	PAHs	$\Sigma IWTU_{PW}$
SD18	18.0	H	0.00	0.00	0.00
SD14	55.6	I	0.00	0.00	0.00
SD37	57.9	I	0.00	0.00	0.00
HB3A	60.0	I	0.00	0.00	0.00
SD01	60.0	I	0.00	0.00	0.00
SD08	60.0	I	0.32	0.00	0.32
SD13	60.0	I	**3.74**	0.00	**3.74**
SD21	60.0	I	0.00	0.00	0.00
SD23	60.0	I	**1.58**	0.00	**1.58**
SD24	61.1	I	0.00	0.00	0.00
SD07	62.5	I	0.00	0.00	0.00
CSD1	70.0	I	0.00	0.00	0.00
SD28	100	N	0.00	0.00	0.00
A3SD10	100	N	0.00	0.00	0.00
GM08	100	N	0.00	0.00	0.00
Threshold Effects Quotient[1]			1.00	1.00	1.00
% > TEQ			16.7%	0.00%	16.7%

Bolded values indicate HQs exceeding TEQ.

1- TEQ selected as the greater of 1.0 and the maximum value of least toxic sample group.

2- Toxicity Group Classification:

High (H) <20 %; Intermediate (I) ≥20 and <50%; Low (L) ≥50 and <80%; Non-toxic (N) >80%.

Table 3.4-3 (continued). Exposure-response analysis for **EDTA-treated** (e.g., organics-related) porewater: B) *Mulinia*.

			Interstitial Water Toxic Units (100% Porewater Conc./LC_{50})		
	Toxicity		Organics		
Station	EC20%	Tox-GRP[2]	PCBs	PAHs	$\Sigma IWTU_{PW}$
SD18	2.00	H	0.00	0.00	0.00
SD08	2.71	H	0.32	0.00	0.32
SD37	10.7	H	0.00	0.00	0.00
CSD1	11.2	I	0.00	0.00	0.00
SD23	12.1	I	**1.58**	0.00	**1.58**
SD21	15.2	I	0.00	0.00	0.00
SD01	15.9	I	0.00	0.00	0.00
SD14	15.9	I	0.00	0.00	0.00
HB3A	16.9	I	0.00	0.00	0.00
A3SD10	17.0	I	0.00	0.00	0.00
SD07	17.2	I	0.00	0.00	0.00
SD13	17.8	I	**3.74**	0.00	**3.74**
SD24	21.1	I	0.00	0.00	0.00
SD28	55.7	L	0.00	0.00	0.00
GM08	58.0	L	0.00	0.00	0.00
Threshold Effects Quotient[1]			1.00	1.00	1.00
% > TEQ			15.4%	0.00%	15.4%

Bolded values indicate HQs exceeding TEQ.

1- TEQ selected as the greater of 1.0 and the maximum value of least toxic sample group.

2- Toxicity Group Classification:

High (H) <10 %; Intermediate (I) ≥10 and <40%; Low (L) ≥40 and <70%; Non-toxic (N) ≥70%.

Table 3.4-4. Exposure-response analysis for *Ulva*-treated (e.g., non-ammonia-related) porewater: A) *Ampelisca*.

		Toxicity		Interstitial Water Toxic Units (100% Porewater Conc./LC_{50})								
				Metals					Organics			
Station	Treatment	EC20%	Tox-GRP[2]	Arsenic	Cadmium	Copper	Zinc	$\Sigma IWTU_{PW}$	PCBs	PAHs	$\Sigma IWTU_{PW}$	NH_4-TOT
HB3A	Non-*Ulva*	77.3	I	0.71	0.08	**30.6**	**2.65**	**34.1**	0.00	0.00	0.00	0.53
SD01	Non-*Ulva*	40.0	I	0.07	0.09	1.37	0.23	1.76	0.16	0.00	0.16	**1.14**
A3SD10	Non-*Ulva*	77.3	L	0.66	0.14	2.00	0.23	3.03	0.00	0.00	0.00	0.65
SD28	Non-*Ulva*	100	N	0.41	0.07	2.59	0.29	3.36	0.00	0.00	0.00	0.77
Threshold Effects Quotient[1]				1.00	1.00	2.59	1.00	3.36	1.00	1.00	1.00	1.00
HB3A	*Ulva*	24.0	H	0.56	0.06	**18.1**	**1.55**	**20.3**	0.00	0.00	0.00	0.05
SD01	*Ulva*	72.8	L	0.02	0.07	1.95	0.20	2.25	0.52	0.00	0.52	0.04
A3SD10	*Ulva*	100	N	0.52	0.13	3.41	0.35	4.41	0.00	0.00	0.00	0.05
SD28	*Ulva*	100	N	0.22	0.08	3.12	0.15	3.57	0.00	0.00	0.00	0.03
Threshold Effects Quotient[1]				1.00	1.00	3.41	1.00	4.41	1.00	1.00	1.00	1.00

Bolded values indicate HQs exceeding TEQ.

1- TEQ selected as the greater of 1.0 and the maximum value of least toxic sample group.

2- Toxicity Group Classification:

High (H) <20 %; Intermediate (I) ≥20 and <50%; Low (L) ≥50 and <80%; Non-toxic (N) >80%.

Table 3.4-4 (continued). Exposure-response analysis for *Ulva*-treated (e.g., non-ammonia-related) porewater: B) *Mulinia*.

				Interstitial Water Toxic Units (100% Porewater Conc./LC_{50})								
		Toxicity		Metals					Organics			
Station	Treatment	EC20%	Tox-GRP[2]	Arsenic	Cadmium	Copper	Zinc	$\Sigma IWTU_{PW}$	PCBs	PAHs	$\Sigma IWTU_{PW}$	NH_4-TOT
A3SD10	Non-*Ulva*	0.41	H	0.66	0.14	2.00	0.23	**3.0**	0.00	0.00	0.00	1.46
HB3A	Non-*Ulva*	8.26	H	0.71	0.08	**30.6**	**2.65**	34.07	0.00	0.00	0.00	1.19
SD01	Non-*Ulva*	9.21	H	0.07	0.09	1.37	0.23	1.76	0.16	0.00	0.16	2.56
SD28	Non-*Ulva*	55.7	L	0.41	0.07	2.59	0.29	3.36	0.00	0.00	0.00	1.72
Threshold Effects Quotient[1]				1.00	1.00	2.6	1.00	3.36	1.00	1.00	1.00	1.72
A3SD10	*Ulva*	1.25	H	0.52	0.13	**3.41**	0.35	**4.4**	0.00	0.00	0.00	0.10
HB3A	*Ulva*	1.25	H	0.56	0.06	**18.1**	**1.55**	20.3	0.00	0.00	0.00	0.12
SD01	*Ulva*	2.14	H	0.02	0.07	1.95	0.20	2.25	0.52	0.00	0.52	0.08
SD28	*Ulva*	13.8	I	0.22	0.08	3.12	0.15	3.57	0.00	0.00	0.00	0.06
Threshold Effects Quotient[1]				1.00	1.00	3.1	1.00	3.6	1.00	1.00	1.00	1.00

Bolded values indicate HQs exceeding TEQ.

1- TEQ selected as the greater of 1.0 and the maximum value of least toxic sample group.

2- Toxicity Group Classification:

High (H) <10 %; Intermediate (I) ≥10 and <40%; Low (L) ≥40 and <70%; Non-toxic (N) ≥70%.

Table 3.4-5. Summary of exposure-response analyses for porewater and Toxicity Identification Evaluation (TIE) testing for the Raymark study area.

			Threshold Effects Quotient (Interstitial Water Toxic Units, Frequency of Exceedence)								
			Metals					Organics			
TRT	SPP	Statistic	Arsenic	Cadmium	Copper	Zinc	$\Sigma IWTU_{PW}$	PCBs	PAHs	$\Sigma IWTU_{PW}$	NH_4-TOT
PW	AMP	TEQ	1.00	1.00	2.68	1.22	4.47	55.7	1.00	63.2	1.00
	MUL	TEQ	1.00	1.00	2.68	1.00	4.07	55.7	1.00	55.7	1.75
	AMP	%>TEQ	30.8%	0.00%	30.8%	7.7%	46.2%	0.00%	0.00%	0.00%	23.1%
	MUL	%>TEQ	28.6%	0.00%	28.6%	14.3%	57.1%	0.00%	0.00%	0.00%	57.1%
	MEDIAN	*TEQ*	1.00	1.00	2.68	1.11	4.27	*55.7*	*1.00*	*59.5*	*1.38*
		%>TEQ	29.7%	0.00%	29.7%	11.0%	51.6%	*0.0%*	*0.00%*	*0.00%*	*40.1%*
EDTA	AMP	TEQ						1.00	1.00	1.00	0.00
	MUL	TEQ						1.00	1.00	1.00	0.00
	AMP	%>TEQ						16.7%	0.00%	16.7%	0.00%
	MUL	%>TEQ						15.4%	0.00%	15.4%	0.00%
	MEDIAN	*TEQ*						*1.00*	*1.00*	*1.00*	*0.00*
		%>TEQ						*16.0%*	*0.00%*	*16.0%*	*0.00%*
C18	AMP	TEQ	1.77	1.00	1.46	7.00	8.40				0.00
	MUL	TEQ	1.47	1.00	1.37	1.00	3.20				0.00
	AMP	%>TEQ	0.00%	0.00%	20.0%	0.00%	0.00%				0.00
	MUL	%>TEQ	16.7%	0.00%	25.0%	16.7%	25.0%				0.00
	MEDIAN	*TEQ*	1.62	1.00	1.41	4.00	5.80				*0.00*
		%>TEQ	8.33%	0.00%	22.5%	8.3%	12.5%				*0.00%*
	Overall	*Mimimum*	1.00	1.00	1.41	1.11	4.27	1.00	1.00	1.00	0.00
		Maximum	1.62	1.00	2.68	4.00	5.80	55.7	1.00	59.5	1.38
		%>TEQ	19.0%	0.00%	26.1%	9.66%	32.1%	8.01%	0.00%	8.01%	13.4%

PW = untreated porewater extracted from sediment, EDTA = treatment for metal chelation experiment, C18 = treatment for organics removal experiment

AMP = Ampelisca, MUL = Mulinia

TEQ = Threshold Effects Quotient = highest observed no effect ratio of porewater concentration to LC50 benchmark

%>TEQ = percentage of stations with IWTU values exceeding the TEQ.

IWTU = Interstitial water toxic units; see Section 4 text.

Appendix A-1-1. Results of chemical analyses of whole sediments collected in the Raymark study area.

Chemical Class	Analyte	A3SD10	A3SD10 (B)	CSD1	GM06	H83A	H83A(B)	ISD01	ISD07	ISD08	ISD13	ISD14	ISD18	ISD21(A)	ISD21(B)	ISD23	ISD24	ISD24 (B)	ISD28	ISD37
Dioxins	Dibenzofuran	1000 00		660 00	660 00	660 00		89 00	100 00	660 00	1000 00	1700 00	610 00	620 00	610 00	990 00	660 00		1000 00	570 00
	2,3,7,8-TCDD	4 58		2 58	0 99	6 91		2 67	1 75	1 59	2 61	3 64	1 27	1 35	2 08	3 23	2 77		1 57	1 54
	1,2,3,7,8 PeCDD	19 30		7 75	2 18	50 70		11 80	13 90	5 56	16 30	11 70	10 10	5 60	7 69	15 50	9 72		11 60	4 66
	1,2,3,4,7,8 HxCDD	14 60		7 84	2 04	26 50		15 80	24 90	6 19	17 80	15 20	15 00	5 59	8 75	14 70	10 10		10 60	3 8
	1,2,3,6,7,8 HxCDD	66 40		27 00	4 70	113 00		52 70	70 50	20 50	70 30	61 20	39 00	20 60	26 90	58 50	32 50		35 40	8 21
	1,2,3,7,8,9 HxCDD	43 50		18 10	4 72	84 70		30 30	61 00	15 60	41 80	36 60	32 00	14 90	21 60	39 60	22 30		27 50	7 78
	1,2,3,4,6,7,8-HpCDD	1520 00		524 00	72 30	1730 00		703 00	1550 00	472 00	1580 00	1310 00	608 00	419 00	517 00	1220 00	625 00		754 00	156 00
	OCDD	15800 00		5380 00	1330 00	7820 00		4780 00	9700 00	4300 00	14000 00	10500 00	3570 00	3450 00	4110 00	9950 00	5390 00		6940 00	3740 00
	2,3,7,8 TCDF	210 00		80 70	8 05	3890 00		408 00	47 30	15 60	201 00	129 00	42 30	13 90	31 40	65 10	31 20		35 90	8 67
	2,3,7,8 TCDF Confirm	468 00		144 00	21 20	3590 00		434 00	76 10	78 00	198 00	157 00	60 80	26 10	40 30	90 30	99 70		64 40	11 50
	1,2,3,7,8-PeCDF	172 00		48 90	3 35	1850 00		211 00	23 30	8 19	106 00	72 60	25 10	7 71	18 50	31 70	21 80		21 20	3 45
	2,3,4,7,8 PeCDF	464 00		109 00	5 58	4890 00		455 00	59 20	16 20	204 00	159 00	50 40	19 20	38 40	80 60	49 40		45 70	8 22
	1,2,3,4,7,8 HxCDF	1080 00		116 00	4 96	6750 00		410 00	69 50	20 70	203 00	184 00	57 70	21 20	43 50	89 50	105 00		54 30	5 19
	1,2,3,6,7,8 HxCDF	307 00		46 70	4 80	1610 00		158 00	39 00	13 00	89 30	68 70	24 70	10 70	21 30	41 90	35 00		26 10	3 77
	2,3,4,6,7,8 HxCDF	905 00		101 00	7 53	4500 00		311 00	73 00	20 90	159 00	146 00	50 10	20 60	40 70	75 60	86 80		49 20	9 42
	1,2,3,7,8,9 HxCDF	29 20		6 54	1 76	65 90		9 56	6 58	2 79	8 07	8 58	9 24	3 59	5 54	14 90	5 17		4 43	2 42
	1,2,3,4,6,7,8 HpCDF	5540 00		639 00	49 90	16500 00		1240 00	544 00	192 00	827 00	706 00	283 00	144 00	233 00	504 00	596 00		354 00	65 30
	1,2,3,4,7,8,9 HpCDF	76 80		14 80	2 96	181 00		26 50	29 90	11 70	27 20	28 60	- 9 48	7 19	11 40	22 10	16 30		17 60	5 6
	OCDF	4180 00		2200 00	173 00	4510 00		474 00	835 00	403 00	982 00	944 00	269 00	240 00	326 00	829 00	668 00		797 00	255 00
	Sum of Dioxins	31452		9690	2339	55339		9388	13249	6186	19535	16145	5708	5025	6078	14046	8369		10186	4857
Dioxin CDDs	Total TCDD	55 80		24 50	3 06	124 00		11 60	22 70	9 91	21 90	25 40	1 27	5 36	4 06	28 50	24 20		20 60	3 86
	Total PeCDD	59 00		36 10	8 19	63 30		18 30	46 90	11 50	72 70	70 90	9 32	21 60	27 30	63 00	22 10		52 30	8 94
	Total HxCDD	510 00		244 00	59 70	988 00		288 00	453 00	179 00	429 00	384 00	238 00	128 00	188 00	351 00	216 00		265 00	73 10
	Total HpCDD	2960 00		1330 00	220 00	3300 00		1320 00	2050 00	1200 00	3510 00	2570 00	1250 00	783 00	967 00	2290 00	1300 00		1690 00	379 00
	Sum of CDDs	3584 80		1634 60	290 89	4475 30		1638 90	3372 60	1400 41	4033 60	3050 30	1498 59	937 96	1186 36	2732 50	1562 30		2027 90	464 90
Dioxin CDFs	Total TCDF	1330 00		366 00	42 10	10900 00		1350 00	264 00	91 00	726 00	614 00	193 00	81 00	188 00	359 00	211 00		200 00	48 80
	Total PeCDF	3450 00		634 00	36 30	20600 00		2270 00	500 00	161 00	1190 00	959 00	349 00	140 00	290 00	555 00	416 00		365 00	53 80
	Total HxCDF	7180 00		759 00	53 60	30300 00		2240 00	783 00	226 00	1350 00	1200 00	443 00	197 00	347 00	717 00	755 00		475 00	83 90
	Total HpCDF	7420 00		1170 00	87 40	18300 00		1770 00	1060 00	366 00	1440 00	1380 00	461 00	290 00	456 00	975 00	1010 00		674 00	137 00
	Sum of CDFs	19380 00		2929 00	219 40	80100 00		7630 00	2617 00	844 00	4706 00	4153 00	1446 00	708 00	1281 00	2606 00	2392 00		1714 00	303 50
	Toxicity Equivalency Factor	627 65		126 29	12 30	4505 21		412 21	111 86	38 99	236 26	191 44	73 55	46 98		122 35	88 10		76 04	18 50
Metals	Silver	2 00		3 00	3 00	2 40		1 40	1 50	1 40	1 40	0 88	0 44	0 42	0 65	0 93	0 62		1 60	0 60
	Arsenic	23 90		11 20	17 90	9 20		7 00	10 60	6 50	9 00	9 20	3 70	3 80	4 00	6 80	8 20		8 10	4 50
	Barium	2710 00		271 00	65 70	12200 00		1130 00	222 00	57 80	533 00	549 00	168 00	98 70	108 00	270 00	478 00		172 00	38 00
	Cadmium	8 30		1 20	1 50	1 00		5 50	4 40	1 40	7 60	7 60	0 80	3 20	3 20	6 30	2 60		4 20	0 51
	Chromium	463 00		402 00	231 00	290 00		89 70	99 90	84 40	91 50	116 00	31 80	35 60	39 00	91 70	97 40		107 00	59 20
	Copper	2550 00		1350 00	661 00	36400 00		1650 00	430 00	232 00	890 00	775 00	271 00	191 00	185 00	462 00	383 00		361 00	173 00
	Mercury	0 43		0 77	1 20	0 47		0 22	0 32	0 37	0 28	0 49	0 16	0 14	0 17	0 28	0 28		0 27	0 17
	Nickel	317 00		54 00	37 40	386 00		80 70	49 20	37 10	59 10	86 30	20 80	20 10	25 00	52 10	63 30		43 40	21 00
	Lead	3290 00		703 00	158 00	26500 00		1570 00	403 00	181 00	934 00	833 00	357 00	266 00	231 00	514 00	506 00		303 00	42 30
	Zinc	1340 00		399 00	292 00	2320 00		750 00	508 00	290 00	871 00	676 00	181 00	270 00	277 00	625 00	363 00		439 00	171 00
PAHs	2-Methylnaphthalene	1000 00		660 00	660 00	660 00		710 00	650 00	660 00	1000 00	1700 00	610 00	620 00	610 00	990 00	660 00		1000 00	570 00
	Acenaphthene	1000 00		660 00	660 00	660 00		140 00	160 00	660 00	200 00	200 00	610 00	81 00	89 00	160 00	660 00		1000 00	570 00
	Acenaphthylene	190 00		200 00	660 00	660 00		350 00	330 00	130 00	410 00	440 00	140 00	160 00	170 00	340 00	110 00		200 00	84 00
	Anthracene	120 00		190 00	660 00	660 00		520 00	520 00	140 00	680 00	640 00	250 00	280 00	330 00	570 00	150 00		300 00	120 00
	Benzo(a)anthracene	1500 00		560 00	190 00	660 00		2500 00	2700 00	670 00	4000 00	3800 00	800 00	1400 00	1500 00	2900 00	890 00		1700 00	430 00
	Benzo(a)pyrene	1700 00		660 00	230 00	120 00		2400 00	2200 00	640 00	4000 00	3600 00	790 00	1300 00	1500 00	2900 00	960 00		1900 00	470 00
	Benzo(b)fluoranthene	2800 00		850 00	400 00	180 00		4000 00	4000 00	1000 00	10000 00	9200 00	1200 00	1800 00	2200 00	4500 00	1600 00		3400 00	900 00
	Benzo(g,h,i)perylene	260 00		190 00	74 00	660 00		460 00	530 00	190 00	1100 00	1000 00	320 00	360 00	330 00	940 00	310 00		600 00	150 00
	Benzo(k)fluoranthene	950 00		470 00	390 00	660 00		1400 00	4200 00	380 00	9100 00	8400 00	600 00	790 00	1000 00	1800 00	670 00		1100 00	820 00
	Chrysene	1400 00		730 00	220 00	1100 00		3800 00	3900 00	990 00	6300 00	4800 00	1100 00	1900 00	2000 00	4400 00	1200 00		2300 00	540 00
	Dibenz(a,h)anthracene	240 00		660 00	660 00	660 00		430 00	520 00	120 00	610 00	550 00	160 00	260 00	280 00	550 00	160 00		310 00	570 00
	Fluoranthene	4500 00		1200 00	330 00	280 00		5600 00	4500 00	1500 00	11000 00	11000 00	1500 00	3000 00	3900 00	7900 00	2400 00		4900 00	860 00
	Fluorene	1000 00		660 00	660 00	660 00		190 00	260 00	660 00	220 00	360 00	75 00	140 00	140 00	220 00	83 00		130 00	570 00
	Indeno(1,2,3-cd)pyrene	880 00		400 00	110 00	78 00		1500 00	1700 00	370 00	2200 00	2000 00	580 00	860 00	910 00	1800 00	620 00		1200 00	280 00
	Naphthalene	1000 00		660 00	660 00	660 00		710 00	650 00	660 00	1000 00	1700 00	610 00	620 00	610 00	990 00	660 00		1000 00	570 00
	Phenanthrene	710 00		310 00	120 00	150 00		2500 00	2200 00	610 00	2800 00	3800 00	840 00	1500 00	1700 00	2800 00	980 00		1500 00	330 00
	Pyrene	3800 00		1300 00	410 00	930 00		5900 00	6700 00	1300 00	8900 00	5900 00	1900 00	2700 00	2900 00	6200 00	1400 00		3500 00	640 00
	Total PAHs	23130 00		10440 00	7094 00	9438 00		33110 00	34720 00	10680 00	80520 00	58090 00	12085 00	17771 00	20169 00	39860 00	13513 00		26040 00	8474 00

Units metals = µg/g dry weight, PAHs, PCBs, pesticides, dioxins = ng/g dry weight

Appendix A-1-1 (continued). Results of chemical analyses of sediments collected in the Raymark study area.

Chemical Class	Analyte	A35D10	A35D10 (B)	C5D1	GM08	H63A	H63A(B)	SD01	SD07	SD08	SD13	SD14	SD18	SD21(A)	SD21(B)	SD23	SD24	SD24 (B)	SD28	SD37
PCBs	3 (4)	1 10	1 10	0 35	0 08	4 00	2 30	1 70	0 28	0 34	0 49	0 51	0 08	0 21	0 14	0 32	0 15	0 20	0 25	0 03
	8 (2 4)*			0 78					0 98	3 00	2 90					1 90			1 00	
	15 (4 4')	10 00	10 00	2 30	1 80	10 00	7 40	10 00	2 10	3 60	4 30	4 60	0 42	1 70	1 10	3 20	1 50	1 90	1 90	0 32
	18 (2 2'5)*			7 50					5 00	6 30	11 00					6 30			6 70	
	28 (2 4 4')*	34 00	34 00	13 00	5 80	26 00	21 00	37 00	7 40	9 70	16 00	16 00	1 40	4 60	3 60	10 00	4 90	4 80	6 50	1 30
	44 (2 2'3 5')*			4 70					2 00	1 40	3 40					2 30			3 10	
	52 (2 2'5 5')*			34 00					24 00	13 00	38 00					30 00			3 50	
	66 (2 3'4 4')*			43 00					16 00	10 00	17 00					11 00			16 00	
	77 (3 3' 4 4')	5 00	5 00	3 30	1 70	3 40	3 50	3 10	1 30	1 70	2 20	1 40	0 30	0 40	0 48	1 30	0 98	1 20	1 20	0 30
	101 (2 2'4 5 5')*			16 00					22 00	13 00	37 00					28 00			23 00	
	105 (2 3 3'4 4')*	25 00	25 00	12 00	5 40	16 00	12 00	15 00	7 30	5 90	12 00	12 00	2 00	5 20	3 90	10 00	6 20	5 90	6 70	1 10
	114 (2 3 4 4 5)	1 60	1 60	0 54	0 22	3 20	2 40	1 10	0 00	0 32	0 73	0 76	0 11	0 23	0 24	0 58	0 36	0 00	0 38	0 06
	118 (2 3' 4 4'5)*	65 00	65 00	24 00	11 00	52 00	42 00	37 00	20 00	15 00	28 00	30 00	5 20	14 00	10 00	27 00	15 00	14 00	18 00	2 80
	123 (2' 3 4 4'5)	2 00	2 00	1 40	0 32	1 90	2 20	1 40	0 00	0 00	0 00	0 00	0 17	0 00	0 00	0 00	0 00	0 33	0 33	0 05
	126 (3 3' 4 4' 5)	3 60	3 60	1 20	0 09	46 00	20 00	2 20	0 00	0 59	3 00	1 70	0 24	0 00	0 00	0 00	0 00	0 95	0 96	0 08
	128 (2 2'3 3'4 4')*																			
	138 (2 2'3 4 4'5)*			61 00					31 00	19 00	67 00					45 00			30 00	
	153 (2 2'4 4'5 5')*			180 00					68 00	28 00	250 00					110 00			66 00	
	156/157 (2 3 3'4 4'5/2 3 3' 4 4'5')	13 00	13 00	4 80	1 40	32 00	25 00	7 20	3 10	2 20	5 00	5 40	1 40	2 30	1 70	4 80	2 90	3 20	2 20	0 4
	167 (2 3'4 4' 5 5')	13 00	13 00	4 00	0 48	86 00	72 00	11 00	1 80	1 20	5 30	3 70	1 00	1 10	0 94	2 80	2 60	2 20	1 50	0 19
	169 (3 3'4 4'5 5')	20 00	20 00	4 60	0 00	180 00	180 00	110 00	12 00	4 30	50 00	25 00	1 10	5 60	7 80	20 00	32 00	29 00	1 50	0 03
	170 (2 2'3 3'4 4'5)*	130 00	130 00	44 00	1 80	4200 00	3000 00	170 00	18 00	7 20	87 00	37 00	14 00	8 80	8 50	31 00	26 00	27 00	17 00	1 50
	180 (2 2'3 4 4'5 5')*	2800 00	3200 00	780 00	6 20	52000 00	42000 00	2600 00	270 00	89 00	1100 00	540 00	280 00	140 00	160 00	490 00	580 00	590 00	250 00	7 80
	187 (2 2'3 4'5 5 6)*			830 00					340 00	110 00	1400 00					590 00			360 00	
	189 (2 3 3'4 4'5 5')	15 00	15 00	4 40	0 00	120 00	92 00	11 00	0 00	0 00	4 90	2 50	1 10	0 00	0 00	1 90	0 00	2 80	0 00	0 00
	195 (2 2'3 3'4 4'5 6)*			78 00					26 00	9 30	110 00					55 00			21 00	
	206 (2 2'3 3'4 4'5 5'6)*			680 00					300 00	150 00	1100 00					600 00			280 00	
	209 (2 2'3 3'4 4'5 5'6 6')*	500 00	500 00	63 00	1 30	2100 00	1900 00	210 00	32 00	18 00	100 00	63 00	34 00	17 00	18 00	60 00	110 00	110 00	33 00	0 86
	Sum of PCB Congeners			2941					1190	508	4359					2108			1142	
	Total PCBs (Sum of Congeners X 2)	27081	27081	6008	247	353783	280604	20718	2355	987	8661	4642	2428	1217	1319	4119	4886	4845	2383	105
PCB Homologs	Total MonoCBs	2 60	2 00	0 35	0 12	16 0	8 50	5 10	0 81	0 34	1 20	1 30	0 24	0 44	0 17	1 00	0 78	0 64	0 47	0 09
	Total DiCBs	24 0	24 0	5 20	2 60	40 0	26 0	35 0	6 20	11 0	13 0	16 0	1 40	8 30	3 40	8 50	12 0	3 70	9 10	0 92
	Total TriCBs	180	180	53 0	21 0	140	120	200	53 0	50 0	100	99 0	8 20	37 0	27 0	68 0	33 0	32 0	51 0	6 00
	Total TetraCBs	600	600	300	110	440	460	250	100	73 0	180	150	28 0	61 0	48 0	130	75 0	70 0	160	22 0
	Total PentaCBs	740	740	180	66 0	1900	1400	340	150	97 0	240	140	52 0	96 0	65 0	200	130	120	150	19 0
	Total HexaCBs	1900	1900	600	42 0	38000	27000	1900	230	100	790	480	200	130	120	390	370	350	230	25 0
	Total HeptaCBs	13000	13000	3000	26 0	230000	180000	11000	1100	330	4400	2200	1300	490	580	1900	2100	2100	1100	34 0
	Total OctaCBs	6300	6300	1300	5 40	71000	58000	4800	460	180	1900	1000	580	250	300	870	1200	1200	480	9 40
	Total NonaCBs	6700	6700	1100	4 60	43000	38000	4000	470	220	1800	990	480	260	300	920	1400	1400	420	7 60
	Sum of PCB Homologs	29448	29448	6539	279	384535	305015	22530	2570	1061	9424	5056	2650	1333	1444	4488	5321	5278	2601	124
	Total PCBs	30000	30000	6600	280	390000	310000	23000	2600	1100	9500	5100	2700	1300	1500	4500	5400	5400	2600	120
PCB Aroclors	Aroclor 1016					66 00			65 00					54 00						
	Aroclor 1221					130 00			130 00					110 00						
	Aroclor 1232					66 00			65 00					54 00						
	Aroclor 1242					66 00			65 00					54 00						
	Aroclor 1248					66 00			65 00					54 00						
	Aroclor 1254					66 00			65 00					54 00						
	Aroclor 1260					66 00			65 00					54 00						
	Aroclor 1262					24000 00			680 00					320 00						
	Aroclor 1268					15000 00			560 00					200 00						
	Sum of Aroclors					39526 00			1760 00					954 00						
Pesticides	4 4'-DDD					11 00			9 50					5 40						
	4,4' DDT					6 60			6 50					5 40						
	Aldrin					3 40			3 40					0 97						
	Alpha chlordane					3 40			16 00					6 70						
	Alpha BHC					3 40			3 40					2 80						
	Beta BHC					3 40			3 40					2 80						
	Delta BHC					3 40			1 20					0 61						
	Dieldrin					0 91			6 50					5 40						

Units metals = µg/g dry weight, PAHs, PCBs, pesticides, dioxins = ng/g dry weight

* indicates congeners included in Sum of PCB Congeners and Total PCBs (Sum of Congeners X 2) calculation

Additional Total PCBs (Sum of Congeners X 2) values calculated from regression analysis as 0 920*(Sum of PCB Homologs) - 9 548

Appendix A-1-1 (continued). Results of chemical analyses of sediments collected in the Raymark study area.

Chemical Class	Analyte	A35D10	A35D10 (B)	CSD1	GM08	HB3A	HB3A(B)	SD01	SD07	SD08	SD13	SD14	SD18	SD21(A)	SD21(B)	SD23	SD24	SD24 (B)	SD28	SD37
Pesticides	Endosulfan I					3 40			0 68					0 45						
continued	Endosulfan II					8 60			1 80					0 92						
	Endosulfan sulfate					120 00			6 50					5 40						
	Endrin					8 60			6 50					5 40						
	Endrin aldehyde					2300 00			20 00					20 00						
	Endrin ketone					8 60			6 50					5 40						
	Gamma chlordane					5 30			8 10					4 90						
	Gamma BHC (Lindane)					3 40			3 40					2 80						
	Heptachlor					3 40			3 40					2 80						
	Heptachlor epoxide					3 40			3 40					2 80						
	Hexachlorobenzene	1000 00		660 00	660 00	660 00		710 00	650 00	660 00	1000 00	1700 00	610 00	620 00	610 00	990 00	660 00		1000 00	570 00
	Toxaphene					340 00			340 00					280 00						
	p,p' DDE					3 60			7 20					5 40						
	p,p' Methoxychlor					34 00			34 00					28 00						
VOAs	1,2,4-Trichlorobenzene	1000 00		660 00	660 00	660 00		710 00	650 00	660 00	1000 00	1700 00	610 00	620 00	610 00	990 00	660 00		1000 00	570 00
	1,2 Dichlorobenzene	1000 00		660 00	660 00	660 00		710 00	650 00	660 00	1000 00	1700 00	610 00	620 00	610 00	990 00	660 00		1000 00	570 00
	1,3 Dichlorobenzene	1000 00		660 00	660 00	660 00		710 00	650 00	660 00	1000 00	1700 00	610 00	620 00	610 00	990 00	660 00		1000 00	570 00
	1,4 Dichlorobenzene	1000 00		660 00	660 00	660 00		710 00	650 00	660 00	1000 00	1700 00	610 00	620 00	610 00	990 00	660 00		1000 00	570 00
	2,2'-Oxybis(1-chloropropane)	1000 00		660 00	660 00	660 00		710 00	650 00	660 00	1000 00	1700 00	610 00	620 00	610 00	990 00	660 00		1000 00	570 00
	2,4,5-Trichlorophenol	2500 00		1700 00	1700 00	1700 00		1800 00	1600 00	1700 00	2600 00	4400 00	1500 00	1600 00	1500 00	2500 00	1700 00		2500 00	1400 00
	2,4,6-Trichlorophenol	1000 00		660 00	660 00	660 00		710 00	650 00	660 00	1000 00	1700 00	610 00	620 00	610 00	990 00	660 00		1000 00	570 00
	2,4 Dichlorophenol	1000 00		660 00	660 00	660 00		710 00	650 00	660 00	1000 00	1700 00	610 00	620 00	610 00	990 00	660 00		1000 00	570 00
	2,4 Dimethylphenol	1000 00		660 00	660 00	230 00		710 00	650 00	660 00	1000 00	1700 00	610 00	620 00	610 00	990 00	660 00		1000 00	570 00
	2,4-Dinitrophenol	2500 00		1700 00	1700 00	1700 00		1800 00	1600 00	1700 00	2600 00	4400 00	1500 00	1600 00	1500 00	2500 00	1700 00		2500 00	1400 00
	2,4-Dinitrotoluene	1000 00		660 00	660 00	660 00		710 00	650 00	660 00	1000 00	1700 00	610 00	620 00	610 00	990 00	660 00		1000 00	570 00
	2,6-Dinitrotoluene	1000 00		660 00	660 00	660 00		710 00	650 00	660 00	1000 00	1700 00	610 00	620 00	610 00	990 00	660 00		1000 00	570 00
	2-Chloronaphthalene	1000 00		660 00	660 00	660 00		710 00	650 00	660 00	1000 00	1700 00	610 00	620 00	610 00	990 00	660 00		1000 00	570 00
	2-Chlorophenol	1000 00		660 00	660 00	660 00		710 00	650 00	660 00	1000 00	1700 00	610 00	620 00	610 00	990 00	660 00		1000 00	570 00
	2-Methylphenol	1000 00		660 00	660 00	660 00		710 00	650 00	660 00	1000 00	1700 00	610 00	620 00	610 00	990 00	660 00		1000 00	570 00
	2-Nitroaniline	2500 00		1700 00	1700 00	1700 00		1800 00	1600 00	1700 00	2600 00	4400 00	1500 00	1600 00	1500 00	2500 00	1700 00		2500 00	1400 00
	2-Nitrophenol	1000 00		660 00	660 00	660 00		710 00	650 00	660 00	1000 00	1700 00	610 00	620 00	610 00	990 00	660 00		1000 00	570 00
	3,3'-Dichlorobenzidine	1000 00		660 00	660 00	660 00		710 00	650 00	660 00	1000 00	1700 00	610 00	620 00	610 00	990 00	660 00		1000 00	570 00
	3-Nitroaniline	2500 00		1700 00	1700 00	1700 00		1800 00	1600 00	1700 00	2600 00	4400 00	1500 00	1600 00	1500 00	2500 00	1700 00		2500 00	1400 00
	4,6-Dinitro-2-methylphenol	2500 00		1700 00	1700 00	1700 00		1800 00	1600 00	1700 00	2600 00	4400 00	1500 00	1600 00	1500 00	2500 00	1700 00		2500 00	1400 00
	4-Bromophenyl phenyl ether	1000 00		660 00	660 00	660 00		710 00	650 00	660 00	1000 00	1700 00	610 00	620 00	610 00	990 00	660 00		1000 00	570 00
	4-Chloro-3-methylphenol	1000 00		660 00	660 00	660 00		710 00	650 00	660 00	1000 00	1700 00	610 00	620 00	610 00	990 00	660 00		1000 00	570 00
	4-Chloroaniline	1000 00		660 00	660 00	660 00		710 00	650 00	660 00	1000 00	1700 00	610 00	620 00	610 00	990 00	660 00		1000 00	570 00
	4-Chlorophenyl phenyl ether	1000 00		660 00	660 00	660 00		710 00	650 00	660 00	1000 00	1700 00	610 00	620 00	610 00	990 00	660 00		1000 00	570 00
	4-Methylphenol	1000 00		660 00	660 00	660 00		1300 00	87 00	660 00	1000 00	1700 00	9900 00	430 00	470 00	990 00	660 00		1000 00	570 00
	4-Nitroaniline	2500 00		1700 00	1700 00	1700 00		1800 00	1600 00	1700 00	2600 00	4400 00	1500 00	1600 00	1500 00	2500 00	1700 00		2500 00	1400 00
	4-Nitrophenol	2500 00		1700 00	1700 00	1700 00		1800 00	1600 00	1700 00	2600 00	4400 00	1500 00	1600 00	1500 00	2500 00	1700 00		2500 00	1400 00
	Butyl benzyl phthalate	1000 00		660 00	660 00	660 00		540 00	1700 00	660 00	810 00	470 00	250 00	110 00	91 00	670 00	210 00		280 00	570 00
	Carbazole	110 00		660 00	660 00	660 00		410 00	390 00	83 00	430 00	550 00	140 00	230 00	230 00	410 00	130 00		220 00	570 00
	Di-n-butyl phthalate	1000 00		660 00	660 00	660 00		84 00	650 00	660 00	170 00	1700 00	610 00	95 00	110 00	990 00	660 00		1000 00	570 00
	Di-n-octyl phthalate	1000 00		660 00	660 00	660 00		2200 00	2000 00	87 00	3300 00	3300 00	120 00	660 00	1000 00	2400 00	180 00		740 00	570 00
	Dibenzofuran	1000 00		660 00	660 00	660 00		89 00	100 00	660 00	1000 00	1700 00	610 00	620 00	610 00	990 00	660 00		1000 00	570 00
	Diethyl phthalate	1000 00		660 00	660 00	660 00		710 00	650 00	660 00	1000 00	1700 00	610 00	620 00	610 00	990 00	660 00		1000 00	570 00
	Dimethyl phthalate	1000 00		660 00	660 00	660 00		710 00	650 00	660 00	1000 00	220 00	610 00	620 00	610 00	990 00	660 00		1000 00	570 00
	Hexachlorobutadiene	1000 00		660 00	660 00	660 00		710 00	650 00	660 00	1000 00	1700 00	610 00	620 00	610 00	990 00	660 00		1000 00	570 00
	Hexachlorocyclopentadiene	1000 00		660 00	660 00	660 00		710 00	650 00	660 00	1000 00	1700 00	610 00	620 00	610 00	990 00	660 00		1000 00	570 00
	Hexachloroethane	1000 00		660 00	660 00	660 00		710 00	650 00	660 00	1000 00	1700 00	610 00	620 00	610 00	990 00	660 00		1000 00	570 00
	Isophorone	1000 00		660 00	660 00	660 00		710 00	650 00	660 00	1000 00	1700 00	610 00	620 00	610 00	990 00	660 00		1000 00	570 00
	N-Nitroso-di-n-propylamine	1000 00		660 00	660 00	660 00		710 00	650 00	660 00	1000 00	1700 00	610 00	620 00	610 00	990 00	660 00		1000 00	570 00
	N-Nitrosodiphenylamine(1)	1000 00		110 00	660 00	660 00		710 00	650 00	660 00	1000 00	1700 00	610 00	620 00	610 00	990 00	660 00		1000 00	570 00
	Nitrobenzene	1000 00		660 00	660 00	660 00		710 00	650 00	660 00	1000 00	1700 00	610 00	620 00	610 00	990 00	660 00		1000 00	570 00
	Pentachlorophenol	2500 00		1700 00	1700 00	1700 00		1800 00	1600 00	1700 00	2600 00	4400 00	1500 00	1600 00	1500 00	2500 00	1700 00		2500 00	1400 00
	Phenol	1000 00		660 00	660 00	120 00		240 00	110 00	660 00	180 00	240 00	1000 00	620 00	610 00	170 00	660 00		1000 00	570 00
	bis(2-Chloroethoxy)methane	1000 00		660 00	660 00	660 00		710 00	650 00	660 00	1000 00	1700 00	610 00	620 00	610 00	990 00	660 00		1000 00	570 00
	bis(2-Chloroethyl)ether	1000 00		660 00	660 00	660 00		710 00	650 00	660 00	1000 00	1700 00	610 00	620 00	610 00	990 00	660 00		1000 00	570 00
	bis(2-Ethylhexyl)phthalate	1400 00		230 00	140 00	130 00		6000 00	6200 00	420 00	6700 00	15000 00	2000 00	3500 00	3600 00	5800 00	1500 00		4300 00	320 00

Units metals = µg/g dry weight, PAHs, PCBs, pesticides, dioxins = ng/g dry weight

Appendix A-1-2.1. Results of chemical analyses of sediment porewaters collected from the Raymark study area.

Chemical Class	Analyte	A3SD10	CSD1	GM08	HB3A	SSD01	SD07	SSD08	SD13	SD14	SD18	SD21(A)	SD21(B)	SD23	SD24	SD26	SD37
Metals	Aluminum	250 00	0 00	1670 00	1380 00	250 00	0 00	210 00	0 00	0 00	0 00	0 00	330 00	0 00	290	230 00	0 00
	Silver	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
	Arsenic	19 90	58 70	20 10	33 50	0 00	95 20	80 80	73 60	17 50	7 80	15 70	8 20	34 60	11 80	19 10	18 00
	Barium	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
	Cadmium	5 60	3 68	0 17	3 17	2 83	3 86	1 60	2 78	3 27	0 65	3 45	3 36	3 33	2 80	3 71	2 95
	Chromium	1 47	2 64	1 69	0 84	3 24	1 05	0 00	2 81	3 14	1 88	1 33	0 00	3 24	2 36	0 00	0 00
	Copper	65 00	71 00	55 00	599 00	112 00	54 00	32 00	46 00	48 00	0 00	52 00	49 00	35 00	41 00	55 00	54 00
	Iron	170 00	520 00	470 00	340 00	610 00	170 00	310 00	220 00	250 00	12540 00	280 00	310 00	120 00	3700 00	120 00	200 00
	Nickel	243 80	14 20	32 00	111 80	27 30	15 30	41 00	4 00	31 00	12 70	16 40	13 60	9 50	14 90	7 40	0 00
	Lead	1 40	1 44	1 56	13 24	2 80	0 75	1 72	0 75	3 56	1 00	1 96	2 56	3 92	4 40	2 76	8 96
	Zinc	1540 00	260 00	420 00	170 00	170 00	150 00	200 00	140 00	270 00	40 00	130 00	100 00	60 00	50 00	260 00	50 00
PAHs	1-Methylnaphthalene	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
	1-Methylphenanthrene	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
	2,3,5-Trimethylnaphthalene	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
	2,6-Dimethylnaphthalene	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
	2-Methylnaphthalene	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
	Acenaphthene	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
	Acenaphthylene	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
	Anthracene	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
	Benzo(a)anthracene	0 00	0 00	0 00	0 00	0 00	0 00	0 00	2 10	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
	Benzo(a)pyrene	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
	Benzo(b)fluoranthene	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
	Benzo(e)pyrene	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
	Benzo(g,h,i)perylene	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
	Benzo(k)fluoranthene	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
	Biphenyl	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
	Chrysene	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
	Dibenz(a,h)anthracene	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
	Fluoranthene	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
	Fluorene	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
	Indeno(1,2,3-cd)pyrene	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
	Naphthalene	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
	Perylene	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
	Phenanthrene	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
	Pyrene	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
	Sum of PAHs	0 00	0 00	0 00	0 00	0 00	0 00	0 00	2 10	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
PCBs	8 (2 4)*	0 00	0 00	0 00	0 00	0 00	877 10	748 80	212 70	0 00	0 00	0 00	0 00	471 90	0 00	807 30	0 00
	18 (2 2'5)*	0 00	0 00	0 00	0 00	0 00	85 10	189 00	0 00	0 00	0 00	0 00	0 00	64 40	0 00	163 40	0 00
	28 (2 4 4')*	0 00	29 60	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	55 80	0 00
	44 (2 2'3 5')*	0 00	195 60	0 00	0 00	0 00	24 00	17 40	0 00	0 00	0 00	0 00	0 00	0 00	0 00	125 70	0 00
	52 (2 2'5 5)*	0 00	321 30	0 00	0 00	0 00	55 80	44 90	11 70	0 00	0 00	0 00	0 00	35 90	0 00	145 40	0 00
	66 (2 3'4 4')*	0 00	0 00	0 00	0 00	0 00	0 00	0 00	23 30	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
	77(3 3' 4 4')	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
	99	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	8 40	0 00
	101 (2 2'4 5 5')*	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	8 50	0 00
	105 (2 3 3'4 4')*	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
	118 (2 3'4 4'5)*	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
	126 (3 3' 4 4' 5)	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
	128 (2 2'3 3'4 4')*	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
	138 (2 2'3 4 4'5)*	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
	153 (2 2'4 4'5 5')*	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
	170 (2 2'3 3'4 4'5)*	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
	180 (2 2'3 4 4'5 5')*	0 00	0 00	0 00	0 00	0 00	0 00	0 00	4 10	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
	187 (2 2'3 4'5 5'6)*	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
	195 (2 2'3 3'4 4'5 6)*	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
	206 (2 2'3 3'4 4'5 5'6)*	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
	209 (2 2'3 3'4 4'5 5'6 6')*	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
	Total PCBs (Sum of Congeners X 2)	0 00	1093 00	0 00	0 00	0 00	2084 00	2000 20	503 60	0 00	0 00	0 00	0 00	1144 40	0 00	2212 20	0 00

Units µg/L. * indicates congeners included in Total PCBs calculation.

Appendix A-1-2.2. Results of chemical analyses of EDTA-treated sediment porewaters collected from the Raymark study area.

Chemical Class	Analyte	CSD1	SD07	SD08	SD13	SD23	SD28
PCBs	8 (2 4)*	0.00	0.00	0.00	143.19	126.15	0.00
	18 (2 2'5)*	0.00	0.00	0.00	0.00	0.00	0.00
	28 (2 4 4')*	0.00	0.00	8.30	0.00	0.00	0.00
	44 (2 2'3 5')*	0.00	0.00	4.62	0.00	0.00	0.00
	52 (2 2'5 5)*	0.00	0.00	0.00	0.00	0.00	0.00
	66 (2 3'4 4')*	0.00	0.00	0.00	0.00	0.00	0.00
	77(3 3' 4 4')	0.00	0.00	0.00	0.00	0.00	0.00
	99	0.00	0.00	0.00	0.00	0.00	0.00
	101 (2 2'4 5 5')*	0.00	0.00	0.00	0.00	0.00	0.00
	105 (2 3 3'4 4')*	0.00	0.00	0.00	0.00	0.00	0.00
	118 (2 3'4 4'5)*	0.00	0.00	0.00	0.00	0.00	0.00
	126 (3 3' 4 4' 5)	0.00	0.00	0.00	0.00	0.00	0.00
	128 (2 2'3 3'4 4')*	0.00	0.00	0.00	0.00	0.00	0.00
	138 (2 2'3 4 4'5)*	0.00	0.00	0.00	0.00	0.00	0.00
	153 (2 2'4 4'5 5')*	0.00	0.00	0.00	0.00	0.00	0.00
	170 (2 2'3 3'4 4'5)*	0.00	0.00	0.00	0.00	0.00	0.00
	180 (2 2'3 4 4'5 5')*	0.00	0.00	0.00	0.00	0.00	0.00
	187 (2 2'3 4'5 5'6)*	0.00	0.00	0.00	0.00	0.00	0.00
	195 (2 2'3 3'4 4'5 6)*	0.00	0.00	0.00	0.00	0.00	0.00
	206 (2 2'3 3'4 4'5 5'6)*	0.00	0.00	0.00	6.50	0.00	0.00
	209 (2 2'3 3'4 4'5 5'6 6')*	0.00	0.00	0.00	0.00	0.00	0.00
	Total PCBs (Sum of Congeners X 2)	0.00	0.00	25.84	299.38	252.30	0.00

Units: µg/L. * indicates congeners included in Total PCBs calculation.

Appendix A-1-2.3. Results of chemical analyses of C18-treated sediment porewaters collected from the Raymark study area.

Chemical Class	Analyte	A3SD10	CSD1	GM08	HB3A	SD01	SD07	SD08	SD13	SD14	SD18	SD21(A)	SD21(B)	SD23	SD24	SD26	SD37
Metals	Arsenic	0 84	40 98	2.00	1 24	0.00	63.54	57 98	5 28	0 00	2 24	1 14	1 46	10 12	0 00	52.86	5 54
	Cadmium	9 32	8 48	6 62	5 16	3 39	5 48	5 76	3 75	4 52	1 01	3 13	5 66	4 85	3 74	9 42	5 78
	Chromium	0 00	0 38	0 00	0 00	1 44	0 00	0 00	0 00	1 03	0 51	0 00	0 00	0 94	0 36	0 00	0 21
	Copper	23 00	19 00	28 00	84 00	15 00	30 00	19 00	21 00	18 00	0 00	13 00	9 00	28 00	18 00	26 00	31 00
	Nickel	6 58	0 00	0 00	0 00	12 66	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
	Lead	0 00	0 00	0 00	3 30	0 00	0 00	0 00	0 00	4 38	0 00	0 00	4 96	4 18	0 00	0 00	0 00
	Zinc	2400 00	100 00	510 00	230 00	170 00	70 00	90 00	120 00	140 00	70 00	80 00	70 00	40 00	50 00	70 00	60 00

Units µg/L

Appendix A-1-2.4. Results of chemical analyses of *Ulva* and non-*Ulva* sediment porewaters collected from the Raymark study area.

		Ulva				Non-*Ulva*			
Chemical Class	Analyte	A3SD10	HB3A	SD01	SD28	A3SD10	HB3A	SD01	SD28
Metals	Arsenic	18.56	20.15	0.89	8.05	23.69	25.47	2.64	14.86
	Cadmium	4.58	2.12	2.48	2.86	5.01	2.87	3.14	2.57
	Chromium	na	na	na	na	na	na	na	na
	Copper	70.00	371.00	40.00	64.00	41.00	628.00	28.00	53.00
	Nickel	na	na	na	na	na	na	na	na
	Lead	na	na	na	na	na	na	na	na
	Zinc	120.00	530.00	70.00	50.00	80.00	910.00	80.00	100.00
PCBs	8 (2 4)*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	18 (2 2'5)*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	28 (2 4 4')*	0.00	0.00	10.49	0.00	0.00	0.00	0.00	0.00
	44 (2 2'3 5')*	0.00	0.00	0.00	0.00	0.00	0.00	3.21	0.00
	52 (2 2'5 5)*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	66 (2 3'4 4')*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	77(3 3' 4 4')	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	101 (2 2'4 5 5')*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	105 (2 3 3'4 4')*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	118 (2 3'4 4'5)*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	126 (3 3' 4 4' 5)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	128 (2 2'3 3'4 4')*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	138 (2 2'3 4 4'5)*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	153 (2 2'4 4'5 5')*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	170 (2 2'3 3'4 4'5)*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	180 (2 2'3 4 4'5 5')*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	187 (2 2'3 4'5 5'6)*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	195 (2 2'3 3'4 4'5 6)*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	206 (2 2'3 3'4 4'5 5'6)*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	209 (2 2'3 3'4 4'5 5'6 6')*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total PCBs (Sum of Congeners X 2)	0.00	0.00	20.98	0.00	0.00	0.00	6.43	0.00

Units: µg/L. na=not applicable. * indicates congeners included in Total PCBs calculation.

Appendix A-3. Results of chemical analyses of tissues collected from fish in the Raymark study area.

Chemical Class	Analyte	A3SD10	GM08	MF03	SD26
Dioxins	2,3,7,8-TCDD	0.20	0.33	0.27	0.22
	1,2,3,7,8-PeCDD	0.33	0.82	0.49	0.32
	1,2,3,4,7,8-HxCDD	0.09	0.16	0.12	0.12
	1,2,3,6,7,8-HxCDD	0.25	0.41	0.31	0.33
	1,2,3,7,8,9-HxCDD	0.11	0.14	0.13	0.18
	1,2,3,4,6,7,8-HpCDD	2.27	1.39	2.48	7.14
	OCDD	17.80	10.90	17.40	42.00
	2,3,7,8-TCDF	1.38	3.19	1.22	1.69
	2,3,7,8-TCDF Confirm.	2.02	4.18	1.56	2.30
	1,2,3,7,8-PeCDF	0.43	0.35	0.15	0.15
	2,3,4,7,8-PeCDF	1.24	1.09	0.50	0.69
	1,2,3,4,7,8-HxCDF	0.51	0.16	0.16	0.30
	1,2,3,6,7,8-HxCDF	0.35	0.14	0.09	0.12
	1,2,3,7,8,9-HxCDF	0.70	0.42	0.35	0.47
	2,3,4,6,7,8-HxCDF	0.09	0.11	0.06	0.12
	1,2,3,4,6,7,8-HpCDF	2.07	1.63	3.24	2.36
	1,2,3,4,7,8,9-HpCDF	0.15	0.30	0.21	0.27
	OCDF	8.61	7.77	17.80	10.30
	Sum of Dioxins	36.57	29.30	44.98	66.77
Dioxin CDDs	Total TCDD	0.20	0.33	0.45	0.28
	Total PeCDD	0.33	0.01	0.49	0.32
	Total HxCDD	0.62	0.26	0.88	1.41
	Total HpCDD	3.55	2.69	4.31	15.50
	Sum of CDDs	4.69	3.29	6.13	17.51
Dioxin CDFs	Total TCDF	3.40	3.27	1.53	3.36
	Total PeCDF	4.44	2.71	0.95	1.71
	Total HxCDF	3.57	1.30	1.83	0.99
	Total HpCDF	3.83	6.67	13.90	8.12
	Sum of CDFs	15.24	13.95	18.21	14.18
	Toxicity Equivalency Factor	1.42	1.82	1.11	1.21
PCBs	3 (4)	0.00	0.00	0.00	0.00
	15 (4 4')	0.00	0.00	0.00	0.00
	28 (2 4 4')	2.50	13.00	3.30	3.40
	77 (3 3' 4 4')	0.00	1.30	0.00	0.00
	105 (2 3 3'4 4')	3.20	14.00	3.70	4.30
	114 (2 3 4 4'5)	0.18	0.62	0.30	0.31
	118 (2 3' 4 4'5)	11.00	36.00	12.00	14.00
	123 (2' 3 4 4'5)	0.00	0.38	0.00	0.00
	126 (3 3' 4 4' 5)	0.00	0.00	0.00	0.00
	156/157 (2 3 3'4 4'5/2 3 3' 4 4'5')	0.85	2.70	1.30	1.10
	167 (2 3'4 4' 5 5')	0.80	1.80	0.69	0.77
	169 (3 3'4 4'5 5')	0.37	0.00	0.22	0.00
	170 (2 2'3 3'4 4'5)	3.30	2.90	2.40	3.70
	180 (2 2'3 4 4'5 5')	58.00	11.00	39.00	40.00
	189 (2 3 3'4 4'5 5')	0.00	0.00	0.00	0.00
	209 (2 2'3 3'4 4'5 5'6 6')	2.20	0.37	1.80	1.50
	Sum of PCB Congeners	82.40	84.07	64.71	69.08
	Sum of PCB Congeners X 2	164.80	168.14	129.42	138.16
PCB Homologs	Total MonoCBs	0.13	0.00	0.00	0.00
	Total DiCBs	0.62	0.42	1.60	0.00
	Total TriCBs	18.00	31.00	47.00	14.00
	Total TetraCBs	68.00	180.00	120.00	94.00
	Total PentaCBs	77.00	170.00	88.00	89.00
	Total HexaCBs	77.00	120.00	64.00	85.00
	Total HeptaCBs	200.00	43.00	130.00	130.00
	Total OctaCBs	62.00	5.00	74.00	64.00
	Total NonaCBs	40.00	0.00	25.00	24.00
	Sum of PCB Homologs	542.75	549.42	549.60	500.00
	Total PCBs	540.00	550.00	550.00	500.00
Tissue Lipid Content (%)		2.10	3.60	1.60	1.70

Units: PCBs, dioxins = ng/g dry weight.

Appendix A-1-4.1. Grain size analysis for sediments collected from the Raymark study area.

Sample ID	% Sand	% Silt	% Clay	%Silt 63-15.6μ	%Silt <15.6μ
A3SD10	35.6	64.4	0.00	24.3	40.1
CSD1	84.9	15.1	0.00	3.50	11.6
GM03	78.3	21.7	0.00	8.18	13.5
HB3A	20.5	78.1	1.38	29.1	50.4
SD01	33.0	65.6	1.39	20.1	46.9
SD07	73.3	25.9	0.75	9.51	17.2
SD08	66.6	33.4	0.00	17.2	16.2
SD13	54.7	44.0	1.30	11.3	34.0
SD13-RP[1]	54.7	45.3	0.00	15.6	29.8
SD14	57.0	42.0	0.96	14.3	28.7
SD14-RP[1]	57.0	42.2	0.76	16.5	26.4
SD18	16.7	83.3	0.00	27.6	55.7
SD21(A)	22.3	75.5	2.14	31.0	46.7
SD21(B)[2]	20.7	75.2	4.10	30.1	49.2
SD23	52.0	46.9	1.07	18.2	29.8
SD24	57.1	36.5	6.42	20.8	22.1
SD28	78.5	15.7	5.90	6.49	15.1
SD37	28.4	71.6	0.00	22.5	49.1

1 - Lab duplicate.
2 - Field duplicate.

Appendix A-1-4.2. Analysis for Organic Carbon in sediments and sediment porewaters collected from the Raymark study area.

Sample ID	Sediment Total Organic Carbon (%)	Porewater Dissolved Organic Carbon (mg/L)
A3SD10	8.76	10.3
A3SD10-DUP[1]		9.90
CSD1	12.1	21.3
GM03	5.86	14.3
HB3A	14.9	30.4
SD01	7.07	69.0
SD07	7.77	24.1
SD08	10.0	24.6
SD13	10.7	33.6
SD14	7.86	51.1
SD18	6.36	459
SD21(A)	4.56	81.9
SD21(B)[2]	3.25	88.7
SD21-AVG	3.91	85.3
SD23	8.78	30.7
SD24	9.91	25.0
SD28	6.26	19.7
SD37	2.03	34.2
Median	7.77	30.6

1 - Lab duplicate.
2 - Field duplicate.
Note: mg/g dry weight = % X 10

Appendix A-1-5. Summary of SEM and AVS concentrations in sediments collected from the Raymark study area.

Sample Name	AVS (µmol/g dry)	SEM Concentration (µmol/g dry)					Sum of SEM Conc	SEM-AVS (µmol/g dry)
		Cd	Cu	Ni	Pb	Zn		
A3SD10	2.07	0.02	0.04	0.58	5.18	6.74	12.6	**10.5**
CSD1	31.6	7.3E-3	0.28	0.37	2.48	2.89	6.03	-25.5
GM08	9.40	1.1E-2	0.32	0.15	0.41	3.64	4.53	-4.9
HB3A	54.7	3.9E-3	0.03	0.78	46.1	15.3	62.2	**7.5**
SD01	77.7	0.03	1.2E-2	0.46	6.51	7.93	14.9	-62.7
SD07	117	0.02	0.08	0.37	1.49	5.49	7.44	-109.2
SD07-RP[1]	128	0.02	0.05	0.36	1.38	5.23	7.04	-121.3
SD08	85.2	1.4E-2	0.21	0.46	0.71	3.82	5.23	-79.9
SD13	90.5	0.04	0.03	0.32	3.62	7.65	11.7	-78.9
SD14	63.5	0.05	2.4E-3	0.43	1.63	5.56	7.67	-55.8
SD18	0.68	6.7E-3	2.66	0.20	1.60	2.46	6.94	**6.3**
SD18-RP[1]	0.76	7.1E-3	2.63	0.20	1.70	2.58	7.11	**6.3**
SD21A	90.8	0.02	0.06	0.28	1.19	3.75	5.29	-85.5
SD21B	99.3	0.02	0.02	0.24	1.20	3.89	5.36	-94.0
SD23	164	0.03	0.20	0.66	2.27	6.08	9.24	-154.7
SD24	109	0.02	0.47	0.72	2.13	5.40	8.74	-100.3
SD28	105	0.02	0.21	0.29	1.23	7.43	9.19	-95.3
SD37	10.1	3.1E-3	0.48	0.12	0.14	1.65	2.39	-7.7

1 - RP designates replicate analysis.

SEM = Simultaneously Extractable Metals; AVS = Acid Volatile Sulfides.

Appendix A-2-1.1. Hazard Quotients (HQs) and Hazard Indices (HIs) for contaminants in sediments for the Raymark study area. Benchmark = ER-L reference data.

Chemical Class	Analyte	ER-L[1]	A3SD10	CSD1	GM08	HB3A	SD01	SD07	SD08	SD13	SD14	SD18	SD21	SD23	SD24	SD28	SD37
Metals	Silver	1.00	2.00	3.00	3.00	2.40	1.40	1.50	1.40	1.40	0.88	0.44	0.54	0.93	0.62	1.60	0.60
	Arsenic	8.20	2.91	1.37	2.18	1.12	0.85	1.29	0.79	1.10	1.12	0.45	0.48	1.07	1.00	0.99	0.55
	Barium																
	Cadmium	1.20	6.92	1.00	1.25	0.83	4.58	3.67	1.17	6.33	6.33	0.67	2.67	5.25	2.17	3.50	0.43
	Chromium	81.0	5.72	4.96	2.65	3.58	1.11	1.23	1.04	1.13	1.43	0.39	0.46	1.13	1.20	1.32	0.73
	Copper	34.0	75.0	39.7	19.4	1071	48.5	12.6	6.82	26.2	22.8	7.97	5.53	13.6	11.3	10.6	5.09
	Mercury	0.15	2.87	5.13	8.00	3.13	1.47	2.13	2.47	1.87	3.27	1.07	1.03	1.87	1.87	1.80	1.13
	Nickel	20.9	15.2	2.58	1.79	18.5	3.86	2.35	1.78	2.83	4.13	1.00	1.08	2.49	3.03	2.08	1.00
	Lead	46.7	70.4	15.1	3.38	567	33.6	8.63	3.88	20.0	17.8	7.64	5.32	11.0	10.8	6.49	0.91
	Zinc	150	8.93	2.66	1.95	15.5	5.00	3.39	1.93	4.47	4.51	1.21	1.82	3.50	2.42	2.93	1.14
	Metals Hazard Index[2]		190	75.5	43.8	1683	100	36.8	21.3	65.3	62.3	20.8	18.9	40.8	34.4	31.3	11.6
PAHs	2-Methylnaphthalene	70.0	14.3	9.43	9.43	9.43	10.1	9.29	9.43	14.3	24.3	8.71	8.79	14.1	9.43	14.3	8.14
	Acenaphthene	16.0	62.5	41.3	41.3	41.3	8.75	10.0	41.3	12.5	12.5	38.1	5.31	10.0	41.3	62.5	35.6
	Acenaphthylene	44.0	4.32	4.55	15.0	15.0	7.95	7.50	2.95	9.32	10.0	3.18	3.75	7.73	2.50	4.55	1.91
	Anthracene	85.3	1.41	2.23	7.74	7.74	6.10	6.10	1.64	7.97	7.50	2.93	3.58	6.68	1.76	3.52	1.41
	Benzo(a)anthracene	261	5.75	2.15	0.73	2.53	9.58	10.3	2.57	15.3	14.6	3.07	5.56	11.1	3.41	6.51	1.65
	Benzo(a)pyrene	430	3.95	1.53	0.53	0.28	5.58	5.12	1.49	9.30	8.37	1.84	3.26	6.74	2.23	4.42	1.09
	Chrysene	384	7.29	2.21	1.04	0.47	10.4	10.4	2.60	26.0	24.0	3.13	5.21	11.7	4.17	8.85	2.34
	Dibenz(a,h)anthracene	63.4	4.10	3.00	1.17	10.4	7.26	8.36	3.00	17.4	15.8	5.05	5.44	14.8	4.89	9.46	2.37
	Fluoranthene	600	1.58	0.78	0.65	1.10	2.33	7.00	0.63	15.2	14.0	1.00	1.49	3.00	1.12	1.83	1.37
	Fluorene	19.0	73.7	38.4	11.6	57.9	200	205	52.1	279	253	57.9	103	232	63.2	121	28.4
	Naphthalene	160	1.50	4.13	4.13	4.13	2.69	3.25	0.75	3.81	3.44	1.00	1.69	3.44	1.00	1.94	3.56
	Phenanthrene	240	18.8	5.00	1.38	1.17	23.3	18.75	6.25	45.8	45.8	6.25	14.4	32.9	10.0	20.4	3.58
	Pyrene	665	1.50	0.99	0.99	0.99	0.29	0.39	0.99	0.33	0.54	0.11	0.21	0.33	0.12	0.20	0.86
	PAH Hazard Index[2]		201	116	95.6	152	294	302	126	456	433	132.3	161	354	146	260	92.3
PCBs	Total PCBs	22.7	1193	265	10.9	13973	913	104	42.6	382	205	107	55.8	181	214	105	4.61
	Sum of Aroclors																
PST	p,p'-DDE	2.20				1.64		3.27					2.45				

Hazard Quotients calculated as sediment concentration/benchmark.

Shaded cells indicate HQs and HIs>1.

See Appendix A-1-1 for sediment concentrations.

1 - All benchmarks from Long *et al.*, 1995.

2 - Hazard Index calculated as sum of analyte-specific Hazard Quotients.

Appendix A-2-1.2. Hazard Quotients (HQs) and Hazard Indices (HIs) for contaminants in sediments for the Raymark study area. Benchmark = ER-M reference data.

Chemical Class	Analyte	ER-M[1]	A3SD10	CSD1	GM08	HB3A	SD01	SD07	SD08	SD13	SD14	SD18	SD21	SD23	SD24	SD28	SD37
Metals	Silver	3.70	0.54	0.81	0.81	0.65	0.38	0.41	0.38	0.38	0.24	0.12	0.14	0.25	0.17	0.43	0.16
	Arsenic	70.0	0.34	0.16	0.26	0.13	0.10	0.15	0.09	0.13	0.13	0.05	0.06	0.13	0.12	0.12	0.06
	Barium																
	Cadmium	906	9.2E-3	1.3E-3	1.7E-3	1.1E-3	6.1E-3	4.9E-3	1.5E-3	8.4E-3	8.4E-3	8.8E-4	3.5E-3	7.0E-3	2.9E-3	4.6E-3	5.6E-4
	Chromium	370	1.25	1.09	0.62	0.78	0.24	0.27	0.23	0.25	0.31	0.09	0.10	0.25	0.26	0.29	0.16
	Copper	270	9.44	5.00	2.45	135	6.11	1.59	0.86	3.30	2.87	1.00	0.70	1.71	1.42	1.34	0.64
	Mercury	0.71	0.61	1.08	1.69	0.66	0.31	0.45	0.52	0.39	0.69	0.23	0.22	0.39	0.39	0.38	0.24
	Nickel	51.6	6.14	1.05	0.72	7.48	1.56	0.95	0.72	1.15	1.67	0.40	0.44	1.01	1.23	0.84	0.41
	Lead	218	15.1	3.22	0.72	122	7.20	1.85	0.83	4.28	3.82	1.64	1.14	2.36	2.32	1.39	0.19
	Zinc	410	3.27	0.97	0.71	5.66	1.83	1.24	0.71	1.64	1.65	0.44	0.67	1.28	0.89	1.07	0.42
	Metals Hazard Index[2]		36.7	13.4	7.99	272	17.7	6.92	4.34	11.5	11.4	3.97	3.46	7.39	6.80	5.86	2.29
PAHs	2-Methylnaphthalene	670	1.49	0.99	0.99	0.99	1.06	0.97	0.99	1.49	2.54	0.91	0.92	1.48	0.99	1.49	0.85
	Acenaphthene	500	2.00	1.32	1.32	1.32	0.28	0.32	1.32	0.40	0.40	1.22	0.17	0.32	1.32	2.00	1.14
	Acenaphthylene	640	0.30	0.31	1.03	1.03	0.55	0.52	0.20	0.64	0.69	0.22	0.26	0.53	0.17	0.31	0.13
	Anthracene	1100	0.11	0.17	0.60	0.60	0.47	0.47	0.13	0.62	0.58	0.23	0.28	0.52	0.14	0.27	0.11
	Benzo(a)anthracene	1600	0.94	0.35	0.12	0.41	1.56	1.69	0.42	2.50	2.38	0.50	0.91	1.81	0.56	1.06	0.27
	Benzo(a)pyrene	1600	1.06	0.41	0.14	0.08	1.50	1.38	0.40	2.50	2.25	0.49	0.88	1.81	0.60	1.19	0.29
	Chrysene	2800	1.00	0.30	0.14	0.06	1.43	1.43	0.36	3.57	3.29	0.43	0.71	1.61	0.57	1.21	0.32
	Dibenz(a,h)anthracene	260	1.00	0.73	0.28	2.54	1.77	2.04	0.73	4.23	3.85	1.23	1.33	3.62	1.19	2.31	0.58
	Fluoranthene	5100	0.19	0.09	0.08	0.13	0.27	0.82	0.07	1.78	1.65	0.12	0.18	0.35	0.13	0.22	0.16
	Fluorene	540	2.59	1.35	0.41	2.04	7.04	7.22	1.83	9.81	8.89	2.04	3.61	8.15	2.22	4.26	1.00
	Naphthalene	2100	0.11	0.31	0.31	0.31	0.20	0.25	0.06	0.29	0.26	0.08	0.13	0.26	0.08	0.15	0.27
	Phenanthrene	1500	3.00	0.80	0.22	0.19	3.73	3.00	1.00	7.33	7.33	1.00	2.30	5.27	1.60	3.27	0.57
	Pyrene	2600	0.38	0.25	0.25	0.25	0.07	0.10	0.25	0.08	0.14	0.03	0.05	0.08	0.03	0.05	0.22
	PAH Hazard Index[2]		14.2	7.40	5.90	9.95	19.9	20.2	7.76	35.3	34.2	8.49	11.7	25.6	9.60	17.8	5.92
PCBs	Total PCBs	180	150	33.4	1.37	1762	115	13.1	5.37	48.1	25.8	13.5	7.04	22.9	27.0	13.2	0.58
	Sum of Aroclors																
PST	p,p'-DDE	27.0				0.13		0.27					0.20				

Hazard Quotients calculated as sediment concentration/benchmark.

Shaded cells indicate HQs and HIs>1.

See Appendix A-1-1 for sediment concentrations.

1 - All benchmarks from Long *et al*., 1995.

2 - Hazard Index calculated as sum of analyte-specific Hazard Quotients.

Appendix A-2-2.1. Hazard Quotients (HQs) and Hazard Indices (HIs) for contaminants in WHOLE porewaters for the Raymark TIE.

Chemical Class	Analyte	WQSV[1,2]	Source[3]	A3SD10	CSD1	GM08	HB3A	SD01	SD07	SD08	SD13	SD14	SD18	SD21	SD23	SD24	SD28	SD37
Metals	Silver	0.92	a	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Arsenic	36.0	a	0.55	1.83	0.56	0.93	0.00	2.64	2.24	2.04	0.49	0.22	0.33	0.96	0.33	0.53	0.50
	Barium	3.80	d	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Cadmium	36.0	c	0.16	0.10	0.00	0.09	0.08	0.11	0.04	0.08	0.09	0.02	0.09	0.09	0.08	0.10	0.08
	Chromium	50.0	a	0.03	0.05	0.03	0.02	0.06	0.02	0.00	0.06	0.06	0.04	0.01	0.06	0.05	0.00	0.00
	Copper	20.5	c	3.17	3.46	2.68	29.2	5.46	2.63	1.56	2.24	2.34	0.00	2.46	1.71	2.00	2.68	2.63
	Nickel	2400	c	0.10	0.01	0.01	0.05	0.01	0.01	0.02	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.00
	Lead	3020	c	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Zinc	343	c	4.49	0.76	1.22	0.50	0.50	0.44	0.58	0.41	0.79	0.12	0.34	0.17	0.15	0.76	0.15
	Metals Hazard Index[4]			8.50	6.01	4.62	30.8	6.12	5.85	4.45	4.83	3.76	0.40	3.25	3.01	2.61	4.08	3.37
PAHs	2-Methylnaphthalene	1.22	e	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Acenaphthene	1125	c	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Acenaphthylene	0.64	e	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Anthracene	0.40	e	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Benzo(a)anthracene	0.05	e	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Benzo(a)pyrene	0.027	e	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Chrysene	0.13	e	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Dibenz(a,h)anthracene	0.013	e	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Fluoranthene	66.9	c	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Fluorene	0.14	e	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Naphthalene	620	b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Phenanthrene	4.60	e	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Pyrene	1.21	e	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	PAH Hazard Index[4]			0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.4	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PCBs	Total PCBs	40.0	c	0.00	27.3	0.00	0.00	0.00	52.1	50.0	12.6	0.00	0.00	0.00	28.6	0.00	55.3	0.00

See Appendix A-1-2 for porewater concentrations.

HQ=sediment porewater concentration/WQSV. Blank cells indicate HQs not calculated due to non-detect or zero porewater concentrations.

1 - See text for description of WQSV derivation process.

2 - Benchmark units: µg/L.

3 - Water Quality Screening Value (WQSV) sources

a - U.S. EPA Water Quality Criteria - Saltwater Chronic (USEPA, 1986);

b - U.S. EPA Water Quality Criteria - Freshwater Chronic (USEPA, 1986);

c - literature LC50 values for *Ampelisca* (Berry *et al.*, 1996 (Cd, Cu, Pb, Ni, Zn); Ho *et al.*, 1997 (PCBs));

d - literature values for Daphnids (Suter, 1996 (Ba))

e - EqP partitioning of ER-L sediment benchmark into porewater at 1% TOC

4 - Hazard Index = class-specific sum of Hazard Quotients.

Appendix A-2-2.2. Hazard Quotients (HQs) and Hazard Indices (HIs) for contaminants in C-18 and EDTA-treated porewaters for the Raymark TIE.

Chemical Class	Analyte	WQSV[1,2]	Source[3]	A3SD10	CSD1	GM08	HB3A	SD01	SD07	SD08	SD13	SD14	SD18	SD21	SD23	SD24	SD28	SD37
Metals	Arsenic	36.0	a	0.02	1.14	0.06	0.03		1.77	1.61	0.15		0.06	0.04	0.28		1.47	0.15
	Cadmium	36.0	c	0.26	0.24	0.18	0.14	0.09	0.15	0.16	0.10	0.13	0.03	0.12	0.13	0.10	0.26	0.16
	Chromium	50.0	a		7.6E-3			2.9E-2				2.1E-2	1.0E-2		1.9E-2	7.2E-3		4.2E-3
	Copper	20.5	c	1.12	0.93	1.37	4.10	0.73	1.46	0.93	1.02	0.88		0.54	1.37	0.88	1.27	1.51
	Nickel	2400	c	2.7E-3				5.3E-3										
	Lead	3020	c				1.1E-3					1.5E-3		8.2E-4	1.4E-3			
	Zinc	343	c	7.00	0.29	1.49	0.67	0.50	0.20	0.26	0.35	0.41	0.20	0.22	0.12	0.15	0.20	0.17
	Metals Hazard Index[4]			8.40	2.60	3.09	4.95	1.36	3.58	2.96	1.63	1.43	0.30	0.91	1.92	1.13	3.20	2.01
PCBs	Total PCBs	40.0	c							0.65	7.46				6.31			

See Appendix A-1-2 for porewater concentrations

HQ=sediment porewater concentration/WQSV. Blank cells indicate HQs not calculated due to non-detect or zero porewater concentrations.

1 - See text for description of WQSV derivation process.

2 - Benchmark units: µg/L

3 - Water Quality Screening Value (WQSV) sources.

a - U.S. EPA Water Quality Criteria - Saltwater Chronic (USEPA, 1986);

b - U.S. EPA Water Quality Criteria - Freshwater Chronic (USEPA, 1986);

c - literature LC50 values for *Ampelisca* (Berry *et al.*, 1996 (Cd, Cu, Pb, Ni, Zn); Ho *et al.*, 1997 (PCBs));

d - literature values for Daphnids (Suter, 1996 (Ba))

e - EqP partitioning of ER-L sediment benchmark into porewater at 1% TOC

4 - Hazard Index = class-specific sum of Hazard Quotients.

Appendix A-2-2.3. Hazard Quotients (HQs) and Hazard Indices (HIs) for contaminants in *Ulva*- and non-*Ulva*-treated porewaters collected from the Raymark study area.

Chemical Class	Analyte	WQSV[1,2]	Source[3]	*Ulva*				Non-*Ulva*			
				A3SD10	HB3A	SD01	SD28	A3SD10	HB3A	SD01	SD28
Metals	Arsenic	36.0	a	0.52	0.56	0.02	0.22	0.66	0.71	0.07	0.41
	Cadmium	36.0	c	0.13	0.06	0.07	0.08	0.14	0.08	0.09	0.07
	Chromium	50.0	a								
	Copper	20.5	c	3.41	18.1	1.95	3.12	2.00	30.6	1.37	2.59
	Nickel	2400	c								
	Lead	3020	c								
	Zinc	343	c	0.35	1.55	0.20	0.15	0.23	2.65	0.23	0.29
PCBs	Total PCBs	40.0	c			0.52				0.16	

See Appendix A-1-2 for porewater concentrations.

HQ=sediment porewater concentration/WQSV. Blank cells indicate HQs not calculated due to non-detect or zero porewater concentrations.

1 - See text for description of WQSV derivation process.

2 - Benchmark units: µg/L.

3 - Water Quality Screening Value (WQSV) sources:

a - U.S. EPA Water Quality Criteria - Saltwater Chronic (USEPA, 1986);

b - U.S. EPA Water Quality Criteria - Freshwater Chronic (USEPA, 1986);

c - literature LC50 values for *Ampelisca* (Berry *et al*., 1996 (Cd, Cu, Pb, Ni, Zn); Ho *et al*., 1997 (PCBs));

d - literature values for Daphnids (Suter, 1996 (Ba)).

e - EqP partitioning of ER-L sediment benchmark into porewater at 1% TOC

4 - Hazard Index = class-specific sum of Hazard Quotients.

Appendix A-2-3. Hazard Quotients (HQs) for *Ampelisca* and *Mulinia* exposed to ammonia in sediment porewaters from the Raymark study area.

Treat	Class	Analyte	Benchmark[1,2]	A3SD10	CSD1	GM08	HB3A	SD01	SD07	SD08	SD13	SD14	SD18	SD21	SD23	SD24	SD28	SD37
PW	AMPAM	Total Ammonia	30.0	0.65	0.55	0.41	0.53	1.14	1.05	0.98	1.23	0.91	1.47	1.19	0.78	0.78	0.77	1.65
		Un-ionized Ammonia	0.40	0.30	0.84	0.16	0.32	0.75	1.60	0.89	1.03	0.68	0.23	0.70	1.29	0.94	1.27	2.01
	MULAM	Total Ammonia	13.4	1.46	1.23	0.92	1.19	2.56	2.34	2.19	2.76	2.05	3.29	2.65	1.75	1.74	1.72	3.70
		Un-ionized Ammonia	0.09	1.31	3.72	0.70	1.41	3.34	7.12	3.96	4.59	3.04	1.02	3.09	5.71	4.17	5.64	8.94
ULVA	AMPAM	Total Ammonia	30.0	0.05	0.02	0.00	0.05	0.04	0.06	0.02	0.02	0.05	0.14	0.03	0.09	0.03	0.03	0.10
		Un-ionized Ammonia	0.40	0.04	0.08	0.01	0.07	0.08	0.23	0.07	0.06	0.11	0.23	0.09	0.10	0.08	0.09	0.27
	MULAM	Total Ammonia	13.4	0.10	0.04	0.01	0.12	0.08	0.14	0.04	0.05	0.11	0.31	0.07	0.21	0.06	0.06	0.22
		Un-ionized Ammonia	0.09	0.16	0.35	0.05	0.29	0.35	1.03	0.32	0.26	0.49	1.03	0.41	0.46	0.34	0.40	1.20

AMPAM=*Ampelisca*; MULAM=*Mulinia*.

Benchmark units: mg/L.

1 - Benchmark for *Ampelisca*: NOEC = No Observable Effect Concentration.

2 - Benchmark for *Mulinia* larval Development: LOEC (Carr, et al., 1996)

3 - Hazard Index = sum of class-specific Hazard Quotients

Appendix Table B-1.1. *Ampelisca* survival in whole porewater from the Raymark study area.

Station	Method[4]	Concentration Porewater (%)						LC50[2]	LC2
		0[1]	6.25	12.5	25	50	100	(%)	(%
A3SD10	a	100	100	100	100	86.7	73.3	>100	77.
CSD1	a	100	100	100	93.3	100	53.3	>100	64.
GM08	c	100	100	100	100	100	66.7	>100	80.
HB3A	c	100	86.7	100	93.3	100	40.0	91.7	66.
SD01	b	100	100	100	100	66.7	0.00	56.1	40.
SD07	b	100	100	100	100	100	0.00	70.7	60.
SD08	a	100	100	86.7	93.3	86.7	0.00	59.2	43.
SD13	b	100	100	93.3	100	100	0.00	70.7	60.
SD14	b	100	100	93.3	100	100	0.00	70.7	60.
SD18	b	100	100	100	80.0	0.00	0.00	31.0	25.
SD21	c	100	100	100	100	100	6.67	76.8	60.
SD23	b	91.7	100	100	100	100	0.00	70.7	60.
SD24	b	93.3	93.3	100	100	80.0	0.00	62.7	51.
SD28	c	100	100	100	100	100	100	>100	10
SD37	b	91.7	100	93.3	80.0	100	0.00	41.4	28.

Shading indicates values excluded from calculations.

1 - Control value for experiment, assumed for all treatments, is 0% porewater.

2 - Lethal Concentration - 50% (concentration of porewater causing 50% reduction in survival).

3 - Lethal Concentration - 20% (concentration of porewater causing 20% reduction in survival).

4 - Calculation method:

a - LC50 and LC20 calculated using Maximum Likelihood-Probit method.

b - LC50 calculated using Trimmed Spearman-Karber method; LC20 calculated using Linear Interpolation (IC20).

c - LC50 and LC20 calculated using Linear Interpolation (IC50 and IC20).

Appendix Table B-1.2. *Mulinia* normal larval development in whole porewater from the Raymark study area.

Station	Method[4]	Concentration Porewater (%)						EC50[2] (%)	EC20[3] (%)
		0[1]	6.25	12.5	25	50	100		
A3SD10	a	97.7	2.00	0.33	0.00	0.00	0.00	0.91	0.41
CSD1	a	97.7	90.0	49.0	12.3	0.00	0.00	17.3	11.7
GM08	a	96.0	96.3	89.0	12.7	0.00	0.00	18.5	14.8
HB3A	a	95.7	93.0	20.7	0.00	0.00	0.00	10.2	8.26
SD01	a	95.3	92.0	49.7		0.00	0.00	12.7	9.21
SD07	a	96.3	85.0	24.7	0.00	0.00	0.00	9.73	7.20
SD08	a	97.0	41.3	10.7	92.0	0.00	0.00	5.55	3.20
SD13	a	97.0	91.7	84.3	67.0	21.3	0.00	32.4	20.7
SD14	a	96.7	88.3	82.7		0.00	0.00	17.1	13.8
SD18	c	93.0	0.00	0.00		0.00	0.00	3.13	1.25
SD21	a	98.0	78.3	56.7	0.00	0.00	0.00	11.4	7.58
SD23	c	94.7	89.0	83.3	78.7	67.0	0.00	64.7	31.3
SD24	a	98.3	92.0	89.0	28.3	3.67	0.00	21.2	14.9
SD28	c	96.0	94.7	96.3	91.0	86.7	0.00	72.3	55.7
SD37	a	95.3	88.7	12.0	0.00	0.00	0.00	9.23	7.39

1 - Control value for experiment, assumed for all treatments, is 0% porewater.
2 - Effect Concentration - 50% (concentration of porewater causing 50% reduction in test response).
3 - Effect Concentration - 20% (concentration of porewater causing 20% reduction in test response).
4 - Calculation method:
a - EC50 and EC20 calculated using Maximum Likelihood-Probit method.
b - EC50 calculated using Trimmed Spearman-Karber method; EC20 calculated using Linear Interpolation (IC20).
c - EC50 and EC20 calculated using Linear Interpolation (IC50 and IC20).

Appendix Table B-2.1. *Ampelisca* survival in C-18 treated porewater from the Raymark study area.

Station	Method[4]	Concentration Porewater (%)				LC50[2] (%)	LC20[3] (%)
		0[1]	10	50	100		
A3SD10	c	100	100	100	90.0	>100	100.0
CSD1	c	100	100	100	70.0	>100	83.3
GM08	c	100	100	100	100	>100	100.0
HB3A	a	100	100	30.0	40.0	52.2	22.7
SD01	b	100	100	90.0	0.00	63.0	55.6
SD07	c	100	100	100	70.0	>100	83.3
SD08	c	80.0	100	100	0.00	75.0	60.0
SD13	b	90.0	100	100	0.00	70.7	60.0
SD14	b	100	100	100	0.00	70.7	60.0
SD18	b	100	100	0.00	0.00	22.4	18.0
SD21	c	100	100	100	0.00	75.0	60.0
SD23	b	100	100	100	0.00	70.7	60.0
SD24	b	100	100	100	0.00	70.7	60.0
SD28	c	100	100	100	100	>100	100
SD37	c	100	90.0	90.0	0.00	68.0	55.0

1 - Control value for experiment, assumed for all treatments, is 0% porewater.
2 - Lethal Concentration - 50% (concentration of porewater causing 50% reduction in survival).
3 - Lethal Concentration - 20% (concentration of porewater causing 20% reduction in survival).
4 - Calculation method:
a - LC50 and LC20 calculated using Maximum Likelihood-Probit method.
b - LC50 calculated using Trimmed Spearman-Karber method; LC20 calculated using Linear Interpolation (IC20).
c - LC50 and LC20 calculated using Linear Interpolation (IC50 and IC20).

Appendix Table B-2.2. *Mulinia* normal larval development in C-18 treated porewater from the Raymark study area.

Station	Method[4]	Concentration Porewater (%)				EC50[2] (%)	EC20[3] (%)
		0[1]	10	50	100		
A3SD10	c	96.0	2.33	0.00	0.00	5.12	2.05
CSD1	c	93.3	17.3	0.00	0.00	6.14	2.46
GM08	a	95.3	89.7	33.0	47.0	57.7	15.9
HB3A	c	88.0	90.7	0.00	0.00	30.0	18.0
SD01	c	95.3	96.0	0.00	0.00	30.0	18.0
SD07	c	97.7	23.3	0.00	0.00	6.57	2.63
SD08	c	96.3	34.0	0.00	0.00	7.73	3.09
SD13	c	96.3	92.7	0.00	0.00	29.2	16.7
SD14	c	94.0	92.3	0.00	0.00	29.6	17.4
SD18	c	89.7	94.0	22.3	0.00	36.4	20.6
SD21	c	92.7	89.7	0.00	0.00	29.3	16.9
SD23	a	94.7	93.0	73.3	64.3	>100	49.2
SD24	a	97.7	94.0	58.0	0.00	52.1	45.7
SD28	a	97.7	93.7	69.7	3.33	59.5	46.8
SD37	c	97.3	82.7	0.00	0.00	12.8	10.5

1 - Control value for experiment, assumed for all treatments, is 0% porewater.
2 - Effect Concentration - 50% (concentration of porewater causing 50% reduction in test response).
3 - Effect Concentration - 20% (concentration of porewater causing 20% reduction in test response).
4 - Calculation method:
a - EC50 and EC20 calculated using Maximum Likelihood-Probit method.
b - EC50 calculated using Trimmed Spearman-Karber method; EC20 calculated using Linear Interpolation (IC20).
c - EC50 and EC20 calculated using Linear Interpolation (IC50 and IC20).

Appendix Table B-3.1. *Ampelisca* survival in EDTA-treated porewater from the Raymark study area.

Station	Method[4]	Concentration Porewater (%)				LC50[2] (%)	LC20[3] (%)
		0[1]	10	50	100		
A3SD10	c	100	100	100	100	>100	100
CSD1	c	100	100	100	50.0	>100	70.0
GM08	a	100	100	90.0	80.0	>100	100
HB3A	c	90.0	100	100	0.00	75.0	60.0
SD01	b	100	100	100	0.00	70.7	60.0
SD07	b	100	100	100	20.0	77.1	62.5
SD08	c	100	100	100	0.00	75.0	60.0
SD13	b	100	100	100	0.00	70.7	60.0
SD14	b	100	100	90.0	0.00	63.0	55.6
SD18	b	100	100	0.00	0.00	22.4	18.0
SD21	c	100	100	100	0.00	75.0	60.0
SD23	b	87.5	90.0	100	0.00	70.7	60.0
SD24	b	100	100	100	10.0	73.5	61.1
SD28	c	100	100	100	90.0	>100	100
SD37	b	100	90.0	100	0.00	69.4	57.9

1 - Control value for experiment, assumed for all treatments, is 0% porewater.
2 - Lethal Concentration - 50% (concentration of porewater causing 50% reduction in survival).
3 - Lethal Concentration - 20% (concentration of porewater causing 20% reduction in survival).
4 - Calculation method:
a - LC50 and LC20 calculated using Maximum Likelihood-Probit method.
b - LC50 calculated using Trimmed Spearman-Karber method; LC20 calculated using Linear Interpolation (IC20).
c - LC50 and LC20 calculated using Linear Interpolation (IC50 and IC20).

Appendix Table B-3.2. *Mulinia* normal larval development in EDTA-treated porewater from the Raymark study area.

Station	Method[4]	Concentration Porewater (%)				EC50[2] (%)	EC20[3] (%)
		0[1]	10	50	100		
A3SD10	c	98.3	95.3	0.00	0.00	29.4	17.0
CSD1	c	95.3	78.7	0.33	0.00	25.8	11.2
GM08	c	94.7	97.7	87.7	20.7	79.5	58.0
HB3A	c	95.7	92.7	0.00	0.00	29.4	16.9
SD01	c	97.7	91.7	0.00	0.00	28.7	15.9
SD07	c	94.7	92.3	0.00	0.00	29.5	17.2
SD08	c	95.7	25.0	0.00	0.00	6.77	2.71
SD13	c	93.7	93.0	0.00	0.00	29.9	17.8
SD14	c	99.0	93.0	0.00	0.00	28.7	15.9
SD18	c	99.0	0.00	0.00	0.00	5.00	2.00
SD21	c	95.7	88.0	0.00	0.00	28.3	15.2
SD23	c	94.0	79.3	0.00	0.00	26.3	12.1
SD24	b	96.3	96.3	26.7	0.00	30.8	21.1
SD28	a	96.3	93.3	85.3	5.67	68.4	55.7
SD37	c	93.7	76.3	0.00	0.00	25.5	10.7

1 - Control value for experiment, assumed for all treatments, is 0% porewater.
2 - Effect Concentration - 50% (concentration of porewater causing 50% reduction in test response).
3 - Effect Concentration - 20% (concentration of porewater causing 20% reduction in test response).
4 - Calculation method:
a - EC50 and EC20 calculated using Maximum Likelihood-Probit method.
b - EC50 calculated using Trimmed Spearman-Karber method; EC20 calculated using Linear Interpolation (IC20).
c - EC50 and EC20 calculated using Linear Interpolation (IC50 and IC20).

Appendix Table B-4.1. *Ampelisca* survival in *Ulva*-treated porewater from the Raymark study area.

Station	Method[4]	Concentration Porewater (%)						LC50[2] (%)	LC20[3] (%)
		0[1]	6.25	12.5	25	50	100		
A3SD10	c	100	100	100	100	100	100	>100	100
CSD1	c	100	100	100	100	100	100	>100	100
GM08	c	100	100	100	100	93.3	100	>100	100
HB3A	a	100	93.3	93.3	100	53.3	0.00	45.5	24.0
SD01	a	100	100	100	100	93.3	60.0	>100	72.8
SD07	c	100	100	100	100	100	100	>100	100
SD08	c	100	100	100	100	100	100	>100	100
SD13	c	100	100	100	100	100	100	>100	100
SD14	a	100	100	100	93.3	66.7	53.3	93.8	43.6
SD18	a	100	100	80.0	77.5	65.0	0.00	40.8	20.0
SD21	a	100	100	100	100	66.7	45.0	80.8	46.9
SD23	c	100	100	100	100	100	93.3	>100	100
SD24	c	100	100	100	100	100	93.3	>100	100
SD28	c	100	100	100	100	100	100	>100	100
SD37	c	100	100	100	100	100	93.3	>100	100

1 - Control value for experiment, assumed for all treatments, is 0% porewater.
2 - Lethal Concentration - 50% (concentration of porewater causing 50% reduction in survival).
3 - Lethal Concentration - 20% (concentration of porewater causing 20% reduction in survival).
4 - Calculation method:
a - LC50 and LC20 calculated using Maximum Likelihood-Probit method.
b - LC50 calculated using Trimmed Spearman-Karber method; LC20 calculated using Linear Interpolation (IC20).
c - LC50 and LC20 calculated using Linear Interpolation (IC50 and IC20).

Appendix Table B-4.2. *Mulinia* normal larval development in *Ulva*-treated porewater from the Raymark study are

Station	Method[4]	Concentration Porewater (%)						EC50[2] (%)	EC20[3] (%)
		0[1]	6.25	12.5	25	50	100		
A3SD10	c	95.7	0.00	0.00	0.00	0.00	0.00	3.13	1.25
CSD1	c	95.7	5.00	6.00	0.00	0.00	0.00	6.67	2.67
GM08	c	95.7	0.00	0.00	0.00	0.00	0.00	3.13	1.25
HB3A	c	95.7	0.33	0.00	0.00	0.00	0.00	3.14	1.25
SD01	a	95.7	0.33	16.7	12.7	0.00	0.00	5.28	2.14
SD07	a	95.7	0.00	10.3	4.33	0.00	0.00	3.80	1.64
SD08	a	95.7	7.50	62.0	47.5	1.00	0.00	19.0	11.1
SD13	a	95.7		66.0	46.5	17.5	0.00	21.4	10.8
SD14	a	95.7		64.0	41.0	3.50	1.00	18.6	10.3
SD18	a	95.7		44.0		21.0	0.00	12.0	5.91
SD21	c	95.7	0.33	0.00	0.00	0.00	0.00	3.14	1.25
SD23	a	95.7	6.33	4.00	0.00	0.00	0.00	1.08	0.38
SD24	c	95.7	0.00	9.67	0.00	0.00	0.00	6.95	2.78
SD28	a	95.7		67.0	61.0	0.00	0.00	22.3	13.8
SD37	a	95.7	35.0	27.7	4.00	0.33	0.00	5.23	2.24

Shading indicates values excluded from calculations.

1 - Control value for experiment, assumed for all treatments, is 0% porewater. No control data available for *Ulva* treatment; control value taken as average of controls from whole, EDTA, and C18 treatments.

2 - Effect Concentration - 50% (concentration of porewater causing 50% reduction in test response).

3 - Effect Concentration - 20% (concentration of porewater causing 20% reduction in test response).

4 - Calculation method:

a - EC50 and EC20 calculated using Maximum Likelihood-Probit method.

b - EC50 calculated using Trimmed Spearman-Karber method; EC20 calculated using Linear Interpolation (IC20).

c - EC50 and EC20 calculated using Linear Interpolation (IC50 and IC20).