Click Here to Return to Main Document

APPENDIX D
ECOLOGICAL RISK CALCULATIONS

Appendix D-1-1. Hazard Quotients of CoCs in sediments for the Raymark Phase III Ecological Risk Assessmeht Investigation.
Benchmark = NOAA ER-L.

	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	1,6,7-Trimethylnaphthalene	1-Methylnaphthalene	1-Methylphenanthrene	2,6-Dimethylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b+k)fluoranthene	Benzo(e)pyrene	Benzo(g,h,i)perylene
ER-L[1]	1.20	81.00	34.00	46.70	0.15	20.90	150					16.00	44.00	85.30	261	430			
C-1-SED-SMP	0.18	0.31	3.09	0.80	1.40	0.33	0.46					0.25	0.52	0.41	0.50	0.28			
C-2-SED-SMP	0.26	0.95	8.35	1.64	3.93	0.84	1.13					1.36	1.68	1.41	1.49	0.88			
C-3-SED-SMP	0.35	0.60	14.82	2.87	5.33	0.97	1.62					0.38	0.68	0.73	0.84	0.44			
D-1-SED-SMP	0.13	0.18	0.66	0.16	0.24	0.44	0.28					0.06	0.02	0.04	0.03	0.02			
D-2-SED-SMP	0.27	0.32	2.16	0.62	4.60	0.87	0.79					0.19	0.41	0.46	0.50	0.23			
D-3-SED-SMP	1.75	0.45	6.18	1.88	0.39	0.99	1.19					22.50	12.05	25.79	21.46	10.23			
D-4-SED-SMP	0.53	2.12	4.56	1.21	1.73	1.05	1.05					4.75	1.02	2.34	1.88	1.12			
D-5-SED-SMP	0.28	0.12	1.64	0.81	0.80	0.26	0.38					0.75	2.73	2.11	2.53	1.33			
D-6-SED-SMP	0.50	0.64	7.82	0.90	3.07	0.54	1.06					0.56	1.09	1.02	1.19	0.70			
E-1-SED-SMP	0.03	1.72	8.18	8.21	5.87	1.26	1.27					1.31	5.91	3.17	2.80	2.21			
E-2-SED-SMP	0.03	0.65	3.82	3.70	1.80	0.82	0.57					0.63	4.77	2.70	2.53	1.86			
E-3-SED-SMP	0.10	0.26	1.06	1.92	1.00	0.84	0.77					4.94	11.82	11.14	12.64	6.74			
E-4-SED-SMP	0.04	0.59	2.92	3.28	2.07	0.95	0.58					0.47	2.95	1.76	1.78	1.26			
F-1-SED-SMP	0.67	0.45	3.12	4.05	1.27	0.55	1.27					2.19	8.18	7.27	6.90	4.65			
F-2-SED-SMP	0.13	4.81	22.38	12.23	3.67	3.15	6.55					3.69	15.45	7.74	9.20	7.67			
F-3-SED-SMP	0.04	0.59	5.12	6.70	2.60	1.14	2.52					68.75	21.38	37.51	42.15	22.56			
Reference	1.25	2.85	19.44	3.38	8.00	1.79	1.95					20.63	7.50	3.87	0.73	0.53			

Hazard Quotients calculated as sediment concentration/benchmark.
See Appendix A-1 for sediment concentrations.
1 - Benchmarks from Table 3.3-1.
2 - Sum of High Molecular Weight PAHs - Benzo(a)anthracene, Benzo(a)pyrene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, and Perylene; Perylene not available for reference.
3 - Sum of Low Molecular Weight PAHs - 2-Methylnaphthalene, Acenaphthene, Acenaphthylene, Anthracene, Fluorene, Naphthalene, and Phenanthrene.
4 - Total PCBs = Sum of Congeners x 2.
5 - 2,3,7,8-TCDD equivalent concentration for prediction of impacts on fish; see WHO, 1998.

Appendix D-1-1. Hazard Quotients of CoCs in sediments for the Raymark Phase III Ecological Risk Assessment Investigation. Benchmark = NOAA ER-L.

	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	HMW PAHs[2]	Indeno(1,2,3-cd)pyrene	LMW PAHs[3]	Perylene	Phenanthrene	Pyrene	Sum PAHs	Total PCBs[4]	o,p'-DDE	p,p'-DDD	p,p'-DDE	p,p'-DDT	Dioxin-Fish[5]
ER-L[1]	384	63.40	600	19.00	1700		552		240	665	4022	22.70	2.20	1.58	2.20	1.58	60.0
C-1-SED-SMP	0.31	0.28	0.32	0.26	0.38		0.33		0.40	0.30	0.39	1.68	0.18	0.24	0.18	0.24	0.07
C-2-SED-SMP	0.99	0.91	1.08	1.58	1.15		1.27		1.71	1.02	1.22	7.01	0.25	2.41	0.25	0.35	0.20
C-3-SED-SMP	0.47	0.44	0.52	0.53	0.58		0.51		0.54	0.56	0.61	2.67	0.27	0.38	0.27	0.38	0.15
D-1-SED-SMP	0.02	0.02	0.03	0.05	0.03		0.04		0.05	0.03	0.03	0.65	0.18	0.25	0.18	0.25	0.04
D-2-SED-SMP	0.29	0.22	0.33	0.21	0.57		0.29		0.35	0.27	0.43	1.58	0.30	0.41	0.30	0.41	0.04
D-3-SED-SMP	11.98	10.88	20.00	25.26	16.76		27.03		45.83	18.05	18.32	1.92	0.15	0.21	0.15	0.21	0.39
D-4-SED-SMP	1.22	1.17	1.52	2.84	1.49		2.17		3.21	1.37	1.64	8.26	0.25	2.34	0.25	0.35	0.20
D-5-SED-SMP	1.51	1.58	1.83	0.95	1.84		1.04		0.83	1.65	1.73	223	0.19	12.66	0.19	0.26	3.72
D-6-SED-SMP	0.70	0.69	0.67	0.42	0.83		0.62		0.63	0.74	0.84	2.46	0.18	1.14	0.18	0.25	0.08
E-1-SED-SMP	2.53	2.68	2.67	1.47	2.70		3.07		4.08	2.56	3.08	1836	0.57	0.79	0.57	0.79	3.38
E-2-SED-SMP	2.86	2.68	2.83	0.53	2.70		2.61		3.63	2.41	3.16	39.04	1.86	14.56	1.86	2.59	0.49
E-3-SED-SMP	8.59	7.26	10.33	7.37	9.88		7.73		10.42	9.32	9.86	4.06	0.41	0.57	1.82	0.57	0.24
E-4-SED-SMP	1.95	1.89	2.00	0.39	1.87		1.64		2.29	1.65	2.20	17.27	1.39	15.19	1.39	1.93	0.54
F-1-SED-SMP	4.69	5.05	5.33	4.11	5.61		4.88		6.25	4.96	5.69	10.19	3.32	22.78	0.41	2.66	0.20
F-2-SED-SMP	7.29	10.09	9.50	3.37	9.13		7.00		8.75	8.42	10.53	40.48	1.23	44.30	13.64	15.19	0.58
F-3-SED-SMP	22.66	23.66	35.00	48.42	31.94		25.80		32.50	25.56	31.66	33.08	1.64	75.95	45.00	2.28	0.25
Reference	0.57	5.21	0.55	17.37	0.78		3.80		0.50	0.62	1.76	3.31					0.13

Hazard Quotients calculated as sediment concentration/benchmark.

See Appendix A-1 for sediment concentrations.

1 - Benchmarks from Table 3.3-1.

2 - Sum of High Molecular Weight PAHs - Benzo(a)anthracene, Benzo(a)pyrene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, and Perylene; Perylene not available for reference.

3 - Sum of Low Molecular Weight PAHs - 2-Methylnaphthalene, Acenaphthene, Acenaphthylene, Anthracene, Fluorene, Naphthalene, and Phenanthrene.

4 - Total PCBs = Sum of Congeners x 2.

5 - 2,3,7,8-TCDD equivalent concentration for prediction of impacts on fish; see WHO, 1998.

Appendix D-1-2. Hazard Quotients of CoCs in sediments for the Raymark Phase III Ecological Risk Assessment Investigation. Benchmark = NOAA ER-M.

	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	1,6,7-Trimethylnaphthalene	1-Methylnaphthalene	1-Methylphenanthrene	2,6-Dimethylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b+k)fluoranthene	Benzo(e)pyrene	Benzo(g,h,i)perylene
ER-M[1]	9.60	370	270	218	0.71	51.60	410					500	640	1100	1600	1600			
C-1-SED-SMP	0.02	0.07	0.39	0.17	0.30	0.13	0.17					8.00E-03	0.04	0.03	0.08	0.08			
C-2-SED-SMP	0.03	0.21	1.05	0.35	0.83	0.34	0.41					0.04	0.12	0.11	0.24	0.24			
C-3-SED-SMP	0.04	0.13	1.87	0.61	1.13	0.39	0.59					0.01	0.05	0.06	0.14	0.12			
D-1-SED-SMP	0.02	0.04	0.06	0.03	0.05	0.18	0.10					2.00E-03	1.56E-03	2.73E-03	5.63E-03	4.38E-03			
D-2-SED-SMP	0.03	0.07	0.27	0.13	0.97	0.35	0.29					6.00E-03	0.03	0.04	0.08	0.06			
D-3-SED-SMP	0.22	0.10	0.78	0.40	0.06	0.40	0.43					0.72	0.83	2.00	3.50	2.75			
D-4-SED-SMP	0.07	0.46	0.57	0.26	0.37	0.43	0.39					0.15	0.07	0.18	0.31	0.30			
D-5-SED-SMP	0.04	0.03	0.21	0.17	0.17	0.11	0.14					0.02	0.19	0.16	0.41	0.36			
D-6-SED-SMP	0.06	0.14	0.99	0.19	0.65	0.22	0.40					0.02	0.06	0.06	0.19	0.19			
E-1-SED-SMP	4.06E-03	0.38	1.03	1.33	1.24	0.51	0.47					0.04	0.41	0.25	0.46	0.59			
E-2-SED-SMP	3.59E-03	0.14	0.48	0.79	0.38	0.33	0.21					0.02	0.33	0.21	0.41	0.50			
E-3-SED-SMP	0.01	0.06	0.14	0.41	0.21	0.34	0.28					0.16	0.81	0.86	2.06	1.81			
E-4-SED-SMP	5.05E-03	0.13	0.37	0.70	0.44	0.38	0.21					0.02	0.20	0.14	0.29	0.34			
F-1-SED-SMP	0.06	0.10	0.39	0.87	0.27	0.22	0.47					0.07	0.56	0.56	1.13	1.25			
F-2-SED-SMP	0.02	1.05	2.82	2.62	0.77	1.28	2.40					0.12	1.06	0.60	1.50	2.06			
F-3-SED-SMP	4.43E-03	0.13	0.64	1.44	0.55	0.46	0.92					2.20	1.47	2.91	6.88	6.06			
Reference	0.16	0.62	2.45	0.72	1.69	0.72	0.71					0.66	0.52	0.30	0.12	0.14			

Hazard Quotients calculated as sediment concentration/benchmark.

See Appendix A-1 for sediment concentrations.

1 - Benchmarks from Table 3.3-1.

2 - Sum of High Molecular Weight PAHs - Benzo(a)anthracene, Benzo(a)pyrene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, and Perylene; Perylene not available for reference.

3 - Sum of Low Molecular Weight PAHs - 2-Methylnaphthalene, Acenaphthene, Acenaphthylene, Anthracene, Fluorene, Naphthalene, and Phenanthrene.

4 - Total PCBs = Sum of Congeners x 2.

5 - 2,3,7,8-TCDD equivalent concentration for prediction of impacts on fish; WHO, 1998.

Appendix D-1-2. Hazard Quotients of CoCs in sediments for the Raymark Phase III Ecological Risk Assessment Investigation. Benchmark = NOAA ER-M.

	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	HMW PAHs[2]	Indeno(1,2,3-cd)pyrene	LMW PAHs[3]	Perylene	Phenanthrene	Pyrene	Sum PAHs	Total PCBs[4]	o,p'-DDE	p,p'-DDD	p,p'-DDE	p,p'-DDT	Dioxin-Fish[5]
ER-M[1]	2600	260	5100	540	9600		3160		1500	2600	44792	180	27.00	27.00	27.00	27.00	100.0
C-1-SED-SMP	0.04	0.07	0.04	9.26E-03	0.07		0.06		0.06	0.08	0.03	0.21	0.01	0.01	0.01	0.01	0.04
C-2-SED-SMP	0.14	0.22	0.13	0.06	0.20		0.22		0.27	0.26	0.11	0.88	0.02	0.14	0.02	0.02	0.12
C-3-SED-SMP	0.06	0.11	0.06	0.02	0.10		0.09		0.09	0.14	0.05	0.34	0.02	0.02	0.02	0.02	0.09
D-1-SED-SMP	2.86E-03	3.85E-03	3.33E-03	1.85E-03	5.83E-03		6.96E-03		8.00E-03	6.92E-03	2.99E-03	0.11	0.01	0.01	0.01	0.01	0.02
D-2-SED-SMP	0.04	0.05	0.04	7.41E-03	0.10		0.05		0.06	0.07	0.04	0.20	0.02	0.02	0.02	0.02	0.03
D-3-SED-SMP	1.64	2.65	2.35	0.89	2.97		4.72		7.33	4.62	1.65	0.24	0.01	0.01	0.01	0.01	0.23
D-4-SED-SMP	0.17	0.28	0.18	0.10	0.26		0.38		0.51	0.35	0.15	1.04	0.02	0.14	0.02	0.02	0.12
D-5-SED-SMP	0.21	0.38	0.22	0.03	0.33		0.18		0.13	0.42	0.16	28.08	0.02	0.74	0.02	0.02	2.23
D-6-SED-SMP	0.10	0.17	0.08	0.01	0.15		0.11		0.10	0.19	0.08	0.31	0.01	0.07	0.01	0.01	0.05
E-1-SED-SMP	0.35	0.65	0.31	0.05	0.48		0.54		0.65	0.65	0.28	232	0.05	0.05	0.05	0.05	2.03
E-2-SED-SMP	0.39	0.65	0.33	0.02	0.48		0.46		0.58	0.62	0.28	4.92	0.15	0.85	0.15	0.15	0.29
E-3-SED-SMP	1.18	1.77	1.22	0.26	1.75		1.35		1.67	2.38	0.88	0.51	0.03	0.03	0.15	0.03	0.14
E-4-SED-SMP	0.27	0.46	0.24	0.01	0.33		0.29		0.37	0.42	0.20	2.18	0.11	0.89	0.11	0.11	0.32
F-1-SED-SMP	0.64	1.23	0.63	0.14	0.99		0.85		1.00	1.27	0.53	1.28	0.27	1.33	0.03	0.16	0.12
F-2-SED-SMP	1.00	2.46	1.12	0.12	1.62		1.22		1.40	2.15	0.95	5.11	0.10	2.59	1.11	0.89	0.36
F-3-SED-SMP	3.11	5.77	4.12	1.70	5.66		4.51		5.20	6.54	2.84	4.17	0.13	4.44	3.67	0.13	0.15
Reference	0.06	1.27	0.06	0.61	0.14		0.66		0.08	0.16	0.16	0.42					0.08

Hazard Quotients calculated as sediment concentration/benchmark.

See Appendix A-1 for sediment concentrations.

1 - Benchmarks from Table 3.3-1.

2 - Sum of High Molecular Weight PAHs - Benzo(a)anthracene, Benzo(a)pyrene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, and Perylene; Perylene not available for reference.

3 - Sum of Low Molecular Weight PAHs - 2-Methylnaphthalene, Acenaphthene, Acenaphthylene, Anthracene, Fluorene, Naphthalene, and Phenanthrene.

4 - Total PCBs = Sum of Congeners x 2.

5 - 2,3,7,8-TCDD equivalent concentration for prediction of impacts on fish; WHO, 1998.

Appendix D-2-1a. Equilibrium-partitioning calculated concentrations of organic contaminants in sediment porewaters from the Raymark Phase III Ecological Risk Assessment Investigation[1].

	1,6,7-Trimethylnaphthalene	1-Methylnaphthalene	1-Methylphenanthrene	2,6-Dimethylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b+k)fluoranthene	Benzo(e)pyrene	Benzo(g,h,i)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	HMW PAHs[3]
$Log_{10}Koc$[2]		3.90	4.99	4.53	3.85	3.98	4.47	5.60	6.01	6.09	6.01	6.59	5.60	6.58	5.03	4.14	
C-1		0.04	0.02	9.04E-03	0.04	0.18	0.09	0.02	9.10E-03	0.01	7.43E-03	1.81E-03	0.02	3.67E-04	0.14	0.03	0.20
C-2		0.04	0.02	0.01	0.10	0.25	0.13	0.03	0.01	0.02	9.85E-03	2.17E-03	0.03	4.96E-04	0.19	0.07	0.27
C-3		0.02	5.44E-03	5.02E-03	0.02	0.08	0.05	0.01	4.57E-03	6.08E-03	3.85E-03	8.85E-04	0.01	1.81E-04	0.07	0.02	0.10
D-1		7.36E-03	5.97E-04	1.73E-03	8.24E-03	6.14E-03	5.94E-03	1.32E-03	4.06E-04	6.62E-04	4.06E-04	9.15E-05	1.17E-03	1.56E-05	9.26E-03	4.27E-03	0.01
D-2		5.52E-03	4.18E-03	1.30E-03	0.01	0.06	0.04	9.53E-03	2.87E-03	4.02E-03	2.14E-03	4.96E-04	8.06E-03	1.09E-04	0.05	8.55E-03	0.09
D-3		0.48	0.21	0.14	2.52	2.77	3.70	0.70	0.22	0.30	0.16	0.04	0.57	9.15E-03	5.56	1.74	7.12
D-4		0.04	0.02	9.51E-03	0.31	0.14	0.20	0.04	0.01	0.02	0.01	2.52E-03	0.03	5.77E-04	0.25	0.12	0.34
D-5		0.12	0.03	0.02	0.12	0.89	0.43	0.12	0.04	0.05	0.03	6.11E-03	0.10	1.89E-03	0.73	0.09	1.00
D-6		0.07	0.01	0.03	0.08	0.33	0.20	0.05	0.02	0.03	0.01	3.11E-03	0.04	7.78E-04	0.25	0.04	0.37
E-1		0.04	9.49E-03	7.27E-03	0.03	0.29	0.10	0.02	0.01	0.02	8.69E-03	2.12E-03	0.03	4.85E-04	0.16	0.02	0.22
E-2		0.02	4.66E-03	1.04E-03	4.95E-03	0.08	0.03	5.81E-03	2.79E-03	5.77E-03	3.41E-03	8.15E-04	9.69E-03	1.59E-04	0.06	2.57E-03	0.07
E-3		0.04	0.04	9.65E-03	0.16	0.78	0.46	0.12	0.04	0.06	0.03	7.04E-03	0.12	1.74E-03	0.82	0.15	1.11
E-4		9.67E-03	3.83E-03	1.00E-03	4.78E-03	0.06	0.02	5.21E-03	2.42E-03	5.33E-03	3.27E-03	7.30E-04	8.50E-03	1.45E-04	0.05	2.48E-03	0.07
F-1		0.06	0.06	0.02	0.12	0.92	0.51	0.11	0.05	0.06	0.04	8.85E-03	0.11	2.07E-03	0.72	0.14	1.00
F-2		0.05	0.02	0.02	0.06	0.50	0.16	0.04	0.02	0.04	0.02	5.80E-03	0.05	1.19E-03	0.37	0.03	0.49
F-3		0.20	0.03	0.04	1.11	0.71	0.77	0.20	0.07	0.10	0.05	0.01	0.16	2.86E-03	1.40	0.48	1.84
Reference					0.79	0.59	0.19	8.08E-03	3.87E-03	0.01			9.36E-03	1.49E-03	0.05	0.41	0.07

1 - Porewater concentration (µg/L) = sediment concentration/(foc X Koc)(foc=%TOC/100).
2 - See Table 6.1-2 for Koc values.
3 - Sum of High Molecular Weight PAHs - Benzo(a)anthracene, Benzo(a)pyrene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, and Perylene; Perylene not available for reference.
4 - Sum of Low Molecular Weight PAHs - 2-Methylnaphthalene, Acenaphthene, Acenaphthylene, Anthracene, Fluorene, Naphthalene, and Phenanthrene.
5 - Sum of individual PCB congeners x 2; see Appendix D-2-1b.
6 - 2,3,7,8-TCDD equivalent concentration for prediction of impacts on fish; see WHO, 1998.

Appendix D-2-1a. Equilibrium-partitioning calculated concentrations of organic contaminants in sediment porewaters from the Raymark Phase III Ecological Risk Assessment Investigation[1].

	Indeno(1,2,3-cd)pyrene	LMW PAHs[4]	Perylene	Phenanthrene	Pyrene	Sum PAHs	Total PCBs[5]	o,p'-DDE	p,p'-DDD	p,p'-DDE	p,p'-DDT	Dioxin-Fish[6]	Total Organic Carbon %
$Log_{10}Koc$[2]	6.54		5.95	4.47	5.02			6.65	6.00	6.65	6.42	6.88	
C-1	2.17E-03	1.14	5.30E-03	0.25	0.15	1.14	2.48E-03	6.70E-06	2.98E-05	6.70E-06	1.13E-05	4.34E-05	1.30
C-2	2.72E-03	1.48	3.35E-03	0.45	0.21	1.67	1.84E-03	4.01E-06	1.24E-04	4.01E-06	6.76E-06	5.01E-05	3.10
C-3	1.06E-03	0.64	1.73E-03	0.11	0.09	0.56	1.08E-03	3.31E-06	1.47E-05	3.31E-06	5.57E-06	2.94E-05	4.10
D-1	1.02E-04	0.14	9.29E-04	0.02	0.01	0.10	1.60E-03	5.32E-06	2.37E-05	5.32E-06	8.96E-06	1.73E-05	1.70
D-2	6.06E-04	0.36	0.01	0.08	0.05	0.37	1.30E-03	4.33E-06	1.93E-05	4.33E-06	7.28E-06	9.91E-06	3.40
D-3	0.05	35.34	0.07	18.51	5.69	45.65	1.53E-03	3.68E-06	1.64E-05	3.68E-06	6.19E-06	1.54E-04	2.00
D-4	3.24E-03	2.08	3.65E-03	0.76	0.25	2.32	3.37E-03	3.66E-06	1.10E-04	3.66E-06	6.16E-06	4.68E-05	3.40
D-5	8.29E-03	3.12	9.67E-03	0.48	0.74	4.33	0.89	6.71E-06	1.44E-03	6.71E-06	1.13E-05	2.09E-03	1.40
D-6	4.06E-03	1.85	6.55E-03	0.34	0.31	1.99	2.80E-03	6.03E-06	1.21E-04	6.03E-06	1.02E-05	4.08E-05	1.50
E-1	2.68E-03	1.31	2.06E-03	0.35	0.17	1.36	0.82	3.04E-06	1.35E-05	3.04E-06	5.12E-06	2.87E-04	9.30
E-2	1.03E-03	0.35	6.38E-04	0.10	0.05	0.40	2.68E-03	3.28E-06	8.19E-05	3.28E-06	5.52E-06	1.37E-05	28.30
E-3	9.95E-03	3.09	0.01	1.20	0.84	5.11	9.66E-04	2.91E-06	1.30E-05	1.29E-05	4.90E-06	2.65E-05	7.00
E-4	9.37E-04	0.28	5.64E-04	0.08	0.05	0.33	1.68E-03	3.14E-06	1.10E-04	3.14E-06	5.28E-06	1.93E-05	22.00
F-1	0.01	3.79	0.01	1.23	0.76	5.16	1.96E-03	4.03E-05	8.85E-04	4.97E-06	3.90E-05	3.88E-05	4.10
F-2	7.31E-03	2.02	5.37E-03	0.49	0.37	2.37	2.97E-03	4.27E-06	4.93E-04	4.75E-05	6.39E-05	3.22E-05	14.30
F-3	0.02	5.61	0.02	1.89	1.16	8.84	3.35E-03	5.86E-06	8.70E-04	1.61E-04	9.86E-06	1.45E-05	13.90
Reference	5.45E-04	5.55		0.07	0.07	2.90	1.08E-03					1.70E-05	5.86

1 - Porewater concentration (µg/L) = sediment concentration/(foc X Koc)(foc=%TOC/100).

2 - See Table 6.1-2 for Koc values.

3 - Sum of High Molecular Weight PAHs - Benzo(a)anthracene, Benzo(a)pyrene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, and Perylene; Perylene not available for reference.

4 - Sum of Low Molecular Weight PAHs - 2-Methylnaphthalene, Acenaphthene, Acenaphthylene, Anthracene, Fluorene, Naphthalene, and Phenanthrene.

5 - Sum of individual PCB congeners x 2; see Appendix D-2-1b.

6 - 2,3,7,8-TCDD equivalent concentration for prediction of impacts on fish; see WHO, 1998.

Appendix D-2-1b. Equilibrium-partitioning calculated concentrations of PCB congener in sediment porewaters from the Raymark Phase III Ecological Risk Assessment Investigation[1].

PCB Congeners

Analyte	$Log_{10}Koc$[2]	C-1-PW	C-2-PW	C-3-PW	D-1-PW	D-2-PW	D-3-PW	D-4-PW	D-5-PW	D-6-PW	D-6-FD	E-1-PW	E-2-PW	E-3-PW	E-4-PW	F-1-PW	F-2-PW	F-3-PW	Reference
PCB003	4.61	3.07E-04	1.84E-04	1.52E-04	2.44E-04	1.98E-04	1.69E-04	1.68E-04	0.24	2.77E-04	2.04E-04	0.02	1.50E-04	1.33E-04	1.44E-04	2.28E-04	1.96E-04	2.69E-04	3.35e-05
PCB008	4.98	2.09E-04	1.25E-04	1.03E-04	1.66E-04	1.35E-04	1.15E-04	1.14E-04	0.01	1.88E-04	1.39E-04	0.23	1.02E-04	9.06E-05	9.79E-05	1.55E-04	1.33E-04	1.83E-04	1.89e-04
PCB015	5.21	7.90E-05	4.73E-05	3.90E-05	6.28E-05	5.10E-05	4.33E-05	1.96E-04	7.81E-03	2.31E-04	5.24E-05	0.05	2.64E-04	3.43E-05	3.70E-05	5.86E-05	5.04E-05	6.91E-05	2.64e-04
PCB018	5.15	9.26E-05	5.55E-05	4.57E-05	7.35E-05	5.98E-05	5.08E-05	5.06E-05	4.58E-03	8.33E-05	6.14E-05	2.02E-03	4.53E-05	4.02E-05	4.33E-05	6.86E-05	5.90E-05	8.09E-05	
PCB028	5.57	6.59E-05	3.95E-05	3.26E-05	5.24E-05	4.26E-05	3.62E-05	2.95E-04	0.04	5.94E-05	4.37E-05	0.02	1.49E-04	2.86E-05	1.52E-04	4.89E-05	4.20E-05	4.00E-04	
PCB029	5.51	8.65E-05	5.18E-05	4.27E-05	6.87E-05	5.58E-05	4.75E-05	4.72E-05	4.28E-03	7.79E-05	5.74E-05	1.88E-03	4.23E-05	3.75E-05	4.05E-05	6.41E-05	5.51E-05	7.56E-05	
PCB044	5.65	5.38E-05	3.22E-05	2.68E-05	4.27E-05	3.47E-05	2.95E-05	1.92E-04	0.13	2.78E-04	3.57E-05	0.04	1.48E-04	2.33E-05	7.92E-05	3.99E-05	3.43E-05	4.70E-05	
PCB050	5.53	2.38E-05	1.43E-05	1.18E-05	1.89E-05	1.54E-05	1.17E-04	1.94E-04	1.18E-03	2.14E-05	5.45E-06	0.02	1.53E-04	1.03E-05	1.17E-04	1.76E-05	3.04E-05	2.08E-05	
PCB052	5.74	1.94E-05	1.16E-05	9.59E-06	1.54E-05	1.25E-05	1.07E-05	1.08E-05	9.60E-04	1.75E-05	1.29E-05	4.79E-03	4.63E-05	8.43E-06	9.09E-06	1.44E-05	1.24E-05	4.43E-05	
PCB066	6.09	1.93E-04	1.67E-04	7.83E-06	1.26E-05	1.02E-05	8.69E-06	2.87E-04	6.11E-03	1.43E-05	1.05E-05	0.02	1.00E-04	6.88E-06	4.38E-05	1.17E-05	8.36E-04	6.16E-05	
PCB087	6.18	2.12E-05	4.31E-05	1.56E-05	6.83E-06	5.55E-06	1.74E-05	2.22E-05	4.25E-04	3.29E-05	5.70E-06	1.75E-03	3.69E-05	3.73E-06	2.11E-05	9.20E-05	5.68E-05	2.05E-04	2.67e-05
PCB101	6.27	1.77E-05	1.37E-05	3.46E-06	5.57E-06	4.53E-06	6.04E-05	2.44E-05	2.03E-03	6.31E-06	4.65E-06	4.07E-03	3.01E-05	3.04E-06	1.51E-05	5.20E-06	3.97E-05	5.62E-05	1.09e-06
PCB105	6.54	4.99E-06	1.31E-05	1.32E-05	3.97E-06	3.22E-06	2.74E-06	6.45E-06	2.47E-04	4.50E-06	3.31E-06	2.54E-04	2.44E-06	2.17E-06	2.34E-06	3.70E-06	1.10E-05	2.18E-05	4.44e-05
PCB114	6.54	7.01E-06	4.20E-06	3.46E-06	5.57E-06	4.53E-06	3.85E-06	3.83E-06	3.47E-04	6.31E-06	4.65E-06	1.32E-03	3.43E-06	3.04E-06	3.28E-06	5.20E-06	4.47E-06	6.13E-06	1.29e-06
PCB118	6.63	1.40E-05	1.37E-05	2.83E-06	4.54E-06	3.69E-06	1.64E-05	2.33E-05	2.07E-03	1.80E-05	3.79E-06	3.95E-03	2.87E-05	1.60E-05	1.32E-05	4.33E-05	2.84E-05	2.78E-05	2.47e-07
PCB123	6.63	1.33E-05	2.39E-05	2.31E-06	3.71E-06	3.01E-06	8.66E-06	2.32E-05	1.69E-03	2.31E-05	3.09E-06	2.54E-03	2.06E-05	1.89E-05	8.59E-06	2.19E-05	2.53E-05	5.10E-05	
PCB126	6.77																		2.09e-06
PCB128	6.63																		5.84e-07
PCB138	6.71																		
PCB153	6.80																		
PCB156/157	7.06																		
PCB167	7.15																		
PCB169	7.29	2.11E-06	2.76E-05	1.04E-06	1.68E-06	1.36E-06	1.03E-05	1.15E-06	1.04E-04	1.90E-06	1.40E-06	3.07E-04	1.03E-06	9.17E-07	9.89E-07	1.57E-06	1.35E-06	1.85E-06	2.19e-06
PCB170	7.15	1.07E-05	1.39E-05	1.14E-05	1.37E-06	1.11E-06	9.46E-07	1.54E-05	2.04E-04	1.51E-05	1.60E-05	2.06E-04	4.32E-06	7.48E-07	3.17E-06	2.41E-05	2.40E-05	1.51E-06	6.16e-06
PCB180	7.24	1.03E-05	1.85E-05	1.07E-05	2.10E-06	1.71E-06	1.45E-06	1.34E-05	1.31E-04	1.91E-05	1.12E-05	1.44E-04	4.11E-06	1.66E-05	3.94E-06	3.49E-05	2.50E-05	1.87E-05	
PCB187	7.05	5.85E-06	1.02E-05	2.89E-06	4.65E-06	3.78E-06	1.38E-05	1.10E-05	2.89E-04	1.58E-05	1.06E-05	4.46E-04	2.86E-06	2.54E-06	2.74E-06	2.79E-05	1.52E-05	2.84E-05	
PCB188	6.70	1.10E-06	5.01E-06	5.42E-07	8.71E-07	7.07E-07	6.01E-07	5.99E-07	5.42E-05	2.71E-06	2.64E-06	2.39E-05	5.36E-07	4.76E-07	5.13E-07	4.06E-06	1.40E-06	9.58E-07	
PCB189	7.58	2.11E-06	1.27E-06	1.04E-06	1.68E-06	1.36E-06	1.16E-06	1.15E-06	1.04E-04	1.90E-06	1.40E-06	4.60E-05	1.03E-06	9.17E-07	9.89E-07	1.57E-06	1.35E-06	1.85E-06	
PCB195	7.43	3.30E-07	3.60E-06	1.63E-07	2.62E-07	2.13E-07	1.81E-07	6.56E-06	1.63E-05	2.97E-06	2.03E-06	7.19E-06	6.30E-07	1.43E-07	1.55E-07	8.16E-06	2.42E-06	1.20E-06	
PCB200	7.15	2.69E-07	1.91E-06	1.33E-07	2.14E-07	8.02E-07	1.48E-07	1.47E-07	1.33E-05	2.43E-07	1.79E-07	5.87E-06	1.32E-07	1.17E-07	1.26E-07	2.00E-07	1.72E-07	2.36E-07	2.02e-07
PCB206	7.95	1.24E-03	9.22E-04	5.40E-04	8.00E-04	6.51E-04	7.65E-04	1.69E-03	0.45	1.40E-03	7.42E-04	0.41	1.34E-03	4.83E-04	8.39E-04	9.80E-04	1.49E-03	1.67E-03	5.38E-04
PCB209	8.04	2.48E-03	1.84E-03	1.08E-03	1.60E-03	1.30E-03	1.53E-03	3.37E-03	0.89	2.80E-03	1.48E-03	0.82	2.68E-03	9.66E-04	1.68E-03	1.96E-03	2.97E-03	3.35E-03	1.08E-03
Sum of PCB Congeners		1.30	3.10	4.10	1.70	3.40	2.00	3.40	1.40	1.50	2.90	9.30	29.30	7.00	22.00	4.10	14.30	13.90	5.86
Sum of PCB Congeners X 2																			
TOC																			

Units: =µg/L.

1 - Porewater concentration (µg/L) = sediment concentration/(foc X K_{OC}). The foc = %TOC/100; sediment PCB congener concentrations reported in Appendix A-1.

2 - See Table 6.1-2 for Koc values.

Appendix D-2-2. Hazard Quotients measured/calculated for CoCs in sediment porewaters for the Raymark Phase III Ecological Risk Assessment Investigation[1].
Benchmark = EPA Ambient Water Quality Criteria - Saltwater Chronic (WQC-SC) value.

	Cadmium	Chromium	Copper	Lead	Nickel	Zinc	1,6,7-Trimethylnaphthalene	1-Methylnaphthalene	1-Methylphenanthrene	2,6-Dimethylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b+k)fluoranthene	Benzo(e)pyrene
WQC-SC[2]	9.30	50.00	3.10	8.10	8.20	81.00											
C-1	0.01	0.08	0.40	0.18	0.49	0.02					18.21	0.46	0.29	0.07	0.04		
C-2	0.01	0.19	0.40	0.18	0.49	0.07					2.37E-03	0.40	0.32	0.36	0.21		
C-3	0.01	0.04	0.40	0.41	0.49	0.16					5.46E-03	0.54	0.45	0.48	0.29		
D-1	0.01	8.00E-03	0.40	0.40	0.49	0.22					1.13E-03	0.17	0.18	0.21	0.11		
D-2	0.01	0.03	0.94	0.18	0.49	0.02					4.52E-04	0.01	0.02	0.02	9.58E-03		
D-3	0.04	8.00E-03	3.61	0.46	0.49	0.40					6.79E-04	0.12	0.13	0.15	0.07		
D-4	0.01	0.05	0.40	0.18	0.49	0.11					0.14	6.02	12.90	10.73	5.12		
D-5	0.01	0.03	0.40	0.18	0.49	0.08					0.02	0.30	0.69	0.55	0.33		
D-6	0.01	0.02	0.40	0.18	0.49	0.05					6.59E-03	1.95	1.51	1.81	0.95		
E-1	0.01	0.08	6.71	0.18	0.49	0.02					4.62E-03	0.73	0.68	0.79	0.47		
E-2	0.01	0.27	4.97	4.27	0.49	0.02					1.74E-03	0.64	0.34	0.30	0.24		
E-3	0.01	0.02	.1.65	0.18	1.01	0.10					2.72E-04	0.17	0.10	0.09	0.07		
E-4	0.01	0.07	0.94	0.46	1.21	0.14					8.68E-03	1.69	1.59	1.81	0.96		
F-1	0.01	0.03	0.40	0.18	0.49	0.12					2.62E-04	0.13	0.08	0.08	0.06		
F-2	0.01	0.07	1.90	0.18	0.49	0.36					6.57E-03	2.00	1.77	1.68	1.13		
F-3	0.01	0.01	0.40	0.18	0.49	0.08					3.17E-03	1.08	0.54	0.64	0.54		
Reference	0.02	0.03	17.74	0.19	3.90	5.18					0.06	1.54	2.70	3.03	1.62		
											0.04	1.28	0.66	0.12	0.09		

Metals-measured; Organics-calculated.

1 - Hazard Quotients calculated as porewater concentration (Appendix D-2-1 for organics and A-2 for metals)/WQSV (Table 6.1-3).

2 - Water Quality Criteria-Saltwater Chronic; see Table 6.1-3.

3 - Sum of High Molecular Weight PAHs - Benzo(a)anthracene, Benzo(a)pyrene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, and Perylene; Perylene not available for reference.

4 - Sum of Low Molecular Weight PAHs - 2-Methylnaphthalene, Acenaphthene, Acenaphthylene, Anthracene, Fluorene, Naphthalene, and Phenanthrene.

5 - Sum of individual PCB congeners x 2.

6 - 2,3,7,8-TCDD equivalent concentration for prediction of impacts on fish; see WHO, 1998.

Appendix D-2-2. Hazard Quotients measured/calculated for CoCs in sediment porewaters for the Raymark Phase III Ecological Risk Assessment Investigation[1].
Benchmark = EPA Ambient Water Quality Criteria - Saltwater Chronic (WQC-SC) value.

	Benzo(g,h,i)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	HMW PAHs[3]	Indeno(1,2,3-cd)pyrene	LMW PAHs[4]	Perylene	Phenanthrene	Pyrene	Sum PAHs	Total PCBs[5]	o,p'-DDE	p,p'-DDD	p,p'-DDE	p,p'-DDT	Dioxin-Fish[6]
WQC-SC[2]		0.10	1.68E-03	5.74	0.14	0.29		5.76		6.06	0.63	5.32	0.03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03
C-1		0.24	0.22	0.02	0.20	0.69		0.20		0.04	0.23	0.21	0.08	6.70E-03	0.03	6.70E-03	0.01	0.04
C-2		0.32	0.30	0.03	0.51	0.95		0.26		0.07	0.33	0.31	0.06	4.01E-03	0.12	4.01E-03	6.76E-03	0.05
C-3		0.11	0.11	0.01	0.13	0.35		0.11		0.02	0.14	0.11	0.04	3.31E-03	0.01	3.31E-03	5.57E-03	0.03
D-1		0.01	9.28E-03	1.61E-03	0.03	0.05		0.02		3.92E-03	0.02	0.02	0.05	5.32E-03	0.02	5.32E-03	8.96E-03	0.02
D-2		0.08	0.06	9.49E-03	0.06	0.31		0.06		0.01	0.08	0.07	0.04	4.33E-03	0.02	4.33E-03	7.28E-03	9.91E-03
D-3		5.99	5.44	0.97	12.63	24.98		6.13		3.05	9.02	8.58	0.05	3.68E-03	0.02	3.68E-03	6.19E-03	0.15
D-4		0.36	0.34	0.04	0.84	1.18		0.38		0.13	0.40	0.44	0.11	3.66E-03	0.11	3.66E-03	6.16E-03	0.05
D-5		1.08	1.13	0.13	0.68	3.51		0.54		0.08	1.18	0.81	29.75	6.71E-03	1.44	6.71E-03	0.01	2.09
D-6		0.47	0.46	0.04	0.28	1.30		0.32		0.06	0.49	0.37	0.09	6.03E-03	0.12	6.03E-03	0.01	0.04
E-1		0.27	0.29	0.03	0.16	0.76		0.23		0.06	0.27	0.26	27.44	3.04E-03	0.01	3.04E-03	5.12E-03	0.29
E-2		0.10	0.09	9.69E-03	0.02	0.26		0.06		0.02	0.09	0.08	0.09	3.28E-03	0.08	3.28E-03	5.52E-03	0.01
E-3		1.23	1.04	0.14	1.05	3.89		0.54		0.20	1.33	0.96	0.03	2.91E-03	0.01	0.01	4.90E-03	0.03
E-4		0.09	0.09	8.80E-03	0.02	0.24		0.05		0.01	0.08	0.06	0.06	3.14E-03	0.11	3.14E-03	5.28E-03	0.02
F-1		1.14	1.23	0.13	1.00	3.52		0.66		0.20	1.21	0.97	0.07	0.04	0.68	4.97E-03	0.04	0.04
F-2		0.51	0.71	0.06	0.24	1.72		0.35		0.08	0.59	0.45	0.10	4.27E-03	0.49	0.05	0.06	0.03
F-3		1.63	1.70	0.24	3.48	6.47		0.97		0.31	1.84	1.86	0.11	5.86E-03	0.87	0.16	9.86E-03	0.01
Reference		0.10	0.89	9.09E-03	2.96	0.26		0.96		0.01	0.11	0.55	0.04					0.02

Metals-measured; Organics-calculated.

1 - Hazard Quotients calculated as porewater concentration (Appendix D-2-1 for organics and A-2 for metals)/WQSV (Table 6.1-3).

2 - Water Quality Criteria-Saltwater Chronic; see Table 6.1-3.

3 - Sum of High Molecular Weight PAHs - Benzo(a)anthracene, Benzo(a)pyrene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, and Perylene; Perylene not available for reference.

4 - Sum of Low Molecular Weight PAHs - 2-Methylnaphthalene, Acenaphthene, Acenaphthylene, Anthracene, Fluorene, Naphthalene, and Phenanthrene.

5 - Sum of individual PCB congeners x 2.

6 - 2,3,7,8-TCDD equivalent concentration for prediction of impacts on fish; see WHO, 1998.

Appendix D-2-3. Hazard Quotients measured/calculated for CoCs in sediment porewaters for the Raymark Phase III Ecological Risk Assessment Investigation [1].
Benchmark = EPA Ambient Water Quality Criteria - Saltwater Acute (WQC-SA) value.

	Cadmium	Chromium	Copper	Lead	Nickel	Zinc	1,6,7-Trimethylnaphthalene	1-Methylnaphthalene	1-Methylphenanthrene	2,6-Dimethylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b+k)fluoranthene	Benzo(e)pyrene	Benzo(g,h,i)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene
WQC-SA[2]	42.00	1100	4.80	210	74.00	90.00					148	3.67	2.30	0.52	0.34				0.77	0.01	45.95
C-1	2.38E-03	3.45E-03	0.26	6.90E-03	0.05	0.02					2.95E-04	0.05	0.04	0.06	0.03				0.03	0.03	2.95E-03
C-2	2.38E-03	8.45E-03	0.26	6.90E-03	0.05	0.06					6.81E-04	0.07	0.06	0.06	0.04				0.04	0.04	4.23E-03
C-3	2.38E-03	1.82E-03	0.26	0.02	0.05	0.14					1.40E-04	0.02	0.02	0.03	0.01				0.01	0.01	1.52E-03
D-1	2.38E-03	3.64E-04	0.26	0.02	0.05	0.20					5.64E-05	1.67E-03	2.59E-03	2.54E-03	1.20E-03				1.53E-03	1.16E-03	2.02E-04
D-2	2.38E-03	1.38E-03	0.60	6.90E-03	0.05	0.02					8.47E-05	0.02	0.02	0.02	8.46E-03				0.01	8.12E-03	1.19E-03
D-3	9.29E-03	3.64E-04	2.33	0.02	0.05	0.36					0.02	0.75	1.61	1.34	0.64				0.75	0.68	0.12
D-4[1]	2.38E-03	2.27E-03	0.26	6.90E-03	0.05	0.10					2.14E-03	0.04	0.09	0.07	0.04				0.04	0.04	5.40E-03
D-5	2.38E-03	1.27E-03	0.26	6.90E-03	0.05	0.08					8.22E-04	0.24	0.19	0.23	0.12				0.13	0.14	0.02
D-6	2.38E-03	9.09E-04	0.26	6.90E-03	0.05	0.05					5.78E-04	0.09	0.08	0.10	0.06				0.08	0.06	5.38E-03
E-1	2.38E-03	2.64E-03	4.33	6.90E-03	0.05	0.02					2.17E-04	0.08	0.04	0.04	0.03				0.03	0.04	3.47E-03
E-2	2.38E-03	0.01	3.21	0.16	0.05	0.02					3.39E-06	0.02	0.01	0.01	8.22E-03				0.01	0.01	1.21E-03
E-3	2.38E-03	9.09E-04	1.06	6.90E-03	0.11	0.09					1.08E-03	0.21	0.20	0.23	0.12				0.15	0.13	0.02
E-4	2.38E-03	3.09E-03	0.60	0.02	0.13	0.13					3.27E-06	0.02	9.99E-03	0.01	7.14E-03				0.01	0.01	1.10E-03
F-1	2.38E-03	1.36E-03	0.26	6.90E-03	0.05	0.10					8.19E-04	0.25	0.22	0.21	0.14				0.14	0.15	0.02
F-2	2.38E-03	3.18E-03	1.23	6.90E-03	0.05	0.32					3.96E-04	0.14	0.07	0.08	0.07				0.06	0.09	8.04E-03
F-3	2.38E-03	5.45E-04	0.26	6.90E-03	0.05	0.05					7.59E-03	0.19	0.34	0.38	0.20				0.20	0.21	0.03
Reference	4.05E-03	1.54E-03	11.46	7.43E-03	0.43	4.67					5.40E-03	0.16	0.08	0.02	0.01				0.01	0.11	1.14E-03

Metals-measured; Organics-calculated.

1 - Hazard Quotients calculated as porewater concentration (Appendix D-2-1 for organics and A-2 for metals)/WQC-SA (Table 6.1-3).

2 - Water Quality Criteria-Saltwater Acute (Table 6.1-3); a value of 8 times the WQSV was used where WQC-SA values were not available.

3 - Sum of High Molecular Weight PAHs - Benzo(a)anthracene, Benzo(a)pyrene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, and Perylene; Perylene not available for reference.

4 - Sum of Low Molecular Weight PAHs - 2-Methylnaphthalene, Acenaphthene, Acenaphthylene, Anthracene, Fluorene, Naphthalene, and Phenanthrene.

5 - Sum of individual PCB congeners x 2.

6 - 2,3,7,8-TCDD equivalent concentration for prediction of impacts on fish; see WHO, 1998.

Appendix D-2-3. Hazard Quotients measured/calculated for CoCs in sediment porewaters for the Raymark Phase III Ecological Risk Assessment Investigation[1].
Benchmark = EPA Ambient Water Quality Criteria - Saltwater Acute (WQC-SA) value.

	Fluorene	HMW PAHs[3]	Indeno(1,2,3-cd)pyrene	LMW PAHs[4]	Perylene	Phenanthrene	Pyrene	Sum PAHs	Total PCBs[5]	o,p'-DDE	p,p'-DDD	p,p'-DDE	p,p'-DDT	Dioxin-Fish[6]
WQC-SA[2]	1.10	2.28		46.09		48.47	5.04	42.57	10.00	0.13	0.13	0.13	0.13	8.00E-03
C-1	0.03	0.09		0.02		5.13E-03	0.03	0.03	2.48E-04	5.15E-05	2.30E-04	5.15E-05	8.88E-05	5.43E-03
C-2	0.06	0.12		0.03		9.18E-03	0.04	0.04	1.84E-04	3.09E-05	9.50E-04	3.09E-05	5.20E-05	8.27E-03
C-3	0.02	0.04		0.01		2.20E-03	0.02	0.01	1.06E-04	2.55E-05	1.13E-04	2.55E-05	4.29E-05	3.87E-03
D-1	3.87E-03	5.75E-03		3.11E-03		4.90E-04	1.99E-03	2.29E-03	1.60E-04	4.10E-05	1.82E-04	4.10E-05	6.90E-05	2.16E-03
D-2	7.74E-03	0.04		7.77E-03		1.70E-03	9.95E-03	8.80E-03	1.30E-04	3.33E-05	1.48E-04	3.33E-05	5.60E-05	1.24E-03
D-3	1.58	3.12		0.77		0.38	1.13	1.07	1.53E-04	2.83E-05	1.26E-04	2.83E-05	4.76E-05	0.02
D-4	0.10	0.15		0.05		0.02	0.05	0.05	3.37E-04	2.82E-05	8.44E-04	2.82E-05	4.74E-05	5.86E-03
D-5	0.08	0.44		0.07		9.92E-03	0.15	0.10	0.09	5.16E-05	0.01	5.16E-05	8.68E-05	0.26
D-6	0.04	0.16		0.04		6.94E-03	0.06	0.05	2.80E-04	4.64E-05	9.30E-04	4.64E-05	7.81E-05	5.08E-03
E-1	0.02	0.10		0.03		7.32E-03	0.03	0.03	0.08	2.34E-05	1.04E-04	2.34E-05	3.94E-05	0.04
E-2	2.32E-03	0.03		7.68E-03		2.13E-03	0.01	9.41E-03	2.68E-04	2.52E-05	6.30E-04	2.52E-05	4.24E-05	1.71E-03
E-3	0.13	0.49		0.07		0.02	0.17	0.12	9.66E-05	2.24E-05	9.97E-05	9.95E-05	3.77E-05	3.31E-03
E-4	2.24E-03	0.03		5.99E-03		1.74E-03	9.40E-03	7.85E-03	1.68E-04	2.41E-05	8.46E-04	2.41E-05	4.06E-05	2.42E-03
F-1	0.13	0.44		0.08		0.03	0.15	0.12	1.96E-04	3.10E-04	6.81E-03	3.82E-05	3.00E-04	4.84E-03
F-2	0.03	0.21		0.04		0.01	0.07	0.06	2.97E-04	3.29E-05	3.80E-03	3.65E-04	4.92E-04	4.03E-03
F-3	0.44	0.81		0.12		0.04	0.23	0.21	3.35E-04	4.51E-05	6.69E-03	1.24E-03	7.50E-05	1.81E-03
Reference	0.37	0.03		0.12		1.42E-03	0.01	0.07	1.08E-04					2.12E-03

Metals-measured; Organics-calculated.

1 - Hazard Quotients calculated as porewater concentration (Appendix D-2-1 for organics and A-2 for metals)/WQC-SA (Table 6.1-3).

2 - Water Quality Criteria-Saltwater Acute (Table 6.1-3); a value of 8 times the WQSV was used where WQC-SA values were not available.

3 - Sum of High Molecular Weight PAHs - Benzo(a)anthracene, Benzo(a)pyrene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, and Perylene; Perylene not available for reference.

4 - Sum of Low Molecular Weight PAHs - 2-Methylnaphthalene, Acenaphthene, Acenaphthylene, Anthracene, Fluorene, Naphthalene, and Phenanthrene.

5 - Sum of individual PCB congeners x 2.

6 - 2,3,7,8-TCDD equivalent concentration for prediction of impacts on fish; see WHO, 1998.

Appendix D-3-1. Dioxin and Dioxin-Like PCB Congeners in sediments for the Raymark Phase III Ecological Risk Assessment Investigation.

Station	2,3,7,8-TCDF(a)	2,3,7,8-TCDD	1,2,3,7,8-PeCDF	2,3,4,7,8-PeCDF	1,2,3,7,8-PeCDD	1,2,3,4,7,8-HxCDF	1,2,3,6,7,8-HxCDF	2,3,4,6,7,8-HxCDF	1,2,3,7,8,9-HxCDF	1,2,3,4,7,8-HxCDD	1,2,3,6,7,8-HxCDD	1,2,3,7,8,9-HxCDD	1,2,3,4,6,7,8-HpCDF	1,2,3,4,7,8,9-HpCDF	1,2,3,4,6,7,8-HpCDD	1,2,3,4,6,7,8,9-OCDF	1,2,3,4,6,7,8,9-OCDD	PCB077	PCB105	PCB118	PCB126
C-1-SED-SMP	1.05	0.38	1.40	2.46	1.06	2.20	0.74	2.68	0.48	0.90	1.58	1.10	29.44	1.16	37.68	177	560	0.385	0.95	0.97	0.385
C-2-SED-SMP	8.00	0.19	4.12	7.56	2.89	5.68	3.98	7.44	0.85	2.82	5.64	4.04	68.40	4.04	129	390	1540	0.55	4.6	1.8	2.4
C-3-SED-SMP	7.16	0.34	5.28	7.52	0.33	6.80	5.16	9.44	1.25	2.22	2.87	2.67	45.20	4.52	66.00	158	976	0.6	2.2	0.6	3.2
D-1-SED-SMP	0.17	0.49	0.25	0.24	1.29	0.34	0.44	0.30	0.34	0.18	0.22	0.36	4.12	0.29	8.56	37.20	222	0.4	0.4	0.4	0.4
D-2-SED-SMP	1.05	0.62	0.27	0.24	1.40	0.23	0.24	0.29	0.32	0.28	0.72	0.40	2.87	0.24	18.08	12.48	436	0.65	0.65	0.65	0.65
D-3-SED-SMP	9.04	0.45	9.32	12.36	2.90	18.76	9.44	11.60	1.95	4.00	14.16	7.00	612	8.00	161	516	1252	0.325	1.2	5.1	0.325
D-4-SED-SMP	10.16	0.31	6.88	8.18	1.40	13.12	7.40	7.48	0.70	2.58	5.40	1.86	92.00	4.12	109	374	1368	0.55	2.6	3.5	1.3
D-5-SED-SMP	40.80	5.22	208	70.20	8.78	716	376	87.40	8.56	3.92	5.82	3.62	3920	84.00	50.80	3160	430	320	20.5	120	20.5
D-6-SED-SMP	2.14	0.20	1.94	2.98	1.11	2.92	2.36	3.92	0.74	0.42	0.80	1.23	28.20	2.30	30.00	182	514	0.4	1.7	0.4	0.4
D-6-SED-FD	5.64	0.31	6.12	8.12	2.28	10.38	9.12	15.84	2.60	2.54	2.78	2.80	63.60	9.08	50.40	159	758	0.55	0.55	0.55	0.55
E-1-SED-SMP	114	2.05	76.60	212	10.74	290	113	136	40.40	10.60	37.60	16.62	734	84.20	866	2940	7900	170	560	1600	140
E-2-SED-SMP	20.00	0.58	10.54	23.00	5.52	18.52	13.06	17.90	1.93	6.32	13.88	9.24	113	6.40	252	424	3180	4.1	36	36	4.1
E-3-SED-SMP	6.98	0.37	3.24	9.82	2.50	7.58	4.10	8.58	0.70	5.72	6.94	4.22	45.00	2.66	133	141	1230	0.9	0.9	0.9	0.9
E-4-SED-SMP	3.28	0.52	5.06	26.20	6.06	11.84	11.08	22.20	1.93	7.42	23.40	12.16	220	8.60	376	216	8080	3.05	16	14	3.05
F-1-SED-SMP	10.82	0.59	5.54	9.10	1.41	8.52	5.90	7.32	0.70	3.16	6.84	4.68	46.80	2.44	117	119	1554	0.9	13	0.9	0.9
F-2-SED-SMP	21.80	0.63	9.32	25.20	6.66	18.22	12.20	24.40	1.84	9.38	34.40	14.52	143	10.18	630	300	5500	2.7	28	24	9.3
F-3-SED-SMP	12.36	0.43	5.44	14.06	1.71	8.40	5.58	10.24	1.28	3.46	7.76	5.08	44.60	2.34	135	79.80	1254	3.6	98	33	18
Reference	8.05	0.50	1.68	2.78	2.18	2.48	4.80	7.53	1.76	1.02	4.70	4.72	49.90	2.96	72.30	173.00	1330.00	1.7	5.4	11	0.066

Units = ng/kg

Appendix D-3-2. Mammal, Fish, and Bird 2,3,7,8-TCDD Toxicity Equivalent (TEQ) concentrations in sediment for the Raymark Phase III Ecological Risk Assessment Investigation[1].

	2,3,7,8-TCDF(o)	2,3,7,8-TCDD	1,2,3,7,8-PeCDF	2,3,4,7,8-PeCDF	1,2,3,7,8-PeCDD	1,2,3,4,7,8-HxCDF	1,2,3,6,7,8-HxCDF	2,3,4,6,7,8-HxCDF	1,2,3,7,8,9-HxCDF	1,2,3,4,7,8-HxCDD	1,2,3,6,7,8-HxCDD	1,2,3,7,8,9-HxCDD	1,2,3,4,6,7,8-HpCDF	1,2,3,4,7,8,9-HpCDF	1,2,3,4,6,7,8-HpCDD	1,2,3,4,6,7,8,9-OCDF	1,2,3,4,6,7,8,9-OCDD	PCB077	PCB105	PCB118	PCB126	Sum TEQ
TEF-Mammal	0.10	1.00	0.05	0.50	1.00	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.01	0.01	0.01	1.00E-04	1.00E-04	0.0001	0.0001	0.0001	0.1	
C-1-SED-SMP	0.10	0.38	0.07	1.23	1.06	0.22	0.07	0.27	0.05	0.09	0.16	0.11	0.29	0.01	0.38	0.02	0.06	3.85E-05	9.50E-05	9.70E-05	0.04	4.61
C-2-SED-SMP	0.80	0.19	0.21	3.78	2.89	0.57	0.40	0.74	0.08	0.28	0.56	0.40	0.68	0.04	1.29	0.04	0.15	5.50E-05	4.60E-04	1.80E-04	0.24	13.36
C-3-SED-SMP	0.72	0.34	0.26	3.76	0.33	0.68	0.52	0.94	0.13	0.22	0.29	0.27	0.45	0.05	0.66	0.02	0.10	6.00E-05	2.20E-04	6.00E-05	0.32	10.04
D-1-SED-SMP	0.02	0.49	0.01	0.12	1.29	0.03	0.04	0.03	0.03	0.02	0.02	0.04	0.04	2.92E-03	0.09	3.72E-03	0.02	4.00E-05	4.00E-05	4.00E-05	0.04	2.34
D-2-SED-SMP	0.11	0.62	0.01	0.12	1.40	0.02	0.02	0.03	0.03	0.03	0.07	0.04	0.03	2.40E-03	0.16	1.25E-03	0.04	6.50E-05	6.50E-05	6.50E-05	0.07	2.83
D-3-SED-SMP	0.90	0.45	0.47	6.18	2.90	1.88	0.94	1.16	0.19	0.40	1.42	0.70	6.12	0.06	1.61	0.05	0.13	3.25E-05	1.20E-04	5.10E-04	0.03	25.62
D-4-SED-SMP	1.02	0.31	0.34	4.06	1.40	1.31	0.74	0.75	0.07	0.26	0.54	0.19	0.92	0.04	1.09	0.04	0.14	5.50E-05	2.60E-04	3.50E-04	0.13	13.36
D-5-SED-SMP	4.08	5.22	10.40	35.10	8.78	71.60	37.60	8.74	0.86	0.39	0.58	0.36	39.20	0.84	0.51	0.32	0.04	0.03	2.05E-03	0.01	2.05	227
D-6-SED-SMP	0.21	0.20	0.10	1.49	1.11	0.29	0.24	0.39	0.07	0.04	0.08	0.12	0.28	0.02	0.30	0.02	0.05	4.00E-05	1.70E-04	4.00E-05	0.04	5.07
D-6-SED-FD	0.56	0.31	0.31	4.06	2.28	1.04	0.91	1.58	0.26	0.25	0.28	0.28	0.64	0.09	0.50	0.02	0.08	5.50E-05	5.50E-05	5.50E-05	0.06	13.50
E-1-SED-SMP	11.44	2.05	3.83	106	10.74	29.00	11.30	13.56	4.04	1.06	3.78	1.66	7.34	0.84	8.66	0.29	0.79	0.02	0.06	0.16	14.00	231
E-2-SED-SMP	2.00	0.58	0.53	11.50	5.52	1.85	1.31	1.79	0.19	0.63	1.39	0.92	1.13	0.06	2.52	0.04	0.32	4.10E-04	3.60E-03	3.60E-03	0.41	32.70
E-3-SED-SMP	0.70	0.37	0.16	4.91	2.50	0.76	0.41	0.86	0.07	0.57	0.69	0.42	0.45	0.03	1.33	0.01	0.12	9.00E-05	9.00E-05	9.00E-05	0.09	14.46
E-4-SED-SMP	0.33	0.52	0.25	13.10	6.06	1.18	1.11	2.22	0.19	0.74	2.34	1.22	2.20	0.09	3.76	0.02	0.81	3.05E-04	1.60E-03	1.40E-03	0.31	36.44
F-1-SED-SMP	1.08	0.59	0.28	4.55	1.41	0.85	0.59	0.73	0.07	0.32	0.68	0.47	0.47	0.02	1.17	0.01	0.16	9.00E-05	1.30E-03	9.00E-05	0.09	13.54
F-2-SED-SMP	2.18	0.63	0.47	12.60	6.66	1.82	1.22	2.44	0.18	0.94	3.44	1.45	1.43	0.10	6.30	0.03	0.55	2.70E-04	2.80E-03	2.40E-03	0.93	43.38
F-3-SED-SMP	1.24	0.43	0.27	7.03	1.71	0.84	0.56	1.02	0.13	0.35	0.78	0.51	0.45	0.02	1.35	7.98E-03	0.13	3.60E-04	9.80E-03	3.30E-03	1.80	18.63
Reference	0.81	0.50	0.08	1.39	2.18	0.25	0.48	0.75	0.18	0.10	0.47	0.47	0.50	0.03	0.72	0.02	0.13	1.70E-04	5.40E-04	1.10E-03	8.60E-03	9.07
TEF-Fish	0.05	1.00	0.05	0.50	1.00	0.10	0.10	0.10	0.10	0.50	0.01	0.01	0.01	0.01	1.00E-03	1.00E-04	1.00E-04	0.0001	0.000005	0.000005	0.005	
C-1-SED-SMP	0.05	0.38	0.07	1.23	1.06	0.22	0.07	0.27	0.05	0.45	0.02	0.01	0.29	0.01	0.04	0.02	0.06	3.85E-05	4.75E-06	4.85E-06	1.93E-03	4.30
C-2-SED-SMP	0.40	0.19	0.21	3.78	2.89	0.57	0.40	0.74	0.08	1.41	0.06	0.04	0.68	0.04	0.13	0.04	0.15	5.50E-05	2.30E-05	9.00E-06	0.01	11.82
C-3-SED-SMP	0.36	0.34	0.26	3.76	0.33	0.68	0.52	0.94	0.13	1.11	0.03	0.03	0.45	0.05	0.07	0.02	0.10	6.00E-05	1.10E-05	3.00E-06	0.02	9.17
D-1-SED-SMP	8.43E-03	0.49	0.01	0.12	1.29	0.03	0.04	0.03	0.03	0.09	2.24E-03	3.64E-03	0.04	2.92E-03	8.56E-03	3.72E-03	0.02	4.00E-05	2.00E-06	2.00E-06	2.00E-03	2.23
D-2-SED-SMP	0.05	0.62	0.01	0.12	1.40	0.02	0.02	0.03	0.03	0.14	7.20E-03	4.04E-03	0.03	2.40E-03	0.02	1.25E-03	0.04	6.50E-05	3.25E-06	3.25E-06	3.25E-03	2.56
D-3-SED-SMP	0.45	0.45	0.47	6.18	2.90	1.88	0.94	1.16	0.19	2.00	0.14	0.07	6.12	0.06	0.16	0.05	0.13	3.25E-05	6.00E-06	2.55E-05	1.63E-03	23.36
D-4-SED-SMP	0.51	0.31	0.34	4.06	1.40	1.31	0.74	0.75	0.07	1.28	0.05	0.02	0.92	0.04	0.11	0.04	0.14	5.50E-05	1.30E-05	1.75E-05	6.50E-03	12.12
D-5-SED-SMP	2.04	5.22	10.40	35.10	8.78	71.60	37.60	8.74	0.86	1.96	0.06	0.04	39.20	0.84	0.05	0.32	0.04	0.03	1.03E-04	6.00E-04	0.10	223
D-6-SED-SMP	0.11	0.20	0.10	1.49	1.11	0.29	0.24	0.39	0.07	0.21	8.00E-03	0.01	0.28	0.02	0.03	0.02	0.05	4.00E-05	8.50E-06	2.00E-06	2.00E-03	4.64
D-6-SED-FD	0.28	0.31	0.31	4.06	2.28	1.04	0.91	1.58	0.26	1.27	0.03	0.03	0.64	0.09	0.05	0.02	0.08	5.50E-05	2.75E-06	2.75E-06	2.75E-03	13.23
E-1-SED-SMP	5.72	2.05	3.83	106	10.74	29.00	11.30	13.56	4.04	5.30	0.38	0.17	7.34	0.84	0.87	0.29	0.79	0.02	2.80E-03	8.00E-03	0.70	203
E-2-SED-SMP	1.00	0.58	0.53	11.50	5.52	1.85	1.31	1.79	0.19	3.16	0.14	0.09	1.13	0.06	0.25	0.04	0.32	4.10E-04	1.80E-04	1.80E-04	0.02	29.46
E-3-SED-SMP	0.35	0.37	0.16	4.91	2.50	0.76	0.41	0.86	0.07	2.86	0.07	0.04	0.45	0.03	0.13	0.01	0.12	9.00E-05	4.50E-06	4.50E-06	4.50E-03	14.11
E-4-SED-SMP	0.16	0.52	0.25	13.10	6.06	1.18	1.11	2.22	0.19	3.71	0.23	0.12	2.20	0.09	0.38	0.02	0.81	3.05E-04	8.00E-05	7.00E-05	0.02	32.37
F-1-SED-SMP	0.54	0.59	0.28	4.55	1.41	0.85	0.59	0.73	0.07	1.58	0.07	0.05	0.47	0.02	0.12	0.01	0.16	9.00E-05	6.50E-06	4.50E-06	4.50E-03	12.09
F-2-SED-SMP	1.09	0.63	0.47	12.60	6.66	1.82	1.22	2.44	0.18	4.69	0.34	0.15	1.43	0.10	0.63	0.03	0.55	2.70E-04	1.40E-04	1.20E-04	0.05	35.08
F-3-SED-SMP	0.62	0.43	0.27	7.03	1.71	0.84	0.56	1.02	0.13	1.73	0.08	0.05	0.45	0.02	0.14	7.98E-03	0.13	3.60E-04	4.90E-04	1.65E-04	0.09	15.29
Reference	0.40	0.50	0.08	1.39	2.18	0.25	0.48	0.75	0.18	0.51	0.05	0.05	0.50	0.03	0.07	0.02	0.13	1.70E-04	2.70E-05	5.50E-06	4.30E-04	7.57
TEF-Bird	1.00	1.00	0.10	1.00	1.00	0.10	0.10	0.10	0.10	0.05	0.01	0.10	0.01	0.01	1.00E-03	1.00E-04	1.00E-04	0.05	0.0001	0.00001	0.1	
C-1-SED-SMP	1.05	0.38	0.14	2.46	1.06	0.22	0.07	0.27	0.05	0.04	0.02	0.11	0.29	0.01	0.04	0.02	0.06	0.02	9.50E-05	9.70E-06	0.04	6.34
C-2-SED-SMP	8.00	0.19	0.41	7.56	2.89	0.57	0.40	0.74	0.08	0.14	0.06	0.40	0.68	0.04	0.13	0.04	0.15	0.03	4.60E-04	1.80E-05	0.24	22.76
C-3-SED-SMP	7.16	0.34	0.53	7.52	0.33	0.68	0.52	0.94	0.13	0.11	0.03	0.27	0.45	0.05	0.07	0.02	0.10	0.03	2.20E-04	6.00E-06	0.32	19.57
D-1-SED-SMP	0.17	0.49	0.03	0.24	1.29	0.03	0.04	0.03	0.03	9.00E-03	2.24E-03	0.04	0.04	2.92E-03	8.56E-03	3.72E-03	0.02	0.02	4.00E-06	4.00E-06	0.04	2.53
D-2-SED-SMP	1.05	0.62	0.03	0.24	1.40	0.02	0.02	0.03	0.03	0.01	7.20E-03	0.04	0.03	2.40E-03	0.02	1.25E-03	0.04	0.03	6.50E-05	6.50E-06	0.07	3.71
D-3-SED-SMP	9.04	0.45	0.93	12.36	2.90	1.88	0.94	1.16	0.19	0.20	0.14	0.70	6.12	0.06	0.16	0.05	0.13	0.02	1.20E-04	5.10E-05	0.03	37.49
D-4-SED-SMP	10.16	0.31	0.69	8.18	1.40	1.31	0.74	0.75	0.07	0.13	0.05	0.19	0.92	0.04	0.11	0.04	0.14	0.03	2.60E-04	3.50E-05	0.13	25.36
D-5-SED-SMP	40.80	5.22	20.80	70.20	8.78	71.60	37.60	8.74	0.86	0.20	0.06	0.36	39.20	0.84	0.05	0.32	0.04	16.00	2.05E-03	1.20E-03	2.05	324
D-6-SED-SMP	2.14	0.20	0.19	2.98	1.11	0.29	0.24	0.39	0.07	0.02	8.00E-03	0.12	0.28	0.02	0.03	0.02	0.05	0.02	1.70E-04	4.00E-06	0.04	8.24
D-6-SED-FD	5.64	0.31	0.61	8.12	2.28	1.04	0.91	1.58	0.26	0.13	0.03	0.28	0.64	0.09	0.05	0.02	0.08	0.03	5.50E-05	5.50E-06	0.08	22.14
E-1-SED-SMP	114	2.05	7.66	212	10.74	29.00	11.30	13.56	4.04	0.53	0.38	1.66	7.34	0.84	0.87	0.29	0.79	8.50	0.06	0.02	14.00	440
E-2-SED-SMP	20.00	0.58	1.05	23.00	5.52	1.85	1.31	1.79	0.19	0.32	0.14	0.92	1.13	0.06	0.25	0.04	0.32	0.21	3.60E-03	3.60E-04	0.41	59.09
E-3-SED-SMP	6.98	0.37	0.32	9.82	2.50	0.76	0.41	0.86	0.07	0.29	0.07	0.42	0.45	0.03	0.13	0.01	0.12	0.05	9.00E-06	9.00E-06	0.09	23.75
E-4-SED-SMP	3.28	0.52	0.51	26.20	6.06	1.18	1.11	2.22	0.19	0.37	0.23	1.22	2.20	0.09	0.38	0.02	0.81	0.15	1.60E-03	1.40E-04	0.31	47.03
F-1-SED-SMP	10.82	0.59	0.55	9.10	1.41	0.85	0.59	0.73	0.07	0.16	0.07	0.47	0.47	0.02	0.12	0.01	0.16	0.05	1.30E-03	9.00E-06	0.09	26.33
F-2-SED-SMP	21.80	0.63	0.93	25.20	6.66	1.82	1.22	2.44	0.18	0.47	0.34	1.45	1.43	0.10	0.63	0.03	0.55	0.14	2.80E-03	2.40E-04	0.93	66.96
F-3-SED-SMP	12.36	0.43	0.54	14.06	1.71	0.84	0.56	1.02	0.13	0.17	0.08	0.51	0.45	0.02	0.14	7.98E-03	0.13	0.18	9.80E-03	3.30E-04	1.80	35.14
Reference	8.05	0.50	0.17	2.78	2.18	0.25	0.48	0.75	0.18	0.05	0.05	0.47	0.50	0.03	0.07	0.02	0.13	0.09	5.40E-04	1.10E-04	8.60E-03	16.75

1 - TEQ = matrix conc x matrix benchmark.

Appendix D-3-3. Mammal, Fish, and Bird Sum TEQ Values for the Raymark Phase III Ecological Risk Assessment Investigation[1].

SEDIMENT 2,3,7,8-TCDD

	TEF-MAM	TEF-FISH	TEF-BIRD
C-1-SED-SMP	4.61	4.30	6.34
C-2-SED-SMP	13.36	11.82	22.76
C-3-SED-SMP	10.04	9.17	19.57
D-1-SED-SMP	2.34	2.23	2.53
D-2-SED-SMP	2.83	2.56	3.71
D-3-SED-SMP	25.62	23.38	37.49
D-4-SED-SMP	13.36	12.12	25.36
D-5-SED-SMP	227	223	324
D-6-SED-SMP	5.07	4.64	8.24
D-6-SED-FD	13.50	13.23	22.14
E-1-SED-SMP	231	203	440
E-2-SED-SMP	32.70	29.48	59.09
E-3-SED-SMP	14.46	14.11	23.75
E-4-SED-SMP	36.44	32.37	47.03
F-1-SED-SMP	13.54	12.09	26.33
F-2-SED-SMP	43.38	35.08	66.96
F-3-SED-SMP	18.63	15.29	35.14
Reference	9.07	7.57	16.75

units = ng/kg

1 - Sum TEQ Values; see Appendix D-3-2.

Appendix D-3-4. BAF and BSAF calculations for the Raymark Phase III Ecological Risk Assessment Investigation[1].

		BAF							BSAF									
Station	Species	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	1,6,7-Trimethylnaphthalene	1-Methylnaphthalene	1-Methylphenanthrene	2,6-Dimethylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b+k)fluoranthene
C-1-TISS-SMP	MUS	2.00	0.05	0.23	0.03	0.46	0.12	1.00	1.19	14.63	0.18	0.89	3.74	0.16	0.10	0.08	0.03	0.03
C-2-TISS-SMP	MUS	2.16	0.02	0.15	0.02	0.19	0.04	0.36	1.52	21.48	0.21	1.01	1.51	0.16	0.10	0.07	0.03	0.04
C-3-TISS-SMP	MUS	1.21	0.05	0.07	0.02	0.13	0.03	0.24	1.61	26.85	0.37	1.15	4.15	0.58	0.13	0.17	0.10	0.16
D-1-TISS-SMP	MUS	4.63	0.07	0.74	0.13	2.47	0.05	1.42	2.18	42.28	2.18	2.18	10.80	6.10	1.74	1.26	0.31	0.78
D-2-TISS-SMP	MUS	1.53	0.03	0.27	0.02	0.13	0.03	0.49	2.83	79.33	0.30	11.33	6.80	0.71	0.26	0.21	0.04	0.20
D-3-TISS-SMP	MUS	0.47	0.03	0.09	0.01	1.69	0.03	0.39	0.06	1.22	0.01	0.08	0.05	0.01	2.50E-03	2.50E-03	1.25E-03	1.47E-03
D-4-TISS-SMP	MUS	0.90	0.01	0.13	0.02	0.38	0.03	0.42	1.19	14.62	0.13	0.65	0.42	0.34	0.04	0.05	0.01	0.02
D-6-TISS-SMP	MUS	1.83	0.05	0.11	0.04	0.30	0.07	0.43	0.23	6.71	0.22	0.27	1.03	0.07	0.04	0.04	0.01	0.01
HB-9-TISS-SMP	MUS	14.93	0.09	1.15	0.11	2.57	0.08	1.48	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AVG-BAF; Median-BSAF		3.30	0.04	0.33	0.04	0.93	0.05	0.69	1.36	18.05	0.21	0.95	2.62	0.25	0.10	0.07	0.03	0.04

Species: Ribbed Mussel.

NA - Not Available

1 - Metals = BAF calculation = Tissue concentration (see Appendix A-3)/Sediment concentration (see Appendix A-1).

Organics = BSAF calculation = ((Tissue Concentration (see Appendix A-3)/Lipid (see Appendix A-3))/(Sediment Concentration (see Appendix A-1)/TOC (see Appendix A-1))).

PAHs not analyzed for Station HB-9-TISS-SMP

2 - Sum of High Molecular Weight PAHs - Benzo(a)anthracene, Benzo(a)pyrene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, and Perylene.

3 - Sum of Low Molecular Weight PAHs - 2-Methylnaphthalene, Acenaphthene, Acenaphthylene, Anthracene, Fluorene, Naphthalene, and Phenanthrene.

4 - Sum of Individual PCB congeners x 2.

5 - U.S. EPA, 1993d.

Appendix D-3-4. BAF and BSAF calculations for the Raymark1 Phase III Ecological Risk Assessment Investigation[1].

Station	Species	BSAF																							
		Benzo(e)pyrene	Benzo(g,h,i)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	HMW PAHs[2]	Indeno(1,2,3-cd)pyrene	LMW PAHs[3]	Perylene	Phenanthrene	Pyrene	Sum PAHs	Median of PAHs	Total PCBs[4]	o,p'-DDE	p,p'-DDD	p,p'-DDE	p,p'-DDT	Median of Pesticides	Dioxin-Mammal[5]	Dioxin-Fish[5]	Dioxin-Bird[5]
C-1-TISS-SMP	MUS	0.04	0.04	0.07	0.20	0.11	0.72	0.08	0.04	1.43	0.08	0.43	0.20	0.28		1.88	3.88	3.88	3.88	3.88				
C-2-TISS-SMP	MUS	0.04	0.05	0.03	0.21	0.09	0.41	0.07	0.04	1.21	0.13	0.30	0.19	0.29		1.47	8.86	1.28	8.86	8.86				
C-3-TISS-SMP	MUS	0.14	0.20	0.18	0.63	0.21	1.90	0.18	0.18	2.47	0.13	0.95	0.33	0.53		3.50	5.25	16.60	5.25	5.25				
D-1-TISS-SMP	MUS	1.49	0.38	1.09	2.18	1.90	6.97	1.05	0.36	9.55	0.16	3.09	3.63	3.07		5.51	2.13	17.44	9.15	2.13				
D-2-TISS-SMP	MUS	0.31	0.20	0.22	0.30	0.30	3.83	0.13	0.08	3.02	0.02	0.95	0.68	0.56		5.65	2.62	10.98	9.28	2.62				
D-3-TISS-SMP	MUS	1.72E-03	1.83E-03	1.20E-03	7.97E-03	2.67E-03	0.02	2.39E-03	1.49E-03	0.03	4.58E-03	6.82E-03	6.08E-03	9.37E-03		2.96	6.62	6.62	6.62	6.62				
D-4-TISS-SMP	MUS	0.06	0.02	0.04	0.10	0.07	0.35	0.05	0.02	0.53	0.06	0.16	0.12	0.17		1.32	5.18	0.77	5.18	5.18				
D-6-TISS-SMP	MUS	0.05	0.02	0.03	0.08	0.08	0.43	0.04	0.02	0.88	0.04	0.25	0.12	0.13		1.91	3.48	0.07	3.48	3.48				
HB-9-TISS-SMP	MUS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		2.35	2.17	2.17	2.17	2.17				
AVG-BAF; Median-BSAF		0.06	0.04	0.05	0.20	0.10	0.57	0.07	0.04	1.32	0.08	0.37	0.20	0.29	0.20	2.35	3.88	3.88	5.25	3.88	3.88	0.3	0.1	0.1

Species: Ribbed Mussel.

NA - Not Available

1 - Metals = BAF calculation = Tissue concentration (see Appendix A-3)/Sediment concentration (see Appendix A-1).

Organics = BSAF calculation = ((Tissue Concentration (see Appendix A-3)/Lipid (see Appendix A-3))/(Sediment Concentration (see Appendix A-1)/TOC (see Appendix A-1))).

PAHs not analyzed for Station HB-9-TISS-SMP

2 - Sum of High Molecular Weight PAHs - Benzo(e)anthracene, Benzo(e)pyrene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, and Perylene.

3 - Sum of Low Molecular Weight PAHs - 2-Methylnaphthalene, Acenaphthene, Acenaphthylene, Anthracene, Fluorene, Naphthalene, and Phenanthrene.

4 - Sum of Individual PCB congeners x 2.

5 - U.S. EPA, 1993d.

Appendix D-3-5. Predicted tissue concentrations using the average BAF value and median BSAF value for the Raymark Phase III Ecological Risk Assessment Investigation.

Station	Avg Lipid	TOC	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	1,6,7-Trimethylnaphthalene	1-Methylnaphthalene	1-Methylphenanthrene	2,6-Dimethylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b+k)fluoranthene	Benzo(e)pyrene	Benzo(g,h,i)perylene	Chrysene	Dibenz(a,h)anthracene
D-5-SED-SMP	2.67	1.40	1.12	0.43	18.18	1.68	0.11	0.28	39.29	5.45	5.06	15.57	4.28	4.67	46.70	70.04	257	222	366	148	128	226	38.91
E-1-SED-SMP	2.67	9.30	0.13	6.14	90.90	12.91	0.81	1.36	132	1.00	1.87	5.10	1.35	1.23	15.23	15.82	42.76	55.65	106	48.03	44.52	56.82	9.96
E-2-SED-SMP	2.67	28.30	0.11	2.34	42.51	7.70	0.25	0.88	59.25	0.19	0.65	2.50	0.19	0.19	4.04	4.43	12.71	15.40	39.06	18.87	17.13	21.18	3.27
E-3-SED-SMP	2.67	7.00	0.40	0.92	11.97	4.00	0.14	0.90	79.69	2.10	1.87	19.46	1.79	6.15	40.47	73.93	257	226	418	179	148	257	35.80
E-4-SED-SMP	2.67	22.00	0.16	2.11	32.50	6.81	0.29	1.02	60.01	0.19	0.42	2.06	0.19	0.19	3.22	3.71	11.39	13.37	36.15	18.08	15.35	18.57	2.97
F-1-SED-SMP	2.67	4.10	2.64	1.61	34.66	8.41	0.18	0.59	132	3.06	2.79	31.89	4.38	4.65	47.83	82.38	239	266	440	199	186	239	42.52
F-2-SED-SMP	2.67	14.30	0.53	17.23	249	25.42	0.51	3.38	680	0.99	2.06	9.91	2.97	2.25	25.91	25.14	91.43	126	270	114	122	107	24.38
F-3-SED-SMP	2.67	13.90	0.14	2.11	56.89	13.94	0.36	1.22	262	3.92	6.62	13.72	6.66	43.11	36.84	125	431	380	678	298	282	341	58.79
Reference	2.67	5.86	4.95	10.20	216	7.03	1.11	1.92	202	NA	NA	NA	NA	30.68	30.68	30.68	17.66	21.38	73.44	NA	NA	20.45	30.68

1 - For Metals: Tissue Conc.= Avg BAF x Sed.Conc.; For Organics: Tissue Conc.= Lipid(Median BSAF(Sed.Conc./TOC)).
2 - See Appendix D-3-4 for average BAF value for Metals and median BSAF value for Organics.
3 - Sum of High Molecular Weight PAHs - Benzo(a)anthracene, Benzo(a)pyrene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, and Perylene.
4 - Sum of Low Molecular Weight PAHs - 2-Methylnaphthalene, Acenaphthene, Acenaphthylene, Anthracene, Fluorene, Naphthalene, and Phenanthrene.
5 - Sum of individual PCB congeners x 2.
6 - 2,3,7,8-TCDD equivalent concentration for prediction of impacts on fish; see WHO, 1998.

Appendix D-3-5. Predicted tissue concentrations using the average BAF value and median BSAF value for the Raymark Phase III Ecological Risk Assessment Investigation.

Station	Avg Lipid	TOC	Fluoranthene	Fluorene	HMW PAHs[2]	Indeno(1,2,3-cd)pyrene	LMW PAHs[3]	Perylene	Phenanthrene	Pyrene	Sum PAHs	Total PCBs[4]	o,p'-DDE	p,p'-DDD	p,p'-DDE	p,p'-DDT	Dioxin-Mammal[6]	Dioxin-Fish[6]	Dioxin-Bird[6]
D-5-SED-SMP	2.67	1.40	428	7.00	1218	156	224	46.70	77.83	428	2703	22646	3.07	148	3.07	3.07	130	42.47	61.66
E-1-SED-SMP	2.67	9.30	93.73	1.64	269	50.38	99.17	9.96	57.41	99.58	727	28108	1.39	1.39	1.39	1.39	19.84	5.82	12.62
E-2-SED-SMP	2.67	28.30	32.73	0.19	88.36	19.25	27.78	3.08	16.75	30.80	245	196	1.50	8.42	1.50	1.50	0.92	0.28	0.56
E-3-SED-SMP	2.67	7.00	483	10.90	1307	187	332	49.03	195	483	3085	82.61	1.33	1.33	5.92	1.33	1.65	0.54	0.90
E-4-SED-SMP	2.67	22.00	29.72	0.19	78.75	17.58	22.48	2.72	13.62	27.24	219	112	1.44	11.30	1.44	1.44	1.33	0.39	0.57
F-1-SED-SMP	2.67	4.10	425	10.36	1268	213	358	55.81	199	438	3148	354	18.44	90.92	2.27	10.61	2.64	0.79	1.71
F-2-SED-SMP	2.67	14.30	217	2.44	591	137	147	25.91	80.00	213	1613	403	1.96	50.69	21.72	17.38	2.43	0.65	1.25
F-3-SED-SMP	2.67	13.90	823	36.06	2128	333	558	94.06	306	666	4990	339	2.68	89.40	73.75	2.68	1.07	0.29	0.67
Reference	2.67	5.86	30.68	30.68	121	10.23	195	NA	11.16	38.12	660	6.99	NA	NA	NA	NA	1.24	0.34	0.76

1 - For Metals: Tissue Conc.= Avg BAF x Sed.Conc.; For Organics: Tissue Conc.= Lipid(Median BSAF(Sed.Conc./TOC)).

2 - See Appendix D-3-4 for average BAF value for Metals and median BSAF value for Organics.

3 - Sum of High Molecular Weight PAHs - Benzo(a)anthracene, Benzo(a)pyrene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, and Perylene.

4 - Sum of Low Molecular Weight PAHs - 2-Methylnaphthalene, Acenaphthene, Acenaphthylene, Anthracene, Fluorene, Naphthalene, and Phenanthrene.

5 - Sum of Individual PCB congeners x 2.

6 - 2,3,7,8-TCDD equivalent concentration for prediction of impacts on fish; see WHO, 1998.

Appendix D-4-1. Site vs. reference tissue concentration ratios in ribbed mussels collected for the Raymark Phase III Ecological Risk Assessment Investigation.

Station	Species	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	1,6,7-Trimethylnaphthalene	1-Methylnaphthalene	1-Methylphenanthrene	2,6-Dimethylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b+k)fluoranthene	Benzo(e)pyrene	Benzo(g,h,i)perylene
Reference Concentration[2]		4.95	10.20	216	7.03	1.11	1.92	202	NA	NA	NA	NA	30.68	30.68	30.68	17.66	21.38	73.44	NA	NA
C-1-TISS-SMP	MUS	0.09	0.12	0.11	0.16	0.09	0.44	0.34					0.75	0.18	0.18	0.85	0.26	0.15		
C-2-TISS-SMP	MUS	0.14	0.17	0.20	0.23	0.10	0.38	0.30					0.49	0.18	0.18	0.74	0.26	0.15		
C-3-TISS-SMP	MUS	0.10	0.23	0.17	0.31	0.09	0.32	0.29					0.55	0.39	0.18	1.42	0.61	0.46		
D-1-TISS-SMP	MUS	0.15	0.10	0.08	0.14	0.08	0.26	0.29					0.61	0.46	0.39	1.47	0.23	0.34		
D-2-TISS-SMP	MUS	0.10	0.08	0.09	0.10	0.08	0.27	0.29					0.78	0.49	0.39	1.81	0.23	0.53		
D-3-TISS-SMP	MUS	0.20	0.10	0.08	0.13	0.09	0.30	0.34					0.62	0.18	0.18	0.79	0.26	0.15		
D-4-TISS-SMP	MUS	0.12	0.18	0.09	0.14	0.09	0.36	0.33					0.95	0.46	0.21	1.25	0.30	0.18		
D-5	Predicted	0.23	0.04	0.08	0.24	0.10	0.15	0.19					0.15	1.52	2.28	14.54	10.37	4.98		
D-6-TISS-SMP	MUS	0.22	0.27	0.14	0.23	0.13	0.39	0.35					0.52	0.20	0.20	1.25	0.28	0.16		
E-1	Predicted	0.03	0.60	0.42	1.84	0.73	0.71	0.65					0.04	0.50	0.52	2.42	2.60	1.44		
E-2	Predicted	0.02	0.23	0.20	1.09	0.23	0.46	0.29					6.27E-03	0.13	0.14	0.72	0.72	0.53		
E-3	Predicted	0.08	0.09	0.08	0.57	0.13	0.47	0.39					0.20	1.32	2.41	14.54	10.56	5.69		
E-4	Predicted	0.03	0.21	0.15	0.97	0.28	0.53	0.30					6.05E-03	0.10	0.12	0.84	0.63	0.49		
F-1	Predicted	0.53	0.16	0.16	1.20	0.16	0.31	0.65					0.15	1.56	2.69	13.54	12.43	5.99		
F-2	Predicted	0.11	1.69	1.15	3.61	0.46	1.76	3.36					0.07	0.84	0.82	5.18	5.88	3.68		
F-3	Predicted	0.03	0.21	0.26	1.98	0.33	0.64	1.29					1.41	1.20	4.09	24.41	17.78	9.23		

Tissue Concentrations Ratios calculated as Station Tissue Concentration/Reference Tissue Concentration.

See Appendix A-3 for tissue concentrations and units.

Blank cells indicate ratios not calculated; see text Section 6.2.

1 - Tissue values predicted for Ref., D-5, E-1 to E-4, and F-1 to F-3; see Appendix D-3-5.

2 - Reference concentrations were predicted; see Section 6.2 and SAIC, 1998.

3 - Sum of High Molecular Weight PAHs - Benzo(a)anthracene, Benzo(a)pyrene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, and Perylene.

4 - Sum of Low Molecular Weight PAHs - 2-Methylnaphthalene, Acenaphthene, Acenaphthylene, Anthracene, Fluorene, Naphthalene, and Phenanthrene.

5 - Sum of individual PCB congeners x 2.

6 - 2,3,7,8-TCDD equivalent concentration for prediction of impacts on fish; see WHO, 1998.

Appendix D-4-1. Site vs. reference tissue concentration ratios in ribbed mussels collected for the Raymark Phase III Ecological Risk Assessment Investigation.

Station[1]	Species	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	HMW PAHs[3]	Indeno(1,2,3-cd)pyrene	LMW PAHs[4]	Perylene	Phenanthrene	Pyrene	Sum PAHs	Total PCBs[5]	o,p'-DDE	p,p'-DDD	p,p'-DDE	p,p'-DDT	Dioxin-Fish[6]
Reference Concentration[2]		20.45	30.68	30.68	30.68	121	10.23	195	NA	11.16	38.12	660	6.99	NA	NA	NA	NA	0.34
C-1-TISS-SMP	MUS	0.59	0.18	1.08	0.18		0.54			5.74	1.65	1.04	15.80					2.56
C-2-TISS-SMP	MUS	0.27	0.18	0.81	0.18		0.54			5.02	1.50	0.98	15.11					2.95
C-3-TISS-SMP	MUS	1.08	0.39	1.43	0.42		1.56			7.53	2.18	1.35	20.71					1.73
D-1-TISS-SMP	MUS	0.98	0.16	2.41	0.52		0.49			7.62	3.94	1.43	34.71					1.02
D-2-TISS-SMP	MUS	1.37	0.16	2.31	0.59		0.49			8.34	3.67	1.71	34.14					0.58
D-3-TISS-SMP	MUS	0.27	0.18	1.04	0.36		0.54			6.72	1.92	1.05	18.50					9.05
D-4-TISS-SMP	MUS	0.73	0.21	1.78	0.55		0.84			9.86	2.62	1.55	32.42					2.76
D-5	Predicted	11.04	1.27	13.95	0.23		15.22			6.98	11.23	4.10	3240					123
D-6-TISS-SMP	MUS	0.73	0.20	1.34	0.20		0.59			5.74	2.62	1.13	26.39					2.39
E-1	Predicted	2.78	0.32	3.06	0.05		4.93			5.15	2.61	1.10	4022					16.90
E-2	Predicted	1.04	0.11	1.07	6.27E-03		1.88			1.50	0.81	0.37	28.10					0.81
E-3	Predicted	12.56	1.17	15.73	0.36		18.26			17.44	12.66	4.68	11.82					1.56
E-4	Predicted	0.91	0.10	0.97	6.05E-03		1.72			1.22	0.71	0.33	15.99					1.14
F-1	Predicted	11.69	1.39	13.86	0.34		20.79			17.87	11.50	4.77	50.61					2.28
F-2	Predicted	5.22	0.79	7.08	0.08		13.41			7.17	5.60	2.45	57.68					1.90
F-3	Predicted	16.67	1.92	26.83	1.18		32.58			27.40	17.48	7.57	48.45					0.85

Tissue Concentrations Ratios calculated as Station Tissue Concentration/Reference Tissue Concentration.

See Appendix A-3 for tissue concentrations and units.

Blank cells indicate ratios not calculated; see text Section 6.2

1 - Tissue values predicted for Ref., D-5, E-1 to E-4, and F-1 to F-3; see Appendix D-3-5.

2 - Reference concentrations were predicted; see Section 6.2 and SAIC, 1998.

3 - Sum of High Molecular Weight PAHs - Benzo(a)anthracene, Benzo(a)pyrene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, and Perylene.

4 - Sum of Low Molecular Weight PAHs - 2-Methylnaphthalene, Acenaphthene, Acenaphthylene, Anthracene, Fluorene, Naphthalene, and Phenanthrene.

5 - Sum of Individual PCB congeners x 2.

6 - 2,3,7,8-TCDD equivalent concentration for prediction of impacts on fish; see WHO, 1998.

Appendix D-5-1a. Black-crowned night heron sediment ingestion rates for the Raymark Phase III Ecological Risk Assessment Investigation.[1]

Station	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Silver	Zinc	1,6,7-Trimethylnaphthalene	1-Methylnaphthalene	1-Methylphenanthrene	2,6-Dimethylnaphthalene	2-Methylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo(b+k)fluoranthene	Benzo(e)pyrene	Benzo(g,h,i)perylene	Biphenyl
C-1-SED-SMP	0.59	68.38	282	101	0.56	18.23	0.59	183	8.04	10.73	53.63	10.73	24.13	10.73	61.67	93.85	349	322	590	263	244	8.04
C-2-SED-SMP	0.83	207	782	205	1.58	47.19	1.53	453	21.45	26.81	158	32.18	48.27	58.99	196	322	1046	1019	1689	831	697	16.09
C-3-SED-SMP	1.13	130	1351	359	2.15	54.16	1.26	652	13.41	16.09	58.99	18.77	37.54	16.09	80.44	166	590	509	831	429	375	16.09
D-1-SED-SMP	0.43	38.34	60.60	19.57	0.10	24.94	0.12	111	2.68	2.68	2.68	2.68	2.68	2.68	2.68	8.04	24.13	18.77	37.54	18.77	16.09	2.68
D-2-SED-SMP	0.86	69.18	197	78.03	1.85	48.53	0.43	316	4.02	4.02	37.54	4.02	10.73	8.04	48.27	105	349	265	456	198	174	4.02
D-3-SED-SMP	5.63	96.80	563	235	0.16	55.51	2.28	477	236	206	1099	255	375	965	1421	5899	15018	11798	20111	8581	8044	563
D-4-SED-SMP	1.69	461	416	151	0.70	58.99	1.10	424	16.09	32.18	150	29.50	53.63	204	121	536	1314	1287	2172	965	885	16.09
D-5-SED-SMP	0.91	26.01	149	101	0.32	14.75	1.39	152	37.54	34.86	107	29.50	53.63	32.18	322	483	1770	1528	2521	1019	885	34.86
D-6-SED-SMP	1.61	139	713	112	1.23	30.03	0.75	434	40.22	21.45	42.90	34.86	42.90	24.13	129	233	831	804	1314	536	483	13.41
E-1-SED-SMP	0.10	373	745	778	2.36	70.79	12.07	512	45.58	85.81	233	61.67	134	58.31	697	724	1957	2547	4853	2199	2038	37.54
E-2-SED-SMP	0.09	142	349	464	0.72	45.85	5.36	229	26.81	91.17	349	26.81	123	26.81	583	617	1770	2145	5443	2628	2386	26.81
E-3-SED-SMP	0.32	55.77	98.14	241	0.40	46.92	0.64	306	72.40	64.35	670	61.67	96.53	212	1394	2547	8849	7776	14399	6167	5095	239
E-4-SED-SMP	0.13	128	267	410	0.83	53.09	2.95	232	20.11	45.58	223	20.11	67.04	20.11	349	402	1233	1448	3915	1957	1862	20.11
F-1-SED-SMP	2.15	97.60	284	507	0.51	30.84	0.80	512	61.67	56.31	844	68.49	107	93.85	965	1662	4827	5363	8878	4022	3754	80.44
F-2-SED-SMP	0.43	1046	2041	1531	1.47	177	2.95	2633	69.72	145	697	209	265	158	1823	1770	6435	8849	19038	8044	8581	93.85
F-3-SED-SMP	0.11	128	467	839	1.05	63.82	1.34	1014	268	590	938	456	349	2950	2521	8581	29496	26010	46389	20379	19306	912
Reference	4.02	619	1772	424	3.22	100	8.04	783					885	885	885	885	509	617	2118			

Units: Metals - ug CoC/day; Organics - ng CoC/day; and Dioxins - pg CoC/day.

1 - Dietary Intake = Sediment Conc.(see Appendix A-1) x Intake Factors (see Table 6.3-1).

2 - Sum of High Molecular Weight PAHs - Benzo(a)anthracene, Benzo(a)pyrene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, and Perylene.

3 - Sum of Low Molecular Weight PAHs - 2-Methylnaphthalene, Acenaphthene, Acenaphthylene, Anthracene, Fluorene, Naphthalene, and Phenanthrene.

4 - Sum of individual PCB congeners x 2.

5 - 2,3,7,8-TCDD equivalent concentration for prediction of impacts on bird; see WHO, 1998.

Appendix D-5-1a. Black-crowned night heron sediment ingestion rates for the Raymark Phase III Ecological Risk Assessment Investigation.[1]

Station	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	HMW PAHs[2]	Indeno(1,2,3-cd)pyrene	LMW PAHs[3]	Naphthalene	Perylene	Phenanthrene	Pyrene	Sum PAHs	Total PCBs[4]	o,p'-DDE	p,p'-DDD	p,p'-DDE	p,p'-DDT	Dioxin-Mammal	Dioxin-Fish	Dioxin-Bird[5]
C-1-SED-SMP	322	48.27	509	13.41	1713	260	493	32.18	164	257	536	4191	102	1.03	1.03	1.03	1.03	12.35	11.52	17.01
C-2-SED-SMP	1019	156	1743	80.44	5229	778	1877	69.72	247	1099	1823	13177	427	1.47	10.19	1.47	1.47	35.82	31.70	61.03
C-3-SED-SMP	483	75.08	831	26.81	2657	402	748	72.40	169	349	992	6559	162	1.61	1.61	1.61	1.61	26.91	24.58	52.48
D-1-SED-SMP	21.45	2.68	45.58	2.68	150	16.09	58.99	8.04	37.54	32.18	48.27	359	51.48	1.07	1.07	1.07	1.07	6.27	5.99	6.79
D-2-SED-SMP	295	37.54	536	10.73	2609	190	432	26.81	1126	223	483	4596	96.26	1.74	1.74	1.74	1.74	7.59	8.88	9.93
D-3-SED-SMP	12335	1850	32177	1287	76394	9921	40007	563	3218	29496	32177	197594	117	0.87	0.87	0.87	0.87	68.69	62.69	101
D-4-SED-SMP	1260	198	2440	145	6795	1019	3212	88.49	295	2085	2440	17732	503	1.47	9.92	1.47	1.47	35.82	32.49	68.00
D-5-SED-SMP	1555	268	2950	48.27	8393	1073	1544	69.72	322	536	2950	18628	13555	1.11	53.63	1.11	1.11	608	598	866
D-6-SED-SMP	724	118	1073	21.45	3783	563	912	58.99	233	402	1314	9058	150	1.07	4.83	1.07	1.07	13.58	12.43	22.08
E-1-SED-SMP	2601	456	4290	75.06	12308	2306	4540	225	456	2626	4558	33266	111762	3.35	3.35	3.35	3.35	618	544	1180
E-2-SED-SMP	2950	456	4558	26.81	12308	2681	3869	180	429	2333	4290	34126	2376	10.99	61.67	10.99	10.99	87.68	79.05	158
E-3-SED-SMP	8849	1233	16625	375	45021	6435	11439	110	1689	6704	16625	106289	247	2.41	2.41	10.73	2.41	38.77	37.84	63.69
E-4-SED-SMP	2011	322	3218	20.11	8527	1904	2435	102	295	1475	2950	23678	1051	8.18	64.35	8.18	8.18	97.72	86.80	126
F-1-SED-SMP	4827	858	8581	209	25581	4290	7226	166	1126	4022	8849	63528	620	19.57	98.53	2.41	11.26	36.32	32.42	70.59
F-2-SED-SMP	7508	1716	15284	172	41616	9653	10356	536	1823	5631	15016	113518	2464	7.24	188	80.44	64.35	116	94.06	180
F-3-SED-SMP	23328	4022	56311	2467	145601	22792	38183	402	6435	20915	46584	341399	2012	9.65	322	265	9.65	49.94	41.01	94.22
Reference	590	885	885	885		295		885		322	1099	19022	202					24.32	20.29	44.90

Units: Metals - ug CoC/day; Organics - ng CoC/day; and Dioxins - pg CoC/day.

1 - Dietary Intake = Sediment Conc.(see Appendix A-1) x Intake Factors (see Table 6.3-1).

2 - Sum of High Molecular Weight PAHs - Benzo(a)anthracene, Benzo(a)pyrene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, and Perylene.

3 - Sum of Low Molecular Weight PAHs - 2-Methylnaphthalene, Acenaphthene, Acenaphthylene, Anthracene, Fluorene, Naphthalene, and Phenanthrene.

4 - Sum of individual PCB congeners x 2.

5 - 2,3,7,8-TCDD equivalent concentration for prediction of impacts on bird; see WHO, 1998.

Appendix D-5-1b. Black-crowned night heron ribbed mussel ingestion rates for the Raymark Phase III Ecological Risk Assessment Investigation.[1]

Station[2]	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Silver	Zinc	1,6,7-Trimethylnaphthalene	1-Methylnaphthalene	1-Methylphenanthrene	2,6-Dimethylnaphthalene	2-Methylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo(b+k)fluoranthene	Benzo(e)pyrene	Benzo(g,h,i)perylene	Biphenyl	Chrysene
C-1-TISS-SMP	23.60	64.35	1298	58.99	5.15	45.05	64.35	3657	295	4827	295	295	4880	1233	295	295	804	295	590	295	295	295	644
C-2-TISS-SMP	35.93	91.17	2285	85.81	5.90	39.15	102	3245	295	5202	295	295	4558	804	295	295	697	295	590	295	295	295	295
C-3-TISS-SMP	27.35	123	1990	118	5.36	33.25	58.99	3121	295	5899	295	295	5899	912	644	295	1341	697	1823	804	1019	295	1180
D-1-TISS-SMP	39.69	53.63	896	50.95	4.77	28.81	34.86	3169	268	5202	268	268	6972	1341	751	644	1394	268	1341	1287	268	268	1073
D-2-TISS-SMP	26.28	45.58	1067	37.00	4.93	27.89	53.63	3132	268	7506	268	1073	8581	1287	804	644	1716	268	2092	1448	804	268	1502
D-3-TISS-SMP	53.09	53.63	971	49.87	5.36	30.57	48.80	3690	295	5041	295	295	5363	1019	295	295	751	295	590	295	295	295	295
D-4-TISS-SMP	30.57	96.53	1099	53.63	5.36	37.00	58.99	3566	349	8581	349	349	7506	1555	751	349	1180	349	697	1073	349	349	804
D-5	60.12	22.98	975	90.01	5.95	15.14	211	2107	292	271	835	230	417	250	2504	3756	13773	11895	19616	7930	6887	271	12104
D-6-TISS-SMP	58.99	150	1598	85.81	7.51	40.22	45.05	3754	322	4987	322	322	5899	858	322	322	1180	322	644	965	322	322	804
E-1	6.90	329	4875	692	43.66	72.68	1830	7098	53.41	101	273	72.25	157	85.97	817	848	2293	2984	5686	2576	2388	43.98	3047
E-2	6.10	126	2280	413	13.39	47.08	813	3177	10.32	35.10	134	10.32	47.49	10.32	217	237	681	826	2096	1012	919	10.32	1136
E-3	21.22	49.27	642	214	7.44	46.18	97.59	4274	113	100	1043	95.99	150	330	2170	3965	13773	12104	22413	9599	7930	371	13773
E-4	8.58	113	1743	365	15.38	54.51	447	3218	9.98	22.58	110	9.98	33.20	9.98	173	199	611	717	1939	969	823	9.98	996
F-1	141	86.22	1859	451	9.43	31.66	122	7098	184	150	1710	235	285	249	2565	4418	12826	14252	23586	10689	9976	214	12826
F-2	26.29	924	13344	1363	27.29	181	447	36493	53.12	110	531	159	202	121	1389	1348	4903	6742	14506	6129	8538	71.51	5721
F-3	7.51	113	3051	747	19.35	65.52	203	14047	210	462	736	357	273	2312	1976	6726	23120	20388	36362	15974	15133	715	18286
Reference	265	547	11591	377	58.53	103	1220	10651					1845	1845	1845	1845	947	1147	3939				1097

Units: Metals - ug CoC/day; Organics - ng CoC/day; and Dioxins - pg CoC/day.

1 - Dietary Intake = Tissue Conc. x Intake Factors; see Table 6.3-1.

2 - Tissue values predicted for D-5, E-1 to E-4, F-1 to F-3, and Ref. (see Appendix D-3-5 for predicted values and Appendix A-3 for measured values).

3 - Sum of High Molecular Weight PAHs - Benzo(a)anthracene, Benzo(a)pyrene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, and Perylene.

4 - Sum of Low Molecular Weight PAHs - 2-Methylnaphthalene, Acenaphthene, Acenaphthylene, Anthracene, Fluorene, Naphthalene, and Phenanthrene.

5 - Sum of individual PCB congeners x 2.

6 - 2,3,7,8-TCDD equivalent concentration for prediction of impacts on bird; see WHO, 1998.

Appendix D-5-1b. Black-crowned night heron ribbed mussel ingestion rates for the Raymark Phase III Ecological Risk Assessment Investigation.[1]

Station[2]	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	HMW PAHs[3]	Indeno(1,2,3-cd)pyrene	LMW PAHs[4]	Naphthalene	Perylene	Phenanthrene	Pyrene	Sum PAHs	Total PCBs[5]	o,p'-DDE	p,p'-DDD	p,p'-DDE	p,p'-DDT	Dioxin-Mammal	Dioxin-Fish	Dioxin-Bird[6]
C-1-TISS-SMP	295	1770	295	4103	295	21693	11262	295	3432	3379	36655	5921	123	123	123	123	152	47.25	69.78
C-2-TISS-SMP	295	1341	295	3218	295	20513	11262	295	3003	3057	34644	5663	118	118	118	118	185	54.54	105
C-3-TISS-SMP	644	2360	897	6516	858	25266	12335	295	4505	4451	47837	7760	115	365	115	115	105	31.98	68.26
D-1-TISS-SMP	268	3969	858	7240	268	25849	10726	268	4558	8044	50572	13010	105	858	450	105	58.98	18.78	21.30
D-2-TISS-SMP	268	3808	965	8152	268	30675	13407	590	4987	7508	60332	12796	107	450	381	107	35.73	10.79	15.58
D-3-TISS-SMP	295	1716	590	3647	295	21773	10189	295	4022	3915	37030	6934	115	115	115	115	550	167	268
D-4-TISS-SMP	349	2896	912	5826	349	30917	13943	349	5899	5363	54647	12152	139	139	139	139	169	50.97	107
D-5	2087	22955	376	65318	8347	12020	543	2504	4174	22955	144973	1214455	165	7933	165	165	6948	2278	3307
D-6-TISS-SMP	322	2199	322	5148	322	20808	9653	322	3432	5363	39646	9689	134	134	134	134	145	44.21	78.52
E-1	534	5026	87.96	14419	2702	5319	264	534	3079	5341	38973	1507416	74.64	74.64	74.64	74.64	1064	312	677
E-2	176	1755	10.32	4739	1032	1490	69.17	165	898	1652	13139	10533	80.45	451	80.45	80.45	49.57	14.90	29.86
E-3	1920	25877	584	70076	10017	17805	171	2629	10434	25877	165441	4430	71.40	71.40	317	71.40	88.61	28.83	48.53
E-4	159	1594	9.96	4223	943	1206	50.46	146	730	1461	11727	5993	76.99	606	76.99	76.99	71.07	21.04	30.57
F-1	2280	22803	556	67960	11401	19204	442	2993	10689	23515	188825	18967	969	4876	122	569	142	42.17	91.82
F-2	1308	11645	131	31708	7355	7890	409	1389	4290	11441	86493	21616	105	2718	1165	932	130	35.08	66.97
F-3	3153	44139	1934	114131	17866	29930	315	5044	16394	35732	267609	18158	144	4794	3955	144	57.49	15.74	36.15
Reference	1645	1645	1645		548		1645		586	2044	35368	375					68.39	18.46	40.87

Units: Metals - ug CoC/day; Organics - ng CoC/day; and Dioxins - pg CoC/day.

1 - Dietary Intake = Tissue Conc. x Intake Factors; see Table 6.3-1.

2 - Tissue values predicted for D-5, E-1 to E-4, F-1 to F-3, and Ref. (see Appendix D-3-5 for predicted values and Appendix A-3 for measured values).

3 - Sum of High Molecular Weight PAHs - Benzo(a)anthracene, Benzo(a)pyrene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, and Perylene.

4 - Sum of Low Molecular Weight PAHs - 2-Methylnaphthalene, Acenaphthene, Acenaphthylene, Anthracene, Fluorene, Naphthalene, and Phenanthrene.

5 - Sum of individual PCB congeners x 2.

6 - 2,3,7,8-TCDD equivalent concentration for prediction of impacts on bird; see WHO, 1998.

Appendix D-5-1c. Black-crowned night heron total assimilation of sediment and ribbed mussel for the Raymark Phase III Ecological Risk Assessment Investigation.[1]

Station	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	1,6,7-Trimethylnaphthalene	1-Methylnaphthalene	1-Methylphenanthrene	2,6-Dimethylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo(b+k)fluoranthene	Benzo(e)pyrene	Benzo(g,h,i)perylene
C-1	23.28	128	1520	154	5.50	60.92	3697	292	4657	336	294	1198	343	374	1110	594	1136	537	519
C-2	35.39	287	2932	280	7.20	83.12	3559	305	5033	434	315	831	475	594	1678	1265	2194	1084	955
C-3	27.41	243	3216	459	7.23	84.15	3632	297	5694	341	302	893	697	444	1858	1162	2555	1187	1342
D-1	38.61	88.54	920	67.89	4.69	49.82	3158	261	5010	261	261	1293	725	627	1365	276	1327	1257	274
D-2	26.12	110	1217	111	6.53	73.56	3319	262	7231	294	1036	1247	821	720	1988	514	2452	1585	942
D-3	56.53	145	1476	274	5.31	82.86	4011	511	5051	1342	529	1910	1652	5963	15178	11641	19927	8544	8028
D-4	31.05	537	1458	197	5.83	92.41	3841	351	8291	480	364	1693	839	852	2401	1575	2762	1962	1187
D-5	58.75	47.15	1082	184	6.04	28.77	2175	317	295	907	249	272	2720	4081	14962	12922	21310	8615	7481
D-6	58.34	278	2225	191	8.41	67.63	4032	348	4822	351	343	849	434	534	1936	1084	1884	1445	774
E-1	6.74	676	5410	1415	44.30	138	7326	95.29	179	488	129	118	1457	1513	4092	5325	10146	4596	4260
E-2	5.96	258	2530	844	13.59	89.46	3279	35.75	122	465	35.75	35.75	751	822	2359	2860	7257	3503	3182
E-3	20.74	101	712	438	7.55	91.55	4411	178	158	1650	152	521	3431	6269	21776	19137	35436	15178	12538
E-4	8.38	232	1934	747	15.60	104	3321	28.95	65.61	320	28.95	28.95	502	579	1775	2084	5635	2817	2393
F-1	138	177	2063	922	9.56	60.16	7326	217	198	2266	312	330	3399	5853	16993	18881	31249	14161	13217
F-2	27.65	1896	14810	2786	27.69	345	37664	118	246	1182	355	268	3093	3002	10915	15008	32290	13644	14553
F-3	7.34	232	3386	1527	19.63	125	14498	460	1013	1612	783	5065	4328	14734	50650	44664	79658	34994	33153
Reference	259	1123	12864	771	60.40	196	11199					2436	2436	2436	1402	1698	5831		

Units: Metals - ug CoC/kg RoC/day; Organics - ng CoC/kg RoC/day; and Dioxins - pg CoC/kg RoC/day.

1 - Total Assimilated = ((Heron Sed Dietary Intake (see Appendix D-5-1a) + Heron Mussel Diet Intake (see Appendix D-5-1b)) x Bioavailabil Factor x Home Range Factor)/Body Weight.

Bioavailability Factor of 85% assumed; see text.

Home range Factor of 1.0 applied; see Table 6.3-1.

Body weight (BW) of 0.883 kg assumed; see text.

2 - Sum of High Molecular Weight PAHs - Benzo(a)anthracene, Benzo(a)pyrene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, and Per

3 - Sum of Low Molecular Weight PAHs - 2-Methylnaphthalene, Acenaphthene, Acenaphthylene, Anthracene, Fluorene, Naphthalene, and

4 - Sum of individual PCB congeners x 2.

5 - 2,3,7,8-TCDD equivalent concentration for prediction of impacts on bird; WHO, 1998.

Appendix D-5-1c. Black-crowned night heron total assimilation of sediment and ribbed mussel for the Raymark Phase III Ecological Risk Assessment Investigation.1

Station	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	HMW PAHs[2]	Indeno(1,2,3-cd)pyrene	LMW PAHs[3]	Perylene	Phenanthrene	Pyrene	Sum PAHs	Total PCBs[4]	o,p'-DDE	p,p'-DDD	p,p'-DDE	p,p'-DDT	Dioxin-Bird[5]
C-1	929	330	2194	297	5599	534	21357	441	3552	3769	39320	5798	120	120	120	120	83.54
C-2	1265	434	2968	361	8131	1032	21553	521	3949	4698	46033	5862	115	123	115	115	160
C-3	1600	692	3072	697	8830	1213	25061	447	4672	5240	52362	7626	113	353	113	113	116
D-1	1053	261	3864	829	7114	274	24940	294	4419	7790	49028	12574	102	827	435	102	27.04
D-2	1729	294	4182	940	10358	441	29945	1652	5015	7692	62501	12410	105	435	368	105	24.57
D-3	12158	2065	32627	1807	77049	9834	59471	3381	32265	34743	225856	6788	112	112	112	112	355
D-4	1988	527	5137	1017	12245	1316	32854	619	7666	7511	69675	12182	136	144	136	136	168
D-5	13148	2267	24937	408	70956	9068	13058	2720	4534	24937	157487	1182116	160	7688	160	160	4019
D-6	1471	423	3149	330	8598	852	20908	534	3691	6427	47076	9664	130	134	130	130	96.84
E-1	5437	953	8968	157	25728	4821	9490	953	5493	9529	69539	1558664	75.08	75.08	75.08	75.08	1787
E-2	3932	608	6077	35.75	16409	3575	5159	572	3110	5720	45499	12426	88.03	494	88.03	88.03	181
E-3	21776	3036	40913	924	110796	15837	28151	4157	16497	40913	261575	4503	71.05	71.05	316	71.05	108
E-4	2895	463	4631	28.95	12273	2740	3504	425	2123	4246	34082	6781	81.98	645	81.98	81.98	151
F-1	16993	3021	30210	736	90064	15105	25443	3965	14161	31154	223669	18855	971	4787	120	558	156
F-2	12734	2911	25923	291	70584	16373	17564	3093	9551	25468	192536	23180	108	2797	1199	959	237
F-3	40059	6907	96695	4236	250025	39138	65568	11051	35915	78277	586247	19416	148	4925	4063	148	125
Reference	1624	2436	2436	2436		812			886	3026	52357	555					82.57

Units: Metals - ug CoC/kg RoC/day; Organics - ng CoC/kg RoC/day; and Dioxins - pg CoC/kg RoC/day.

1 - Total Assimilated = ((Heron Sed Dietary Intake (see Appendix D-5-1a) + Heron Mussel Diet Intake (see Appendix D-5-1b)) x Bioavailability Factor x Home Range Factor)/Body Weight.

Bioavailability Factor of 85% assumed; see text.

Home range Factor of 1.0 applied; see Table 6.3-1.

Body weight (BW) of 0.883 kg assumed; see text.

2 - Sum of High Molecular Weight PAHs - Benzo(a)anthracene, Benzo(a)pyrene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, and Perylene.

3 - Sum of Low Molecular Weight PAHs - 2-Methylnaphthalene, Acenaphthene, Acenaphthylene, Anthracene, Fluorene, Naphthalene, and Phenanthrene.

4 - Sum of individual PCB congeners x 2.

5 - 2,3,7,8-TCDD equivalent concentration for prediction of impacts on bird; WHO, 1998.

Appendix D-5-2a. Raccoon sediment ingestion rates for the Raymark Phase III Ecological Risk Assessment Investigation.[1]

Station	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Silver	Zinc	1,6,7-Trimethylnaphthalene	1-Methylnaphthalene	1-Methylphenanthrene	2,6-Dimethylnaphthalene	2-Methylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo(b+k)fluoranthene	Benzo(e)pyrene	Benzo(g,h,i)perylene
C-1-SED-SMP	6.20	718	2958	1056	5.92	192	6.20	1927	84.52	113	563	113	254	113	648	986	3663	3381	6198	2761	2564
C-2-SED-SMP	8.73	2175	8001	2158	16.62	496	16.06	4761	225	282	1634	338	507	620	2085	3381	10968	10706	17749	6734	7325
C-3-SED-SMP	11.83	1361	14199	3775	22.54	569	13.24	6846	141	169	620	197	394	169	845	1747	6198	5353	8734	4508	3944
D-1-SED-SMP	4.51	403	637	206	1.01	262	1.24	1169	28.17	28.17	28.17	28.17	28.17	28.17	28.17	84.52	254	197	394	197	169
D-2-SED-SMP	9.02	727	2071	820	19.44	510	4.51	3324	42.26	42.26	394	42.26	113	84.52	507	1099	3663	2789	4789	2085	1831
D-3-SED-SMP	59.16	1017	5916	2468	1.66	583	23.95	5015	2479	2169	11551	2676	3944	10142	14932	61981	157770	123962	211299	90154	84520
D-4-SED-SMP	17.75	4846	4367	1586	7.33	620	11.55	4451	169	338	1578	310	563	2141	1268	5635	13805	13523	22820	10142	9297
D-5-SED-SMP	9.58	273	1566	1062	3.38	155	14.65	1597	394	366	1127	310	563	338	3381	5071	18594	16059	26483	10706	9297
D-6-SED-SMP	16.90	1459	7494	1180	12.96	316	7.89	4564	423	225	451	366	451	254	1352	2451	8734	8452	13805	5635	5071
E-1-SED-SMP	1.10	3916	7832	8170	24.79	744	127	5381	479	902	2451	648	1409	592	7325	7607	20566	26765	50993	23102	21412
E-2-SED-SMP	0.97	1493	3663	4874	7.61	482	56.35	2409	282	958	3663	282	1296	282	5916	6480	18594	22539	57192	27610	25074
E-3-SED-SMP	3.38	586	1031	2530	4.23	493	6.76	3240	761	676	7043	648	1014	2226	14650	26765	92972	81702	151290	84798	53529
E-4-SED-SMP	1.37	1344	2800	4310	8.73	558	30.99	2440	211	479	2338	211	704	211	3663	4226	12960	15214	41133	20566	17467
F-1-SED-SMP	22.54	1026	2986	5325	5.35	324	8.45	5381	648	592	6762	930	1127	986	10142	17467	50712	56346	93253	42260	39442
F-2-SED-SMP	4.51	10988	21440	16087	15.50	1857	30.99	27866	733	1521	7325	2198	2789	1662	19156	18594	67616	92972	200030	84520	90154
F-3-SED-SMP	1.20	1344	4902	8818	10.99	671	14.09	10649	2817	6198	9861	4789	3663	30991	26483	90154	309905	273280	487396	214116	202847
Reference	42.26	6508	18622	4451	33.81	1054	84.52	8227					9297	9297	9297	9297	5353	6480	22257		

Units: Metals - ug CoC/day; Organics - ng CoC/day; and Dioxins - pg CoC/day.

1 - Dietary Intake = Sediment Conc.(see Appendix A-1) x Intake Factors (see Table 6.3-1).

2 - Sum of High Molecular Weight PAHs - Benzo(a)anthracene, Benzo(a)pyrene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, and Perylene.

3 - Sum of Low Molecular Weight PAHs - 2-Methylnaphthalene, Acenaphthene, Acenaphthylene, Anthracene, Fluorene, Naphthalene, and Phenanthrene.

4 - Sum of individual PCB congeners x 2.

5 - 2,3,7,8-TCDD equivalent concentration for prediction of impacts on mammal; see WHO, 1998.

Appendix D-5-2a. Raccoon sediment ingestion rates for the Raymark Phase III Ecological Risk Assessment Investigation.[1]

Station	Biphenyl	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	HMW PAHs[2]	Indeno(1,2,3-cd)pyrene	LMW PAHs[3]	Naphthalene	Perylene	Phenanthrene	Pyrene	Sum PAHs	Total PCBs[4]	o,p'-DDE	p,p'-DDD	p,p'-DDE	p,p'-DDT	Dioxin-Mammal[5]
C-1-SED-SMP	84.52	3381	507	5353	141	18003	2733	5184	338	1719	2705	5635	44035	1076	10.85	10.85	10.85	10.85	130
C-2-SED-SMP	169	10706	1634	18313	845	54938	8170	19721	733	2592	11551	19156	138443	4482	15.50	107	15.50	15.50	376
C-3-SED-SMP	169	5071	789	8734	282	27920	4226	7860	761	1775	3663	10424	68912	1707	16.90	16.90	16.90	16.90	283
D-1-SED-SMP	28.17	225	28.17	479	28.17	1578	169	620	84.52	394	338	507	3775	541	11.27	11.27	11.27	11.27	65.84
D-2-SED-SMP	42.26	3099	394	5635	113	27413	2000	4536	282	11833	2338	5071	48289	1011	18.31	18.31	18.31	18.31	79.78
D-3-SED-SMP	5916	129597	19440	338078	13523	802654	104241	420344	5916	33808	309905	338078	2076082	1230	9.16	9.16	9.16	9.16	722
D-4-SED-SMP	169	13241	2085	25636	1521	71391	10706	33751	930	3099	21693	25638	186309	5285	15.50	104	15.50	15.50	376
D-5-SED-SMP	368	16340	2817	30991	507	88182	11269	16228	733	3381	5635	30991	195719	142415	11.69	563	11.69	11.69	6387
D-6-SED-SMP	141	7607	1240	11269	225	39752	5916	9579	620	2451	4226	13805	95169	1572	11.27	50.71	11.27	11.27	143
E-1-SED-SMP	394	27328	4789	45077	789	129315	24229	47697	2367	4789	27610	47894	349517	1174259	35.22	35.22	35.22	35.22	6497
E-2-SED-SMP	282	30991	4789	47894	282	129315	28173	40654	1888	4508	24511	45077	358560	24967	116	648	116	116	921
E-3-SED-SMP	2507	92972	12960	174674	3944	473028	67616	120187	1155	17749	70433	174674	1116757	2598	25.36	25.36	113	25.36	407
E-4-SED-SMP	211	21130	3381	33808	211	89591	20003	25581	1071	3099	15495	30991	248783	11044	85.93	676	85.93	85.93	1027
F-1-SED-SMP	845	50712	9015	90154	2198	268772	45077	75927	1747	11833	42260	92972	667479	6514	206	1014	25.36	118	382
F-2-SED-SMP	986	78885	18031	160587	1803	437248	101423	108805	5635	19158	59164	157770	1192712	25891	78.07	1972	845	676	1222
F-3-SED-SMP	9579	245107	42260	591637	25919	1529604	239472	401186	4226	67616	219751	478944	3587011	21141	101	3381	2789	101	525
Reference		6196	9297	9297	9297		3099		9297		3381	11551	199661	2118					255

Units: Metals - ug CoC/day; Organics - ng CoC/day; and Dioxins - pg CoC/day.

1 - Dietary Intake = Sediment Conc.(see Appendix A-1) x Intake Factors (see Table 6.3-1).

2 - Sum of High Molecular Weight PAHs - Benzo(a)anthracene, Benzo(a)pyrene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, and Perylene.

3 - Sum of Low Molecular Weight PAHs - 2-Methylnaphthalene, Acenaphthene, Acenaphthylene, Anthracene, Fluorene, Naphthalene, and Phenanthrene.

4 - Sum of individual PCB congeners x 2.

5 - 2,3,7,8-TCDD equivalent concentration for prediction of impacts on mammal; see WHO, 1998.

Appendix D-5-2b. Raccoon ribbed mussel ingestion rates for the Raymark Phase III Ecological Risk Assessment Investigation.[1]

Station[2]	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	1,6,7-Trimethylnaphthalene	1-Methylnaphthalene	1-Methylphenanthrene	2,6-Dimethylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo(b+k)fluoranthene	Benzo(e)pyrene	Benzo(g,h,i)perylene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene
C-1-TISS-SMP	132	360	7253	330	28.77	252	20441	1648	26974	1648	1648	6893	1648	1648	4496	1648	3297	1648	1648	3597	1648	9891
C-2-TISS-SMP	201	510	12768	480	32.97	219	18133	1648	29072	1648	1648	4496	1648	1648	3896	1648	3297	1648	1648	1648	1648	7493
C-3-TISS-SMP	153	689	11119	459	29.97	186	17443	1648	32969	1648	1648	5095	3597	1648	7493	3896	10190	4496	5695	6594	3597	13187
D-1-TISS-SMP	222	300	5005	285	26.67	150	17713	1499	29072	1499	1499	7493	4196	3597	7793	1499	7493	7193	1499	5994	1499	22179
D-2-TISS-SMP	147	255	5964	207	27.57	156	17503	1499	41960	1499	5994	7193	4496	3597	9591	1499	11689	8092	4496	8392	1499	21280
D-3-TISS-SMP	297	300	5425	279	29.97	171	20620	1648	28173	1648	1648	5695	1648	1648	4196	1648	3297	1648	1648	1648	1648	9591
D-4-TISS-SMP	171	539	6144	300	29.97	207	19931	1948	47954	1948	1948	8692	4196	1948	6594	1948	3896	5994	1948	4496	1948	16185
D-5	336	128	5449	503	33.27	84.62	11776	1633	1516	4665	1283	1400	13995	20993	76974	66478	109630	44319	38487	67644	11663	128291
D-6-TISS-SMP	330	839	8932	480	41.96	225	20980	1798	27873	1798	1798	4795	1798	1798	6594	1798	3597	5395	1798	4496	1798	12288
E-1	38.54	1840	27243	3870	244	406	39668	298	562	1527	404	369	4565	4740	12817	16679	31778	14397	13343	17030	2985	28091
E-2	34.09	702	12740	2308	74.86	263	17757	57.70	196	750	57.70	57.70	1212	1327	3808	4616	11712	5654	5135	6347	981	9808
E-3	119	275	3587	1198	41.59	269	23884	630	560	5831	536	1843	12129	22159	76974	67644	125258	53649	44319	76974	10730	144619
E-4	47.93	631	9741	2042	85.95	305	17986	55.66	126	616	55.66	55.66	965	1113	3414	4008	10836	5418	4602	5566	891	8906
F-1	791	482	10388	2522	52.68	177	39668	916	836	9558	1314	1394	14337	24691	71684	79648	131818	59736	55754	71684	12744	127437
F-2	158	5163	74576	7619	152	1014	203950	297	617	2969	891	674	7764	7536	27404	37680	81069	34254	36538	31971	7308	65083
F-3	42.00	631	17052	4177	108	366	78506	1175	2584	4111	1997	12921	11042	37589	129214	113943	203218	89275	84576	102196	17620	246681
Reference	1482	3058	64776	2108	333	575	60645					9195	9195	9195	5294	6409	22012			6130	9195	9195

Units: Metals - ug CoC/day; Organics - ng CoC/day; Dioxins - pg CoC/day.

1 - Dietary Intake = Tissue Conc. x Intake Factors; see Table 6.3-1.

2 - Tissue values predicted for D-5, E-1 to E-4, F-1 to F-3, and Ref.; see Appendix D-3-5 for predicted values and Appendix A-3 for measured values.

3 - Sum of High Molecular Weight PAHs - Benzo(a)anthracene, Benzo(a)pyrene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, and Perylene.

4 - Sum of Low Molecular Weight PAHs - 2-Methylnaphthalene, Acenaphthene, Acenaphthylene, Anthracene, Fluorene, Naphthalene, and Phenanthrene.

5 - Sum of individual PCB congeners x 2.

6 - 2,3,7,8-TCDD equivalent concentration for prediction of impacts on mammal; see WHO, 1998.

Appendix D-5-2b. Raccoon ribbed mussel ingestion rates for the Raymark Phase III Ecological Risk Assessment Investigation.[1]

Station[2]	Fluorene	HMW PAHs[3]	Indeno(1,2,3-cd)pyrene	LMW PAHs[4]	Perylene	Phenanthrene	Pyrene	Sum PAHs	Total PCBs[5]	o,p'-DDE	p,p'-DDD	p,p'-DDE	p,p'-DDT	Dioxin-Mammal[6]
C-1-TISS-SMP	1648	22928	1648	121235	1648	19182	18882	204855	33089	689	689	689	689	850
C-2-TISS-SMP	1648	17983	1648	114641	1648	16784	17084	193616	31650	659	659	659	659	1033
C-3-TISS-SMP	3896	36415	4795	141316	1648	25176	24876	267346	43369	644	2038	644	644	587
D-1-TISS-SMP	4795	40461	1499	144463	1499	25476	44957	282631	72711	584	4795	2518	584	330
D-2-TISS-SMP	5395	45557	1499	171437	3297	27873	41960	337179	71512	599	2518	2128	599	200
D-3-TISS-SMP	3297	20381	1648	121684	1648	22479	21879	206953	38753	644	644	644	644	3071
D-4-TISS-SMP	5095	33118	1948	172786	1948	32969	29971	305409	67915	779	779	779	779	942
D-5	2099	365046	46651	67178	13995	23326	128291	810215	6787255	920	44336	920	920	38828
D-6-TISS-SMP	1798	28773	1798	116289	1798	19182	29971	222688	55267	749	749	749	749	810
E-1	492	80586	15099	29724	2985	17206	29847	217811	8424532	417	417	417	417	5946
E-2	57.70	26482	5770	8326	923	5020	9231	73429	58864	450	2522	450	450	277
E-3	3266	391637	55981	99507	14695	58314	144619	924604	24759	399	399	1773	399	495
E-4	55.66	23601	5269	6739	816	4082	8164	65538	33494	430	3386	430	430	397
F-1	3106	379923	63719	107326	16726	59736	131420	943515	106000	5526	27251	681	3179	792
F-2	731	177209	41105	44097	7764	23978	63942	483386	120804	586	15192	6511	5209	727
F-3	10807	637846	99847	167273	28192	91624	199694	1495591	101480	804	26793	22104	804	321
Reference	9195		3065			3344	11424	197663	2095					371

Units: Metals - ug CoC/day; Organics - ng CoC/day; Dioxins - pg CoC/day.

1 - Dietary Intake = Tissue Conc. x Intake Factors; see Table 6.3-1.

2 - Tissue values predicted for D-5, E-1 to E-4, F-1 to F-3, and Ref.; see Appendix D-3-5 for predicted values and Appendix A-3 for measured values.

3 - Sum of High Molecular Weight PAHs - Benzo(a)anthracene, Benzo(a)pyrene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, and Perylene.

4 - Sum of Low Molecular Weight PAHs - 2-Methylnaphthalene, Acenaphthene, Acenaphthylene, Anthracene, Fluorene, Naphthalene, and Phenanthrene.

5 - Sum of individual PCB congeners x 2.

6 - 2,3,7,8-TCDD equivalent concentration for prediction of impacts on mammal; see WHO, 1998.

Appendix D-5-2c. Raccoon total assimilation of sediment and ribbed mussel for the Raymark Phase III Ecological Risk Assessment Investigation.[1]

Station	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Silver	Zinc	1,6,7-Trimethylnaphthalene	1-Methylnaphthalene	1-Methylphenanthrene	2,6-Dimethylnaphthalene	2-Methylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo(b+k)fluoranthene	Benzo(e)pyrene	Benzo(g,h,i)perylene
C-1	19.56	153	1447	196	4.91	62.81	51.83	3169	246	3837	313	249	3900	993	325	373	1158	712	1345	625	597
C-2	29.69	380	2942	374	7.03	101	82.95	3243	265	4158	465	281	3681	725	529	712	2109	1750	2982	1471	1271
C-3	23.33	290	3587	628	7.44	107	48.58	3441	253	4695	321	261	4726	746	829	481	1940	1310	2681	1275	1366
D-1	32.06	99.53	799	69.47	3.92	58.35	27.77	2675	216	4123	218	216	5524	1065	598	521	1140	240	1117	1047	236
D-2	22.06	139	1138	145	6.66	94.32	43.10	2951	218	5950	268	855	6810	1031	709	865	1878	607	2334	1442	898
D-3	50.42	187	1607	389	4.48	107	42.03	3632	585	4299	1870	613	4805	2244	2349	9014	22945	17795	30401	13005	12207
D-4	26.72	763	1489	267	5.28	117	48.34	3454	300	6841	499	320	6024	1535	774	1074	2890	2192	3785	2286	1593
D-5	48.96	56.91	994	222	5.19	33.94	169	1895	287	267	821	226	410	246	2482	3692	13539	11693	19283	7795	6789
D-6	49.10	326	2327	235	7.78	76.55	36.78	3619	315	3981	319	307	4734	715	446	602	2171	1452	2465	1563	973
E-1	5.62	815	4969	1706	38.06	163	1467	6382	110	207	564	149	324	136	1684	1749	4729	6155	11726	5312	4924
E-2	4.97	311	2324	1018	11.68	106	652	2857	48.09	163	825	48.09	221	46.09	1010	1106	3174	3847	9761	4712	4280
E-3	17.28	122	654	528	6.49	108	78.22	9843	197	175	1824	168	263	576	3794	6931	24076	21157	39178	16780	13862
E-4	6.98	280	1777	900	13.41	122	359	2894	37.82	85.72	419	37.82	126	37.82	656	756	2320	2723	7362	3681	3126
F-1	115	214	1895	1112	8.22	70.96	97.78	6382	222	202	2312	318	385	337	3468	5972	17339	19286	31885	14449	13486
F-2	23.04	2288	13602	3358	23.80	407	359	32812	146	303	1458	437	555	331	3814	3702	13461	18509	39822	16826	17948
F-3	6.12	280	3110	1841	16.87	147	163	12630	566	1244	1979	981	735	6221	5316	18097	82209	54857	97637	42960	40718
Reference	216	1355	11815	929	51.92	231	978	9757					2620	2620	2620	2620	1506	1826	6271		

Units: Metals - ug CoC/kg RoC/day; Organics -ng CoC/kg RoC/day; and Dioxins - pg CoC/kg RoC/day.

1 - Total Assimilated = ((Raccoon Sed Dietary Intake (Appendix D-5-2a)+ Raccoon Mussel Diet Intake (Appendix D-5-2b)) x Bioavailability Factor x Home Range Factor)/Body Weight

Bioavailability Factor of 85% assumed; see text.

Home range Factor of 1.0 applied; see Table 6.3-1.

Body weight (BW) of 6.00 kg assumed; see text.

2 - Sum of High Molecular Weight PAHs - Benzo(a)anthracene, Benzo(a)pyrene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, and Perylene.

3 - Sum of Low Molecular Weight PAHs - 2-Methylnaphthalene, Acenaphthene, Acenaphthylene, Anthracene, Fluorene, Naphthalene, and Phenanthrene.

4 - Sum of Individual PCB congeners x 2.

5 - 2,3,7,8-TCDD equivalent concentration for prediction of impacts on mammal; see WHO, 1998.

Appendix D-5-2c. Raccoon total assimilation of sediment and ribbed mussel for the Raymark Phase III Ecological Risk Assessment Investigation.[1]

Station	Biphenyl	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	HMW PAHs[2]	Indeno(1,2,3-cd)pyrene	LMW PAHs[3]	Naphthalene	Perylene	Phenanthrene	Pyrene	Sum PAHs	Total PCBs[4]	p,p'-DDE	p,p'-DDD	p,p'-DDE	p,p'-DDT	Dioxin-Mammal[5]
C-1	246	988	305	2159	253	5799	621	17909	8964	477	3101	3473	35259	4840	99.19	99.19	99.19	99.19	139
C-2	257	1750	465	3658	353	10330	1391	19035	9020	601	4014	5134	47042	5119	95.61	109	95.61	95.61	200
C-3	257	1653	621	3105	592	9114	1278	21133	9873	485	4085	5001	47836	6386	93.68	291	93.68	93.68	123
D-1	216	881	216	3210	683	5956	236	20553	8504	268	3657	6441	40574	10377	84.39	881	358	84.39	58.02
D-2	218	1628	268	3813	780	10337	498	24929	10655	2143	4280	6663	54806	10274	87.51	359	304	87.51	39.59
D-3	1072	18593	2987	49253	2363	116597	15001	76787	8905	5023	47088	50994	323430	5864	92.59	92.59	92.59	92.59	537
D-4	300	2513	571	5925	937	14805	1793	29259	11171	715	7744	7878	69660	10370	113	125	113	113	187
D-5	267	11898	2051	22565	369	64207	8205	11816	533	2462	4103	22565	142507	981703	132	6361	132	132	6406
D-6	275	1715	430	3337	287	9708	1093	17831	7731	602	3316	8202	45030	8052	108	113	108	108	135
E-1	90.70	8284	1101	10365	181	29736	5571	10968	544	1101	6349	11013	80371	1359829	64.08	64.08	64.08	64.08	1763
E-2	48.09	5289	817	8175	48.09	22071	4809	8939	322	789	4183	7694	61199	11876	80.06	449	80.06	80.06	170
E-3	649	24076	3356	45233	1021	122494	17510	31123	299	4596	18239	45233	289193	3876	60.12	60.12	267	60.12	128
E-4	37.82	3782	605	6051	37.82	16036	3580	4579	192	555	2773	5547	44529	6310	73.13	575	73.13	73.13	202
F-1	289	17339	3083	30825	751	91898	15413	25961	597	4046	14449	31789	226224	15939	812	4004	100	467	166
F-2	196	15705	3590	31970	359	87048	20192	21661	1122	3814	11778	31409	237447	20782	93.79	2432	1042	834	278
F-3	1923	49201	8483	118782	5203	307084	48070	80532	848	13573	44111	96140	720035	17371	128	4275	3527	128	120
Reference		1748	2620	2620	2620		673		2620		953	3255	56316	597					88.76

Units: Metals - ug CoC/kg RoC/day; Organics -ng CoC/kg RoC/day; and Dioxins - pg CoC/kg RoC/day.

1 - Total Assimilated = ((Raccoon Sed Dietary Intake (Appendix D-5-2a)+ Raccoon Mussel Diet Intake (Appendix D-5-2b)) x Bioavailability Factor x Home Range Factor)/Body Weight

Bioavailability Factor of 85% assumed; see text.

Home range Factor of 1.0 applied; see Table 6.3-1.

Body weight (BW) of 6.00 kg assumed; see text.

2 - Sum of High Molecular Weight PAHs - Benzo(a)anthracene, Benzo(a)pyrene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, and Perylene.

3 - Sum of Low Molecular Weight PAHs - 2-Methylnaphthalene, Acenaphthene, Acenaphthylene, Anthracene, Fluorene, Naphthalene, and Phenanthrene.

4 - Sum of individual PCB congeners x 2.

5 - 2,3,7,8-TCDD equivalent concentration for prediction of impacts on mammal; see WHO, 1998.

Appendix D-5-3. Qualitative summary of CoC risks to the Black Crowned Night Heron in the Raymark Phase III Ecological Risk Assessment.

Black Crown Night Heron HQ (Benchmark = TRV-Dose)[1].

Station	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	1,6,7-Trimethylnaphthalene	1-Methylnaphthalene	1-Methylphenanthrene	2,6-Dimethylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b + k)fluoranthene	Benzo(e)pyrene	Benzo(g,h,i)perylene	Chrysene
TRV	1450	1000	28130	2050	32.00	77400	11300	3.4E+07	3.4E+07	3.4E+07	3.4E+07	3.4E+07	3.4E+07	3.4E+07	3.4E+07	3.4E+07	3.4E+07	3.4E+07	3.4E+07	3.4E+07
C-1	0.02	0.13	0.05	0.07	0.17	7.87E-04	0.33	8.63E-06	1.38E-04	9.93E-06	8.71E-06	3.54E-05	1.02E-05	1.11E-05	3.28E-05	1.76E-05	3.36E-05	1.59E-05	1.53E-05	2.75E-05
C-2	0.02	0.29	0.10	0.14	0.23	1.07E-03	0.31	9.01E-06	1.49E-04	1.28E-05	9.32E-06	2.48E-05	1.41E-05	1.76E-05	4.96E-05	3.74E-05	6.49E-05	3.21E-05	2.83E-05	3.74E-05
C-3	0.02	0.24	0.11	0.22	0.23	1.09E-03	0.32	8.78E-06	1.68E-04	1.01E-05	8.93E-06	2.64E-05	2.06E-05	1.31E-05	5.50E-05	3.44E-05	7.56E-05	3.51E-05	3.97E-05	4.73E-05
D-1	0.03	0.09	0.03	0.03	0.15	6.44E-04	0.28	7.71E-06	1.48E-04	7.71E-06	7.71E-06	3.83E-05	2.15E-05	1.86E-05	4.04E-05	8.17E-06	3.93E-05	3.72E-05	8.09E-06	3.12E-05
D-2	0.02	0.11	0.04	0.05	0.20	9.50E-04	0.29	7.75E-06	2.14E-04	8.71E-06	3.07E-05	3.69E-05	2.43E-05	2.13E-05	5.88E-05	1.52E-05	7.25E-05	4.69E-05	2.79E-05	5.12E-05
D-3	0.04	0.14	0.05	0.13	0.17	1.07E-03	0.35	1.51E-05	1.49E-04	3.97E-05	1.57E-05	5.65E-05	4.89E-05	1.76E-04	4.49E-04	3.44E-04	5.90E-04	2.53E-04	2.38E-04	3.60E-04
D-4	0.02	0.54	0.05	0.10	0.18	1.19E-03	0.34	1.04E-05	2.46E-04	1.42E-05	1.08E-05	5.01E-05	2.48E-05	2.52E-05	7.10E-05	4.86E-05	6.17E-05	5.80E-05	3.51E-05	5.88E-05
D-5	0.04	0.05	0.04	0.09	0.19	3.72E-04	0.19	9.39E-06	8.72E-06	2.68E-05	7.38E-06	8.05E-06	8.05E-05	1.21E-04	4.43E-04	3.82E-04	6.30E-04	2.55E-04	2.21E-04	3.89E-04
D-6	0.04	0.28	0.08	0.09	0.26	8.74E-04	0.36	1.03E-05	1.43E-04	1.04E-05	1.02E-05	2.51E-05	1.28E-05	1.58E-05	5.73E-05	3.21E-05	5.57E-05	4.28E-05	2.29E-05	4.35E-05
E-1	4.65E-03	0.68	0.19	0.69	1.38	1.78E-03	0.65	2.82E-06	5.31E-06	1.44E-05	3.81E-06	3.48E-06	4.31E-05	4.48E-05	1.21E-04	1.58E-04	3.00E-04	1.38E-04	1.28E-04	1.61E-04
E-2	4.11E-03	0.26	0.09	0.41	0.42	1.16E-03	0.29	1.06E-06	3.60E-06	1.37E-05	1.06E-06	1.06E-06	2.22E-05	2.43E-05	6.98E-05	8.46E-05	2.15E-04	1.04E-04	9.41E-05	1.16E-04
E-3	0.01	0.10	0.03	0.21	0.24	1.18E-03	0.39	5.27E-06	4.69E-06	4.88E-05	4.49E-06	1.54E-05	1.02E-04	1.85E-04	6.44E-04	5.86E-04	1.05E-03	4.49E-04	3.71E-04	6.44E-04
E-4	5.78E-03	0.23	0.07	4.96	0.49	1.34E-03	0.29	8.56E-07	1.94E-06	9.48E-06	8.56E-07	8.56E-07	1.48E-05	1.71E-05	5.25E-05	8.17E-05	1.67E-04	8.34E-05	7.08E-05	8.56E-05
F-1	0.10	0.18	0.07	0.45	0.30	7.77E-04	0.65	6.42E-06	5.87E-06	6.70E-05	9.22E-06	9.78E-06	1.01E-04	1.73E-04	5.03E-04	5.59E-04	9.25E-04	4.19E-04	3.91E-04	5.03E-04
F-2	0.02	1.90	0.53	1.36	0.87	4.45E-03	3.33	3.50E-06	7.27E-06	3.50E-05	1.05E-05	7.94E-06	9.15E-05	8.88E-05	3.23E-04	4.44E-04	9.55E-04	4.04E-04	4.31E-04	3.77E-04
F-3	5.06E-03	0.23	0.12	0.75	0.61	1.61E-03	1.28	1.36E-05	3.00E-05	4.77E-05	2.32E-05	1.50E-04	1.28E-04	4.36E-04	1.50E-03	1.32E-03	2.36E-03	1.04E-03	9.81E-04	1.19E-03
Reference	0.18	1.12	0.46	0.38	1.89	2.53E-03	0.99					7.21E-05	7.21E-05	7.21E-05	4.15E-05	5.02E-05	1.73E-04			4.80E-05

TRV = Toxicity Reference Value. Units: Metals - ug CoC/kg RoC/day; Organics - ng CoC/kg RoC/day; and Dioxins - pg CoC/kg RoC/day; Table 6.3-2a.

1 - HQ = Hazard Quotient = Total Assimilated (Appendix D-5-1c)/TRV (Table 6.3-2a).

2 - Sum of High Molecular Weight PAHs - Benzo(a)anthracene, Benzo(e)pyrene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, and Perylene.

3 - Sum of Low Molecular Weight PAHs - 2-Methylnaphthalene, Acenaphthene, Acenaphthylene, Anthracene, Fluorene, Naphthalene, and Phenanthrene

4 - Total PCBs = Sum of Congeners x 2.

5 - 2,3,7,8-TCDD equivalent concentration for prediction of impacts on bird; see WHO, 1998

Appendix D-5-3. Qualitative summary of CoC risks to the Black Crowned Night Heron in the Raymark Phase III Ecological Risk Assessment.

Station	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	HMW PAHs[2]	Indeno(1,2,3-cd)pyrene	LMW PAHs[3]	Perylene	Phenanthrene	Pyrene	Sum PAHs	Total PCBs[4]	o,p'-DDE	p,p'-DDD	p,p'-DDE	p,p'-DDT	Dioxin-Mammal	Dioxin-Fish	Dioxin-Bird[5]
TRV	3.4E+07	3.4E+07	3.4E+07		3.4E+07		3.4E+07	3.4E+07	3.4E+07		1.8E+05	2.8E+03	2.8E+03	2.8E+03	2.8E+03	1.4E+04	1.4E+04	1.4E+04
C-1	9.78E-06	6.49E-05	8.78E-06		1.58E-05		1.31E-05	1.05E-04	1.11E-04		0.03	0.04	0.04	0.04	0.04	0.01	4.04E-03	5.97E-03
C-2	1.28E-05	8.78E-05	1.07E-05		3.05E-05		1.54E-05	1.17E-04	1.39E-04		0.03	0.04	0.04	0.04	0.04	0.02	5.93E-03	0.01
C-3	2.05E-05	9.09E-05	2.06E-05		3.59E-05		1.32E-05	1.36E-04	1.55E-04		0.04	0.04	0.13	0.04	0.04	9.07E-03	3.89E-03	8.30E-03
D-1	7.71E-06	1.14E-04	2.45E-05		8.09E-06		8.71E-06	1.31E-04	2.30E-04		0.07	0.04	0.30	0.16	0.04	4.49E-03	1.70E-03	1.93E-03
D-2	8.71E-06	1.24E-04	2.78E-05		1.31E-05		4.89E-05	1.46E-04	2.26E-04		0.07	0.04	0.16	0.13	0.04	2.98E-03	1.21E-03	1.75E-03
D-3	6.11E-05	9.65E-04	5.35E-05		2.91E-04		1.00E-04	9.55E-04	1.03E-03		0.04	0.04	0.04	0.04	0.04	0.04	0.02	0.03
D-4	1.56E-05	1.52E-04	3.01E-05		3.89E-05		1.83E-05	2.27E-04	2.22E-04		0.07	0.05	0.05	0.05	0.05	0.01	5.74E-03	0.01
D-5	6.71E-05	7.38E-04	1.21E-05		2.68E-04		8.05E-05	1.34E-04	7.38E-04		6.57	0.06	2.75	0.06	0.06	0.52	0.20	0.29
D-6	1.25E-05	9.32E-05	9.78E-06		2.52E-05		1.58E-05	1.09E-04	1.90E-04		0.05	0.05	0.05	0.05	0.05	0.01	3.89E-03	6.92E-03
E-1	2.82E-05	2.65E-04	4.64E-06		1.43E-04		2.82E-05	1.63E-04	2.82E-04		8.86	0.03	0.03	0.03	0.03	0.12	0.06	0.13
E-2	1.80E-05	1.80E-04	1.06E-06		1.06E-04		1.69E-05	9.20E-05	1.69E-04		0.07	0.03	0.18	0.03	0.03	9.44E-03	6.46E-03	0.01
E-3	8.98E-05	1.21E-03	2.73E-05		4.69E-04		1.23E-04	4.86E-04	1.21E-03		0.03	0.03	0.03	0.11	0.03	6.76E-03	4.58E-03	7.72E-03
E-4	1.37E-05	1.37E-04	8.56E-07		8.11E-05		1.26E-05	6.28E-05	1.26E-04		0.04	0.03	0.23	0.03	0.03	0.01	7.42E-03	0.01
F-1	8.94E-05	8.94E-04	2.18E-05		4.47E-04		1.17E-04	4.19E-04	9.22E-04		0.10	0.35	1.71	0.04	0.20	0.01	5.13E-03	0.01
F-2	8.61E-05	7.67E-04	8.61E-06		4.84E-04		9.15E-05	2.63E-04	7.54E-04		0.13	0.04	1.00	0.43	0.34	0.02	8.88E-03	0.02
F-3	2.04E-04	2.86E-03	1.25E-04		1.16E-03		3.27E-04	1.08E-03	2.32E-03		0.11	0.05	1.76	1.45	0.06	7.39E-03	3.90E-03	6.96E-03
Reference	7.21E-05	7.21E-05	7.21E-05		2.40E-05			2.62E-05	8.95E-05		3.08E-03					6.24E-03	2.86E-03	5.90E-03

TRV = Toxicity Reference Value. Units: Metals - ug CoC/kg RoC/day; Organics - ng CoC/kg RoC/day; and Dioxins - pg CoC/kg RoC/day; Table 6.3-2a.

1 - HQ = Hazard Quotient = Total Assimilated (Appendix D-5-1c)/TRV (Table 6.3-2a).

2 - Sum of High Molecular Weight PAHs - Benzo(a)anthracene, Benzo(a)pyrene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, and Perylene.

3 - Sum of Low Molecular Weight PAHs - 2-Methylnaphthalene, Acenaphthene, Acenaphthylene, Anthracene, Fluorene, Naphthalene, and Phenanthrene.

4 - Total PCBs = Sum of Congeners x 2.

5 - 2,3,7,8-TCDD equivalent concentration for prediction of impacts on bird; see WHO, 1998

Appendix D-5-4. Qualitative summary of CoC risks to raccoons in the Raymark Phase III Ecological Risk Assessment.

Raccoon HQ (Benchmark = TRV-Dose)[1].

Station	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	1,6,7-Trimethylnaphthalene	1-Methylnaphthalene	1-Methylphenanthrene	2,6-Dimethylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b + k)fluoranthene	Benzo(e)pyrene	Benzo(g,h,i)perylene
TRV	1000	3280	11710	8000	32.00	40000	160000	0.0E+00	4.3E+08	0.0E+00	0.0E+00	1.8E+08	2.6E+07	5.0E+08	4.5E+05	1.0E+06	0.0E+00	0.0E+00	0.0E+00
C-1	0.02	0.05	0.12	0.02	0.15	1.57E-03	0.02		9.03E-06			5.67E-06	1.27E-05	7.46E-07	2.57E-03	7.12E-04			
C-2	0.03	0.12	0.25	0.05	0.22	2.53E-03	0.02		9.78E-06			4.14E-06	2.06E-05	1.42E-06	4.69E-03	1.75E-03			
C-3	0.02	0.09	0.31	0.08	0.23	2.67E-03	0.02		1.10E-05			4.26E-06	2.45E-05	9.62E-07	4.31E-03	1.31E-03			
D-1	0.03	0.03	0.07	8.68E-03	0.12	1.46E-03	0.02		9.70E-06			6.09E-06	2.33E-05	1.04E-06	2.53E-03	2.40E-04			
D-2	0.02	0.04	0.10	0.02	0.21	2.36E-03	0.02		1.40E-05			5.89E-06	2.76E-05	1.33E-06	4.17E-03	6.07E-04			
D-3	0.05	0.06	0.14	0.05	0.14	2.67E-03	0.02		1.01E-05			1.28E-05	9.14E-05	1.80E-05	0.05	0.02			
D-4	0.03	0.23	0.13	0.03	0.17	2.93E-03	0.02		1.61E-05			8.77E-06	3.01E-05	2.15E-06	6.42E-03	2.19E-03			
D-5	0.05	0.02	0.06	0.03	0.16	8.48E-04	0.01		6.27E-07			1.41E-06	9.58E-05	7.38E-06	0.03	0.01			
D-6	0.05	0.10	0.20	0.03	0.24	1.91E-03	0.02		9.37E-06			4.09E-06	1.74E-05	1.20E-06	4.83E-03	1.45E-03			
E-1	5.62E-03	0.25	0.42	0.21	1.19	4.07E-03	0.04		4.88E-07			7.77E-07	6.55E-05	3.50E-06	0.01	6.15E-03			
E-2	4.97E-03	0.09	0.20	0.13	0.37	2.64E-03	0.02		3.85E-07			2.75E-07	3.93E-05	2.21E-06	7.05E-03	3.85E-03			
E-3	0.02	0.04	0.06	0.07	0.20	2.70E-03	0.02		4.12E-07			3.29E-06	1.48E-04	1.39E-05	0.05	0.02			
E-4	6.98E-03	0.09	0.15	0.11	0.42	3.05E-03	0.02		2.02E-07			2.18E-07	2.55E-05	1.51E-06	5.15E-03	2.72E-03			
F-1	0.12	0.07	0.16	0.14	0.26	1.77E-03	0.04		4.76E-07			1.93E-06	1.35E-04	1.19E-05	0.04	0.02			
F-2	0.02	0.70	1.16	0.42	0.74	0.01	0.21		7.13E-07			1.89E-06	1.48E-04	7.40E-06	0.03	0.02			
F-3	6.12E-03	0.09	0.27	0.23	0.53	3.67E-03	0.08		2.93E-06			3.55E-05	2.07E-04	3.62E-05	0.14	0.05			
Reference	0.22	0.41	1.01	0.12	1.62	5.77E-03	0.06					1.50E-05	1.02E-04	5.24E-06	3.35E-03	1.83E-03			

TRV- Toxicity Reference Value. Units: Metals - ug CoC/kg RoC/day; Organics - ng CoC/kg RoC/day; and Dioxins - pg CoC/kg RoC/day.

1 - Hazard Quotient (HQ) = Total Assimilated (Appendix D-5-2c)/TRV (Table 6.3-2b).

2 - Sum of High Molecular Weight PAHs - Benzo(a)anthracene, Benzo(a)pyrene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, and Perylene.

3 - Sum of Low Molecular Weight PAHs - 2-Methylnaphthalene, Acenaphthene, Acenaphthylene, Anthracene, Fluorene, Naphthalene, and Phenanthrene.

4 - Total PCBs = Sum of Congeners x 2.

5 - 2,3,7,8-TCDD equivalent concentration for prediction of impacts on mammal; see WHO, 1998.

Appendix D-5-4. Qualitative summary of CoC risks to raccoons in the Raymark Phase III Ecological Risk Assessment.

Raccoon HQ (Benchmark = TRV-Dose)[1].

Station	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	HMW PAHs[2]	Indeno(1,2,3-cd)pyrene	LMW PAHs[3]	Perylene	Phenanthrene	Pyrene	Total PAHs	Total PCBs[4]	o,p'-DDE	p,p'-DDD	p,p'-DDE	p,p'-DDT	Dioxin-Mammal[5]
TRV	0.0E+00	7.7E+06	5.0E+07	2.5E+08		0.0E+00		0.0E+00	2.6E+08	2.2E+08		1.4E+05	9.5E+06	2.5E+07	9.5E+06	5.6E+06	1.0E+06
C-1		3.97E-05	4.32E-05	1.01E-06					1.21E-05	1.59E-05		0.03	1.04E-05	3.97E-06	1.04E-05	1.76E-05	1.39E-04
C-2		6.04E-05	7.31E-05	1.41E-06					1.56E-05	2.35E-05		0.04	1.01E-05	4.34E-06	1.01E-05	1.70E-05	2.00E-04
C-3		8.07E-05	6.21E-05	2.37E-06					1.59E-05	2.29E-05		0.05	9.86E-06	1.16E-05	9.86E-06	1.67E-05	1.23E-04
D-1		2.81E-05	6.42E-05	2.73E-06					1.42E-05	2.95E-05		0.07	8.88E-06	2.72E-05	3.77E-05	1.50E-05	5.60E-05
D-2		3.48E-05	7.63E-05	3.12E-06					1.67E-05	3.05E-05		0.07	9.21E-06	1.44E-05	3.20E-05	1.58E-05	3.96E-05
D-3		3.88E-04	9.85E-04	9.53E-06					1.83E-04	2.33E-04		0.04	9.75E-06	3.70E-06	9.75E-06	1.65E-05	5.37E-04
D-4		7.42E-05	1.18E-04	3.75E-06					3.01E-05	3.61E-05		0.07	1.19E-05	5.01E-06	1.19E-05	2.00E-05	1.87E-04
D-5		2.66E-04	4.51E-04	1.48E-06					1.60E-05	1.03E-04		7.01	1.39E-05	2.54E-04	1.39E-05	2.35E-05	6.41E-03
D-6		5.59E-05	6.67E-05	1.15E-06					1.29E-05	2.84E-05		0.06	1.13E-05	4.53E-06	1.13E-05	1.92E-05	1.35E-04
E-1		1.43E-04	2.07E-04	7.26E-07					2.47E-05	5.04E-05		9.71	6.75E-06	2.56E-06	6.75E-06	1.14E-05	1.76E-03
E-2		1.06E-04	1.63E-04	1.92E-07					1.63E-05	3.52E-05		0.08	8.43E-06	1.80E-05	8.43E-06	1.42E-05	1.70E-04
E-3		4.36E-04	9.05E-04	4.09E-06					7.10E-05	2.07E-04		0.03	6.33E-06	2.40E-06	2.81E-05	1.07E-05	1.28E-04
E-4		7.86E-05	1.21E-04	1.51E-07					1.08E-05	2.54E-05		0.05	7.70E-06	2.30E-05	7.70E-06	1.30E-05	2.02E-04
F-1		4.00E-04	6.17E-04	3.01E-06					5.62E-05	1.45E-04		0.11	8.55E-05	1.60E-04	1.05E-05	8.30E-05	1.66E-04
F-2		4.66E-04	6.39E-04	1.44E-06					4.58E-05	1.44E-04		0.15	9.87E-06	9.73E-05	1.10E-04	1.48E-04	2.76E-04
F-3		1.10E-03	2.38E-03	2.08E-05					1.72E-04	4.40E-04		0.12	1.35E-05	1.71E-04	3.71E-04	2.28E-05	1.20E-04
Reference		3.40E-04	5.24E-05	1.05E-05					3.71E-06	1.49E-05		4.26E-03					8.88E-05

TRV- Toxicity Reference Value. Units: Metals - ug CoC/kg RoC/day; Organics - ng CoC/kg RoC/day; and Dioxins - pg CoC/kg RoC/day.

1 - Hazard Quotient (HQ) = Total Assimilated (Appendix D-5-2c)/TRV (Table 6.3-2b).

2 - Sum of High Molecular Weight PAHs - Benzo(a)anthracene, Benzo(a)pyrene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, and Perylene.

3 - Sum of Low Molecular Weight PAHs - 2-Methylnaphthalene, Acenaphthene, Acenaphthylene, Anthracene, Fluorene, Naphthalene, and Phenanthrene.

4 - Total PCBs = Sum of Congeners x 2.

5 - 2,3,7,8-TCDD equivalent concentration for prediction of impacts on mammal; see WHO, 1998.

Appendix D-6-1. Wet weight tissue concentrations for determination of Tissue Screening Hazard Quotients for the Raymark Phase III Ecological Risk Assessment Investigation[1].

Station[2]	Species	% Solids	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	1,6,7-Trimethylnaphthalene	1-Methylnaphthalene	1-Methylphenanthrene	2,6-Dimethylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b + k)fluoranthene	Benzo(e)pyrene	Benzo(g,h,i)perylene
C-1-TISS-SMP	MUS	0.12	0.05	0.14	2.91	0.13	0.01	0.10	8.19	0.66	10.81	0.66	0.66	2.76	0.66	0.66	1.80	0.66	1.32	0.66	0.66
C-2-TISS-SMP	MUS	0.12	0.08	0.20	5.14	0.19	0.01	0.09	7.30	0.66	11.70	0.66	0.66	1.81	0.66	0.66	1.57	0.66	1.33	0.66	0.66
C-3-TISS-SMP	MUS	0.12	0.06	0.29	4.61	0.27	0.01	0.08	7.23	0.68	13.66	0.68	0.68	2.11	1.49	0.68	3.10	1.61	4.22	1.86	2.36
D-1-TISS-SMP	MUS	0.14	0.10	0.14	2.30	0.13	0.01	0.07	8.14	0.69	13.36	0.69	0.69	3.44	1.93	1.65	3.58	0.69	3.44	3.31	0.69
D-2-TISS-SMP	MUS	0.13	0.07	0.11	2.64	0.09	0.01	0.07	7.75	0.66	18.59	0.66	2.66	3.19	1.99	1.59	4.25	0.66	5.18	3.59	1.99
D-3-TISS-SMP	MUS	0.12	0.12	0.12	2.23	0.11	0.01	0.07	8.46	0.68	11.56	0.68	0.68	2.34	0.68	0.68	1.72	0.68	1.35	0.68	0.68
D-4-TISS-SMP	MUS	0.11	0.06	0.19	2.17	0.11	0.01	0.07	7.03	0.69	16.92	0.69	0.69	3.07	1.48	0.69	2.33	0.69	1.37	2.11	0.69
D-5	Predicted	0.12	0.14	0.05	2.22	0.21	0.01	0.03	4.80	0.67	0.62	1.90	0.52	0.57	5.71	8.56	31.38	27.10	44.70	18.07	15.69
D-6-TISS-SMP	MUS	0.11	0.12	0.32	3.38	0.18	0.02	0.09	7.94	0.68	10.55	0.68	0.68	1.82	0.68	0.68	2.50	0.68	1.36	2.04	0.68
E-1	Predicted	0.12	0.02	0.75	11.11	1.58	0.10	0.17	16.17	0.12	0.23	0.62	0.16	0.15	1.86	1.93	5.23	6.80	12.96	5.87	5.44
E-2	Predicted	0.12	0.01	0.29	5.19	0.94	0.03	0.11	7.24	0.02	0.08	0.31	0.02	0.02	0.49	0.54	1.55	1.88	4.78	2.31	2.09
E-3	Predicted	0.12	0.05	0.11	1.46	0.49	0.02	0.11	9.74	0.26	0.23	2.38	0.22	0.75	4.95	9.03	31.38	27.58	51.07	21.87	18.07
E-4	Predicted	0.12	0.02	0.26	3.97	0.83	0.04	0.12	7.33	0.02	0.05	0.25	0.02	0.02	0.39	0.45	1.39	1.63	4.42	2.21	1.88
F-1	Predicted	0.12	0.32	0.20	4.24	1.03	0.02	0.07	16.17	0.37	0.34	3.90	0.54	0.57	5.84	10.07	29.22	32.47	53.74	24.35	22.73
F-2	Predicted	0.12	0.06	2.10	30.40	3.11	0.06	0.41	83.15	0.12	0.25	1.21	0.36	0.27	3.17	3.07	11.17	15.36	33.05	13.97	14.90
F-3	Predicted	0.12	0.02	0.26	6.95	1.70	0.04	0.15	32.01	0.48	1.05	1.68	0.81	5.27	4.50	15.33	52.68	46.45	82.85	36.40	34.48
Reference	Predicted	0.29	1.43	2.96	62.68	2.04	0.32	0.56	58.68					8.90	8.90	8.90	5.12	6.20	21.30		

Species: Ribbed Mussels

1 - Wet wt. conc. = % solids (g dry wt/g wet wt) * dry wt CoC conc.; Appendix A-3.

2 - Tissue values predicted for D-5, E-1 to E-4, F-1 to F-3, and Ref.; see Appendix D-3-5.

3 - Sum of High Molecular Weight PAHs - Benzo(a)anthracene, Benzo(a)pyrene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, and Perylene.

4 - Sum of Low Molecular Weight PAHs - 2-Methylnaphthalene, Acenaphthene, Acenaphthylene, Anthracene, Fluorene, Naphthalene, and Phenanthrene.

5 - Sum of individual PCB congeners x 2.

6 - 2,3,7,8-TCDD equivalent concentration for prediction of impacts on fish; see WHO, 1998.

Appendix D-6-1. Wet weight tissue concentrations for determination of Tissue Screening Hazard Quotients for the Raymark Phase III Ecological Risk Assessment Investigation[1].

Station[2]	Species	% Solids	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	HMW PAHs[3]	Indeno(1,2,3-cd)pyrene	LMW PAHs[4]	Perylene	Phenanthrene	Pyrene	Sum PAHs	Total PCBs[5]	o,p'-DDE	p,p'-DDD	p,p'-DDE	p,p'-DDT	Dioxin-Fish[6]
C-1-TISS-SMP	MUS	0.12	1.44	0.66	3.96	0.66	9.18	0.66	48.57	0.66	7.68	7.56	82.06	13.25	0.28	0.28	0.28	0.28	0.11
C-2-TISS-SMP	MUS	0.12	0.66	0.66	3.01	0.66	7.24	0.66	46.12	0.66	6.75	6.87	77.90	12.73	0.27	0.27	0.27	0.27	0.12
C-3-TISS-SMP	MUS	0.12	2.73	1.49	5.46	1.61	15.09	1.99	58.55	0.68	10.43	10.31	111	17.97	0.27	0.84	0.27	0.27	0.07
D-1-TISS-SMP	MUS	0.14	2.75	0.69	10.19	2.20	18.59	0.69	66.39	0.69	11.71	20.66	130	33.42	0.27	2.20	1.16	0.27	0.05
D-2-TISS-SMP	MUS	0.13	3.72	0.66	9.43	2.39	20.18	0.66	75.96	1.46	12.35	18.59	149	31.68	0.27	1.12	0.94	0.27	0.03
D-3-TISS-SMP	MUS	0.12	0.68	0.68	3.93	1.35	8.36	0.68	49.91	0.68	9.22	8.97	84.89	15.90	0.26	0.26	0.26	0.26	0.38
D-4-TISS-SMP	MUS	0.11	1.59	0.69	5.71	1.80	11.68	0.69	60.96	0.69	11.63	10.57	108	23.96	0.27	0.27	0.27	0.27	0.10
D-5	Predicted	0.12	27.58	4.75	52.30	0.86	149	19.02	27.39	5.71	9.51	52.30	330	2767	0.38	18.08	0.38	0.38	5.19
D-6-TISS-SMP	MUS	0.11	1.70	0.68	4.65	0.68	10.90	0.68	44.04	0.68	7.26	11.35	84.33	20.93	0.28	0.28	0.28	0.28	0.09
E-1	Predicted	0.12	6.94	1.22	11.45	0.20	32.85	6.16	12.12	1.22	7.01	12.17	88.80	3435	0.17	0.17	0.17	0.17	0.71
E-2	Predicted	0.12	2.59	0.40	4.00	0.02	10.80	2.35	3.39	0.38	2.05	3.76	29.94	24.00	0.18	1.03	0.18	0.18	0.03
E-3	Predicted	0.12	31.38	4.37	58.96	1.33	160	22.82	40.57	5.99	23.77	58.96	377	10.09	0.16	0.16	0.72	0.16	0.07
E-4	Predicted	0.12	2.27	0.36	3.63	0.02	9.62	2.15	2.75	0.33	1.66	3.33	26.72	13.66	0.18	1.38	0.18	0.18	0.05
F-1	Predicted	0.12	29.22	5.20	51.96	1.27	155	25.98	43.76	6.62	24.35	53.58	385	43.22	2.25	11.11	0.28	1.30	0.10
F-2	Predicted	0.12	13.03	2.98	26.53	0.30	72.25	16.76	17.98	3.17	9.78	26.07	197	49.25	0.24	6.19	2.65	2.12	0.08
F-3	Predicted	0.12	41.66	7.18	101	4.41	260	40.71	68.20	11.49	37.35	81.41	610	41.37	0.33	10.92	9.01	0.33	0.04
Reference	Predicted	0.29	5.93	8.90	8.90	8.90		2.97			3.24	11.05	191	2.03					0.10

Species codes:

1 - Wet wt. conc. = % solids (g dry wt/g wet wt) * dry wt CoC conc. (Appendix A-3).

2 - Tissue values predicted for D-5, E-1 to E-4, F-1 to F-3, and Ref. (see Appendix D-3-5).

3 - sum of High Molecular Weight PAHs - Benzo(a)anthracene, Benzo(a)pyrene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, and Perylene.

4 - sum of Low Molecular Weight PAHs - 2-Methylnaphthalene, Acenaphthene, Acenaphthylene, Anthracene, Fluorene, Naphthalene, and Phenanthrene.

5 - Sum of individual PCB congeners x 2.

6 - 2,3,7,8-TCDD equivalent concentration for prediction of impacts on fish (WHO, 1998).

Appendix D-6-2. Tissue Screening Concentration Hazard Quotients for the Raymark Phase III Ecological Risk Assessment Investigation[1].

Station[2]	Species	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Silver	Zinc	1,6,7-Trimethylnaphthalene	1-Methylnaphthalene	1-Methylphenanthrene	2,6-Dimethylnaphthalene	2-Methylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b + k)fluoranthene
TSC Benchmark		0.60	0.80	0.62	0.40	4.69	0.39	46.82	3.81	NA	NA	NA	NA	NA	126000	4500	18000	173000	416000	417500
C-1-TISS-SMP	MUS	0.09	0.18	4.69	0.33	2.46E-03	0.26	3.08E-03	2.15						2.19E-05	1.47E-04	3.67E-05	1.04E-05	1.59E-06	3.18E-06
C-2-TISS-SMP	MUS	0.14	0.26	8.29	0.49	2.83E-03	0.23	4.89E-03	1.91						1.44E-05	1.47E-04	3.68E-05	9.06E-06	1.59E-06	3.18E-06
C-3-TISS-SMP	MUS	0.11	0.36	7.43	0.69	2.65E-03	0.20	2.92E-03	1.90						1.68E-05	3.31E-04	3.79E-05	1.79E-05	3.88E-06	1.01E-05
D-1-TISS-SMP	MUS	0.17	0.17	3.71	0.33	2.61E-03	0.18	1.91E-03	2.14						2.73E-05	4.29E-04	9.18E-05	2.07E-05	1.66E-06	8.25E-06
D-2-TISS-SMP	MUS	0.11	0.14	4.26	0.23	2.60E-03	0.18	2.84E-03	2.04						2.53E-05	4.43E-04	8.85E-05	2.46E-05	1.60E-06	1.24E-05
D-3-TISS-SMP	MUS	0.20	0.15	3.59	0.29	2.62E-03	0.18	2.39E-03	2.22						1.85E-05	1.50E-04	3.76E-05	9.95E-06	1.63E-06	3.24E-06
D-4-TISS-SMP	MUS	0.10	0.24	3.50	0.27	2.25E-03	0.19	2.48E-03	1.85						2.43E-05	3.29E-04	3.82E-05	1.34E-05	1.65E-06	3.29E-06
D-5	Predicted	0.23	0.07	3.58	0.52	2.89E-03	0.09	0.01	1.26						4.53E-06	1.27E-03	4.75E-04	1.81E-04	6.52E-05	1.07E-04
D-6-TISS-SMP	MUS	0.21	0.40	5.45	0.46	3.38E-03	0.22	2.04E-03	2.09						1.44E-05	1.51E-04	3.78E-05	1.44E-05	1.64E-06	3.26E-06
E-1	Predicted	0.03	0.94	17.91	3.97	0.02	0.43	0.09	4.24						1.19E-06	4.14E-04	1.07E-04	3.02E-05	1.63E-05	3.10E-05
E-2	Predicted	0.02	0.36	8.38	2.37	6.50E-03	0.28	0.04	1.90						1.87E-07	1.10E-04	3.01E-05	8.97E-06	4.52E-06	1.14E-05
E-3	Predicted	0.08	0.14	2.36	1.23	3.61E-03	0.28	4.75E-03	2.56						5.96E-06	1.10E-03	5.02E-04	1.81E-04	6.63E-05	1.22E-04
E-4	Predicted	0.03	0.32	6.41	2.10	7.46E-03	0.32	0.02	1.92						1.80E-07	8.74E-05	2.52E-05	8.05E-06	3.93E-06	1.06E-05
F-1	Predicted	0.54	0.25	6.83	2.59	4.58E-03	0.19	5.94E-03	4.24						4.51E-06	1.30E-03	5.59E-04	1.69E-04	7.81E-05	1.29E-04
F-2	Predicted	0.11	2.63	49.04	7.83	0.01	1.07	0.02	21.82						2.18E-06	7.03E-04	1.71E-04	6.46E-05	3.69E-05	7.92E-05
F-3	Predicted	0.03	0.32	11.21	4.29	9.39E-03	0.39	9.89E-03	8.40						4.18E-05	1.00E-03	8.51E-04	3.05E-04	1.12E-04	1.98E-04
Reference	Predicted	2.41	3.70	101	5.14	0.07	1.44	0.14	15.40						7.06E-05	1.98E-03	4.94E-04	2.98E-05	1.49E-05	5.10E-05

Species: Ribbed Mussels

Units: metals = µg/g wet wt.; organics = ng/g wet wt.

1 - TSC-HQ = Wet Weight Concentration (Appendix D-6-1)/TSC Benchmark (Table 6.2-2).

2 - Tissue values predicted for D-5, E-1 to E-4, F-1 to F-3, and Ref.; see Appendix D-3-5.

3 - Sum of High Molecular Weight PAHs - Benzo(a)anthracene, Benzo(a)pyrene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, and Perylene.

4 - Sum of Low Molecular Weight PAHs - 2-Methylnaphthalene, Acenaphthene, Acenaphthylene, Anthracene, Fluorene, Naphthalene, and Phenanthrene.

5 - Sum of Individual PCB congeners x 2.

6 - 2,3,7,8-TCDD equivalent concentration for prediction of impacts on fish; see WHO, 1998.

Appendix D-6-2. Tissue Screening Concentration Hazard Quotients for the Raymark Phase III Ecological Risk Assessment Investigation[1].

Station[2]	Species	Benzo(e)pyrene	Benzo(g,h,i)perylene	Biphenyl	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	HMW PAHs[3]	Indeno(1,2,3-cd)pyrene	LMW PAHs[4]	Naphthalene	Perylene	Phenanthrene	Pyrene	Sum PAHs	Total PCBs[5]	o,p'-DDE	p,p'-DDD	p,p'-DDE	p,p'-DDT	Dioxin-Fish[6]
TSC Benchmark		NA	1009000	NA	173000	167000	18000	11000	NA	1009000	NA	6500	NA	12000	42000	NA	440	53.60	53.60	53.60	53.60	50.00
C-1-TISS-SMP	MUS		6.54E-07		8.33E-06	3.95E-06	2.20E-04	6.00E-05		6.54E-07		3.88E-03		6.40E-04	1.80E-04		0.03	5.15E-03	5.15E-03	5.15E-03	5.15E-03	2.12E-03
C-2-TISS-SMP	MUS		6.57E-07		3.83E-06	3.97E-06	1.67E-04	6.03E-05		6.57E-07		3.90E-03		5.63E-04	1.64E-04		0.03	4.95E-03	4.95E-03	4.95E-03	4.95E-03	2.45E-03
C-3-TISS-SMP	MUS		2.34E-06		1.58E-05	8.92E-06	3.04E-04	1.47E-04		1.97E-06		4.39E-03		8.69E-04	2.45E-04		0.04	4.98E-03	0.02	4.98E-03	4.98E-03	1.48E-03
D-1-TISS-SMP	MUS		6.83E-07		1.59E-05	4.12E-06	5.66E-04	2.00E-04		6.83E-07		4.24E-03		9.76E-04	4.92E-04		0.08	5.01E-03	0.04	0.02	5.01E-03	9.65E-04
D-2-TISS-SMP	MUS		1.97E-06		2.15E-05	3.98E-06	5.24E-04	2.17E-04		6.58E-07		5.11E-03		1.03E-03	4.43E-04		0.07	4.95E-03	0.02	0.02	4.95E-03	5.34E-04
D-3-TISS-SMP	MUS		6.70E-07		3.91E-06	4.05E-06	2.19E-04	1.23E-04		6.70E-07		3.59E-03		7.68E-04	2.14E-04		0.04	4.93E-03	4.93E-03	4.93E-03	4.93E-03	7.86E-03
D-4-TISS-SMP	MUS		6.81E-07		9.17E-06	4.12E-06	3.17E-04	1.63E-04		6.81E-07		4.23E-03		9.69E-04	2.52E-04		0.05	5.13E-03	5.13E-03	5.13E-03	5.13E-03	2.01E-03
D-5	Predicted		1.56E-05		1.59E-04	2.85E-05	2.91E-03	7.78E-05		1.88E-05		1.90E-04		7.92E-04	1.25E-03		6.29	7.00E-03	0.34	7.00E-03	7.00E-03	0.10
D-6-TISS-SMP	MUS		6.75E-07		9.84E-06	4.08E-06	2.59E-04	6.19E-05		6.75E-07		3.14E-03		6.05E-04	2.70E-04		0.05	5.29E-03	5.29E-03	5.29E-03	5.29E-03	1.87E-03
E-1	Predicted		5.39E-06		4.01E-05	7.29E-06	6.36E-04	1.82E-05		6.10E-06		9.25E-05		5.85E-04	2.90E-04		7.81	3.17E-03	3.17E-03	3.17E-03	3.17E-03	0.01
E-2	Predicted		2.07E-06		1.50E-05	2.39E-06	2.22E-04	2.14E-06		2.33E-06		2.42E-05		1.71E-04	8.96E-05		0.05	3.42E-03	0.02	3.42E-03	3.42E-03	6.70E-04
E-3	Predicted		1.79E-05		1.81E-04	2.62E-05	3.28E-03	1.21E-04		2.26E-05		6.00E-05		1.98E-03	1.40E-03		0.02	3.04E-03	3.04E-03	0.01	3.04E-03	1.31E-03
E-4	Predicted		1.86E-06		1.31E-05	2.17E-06	2.02E-04	2.06E-06		2.13E-06		1.77E-05		1.39E-04	7.92E-05		0.03	3.27E-03	0.03	3.27E-03	3.27E-03	9.59E-04
F-1	Predicted		2.25E-05		1.69E-04	3.11E-05	2.89E-03	1.15E-04		2.57E-05		1.55E-04		2.03E-03	1.28E-03		0.10	0.04	0.21	5.18E-03	0.02	1.92E-03
F-2	Predicted		1.48E-05		7.53E-05	1.78E-05	1.47E-03	2.71E-05		1.66E-05		1.43E-04		8.15E-04	6.21E-04		0.11	4.46E-03	0.12	0.05	0.04	1.60E-03
F-3	Predicted		3.42E-05		2.41E-04	4.30E-05	5.59E-03	4.01E-04		4.03E-05		1.11E-04		3.11E-03	1.94E-03		0.09	6.11E-03	0.20	0.17	6.11E-03	7.17E-04
Reference	Predicted				3.43E-05	5.33E-05	4.94E-04	8.09E-04		2.94E-08		1.37E-03		2.70E-04	2.63E-04		4.61E-03					2.0E-3

Species: Ribbed Mussels

Units: metals = µg/g wet wt ; organics = ng/g wet wt.

1 - TSC-HQ = Wet Weight Concentration (Appendix D-6-1)/TSC Benchmark (Table 6.2-2).

2 - Tissue values predicted for D-5, E-1 to E-4, F-1 to F-3, and Ref. (see Appendix D-3-5).

3 - sum of High Molecular Weight PAHs - Benzo(a)anthracene, Benzo(a)pyrene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, and Perylene.

4 - sum of Low Molecular Weight PAHs - 2-Methylnaphthalene, Acenaphthene, Acenaphthylene, Anthracene, Fluorene, Naphthalene, and Phenanthrene.

5 - Sum of individual PCB congeners x 2.

6 - 2,3,7,8-TCDD equivalent concentration for prediction of impacts on fish (WHO, 1998).

Appendix D-7-1a. Molar concentrations of CoCs in Target Receptors for the Raymark Phase III Ecological Risk Assessment Investigation[1].

Station[2]	Species	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	1,6,7-Trimethylnaphthalene	1-Methylnaphthalene	1-Methylphenanthrene	2,6-Dimethylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b + k)fluoranthene	Benzo(e)pyrene
Molecular Weight		112	52.00	63.55	207	201	58.69	65.37	170	142	192	156	154	152	178	228	252	252	252
C-1-TISS-SMP	MUS	3.91E-03	0.02	0.38	5.31E-03	4.79E-04	0.01	1.04	0.03	0.63	0.03	0.04	0.15	0.04	0.03	0.07	0.02	0.04	0.02
C-2-TISS-SMP	MUS	5.96E-03	0.03	0.67	7.72E-03	5.48E-04	0.01	0.93	0.03	0.68	0.03	0.04	0.10	0.04	0.03	0.06	0.02	0.04	0.02
C-3-TISS-SMP	MUS	4.54E-03	0.04	0.58	0.01	4.99E-04	0.01	0.89	0.03	0.77	0.03	0.04	0.11	0.08	0.03	0.11	0.05	0.13	0.06
D-1-TISS-SMP	MUS	8.58E-03	0.02	0.26	4.59E-03	4.44E-04	8.52E-03	0.90	0.03	0.68	0.03	0.03	0.16	0.09	0.07	0.11	0.02	0.10	0.10
D-2-TISS-SMP	MUS	4.36E-03	0.02	0.31	3.33E-03	4.59E-04	8.86E-03	0.89	0.03	0.98	0.03	0.13	0.16	0.10	0.07	0.14	0.02	0.15	0.11
D-3-TISS-SMP	MUS	8.81E-03	0.02	0.28	4.49E-03	4.99E-04	9.71E-03	1.05	0.03	0.68	0.03	0.04	0.12	0.04	0.03	0.06	0.02	0.04	0.02
D-4-TISS-SMP	MUS	5.07E-03	0.03	0.32	4.83E-03	4.99E-04	0.01	1.02	0.04	1.13	0.03	0.04	0.19	0.09	0.04	0.10	0.03	0.05	0.08
D-5	Predicted	9.97E-03	8.24E-03	0.29	8.10E-03	5.53E-04	4.81E-03	0.60	0.03	0.04	0.08	0.03	0.03	0.31	0.39	1.12	0.88	1.45	0.59
D-6-TISS-SMP	MUS	9.79E-03	0.05	0.47	7.72E-03	6.98E-04	0.01	1.07	0.04	0.85	0.03	0.04	0.10	0.04	0.03	0.10	0.02	0.05	0.07
E-1	Predicted	1.14E-03	0.12	1.43	0.06	4.06E-03	0.02	2.02	5.85E-03	0.01	0.03	8.63E-03	7.98E-03	0.10	0.09	0.19	0.22	0.42	0.19
E-2	Predicted	1.01E-03	0.05	0.67	0.04	1.25E-03	0.01	0.91	1.13E-03	4.60E-03	0.01	1.23E-03	1.25E-03	0.03	0.02	0.06	0.06	0.15	0.07
E-3	Predicted	3.52E-03	0.02	0.19	0.02	8.92E-04	0.02	1.22	0.01	0.01	0.10	0.01	0.04	0.27	0.41	1.12	0.89	1.66	0.71
E-4	Predicted	1.42E-03	0.04	0.51	0.03	1.43E-03	0.02	0.92	1.09E-03	2.96E-03	0.01	1.19E-03	1.20E-03	0.02	0.02	0.05	0.05	0.14	0.07
F-1	Predicted	0.02	0.03	0.55	0.04	8.78E-04	0.01	2.02	0.02	0.02	0.17	0.03	0.03	0.31	0.46	1.05	1.05	1.74	0.79
F-2	Predicted	4.69E-03	0.33	3.92	0.12	2.54E-03	0.06	10.41	5.82E-03	0.01	0.05	0.02	0.01	0.17	0.14	0.40	0.50	1.07	0.45
F-3	Predicted	1.25E-03	0.04	0.90	0.07	1.80E-03	0.02	4.01	0.02	0.06	0.07	0.04	0.28	0.24	0.70	1.89	1.51	2.69	1.18
Reference	Predicted	0.04	0.20	3.40	0.03	5.53E-03	0.03	3.10					0.20	0.20	0.17	0.08	0.08	0.29	

Units: metals = μmoles/g dry wt; organics = nmoles/g dry wt.

1- Molar conc. = dry weight conc. (Appendix A-3)/Molecular weight (Table 6.2-4).

2 - Tissue values predicted for D-5, E-1 to E-4, F-1 to F-3, and Reference; see Appendix D-3-5.

3 - Sum of High Molecular Weight PAHs - Benzo(a)anthracene, Benzo(a)pyrene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, and Perylene.

4 - Sum of Low Molecular Weight PAHs - 2-Methylnaphthalene, Acenaphthene, Acenaphthylene, Anthracene, Fluorene, Naphthalene, and Phenanthrene.

5 - Sum of individual PCB congeners x 2; see Appendix D-7-1b.

Appendix D-7-1a. Molar concentrations of CoCs in Target Receptors for the Raymark Phase III Ecological Risk Assessment Investigation[1].

Station[2]	Species	Benzo(g,h,i)perylene	Chrysene	Dibenzo(a,h)anthracene	Fluoranthene	Fluorene	HMW PAHs[3]	Indeno(1,2,3-cd)pyrene	LMW PAHs[4]	Naphthalene	Perylene	Phenanthrene	Pyrene	Sum PAHs	Total PCBs[5]	p,p'-DDE
Molecular Weight		276	228	278	202	166	241	276	158	128	252	178	202	203	8317	318
C-1-TISS-SMP	MUS	0.02	0.05	0.02	0.16	0.03	0.32	0.02	2.56	1.64	0.02	0.36	0.31	3.37	0.33	7.23E-03
C-2-TISS-SMP	MUS	0.02	0.02	0.02	0.12	0.03	0.25	0.02	2.42	1.64	0.02	0.31	0.28	3.19	0.32	6.92E-03
C-3-TISS-SMP	MUS	0.07	0.10	0.04	0.22	0.08	0.50	0.08	2.99	1.79	0.02	0.47	0.41	4.40	0.43	6.76E-03
D-1-TISS-SMP	MUS	0.02	0.09	0.02	0.37	0.10	0.58	0.02	3.05	1.56	0.02	0.48	0.74	4.65	0.73	0.03
D-2-TISS-SMP	MUS	0.05	0.12	0.02	0.35	0.11	0.63	0.02	3.62	1.95	0.04	0.52	0.69	5.55	0.71	0.02
D-3-TISS-SMP	MUS	0.02	0.02	0.02	0.16	0.07	0.28	0.02	2.57	1.48	0.02	0.42	0.36	3.41	0.38	6.76E-03
D-4-TISS-SMP	MUS	0.02	0.07	0.02	0.27	0.10	0.48	0.02	3.65	2.03	0.03	0.62	0.49	5.03	0.03	8.18E-03
D-5	Predicted	0.46	0.99	0.14	2.12	0.04	5.06	0.56	1.42	0.08	0.19	0.44	2.12	13.34	2.72	9.65E-03
D-6-TISS-SMP	MUS	0.02	0.07	0.02	0.20	0.04	0.40	0.02	2.46	1.40	0.02	0.36	0.49	3.87	0.02	7.86E-03
E-1	Predicted	0.18	0.25	0.04	0.46	9.87E-03	1.12	0.18	0.63	0.04	0.04	0.32	0.49	3.59	3.38	4.38E-03
E-2	Predicted	0.06	0.09	0.01	0.16	1.16E-03	0.37	0.07	0.18	0.01	0.01	0.09	0.15	1.21	0.02	4.72E-03
E-3	Predicted	0.54	1.12	0.13	2.39	0.07	5.42	0.68	2.10	0.02	0.19	1.09	2.39	15.23	9.93E-03	0.02
E-4	Predicted	0.06	0.08	0.01	0.15	1.12E-03	0.33	0.06	0.14	7.34E-03	0.01	0.08	0.13	1.08	0.01	4.51E-03
F-1	Predicted	0.67	1.05	0.15	2.10	0.06	5.28	0.77	2.27	0.06	0.22	1.12	2.17	15.54	0.04	7.15E-03
F-2	Predicted	0.44	0.47	0.09	1.07	0.01	2.45	0.50	0.93	0.06	0.10	0.45	1.05	7.96	0.05	0.07
F-3	Predicted	1.02	1.49	0.21	4.07	0.22	8.83	1.21	3.54	0.05	0.37	1.72	3.29	24.63	0.04	0.23
Reference	Predicted		0.09	0.11	0.15	0.18	0.50	0.04	1.24	0.24		0.06	0.19	3.26	8.40E-04	

Units: metals = Fmoles/g dry wt; organics = nmoles/g dry wt.

1- Molar conc. = dry weight conc. (Appendix A-3)/Molecular weight (Table 6.2-4).

2 - Tissue values predicted for D-5, E-1 to E-4, F-1 to F-3, and Reference; see Appendix D-3-5.

3 - Sum of High Molecular Weight PAHs - Benzo(a)anthracene, Benzo(a)pyrene, Chrysene, Dibenz(a,h)anthracene, Fluoranthene, and Perylene.

4 - Sum of Low Molecular Weight PAHs - 2-Methylnaphthalene, Acenaphthene, Acenaphthylene, Anthracene, Fluorene, Naphthalene, and Phenanthrene.

5 - Sum of individual PCB congeners x 2; see Appendix D-7-1b.

Appendix D-7-1b. Molar concentrations of PCB congeners in Target Receptors for the Raymark Ecological Risk Assessment Investigation[1,2].

Station	Species	PCB 8	PCB 18	PCB 28	PCB 29	PCB 44	PCB 50	PCB 52	PCB 66	PCB 87	PCB 101	PCB 105	PCB 118	PCB 126	PCB 128	PCB 138	PCB 153	PCB 170	PCB 180	PCB 187	PCB 188	PCB 195	PCB 200	PCB 206	PCB 209	Sum PCBs	Total PCBs
Molecular Weight		223	258	258	258	292	292	292	292	326	326	326	326	361	361	361	361	395	395	395	395	430	430	464	499		
C-1-TISS-SMP	MUS	0.01	8.93E-03	8.93E-03	8.93E-03	7.88E-03	7.88E-03	7.88E-03	7.88E-03	7.05E-03	7.05E-03	7.05E-03	7.05E-03	6.37E-03	6.37E-03	6.37E-03	6.37E-03	5.82E-03	5.82E-03	5.82E-03	5.82E-03	5.35E-03	5.35E-03	4.95E-03	4.61E-03	0.17	0.33
C-2-TISS-SMP	MUS	9.86E-03	8.54E-03	8.54E-03	8.54E-03	7.53E-03	7.53E-03	7.53E-03	7.53E-03	6.74E-03	6.74E-03	6.74E-03	6.74E-03	6.10E-03	6.10E-03	6.10E-03	6.10E-03	5.57E-03	5.57E-03	5.57E-03	5.57E-03	5.12E-03	5.12E-03	4.74E-03	4.41E-03	0.16	0.32
C-3-TISS-SMP	MUS	9.64E-03	8.35E-03	8.35E-03	8.35E-03	7.36E-03	7.36E-03	7.36E-03	7.36E-03	6.59E-03	0.03	6.59E-03	6.59E-03	5.96E-03	5.96E-03	5.96E-03	0.02	5.44E-03	5.44E-03	0.02	5.44E-03	5.00E-03	5.00E-03	4.63E-03	4.31E-03	0.21	0.43
D-1-TISS-SMP	MUS	8.74E-03	7.57E-03	7.57E-03	7.57E-03	0.05	6.68E-03	0.02	0.02	5.97E-03	0.05	0.01	5.97E-03	5.40E-03	5.40E-03	0.03	0.04	4.93E-03	4.93E-03	0.04	4.93E-03	4.54E-03	4.54E-03	4.20E-03	3.91E-03	0.36	0.73
D-2-TISS-SMP	MUS	8.96E-03	7.77E-03	7.77E-03	7.77E-03	0.02	6.85E-03	0.02	0.03	6.13E-03	0.05	0.02	0.02	5.54E-03	5.54E-03	0.03	0.06	5.06E-03	5.06E-03	0.03	5.06E-03	4.65E-03	4.65E-03	4.31E-03	4.01E-03	0.36	0.71
D-3-TISS-SMP	MUS	9.84E-03	8.35E-03	8.35E-03	8.35E-03	7.36E-03	7.36E-03	7.36E-03	7.36E-03	6.59E-03	0.02	6.59E-03	6.59E-03	5.96E-03	5.96E-03	5.96E-03	0.02	5.44E-03	5.44E-03	0.01	5.44E-03	5.00E-03	5.00E-03	4.63E-03	4.31E-03	0.19	0.38
D-4-TISS-SMP	MUS	0.01	0.01	0.01	0.01	0.03	8.90E-03	0.03	8.90E-03	7.97E-03	0.03	7.97E-03	0.02	7.20E-03	7.20E-03	0.02	0.04	6.58E-03	6.58E-03	0.03	6.58E-03	6.05E-03	6.05E-03	5.60E-03	5.21E-03	0.34	0.68
D-6-TISS-SMP	MUS	0.01	9.71E-03	9.71E-03	9.71E-03	8.56E-03	8.56E-03	8.56E-03	8.56E-03	7.66E-03	0.03	7.66E-03	0.02	6.93E-03	6.93E-03	0.02	0.04	6.32E-03	6.32E-03	0.02	6.32E-03	5.82E-03	5.82E-03	5.39E-03	5.01E-03	0.27	0.54

1- Molar conc. = dry weight conc. (Appendix A-3)/Molecular weight.

2 - Units: metals = umoles/g dry wt; organics = nmoles/g dry wt.

Appendix D-7-2. Critical Body Residue Hazard Quotients for Target Receptors for the Raymark Phase III Ecological Risk Assessment[1].

		Metals									Organics		
Station	Species	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Silver	Zinc	Total PAHs	Total PCBs	p,p'-DDE
C-1-TISS-SMP	MUS	0.01	1.5E-2	4.3E-3	2.8E-1	7.3E-3	1.1E-3	8.1E-3	9.6E-3	0.02	8.4E-3	1.7E-3	6.4E-6
C-2-TISS-SMP	MUS	0.01	2.2E-2	6.1E-3	0.48	1.1E-2	1.2E-3	7.0E-3	1.5E-2	0.01	8.0E-3	1.6E-3	6.2E-6
C-3-TISS-SMP	MUS	0.01	1.7E-2	8.2E-3	0.42	1.5E-2	1.1E-3	6.0E-3	8.8E-3	0.01	1.1E-2	2.2E-3	6.0E-6
D-1-TISS-SMP	MUS	9.4E-3	2.5E-2	3.6E-3	0.19	6.3E-3	9.9E-4	4.8E-3	5.2E-3	0.01	1.2E-2	3.7E-3	2.4E-5
D-2-TISS-SMP	MUS	1.5E-2	1.6E-2	3.0E-3	0.23	4.6E-3	1.0E-3	5.0E-3	8.0E-3	0.01	1.4E-2	3.6E-3	2.0E-5
D-3-TISS-SMP	MUS	0.02	3.3E-2	3.6E-3	0.21	6.2E-3	1.1E-3	5.5E-3	7.3E-3	0.02	8.5E-3	1.9E-3	6.0E-6
D-4-TISS-SMP	MUS	1.9E-2	1.9E-2	6.4E-3	0.23	6.7E-3	1.1E-3	6.6E-3	8.8E-3	0.02	1.3E-2	1.4E-4	7.3E-6
D-5	Predicted	6.0E-3	3.7E-2	1.5E-3	0.21	1.1E-2	1.2E-3	2.7E-3	3.1E-2	0.01	3.3E-2	1.4E-2	8.6E-6
D-6-TISS-SMP	MUS	1.6E-2	3.7E-2	1.0E-2	0.34	1.1E-2	1.6E-3	7.2E-3	6.7E-3	0.02	9.2E-3	1.1E-4	7.0E-6
E-1	Predicted	5.1E-2	4.3E-3	2.2E-2	1.03	8.6E-2	9.0E-3	1.3E-2	2.7E-1	0.03	9.0E-3	1.7E-2	3.9E-6
E-2	Predicted	2.9E-2	3.8E-3	8.4E-3	0.48	5.1E-2	2.8E-3	8.5E-3	1.2E-1	0.01	3.0E-3	1.2E-4	4.2E-6
E-3	Predicted	2.4E-2	1.3E-2	3.3E-3	0.14	2.7E-2	1.5E-3	8.6E-3	1.4E-2	0.02	3.8E-2	5.0E-5	1.7E-5
E-4	Predicted	3.1E-2	5.3E-3	7.5E-3	0.37	4.5E-2	3.2E-3	9.8E-3	6.6E-2	0.01	2.7E-3	6.8E-5	4.0E-6
F-1	Predicted	9.7E-3	8.8E-2	5.7E-3	0.39	5.6E-2	2.0E-3	5.7E-3	1.8E-2	0.03	3.9E-2	2.2E-4	6.4E-6
F-2	Predicted	3.5E-2	1.8E-2	6.2E-2	2.83	1.7E-1	5.7E-3	3.3E-2	6.6E-2	0.17	2.0E-2	2.5E-4	6.1E-5
F-3	Predicted	1.6E-2	4.7E-3	7.5E-3	0.65	9.3E-2	4.0E-3	1.2E-2	3.0E-2	0.06	6.2E-2	2.1E-4	2.1E-4
Reference	Predicted	6.7E-2	1.6E-1	3.6E-2	2.46	4.7E-2	1.2E-2	1.8E-2	1.8E-1	0.05	8.1E-3	4.3E-6	

Species: Ribbed Mussels

1 - CBR-HQ = Tissue conc. (Appendix D-7-1a)/CBR Benchmark (Table 6.2-4).

APPENDIX E-1
WORKPLAN FOR ECOLOGICAL RISK CHARACTERIZATION OF AREAS C-F RAYMARK SUPERFUND SITE

Science Applications International Corporation
An Employee-Owned Company

19 April 1999

To: Mike Penko, USACE
From: Greg Tracey, SAIC
Subj: Deliverable Submittal

Attached please find the document entitled "Ecological Characterization of Areas C-F, Raymark Superfund Site, Ferry Creek, Stratford, CT, dated 19 April, 1999. This report completes Task 1 of Contract DACW3396D0004 (DO # 9, Modification 5, Work Order 2) to SAIC from ENSR, Inc.

Should you have any questions, please do not hesitate to call me.

Cc: R. Jennings, EPA
P. Tyler, EPA
R. Curran, CTDEP
T. Prior, USFWS
K. Finkelstein, NOAA
M. Worthy, ENSR
M. Turpin, SAIC Contracts (letter only)

Admiral's Gate, 221 Third Street, Newport, Rhode Island 02840 • Office: (401) 847-4210 • FAX: (401) 849-1585
Other SAIC Offices: Albuquerque, Colorado Springs, Dayton, Falls Church, Huntsville, Las Vegas, Los Altos, Los Angeles, McLean, Oak Ridge, Orlando, San Diego, Seattle, Tucson

WORK PLAN
FOR
ECOLOGICAL RISK CHARACTERIZATION OF
AREAS C - F
RAYMARK SUPERFUND SITE
FERRY CREEK
STRATFORD, CT

FINAL

Submitted to

Mr. Mike Penko
US Army Corps of Engineers
New England District
696 Virginia RD
Concord, MA 01742-2751

And

Mr. Ron Jennings
US Environmental Protection Agency
1 Congress Street, Suite 1100, HBT
Boston, MA 02203

Submitted by
Science Applications International Corporation
221 Third Street
Newport, RI 02840

MODIFICATION TO DACW3396D0004
D.0. NO. 9

20 April 1999

Introduction

This Work Plan has been prepared under Contract Number DACW3396D0004, Delivery Order Number 9. The Scope of Work (SOW) requires Science Applications International Corporation (SAIC) to provide chemical and toxicological assessment support services to evaluate sediments in the Raymark Superfund site study area. The purpose of this Work Plan is to describe the sampling methods, the chemical and toxicological analyses, and the report format which will be used to complete this evaluation. This evaluation is intended to provide the necessary information to reach a conclusion regarding the degree and extent of ecological risk posed by chemical contamination at Raymark.

Objective and Scope

The overall goal of this site-specific investigation is to use the USEPA's Ecological Risk Assessment Framework and applicable EPA Region I guidance to generate and interpret the data required to complete the ecological risk assessment for the Raymark study area.

This ecological risk assessment (ERA) will follow the organization suggested in Eco Update (USEPA, 1991) with appropriate elements from the EPA Region I Supplemental Risk Assessment Guidance for the Superfund Program (USEPA, 1989) and Risk Assessment Guidance for Superfund, Volume II Environmental Evaluation Manual (USEPA, 1989a). These guidance documents recommend a "weight of evidence" approach to assess potential ecological risks. This approach will be based on evaluation of contaminant analytical data relative to environmental benchmarks, sediment toxicity, and potential for bioaccumulation of chemicals and food web exposure modeling. Evaluation of risks will be based on the preponderance of data; locations where a greater number of endpoints suggest adverse risks are presumed to indicate a greater probability of adverse risk. Details of sampling locations, analytical methodologies, and interpretation approaches to risk characterization are discussed in the following sections.

Station Locations and Sampling Methods

Sediment Sampling Plan. Surface sediment samples (0-15 cm depth) will be collected from Areas C (n=3), D (n=6), E (n=4), and F (n=3). In addition, one field duplicate shall also be collected. Location coordinates are presented in Table 1. A schematic of the entire sampling site and aerial photographs of Areas C, D, E, and F are presented Attachment A. Three sites, designated C1 -C3, will be sampled in Area C. Six sites, designated D1 - D3 and D4 - D6, will be sampled in Areas D1 and D2, respectively. Four sites, E1 - E4, will be sampled from Area E and three sites, F1- F3, will be sampled from Area F.

Locations of all sampling sites will be surveyed using a differential GPS. Accuracy will be +/- 3 meters or less. A Trimble 4000 RSi GPS receiver interfaced with a Trimble DSM PRO differential beacon receiver will be utilized to provide real-time positioning data in the North American Datum of 1983 (NAD 83). Differential corrections will be obtained from the US Coast Guard station broadcasting from Montauk Point, Long Island, NY to provide the required accuracy. Individual sampling stations will be selected in coordination with the Contract Manager in the field at the initiation of the field effort. All environmental sampling stations will be marked with PVC stakes and high-flyers during the first two field days and will be maintained for the duration of the effort.

Sediments will be collected for 1) chemical analyses of both bulk samples and pore water samples and 2) toxicological analyses of bulk sediments only. Up to five gallons will be required at each station. One gallon will be used for the toxicity test, 1 gallon will be used for chemical analyses, and the remaining gallons 3 will be used to extract pore water (discussed below) for chemical analyses.

Sediments will be collected over a five day period in April 1999. The majority of sediments will be sampled by hand with scoops from just above the tide line within two hours of low tide. Sediment samples obtained from shallow, subtidal areas will require the use of a 14-ft boat equipped with a 15 horsepower outboard engine as a suitable work platform. A 0.053 m^2 Stainless Steel Ponar grab sampling device will be lowered to the bottom with a hand line to recover material with minimal sample disturbance.

Both intertidal and subtidal samples will be collected to approximately 6" depth until 5 gal. of wet sediment are obtained. Care will be taken to prevent loss of fines as well as to minimize the entrainment of excess water into the sample. Clean techniques will be employed during all sampling procedures and chain of custody procedures will be followed. After each day of collection, samples will be placed on ice and transported by van to a storage facility in Narragansett, RI. Samples will be stored at 4°C until needed.

Pore water samples will be collected according to methods described by Winger and Lasier (1991). Briefly, sediments will be homogenized and interstitial water will be collected using a vacuum-operated pore water extractor constructed from fused glass airstones attached to a 60 cc syringe. The airstone will be inserted into the sediment and a vacuum will be created by retracting and bracing the syringe plunger. The airstone will act as an effective filter to remove the majority of particulates. Sample chain of custody procedures will be followed.

To support Human Health Risk Assessment data needs, surface core samples (0-3" depth) will be taken at 9 locations near the Housatonic Boat Club (Area B). Stations will be identified after a site visit with state regulatory personnel. Sampling locations will be measured using differential GPS as described above. One field duplicate sample will also be collected. The geographic positions of each sampling

location will again be obtained using the navigation procedures described above. A pre-cleaned 3-inch diameter, rigid core tube will be pressed into the sediment by hand to the desired penetration depth to collect sediment, then capped on the top and bottom. Cores collected from shallow, subtidal areas may require the use of longer lengths of rigid core tube and a check valve assembly to ensure sufficient depth of penetration and material recovery.

Biota Sampling Plan. Nine (9) tissue samples shall be collected for chemical analyses. Bivalves (i.e., mussels and oysters) will be collected from three stations in Area C and bivalves and fish will be collected from six stations in Area D. Tissue samples will not be collected from Areas E and F. As much as possible, sediment-sampling locations shall be co-located with biological sampling locations. Should specific sample types not be available at specified locations, SAIC will collect alternate species and/or adjust sampling locations to collect the required sample numbers.

Aluminum minnow traps will be baited with bread and placed in the subtidal zone at low tide and connected via line to a shoreline stake. Minnow traps will be checked twice daily at low tide until sufficient numbers of the target species are obtained for chemical analysis. Fish will be transferred from the traps to clean glass jars after each collection and placed on ice for transport to a storage facility in Newport, RI where arriving samples will be composited (within station) with samples collected previously and frozen at -20°C until needed.

Sample Analysis Plan

Toxicity Testing Procedures. Bulk sediments shall be evaluated in the 10-day solid-phase amphipod test using the marine amphipod, *Ampelisca abdita*. Test conditions are summarized in Table 2. Briefly, bulk sediments will be evaluated according to EPA procedures for the 10-day solid-phase amphipod test (USEPA, 1994). The test will be conducted for 10 days using 1 L glass jars containing 175 mL of homogenized sediment and 800 mL of overlying seawater. Exposure will be static at 20°C with a continuous lighting. Test chambers will be aerated to maintain acceptable oxygen levels. Twenty unfed sub-adult test organisms per chamber will be used. Water quality parameters will be monitored: pore water ammonia will be measured at the beginning of the test; overlying water ammonia, pH, salinity, and dissolved oxygen will be measured at the beginning and the end of the test; and temperature will be recorded daily in one chamber and continuously in the water bath. Survival, measured as the number live retrieved at the end of the test compared to the number added, will be determined. Survival will be compared to a negative laboratory performance control sediment.

Sediment Chemistry Analysis. Sediment samples for ecological risk characterization (n=17) will be analyzed for dioxins, PCBs (congeners), organo-chlorine pesticides, PAHs and metals (As, Cd, Cr, Cu, Hg, Ni, Pb, Ag, Zn) according to methods

outlined in the NOAA Status and Trends Program (NOAA, 1998) and methods detailed in Table 3. In addition, sediment samples will be analyzed for physico-chemical features (i.e., percent moisture, grain size, and TOC) as well as AVS:SEM. Methods for the analyses and QA/QC protocols are described below.

For organic contaminants (PCBs, pesticides, and PAHs) the sample aliquots will be chemically dried and contaminants will be extracted. The extract will be concentrated and purified using Florisil/silica gel column chromatography. Subsequently, the concentrated and purified extract will undergo instrumental analysis (NOAA, 1998).

Dioxin analyses will be performed in accordance with EPA method 1613B. Method 1613B includes procedures for acid/base back extraction, gel permeation chromatography (GPC), silica gel, alumina, and activated carbon column cleanups. and an anthropogenic isolation column for the removal of lipids.

Samples will be prepared for trace metal analysis using microwave digestion. Three to five g of sample will be treated with 5 mL concentrated nitric acid, 2 mL of concentrated hydrochloric acid, and 3 mL of deionized water. The digest will be allowed to cool, and volumetrically diluted to a final volume of 100 mL.

The metals analyses will also be performed in accordance with the NOAA Status and Trends Project Report (1998). Procedures will include ICD, GFAA, and cold vapor hydride generlation methods depending on the analyte and matrix (Table 3). Multi-elemental techniques such as these provide sensitive results with a high degree of accuracy and precision (NOAA, 1998).

For metal analyses, a Varian SpectrAA 20 flame atomic absorption spectrophotometer and a Varian SpectrAA 400 Zeeman graphite furnace atomic absorption spectrophotometer will be used to determine the concentration of trace metals. Each unit will be equipped with data stations and autosamplers. For all metal analyses, a three point calibration curve plus blank will be established.

Quality control samples will be processed along with each batch of samples. Adherence to the specified QA/QC procedures is particularly important in that it provides a basis for comparing data among different methods and different laboratories. MDLs (method detection limits) will be established for each analyte before analyses is conducted (Table 3). MDLs will be obtained for the procedures outlined in 40 CFR part 136 and in Standard Methods for the Examination of Water and Wastewater (APHA, 1995). Water MDLs for inorganic compounds will be reported in µg/L units.

The grain size (Folk, 1968), and TOC (loss on ignition) of the sediment samples will be determined to assess the bioavailability of the contaminants described above.

Sediments will be analyzed for AVS/SEM. Acid-volatile sulfide will be extracted from the sediment samples by 30-min extractions with HCl (1 N in extract) at room temperatures under an argon atmosphere. Sulfide will be quantified by ion-selective electrode. Sediment extracts containing SEM will be filtered through a 1.0-µm glass-fiber filter. Concentrations of metals in SEM extracts will be determined by atomic absorption spectrophotometry (AAS).

To support Human Health Risk Assessment data needs, surface core samples (0-3" depth) will be analyzed for PCBs, metals, grain size, and TOC using methods selected for sediment samples discussed above.

Pore Water Chemistry Analysis. Pore water samples will be collected for metals analyses only. The analyses will include eight metals as described for sediments above, excluding mercury. After porewater extraction, samples will be twice-centrifuged and 0.2 μm filtered prior to acidification (pH 2). After fixation, samples will be analyzed as described for sediment metals discussed above.

Tissue Chemistry Analysis. Tissue samples shall be analyzed for pesticides, PAHs, PCB congeners, and metals following similar procedures for sediments. In addition, tissues will be analyzed for lipid content. Dioxins will not be measured. Methods are listed in Table 3.

Tissue analyses will include the same suite as determined in sediments. Bivalve and fish tissue will be frozen whole after collection and analyzed whole. Shell and exoskeletal material will not be analyzed for any species. Samples of bivalves from the collection will be selected at random and will be re-sected at the organic or inorganic lab depending on the analysis. In addition, the lipid content of the tissue will be determined.

Data Validation and Report Preparation

SAIC will validate data provided by analytical chemistry laboratories as soon as it becomes available and deliver validated data to Tetra Tech NUS in advance of draft report. Data will be validated in accordance with SAIC Standard Operating Procedures (SAIC, 1995). Based on validated data, an ERA report will be prepared.

The purpose of the ERA report is to describe information collected for evaluation of risks from contaminants associated with the Raymark study area to marine ecological receptors in the Raymark study area. A weight-of-evidence (WoE) approach will be used as the primary method for characterizing ecological risks associated with the Raymark study area. The lines of evidence that will be evaluated in drawing conclusions concerning risk are described below.

Exposure-Based Weights of Evidence. Exposure-based weights of evidence include Hazard Quotients (HQs) for sediment and pore water CoCs and SEM metal

bioavailability.

Sediment Hazard Quotients. Chemical concentrations of CoCs will be measured in sediments and compared against benchmarks to elucidate potential adverse effects on target species from exposure to contaminant concentrations in surface sediments. Sediment HQs will be summarized for four major chemical classes: nine metals, PAHs (including all PAH analytes where individual benchmarks exist, as well as Low Molecular Weight, High Molecular Weight and Total PAH summations), Total PCBs. and pesticides. The sediment based benchmarks to be used to develop HQs are from USEPA (1996). Most values used for HQ derivation will be NOAA Effects Range Median (ER-M) values. Where ER-M data are not available, Probable Effects Level (PEL) and Sediment Quality Advisory Level (SQAL) benchmarks will be used. For dioxins, recently published World Health Organization (WHO)Toxicity Equivalency Factors (TEFs) will be applied to estimate potential toxicity attributable to 2,3,7,8-TCDD (Van den Berg *et al.*, 1998).

Pore Water Hazard Quotients. Chemical concentrations in pore water (measured for metals, predicted for organics) will be compared against WQSVs to elucidate potential adverse effects on target species from exposure to sediment pore water. Determination of organic and metal CoCs responsible for the majority of the risk associated with the pore water will be assessed through normalizing concentrations to benchmarks so as to adjust for differences in the inherent toxicity of the chemical. For this investigation, Water Quality Screening Values (WQSV) adopted primarily from EPA Water Quality Criteria - Saltwater Chronic (WQC-SC) values will be used as the benchmarks.

SEM Bioavailability. Simultaneously Extracted Metals (SEM) bioavailability is a measure of the simultaneous and cumulative impact of 5 divalent metals (Cu, Cr, Pb, Ni and Zn) on sediment toxicity. Research by the USEPA into the development of Sediment Quality Criteria for divalent metals in sediment has shown that sediment toxicity can be predicted when the quantity of SEM present in excess of the Acid Volatile Sulfide (AVS) concentration in sediment is measured (Berry *et al.*, 1996).

Effects-Based Weight of Evidence. Effects-Based weights of evidence include assessment of sediment toxicity, Tissue Residue Effects, and modeled effects to birds and raccoons.

Sediment Toxicity. Toxicity endpoints allow assessment of both chemical exposure as well as potential impacts on target receptors, such as macrobenthos (amphipods). In this ERA, the sediment bioassays with amphipod, *Ampelisca* will be used to assess possible impacts from in-place sediments.

Tissue Residue Effects. Possible impacts of CoC residues on target species will be assessed separately through Tissue Screening Concentration (TSC) and Critical Body Residue (CBR) Hazard Quotients. Tissue residues in target species will be

evaluated as indicators of CoC-related exposure and effects. CoC effects in target species will be addressed by comparison of tissue residues against tissue benchmarks derived from water quality criteria (Tissue Screening Concentration HQs as described in Shepard, 1998)), and comparison of tissue residues against threshold concentrations for narcotic effects (Critical Body Residue HQs as described in McCarty *et al.*, 1992)).

Food Chain Transfer Effects. Results and interpretation of the data regarding ecological risk to fish, birds and raccoons shall be included. The format for assessment of risk to birds and mammals will be performed as was done by SAIC for Ferry Creek under Modification 4 of this Delivery Order (SAIC, 1999).

Discussion of each of the weights of evidence and applicable exposure-response relationships will be presented to elucidate concordance among exposure-based and effects-based weights of evidence in order to characterize overall risk for each of the Raymark study areas.

The report is outlined below:

- Problem Formulation
- Sampling Summary
- Site Characterization
- Exposure Assessment
- Ecological Effects Assessment
- Risk Characterization
  - Exposure-Based Weights of Evidence
  - Effects-Based Weight of Evidence Summary
  - Synthesis of Exposure and Effects Weights of Evidence
  - Uncertainty in Risk Estimation

Interim Meeting and Presentation of Preliminary Results

SAIC will prepare and present preliminary results of the investigation at 1 local meeting presumed to be the TTNUS offices in Wilmington, MA.

Schedule of Deliverables

The schedule is summarized in Table 4. All delivery dates assumed are based on 4/5/99 start date; delay in award may, at SAIC's discretion, result in proportionate slippage in deliverable dates.

References

American Public Health Association (APHA), 1995. Standard Methods for the Examination of Water and Wastewater. 19th Edition. APHA Washington, D.C.

Berry, W.J., D.J. Hansen, J.D. Mahoney, D.L. Robson, D.M. DiToro, B.P. Shipley, B. Rogers, J.M. Corbin, and W.S. Boothman, 1996. Predicting the toxicity of metal-spiked laboratory sediments using acid-volatile sulfide and interstitial water normalizations. *Environmental Toxicology and Chemistry*. 12:2067-2079.

Folk, R.L. 1968. Petrology of Sedimentary Rocks, Herphil Publishers, Austin, TX.

McCarty, L.S., D. MacKay, A.D. Smith, G.W. Ozburn, and D.G. Dixon, 1992. Residue-based interpretation of toxicity and bioconcentration QSARs from aquatic bioassays: Neutral narcotic organics. *Environ. Toxicol. Chem.* 11:917-930.

NOAA, 1998. Sampling and Analytical Methods of the National Status and Trends Program Mussel Watch Project: 1993-1996 Update. NOAA Technical Memorandum NOS/ORCA/CMBAD 130.

Science Applications International Corporation (SAIC), 1999. Evaluation of Ecological Risk to Avian and Mammalian Receptors in the Vicinity of Upper and Middle Ferry Creek, Stratford, CT. January 1999.

Science Applications International Corporation (SAIC), 1995. Standard Operating Procedure: Data Validation for the Narragansett Bay Ecorisk and Monitoring of Naval Sites. June 1995.

Shepard, B. K., 1998. Quantification of ecological risks to aquatic biota from bioaccumulated chemicals. National Sediment Bioaccumulation Conference. EPA 823-R-98-002, pp. 2-31 to 2-52.

United States Environmental Protection Agency (USEPA), 1989. Risk Assessment Guidance for Superfund, Volume II Environmental Evaluation Manual EPA/540/1-89/001.

United States Environmental Protection Agency (USEPA), 1991. Ecological Assessment of Superfund Sites: An Overview, ECO-Update 1 (2). December 1991. Publication 9345.0-05I. EPA, Office of Solid Waste and Emergency Response. Hazardous Site Evaluation Division (05-230).

United States Environmental Protection Agency (USEPA), 1994. Methods for Assessing the Toxicity of Sediment-Associated Contaminants with Estuarine and Marine Amphipods. EPA 600/R-94/025.

United States Environmental Protection Agency (USEPA), 1996. The National Sediment Quality Survey: A report to Congress on the extent and severity of sediment contamination in the surface waters of the United States. Office of Science and Technology, USEPA-823-D-96-002.

Van den Berg, M., *et al.*, 1998. Toxic Equivalency Factors (TEF) for PCBs, PCDDs, PCDFs for Humans and Wildlife. Environmental Health Perspectives, Vol. 106, pp. 775-792.

Winger, P.V. and P.J. Lasier, 1991. A Vacuum-Operated Pore-Water Extractor for Estuarine and Freshwater Sediments. *Archives of Environmental Contamination and Toxicology*. 21:321-324.

Table 1. Sample station designations and locations.

Apr-99 Area	Sample ID	Closest Previous Station Designation	UTM Coordinates Meters (NAD 83)		April 1999 Field Sampling Positions Geographic Coordinates (NAD 83)	
			Easting	Northing	Latitude	Longitude
D1	D1	BN07	657222.3973	4560565.735	41° 10′ 52.309″ N	073° 07′ 31.679″ W
	D2	-	657284.7606	4560532.863	41° 10′ 51.200″ N	073° 07′ 29.034″ W
	D3	BN03	657305.6499	4560449.454	41° 10′ 48.482″ N	073° 07′ 28.215″ W
C	C1	HB09	657327.3538	4560803.935	41° 10′ 59.956″ N	073° 07′ 26.956″ W
	C2	HB22	657252.4206	4560680.356	41° 10′ 56.003″ N	073° 07′ 30.285″ W
	C3	-	657216.9057	4560718.897	41° 10′ 57.277″ N	073° 07′ 31.773″ W
D2	D4	B502	657329.8364	4560257.48	41° 10′ 42.243″ N	073° 07′ 27.355″ W
	D6	B504	657331.0511	4560200.057	41° 10′ 40.381″ N	073° 07′ 27.356″ W
	D5	-	657275.0431	4560214.801	41° 10′ 40.898″ N	073° 07′ 29.745″ W
F	F1	SP01	657255.589	4561171.334	41° 11′ 11.914″ N	073° 07′ 29.695″ W
	F2	-	657236.587	4561078.611	41° 11′ 08.922″ N	073° 07′ 30.596″ W
	F3	-	657186.4491	4561164.167	41° 11′ 11.730″ N	073° 07′ 32.668″ W
E	E1*	E02	657019	4560123	41° 10′ 38.101″ N	073° 07′ 40.813″ W
	E2	-	656962.1432	4560019.549	41° 10′ 34.788″ N	073° 07′ 43.348″ W
	E3	-	656958.2686	4559941.746	41° 10′ 32.269″ N	073° 07′ 43.586″ W
	E4	-	657018.8008	4559983.343	41° 10′ 33.575″ N	073° 07′ 40.951″ W
C	HB1		657407.0991	4561068.373	41° 11′ 08.471″ N	073° 07′ 23.290″ W
	HB2		657394.7415	4561036.142	41° 11′ 07.435″ N	073° 07′ 23.85″ W
	HB3**		657346.35	4560913.07	41° 11′ 03.480″ N	073° 07′ 26.040″ W
	HB4		657346.1909	4560915.075	41° 11′ 03.545″ N	073° 07′ 26.045″ W
	HB5		657342.7637	4560884.857	41° 11′ 02.568″ N	073° 07′ 26.220″ W
	HB6		657331.4513	4560870.08	41° 11′ 02.097″ N	073° 07′ 26.719″ W
	HB7		657335.0478	4560868.677	41° 11′ 02.049″ N	073° 07′ 26.566″ W
	HB8		657329.073	4560800.948	41° 10′ 59.858″ N	073° 07′ 26.885″ W
	HB9		657310.7445	4560720.211	41° 10′ 57.254″ N	073° 07′ 27.746″ W

* Estimated position referenced upon a nearby differentially corrected position. The actual station position was measured to be approximately 13 meters south and 62 meters east of the referenced station (Exact station location not available due to obstructed interference).

** Estimated position referenced upon a nearby differentially corrected position. The actual station position was measured to be approximately 2 meters south of the referenced station. (Exact station location not available due to obstructed interference).

Table 2. Summary of Test Conditions and Test Acceptability Criteria for the Amphipod, *Ampelisca abdita*, Acute Toxicity Sediment Tests

1.)	Test type:	Whole sediment, static, non-renewal*
2.)	Test duration:	10 d
3.)	Temperature:	20 ± 2°C
4.)	Salinity:	28 ± 2 ppt
5.)	Light quality:	Ambient laboratory illumination
6.)	Light intensity:	10-20 uE/m^2/s(50-100 ft-c)
7.)	Photoperiod:	Continuous light
8.)	Test chamber size:	1 L glass beaker or 1 quart Mason jar
9.)	Overlying water volume:	725 ml
10.)	Sediment volume:	Approximately 175 ml
11.)	Renewal of overlying water:	None*
12.)	Size and life stage of amphipods:	Subadults, 3 -5 mm, passed through a 1.0 mm sieve and retained on a 0.7 mm sieve, no mature males or females.
13.)	Number of test organisms per chamber:	20
14.)	Number of replicates per sediment:	5
15.)	Feeding regime:	None
16.)	Test chamber cleaning:	None
17.)	Treatments:	Performance control (LIS) and test sediment
18.)	Overlying water:	Natural seawater
19.)	Overlying water aeration:	Water in each test chamber is aerated overnight before start of test, and throughout the test. Trickle-flow (< 100

		bubbles/min) is used.
20.)	Overlying water quality:	DO, pH, salinity, and ammonia are measured daily. Temperature is recorded daily.
21.)	Endpoint:	Survival
22.)	Test acceptability criterion:	Minimum mean control survival of 90%, where no individual chamber exhibits greater than 20% mortality.

* Static renewal, intermittent flow or continuous flow tests may be used where pore water total and un-ionized ammonia values at pH 7.7 exceed 30 and 0.5 mg/L, respectively. During static renewal tests the overlying dilution water is changed every 48 h.

Table 3. List of analytes for chemical analysis.

Metals

Reporting Name	Analyte	CAS NO	Sediment Analysis Method	Sediment MDL mg/Kg dry	Sediment Reporting Lir mg/Kg dry
As	Arsenic	7440-38-2	GFAA 7060	0.04	0.5
Cd	Cadmium	7440-43-9	GFAA 7131	0.06	0.2
Cr	Chromium	7440-47-3	ICP 6010B	0.34	1.0
Cu	Copper	7440-50-8	GFAA 7211	0.1	0.5
Pb	Lead	7439-92-1	GFAA 7421	0.14	0.2
Hg	Total Mercury (cold vapor)	7439-97-6	CVAA 7471	0.005	0.006
Ni	Nickel	7440-02-0	ICP 6010B	1.2	2.0
Ag	Silver	7440-22-4	GFAA 7761	0.03	0.2
Zn	Zinc	7440-66-6	ICP 6010B	2.0	0.43

SEM:AVS

Reporting Name	Analyte	CAS NO	Analysis Method	Sediment MDL mg/Kg dry	Sediment Reporting Lir mg/Kg dry
SEM-Cu	Copper	7440-50-8	ICP 6010B	0.53	2.0
SEM-Cd	Cadmium	7440-43-9	ICP 6010B	0.23	0.5
SEM-Pb	Lead	7439-92-1	ICP 6010B	5.0	10
SEM-Ni	Nickel	7440-02-0	ICP 6010B	0.99	5
SEM-Zn	Zinc	7440-66-6	ICP 6010B	5.9	10
AVS	Acid Volatile Sulfide		Ag_2S Probe EPA, 1992	0.1	20

SEM Reporting Limits based on 2.0 g digested, 50% moisture, and 100-mL final volume.

Table 3. continued.

Metals

Reporting Name	Analyte	CAS NO	Tissue Analysis Method	Tissue MDL mg/Kg dry	Tissue Reporting Lir mg/Kg dry
As	Arsenic	7440-38-2	GFAA 7060		0.5
Cd	Cadmium	7440-43-9	GFAA 7131		0.2
Cr	Chromium	7440-47-3	GFAA 7191		0.5
Cu	Copper	7440-50-8	GFAA 7211		0.5
Pb	Lead	7439-92-1	GFAA 7421		0.2
Hg	Total Mercury (cold vapor)	7439-97-6	CVAA 7471		0.006
Ni	Nickel	7440-02-0	GFAA 7521		0.5
Ag	Silver	7440-22-4	GFAA 7761		0.2
Zn	Zinc	7440-66-6	ICP 6010B		0.43

Tissue MDL studies are in progress and due for completion 04/05/99.

Metals

Reporting Name	Analyte	CAS NO	Porewater Analysis Method	Seawater MDL Ug/L	Seawater Reporting Lim ug/L dry
As	Arsenic	7440-38-2	Hydride 7061	0.30	4.0
Cd	Cadmium	7440-43-9	ICP 6010B	0.15	0.5
Cr	Chromium	7440-47-3	GFAA 7191	0.60	10
Cu	Copper	7440-50-8	GFAA 7211	0.26	0.6
Pb	Lead	7439-92-1	GFAA 7421	0.007	0.04
Ni	Nickel	7440-02-0	ICP 6010B	0.59	2.0
Ag	Silver	7440-22-4	ICP 6010B	0.12	1.0
Zn	Zinc	7440-66-6	ICP 6010B	4.0	0.59

Porewater limits are based on having 50 mL porewater after filtering to chelate/extract and preconcentrate for analysis.

Table 3. continued.

PAHs

Reporting Name	Analyte	CAS NO	Sediment MDL ug/Kg dry	Sediment Reporting Limit ug/Kg dry
T167NAP	1,6,7-Trimethylnaphthalene	2245387	0.10	2
M1NAPH	1-Methylnaphthalene	90120	0.11	2
M1PHEN	1-Methylphenanthrene	832699	0.16	2
D26NAPH	2,6-Dimethylnaphthalene	581420	0.17	2
M2NAPH	2-Methylnaphthalene	91-57-6	0.19	2
ACENAPH	Acenaphthene	83-32-9	0.14	2
ACENAPL	Acenaphthylene	208-96-8	0.13	2
ANTHRAC	Anthracene	120-12-7	0.23	2
BENAAN	Benzo(a)anthracene	56-55-3	0.19	2
BENAPYR	Benzo(a)pyrene	50-32-8	0.065	2
BENBFLU	Benzo(b)fluoranthene	205-99-2	0.34	2
BENEPYR	Benzo(e)pyrene	192972	0.19	2
BGHIPER	Benzo(g,h,i)perylene	191-24-2	0.19	2
BENKFLU	Benzo(k)fluoranthene	207-08-9	0.47	2
BIPHEN	Biphenyl	92524	0.46	2
CHRYSEN	Chrysene	218-01-9	0.18	2
DBAHANT	Dibenz(a,h)anthracene	53-70-3	0.26	2
FLUORAN	Fluoranthene	206-44-0	0.22	2
FLUOREN	Fluorene	86-73-7	0.082	2
I123CDP	Indeno(1,2,3-cd)pyrene	193-39-5	0.093	2
NAPH	Naphthalene	91-20-3	0.28	2
PERYL	Perylene	198550	0.13	2
PHENAN	Phenanthrene	85-01-8	0.22	2
PYRENE	Pyrene	129-00-0	0.24	2

Methods follow NS&T Program guidelines, and SW-846 Method 8270 Modified. Reporting limits based on 20-g sample, 50% moisture content, and 2-mL final extract volume.

Table 3. continued.

PAHs

Reporting Name	Analyte	CAS NO	Tissue MDL ug/Kg dry	Tissue Reporting Limit ug/Kg dry
T167NAP	1,6,7-Trimethylnaphthalene	2245387	5.3	10
M1NAPH	1-Methylnaphthalene	90120	3.8	10
M1PHEN	1-Methylphenanthrene	832699	10	10
D26NAPH	2,6-Dimethylnaphthalene	581420	4.3	10
M2NAPH	2-Methylnaphthalene	91-57-6	6.1	10
ACENAPH	Acenaphthene	83-32-9	4.2	10
ACENAPL	Acenaphthylene	208-96-8	4.5	10
ANTHRAC	Anthracene	120-12-7	3.7	10
BENAAN	Benzo(a)anthracene	56-55-3	9.3	10
BENAPYR	Benzo(a)pyrene	50-32-8	4.7	10
BENBFLU	Benzo(b)fluoranthene	205-99-2	5.5	10
BENEPYR	Benzo(e)pyrene	192972	5.2	10
BGHIPER	Benzo(g,h,i)perylene	191-24-2	3.7	10
BENKFLU	Benzo(k)fluoranthene	207-08-9	5.5	10
BIPHEN	Biphenyl	92524	3.6	10
CHRYSEN	Chrysene	218-01-9	4.2	10
DBAHANT	Dibenz(a,h)anthracene	53-70-3	5.4	10
FLUORAN	Fluoranthene	206-44-0	6.6	10
FLUOREN	Fluorene	86-73-7	4.9	10
I123CDP	Indeno(1,2,3-cd)pyrene	193-39-5	5.1	10
NAPH	Naphthalene	91-20-3	5.1	10
PERYL	Perylene	198550	3.4	10
PHENAN	Phenanthrene	85-01-8	7.6	10
PYRENE	Pyrene	129-00-0	6.0	10

Methods follow NS&T Program guidelines and SW-846 Method 8270 Modified. Reporting limits based on 20-g sample, 90% moisture content, and 2-mL final extract volume.

Table 3. continued.

PCB congeners

Reporting Name	Analyte	CAS NO	Sediment MDL ug/Kg dry	Sediment Reporting Limit ug/Kg dry
PCB008	8 (2 4)	34883437	0.063	1
PCB018	18 (2 2'5)	37680652	0.29	1
PCB028	28 (2 4 4')	7012375	0.025	1
PCB029	29 (2 4 5)	15862074	NA	1
PCB044	44 (2 2'3 5')	41464395	0.18	1
PCB050	50 (2 2' 4 6)	62796650	NA	1
PCB052	52 (2 2'5 5)	35693993	0.083	1
PCB066	66 (2 3'4 4')	32598100	0.030	1
PCB077	77(3 3' 4 4')	32598133	0.047	1
PCB087	87(2 2' 3 4 5')	38380028	0.063	1
PCB101	101 (2 2'4 5 5')	37680732	0.086	1
PCB104	104 (2 2' 4 6 6')		NA	1
PCB105	105 (2 3 3'4 4')	32598144	0.040	1
PCB118	118 (2 3'4 4'5)	31508006	0.046	1
PCB126	126 (3 3' 4 4' 5)	57465288	0.060	1
PCB128	128 (2 2'3 3'4 4')	39380073	0.15	1
PCB138	138 (2 2'3 4 4'5)	35065282	0.075	1
PCB153	153 (2 2'4 4'5 5')	35065271	0.069	1
PCB154	154(2 2 4 4' 5 6')		NA	1
PCB170	170 (2 2'3 3'4 4'5)	35065306	0.14	1
PCB180	180 (2 2'3 4 4'5 5')	35065293	0.058	1
PCB187	187 (2 2'3 4'5 5'6)	52663680	0.046	1
PCB188	188 (2 2' 3 4' 5 6 6')		NA	1
PCB195	195 (2 2'3 3'4 4'5 6)	52663782	0.052	1
PCB200	200 (2 2' 3 3' 4 5 6 6')		NA	1
PCB206	206 (2 2'3 3'4 4'5 5'6)	40186729	0.050	1
PCB209	209 (2 2'3 3'4 4'5 5'6 6')	2051243	0.075	1

Methods follow NS&T Program guidelines and SW-846 Method 8082 Modified. Reporting limit based on 20-g sample, 50% moisture, 2-mL final extract volume; lower reporting limits may be achieved if required by the project QAPjP.

NA – Not available, congener not included in most recent MDL study.

Table 3. continued.

PCB congeners

Reporting Name	Analyte	CAS NO	Tissue MDL ug/Kg dry	Tissue Reporting Limit ug/Kg dry
PCB008	8 (2 4)	34883437	5.1	5
PCB018	18 (2 2'5)	37680652	2.6	5
PCB028	28 (2 4 4')	7012375	3.5	5
PCB029	29 (2 4 5)	15862074	NA	5
PCB044	44 (2 2'3 5')	41464395	6.1	5
PCB050	50 (2 2' 4 6)	62796650	NA	5
PCB052	52 (2 2'5 5)	35693993	1.4	5
PCB066	66 (2 3'4 4')	32598100	3.2	5
PCB077	77(3 3' 4 4')	32598133	2.7	5
PCB087	87(2 2' 3 4 5')	38380028	1.7	5
PCB101	101 (2 2'4 5 5')	37680732	1.7	5
PCB104	104 (2 2' 4 6 6')		NA	5
PCB105	105 (2 3 3'4 4')	32598144	1.5	5
PCB118	118 (2 3'4 4'5)	31508006	5.3	5
PCB126	126 (3 3' 4 4' 5)	57465288	0.67	5
PCB128	128 (2 2'3 3'4 4')	39380073	4.8	5
PCB138	138 (2 2'3 4 4'5)	35065282	3.4	5
PCB153	153 (2 2'4 4'5 5')	35065271	4.2	5
PCB154	154(2 2 4 4' 5 6')		NA	5
PCB170	170 (2 2'3 3'4 4'5)	35065306	NA	5
PCB180	180 (2 2'3 4 4'5 5')	35065293	5.4	5
PCB187	187 (2 2'3 4'5 5'6)	52663680	1.7	5
PCB188	188 (2 2' 3 4' 5 6 6')		NA	5
PCB195	195 (2 2'3 3'4 4'5 6)	52663782	3.9	5
PCB200	200 (2 2' 3 3' 4 5 6 6')		NA	5
PCB206	206 (2 2'3 3'4 4'5 5'6)	40186729	1.0	5
PCB209	209 (2 2'3 3'4 4'5 5'6 6')	2051243	0.75	5

Methods follow NS&T Program guidelines and SW-846 Method 8082 Modified. Reporting limit based on 20-g sample, 90% moisture, 2-mL final extract volume.

NA – Not available, congener not included in most recent MDL study.

Table 3. continued.

OCPs

Reporting Name	Analyte	CAS NO	Sediment MDL ug/Kg dry	Sediment Reporting Limit ug/Kg dry
ABHC	Alpha-BHC	319846	0.014	1
ACHLOR	Alpha-Chlordane	5103719	0.022	1
BBHC	Beta-BHC	319857	0.026	1
DBHC	Delta-BHC	319868	0.017	1
DIELDRIN	Dieldrin	6057	0.049	1
ENDOSFN1	Endosulfan I	959988	0.022	1
ENDOSFN2	Endosulfan II	33212659	0.031	1
ENDOSO4	Endosulfan Sulfate	1031078	0.059	1
ENDRIN	Endrin	72208	0.039	1
ENDRINAD	Endrin Aldehyde	7421934	0.048	1
GBHC	Gamma-BHC(Lindane)	58899	0.014	1
GCHLOR	Gamma-Chlordane	5103742	0.030	1
HPTCHLOR	Heptachlor	76448	0.037	1
HPTEPOX	Heptachlor Epoxide	1024573	0.032	1
MTXYCHLR	Methoxychlor		0.23	5
TOXPHNE	Toxaphene	8001352	NA	10
ALDRIN	Aldrin	309002	0.012	1
HCB	Hexachlorobenzene	118-74-1	NA	1
MIREX	Mirex	2385855	NA	1
DDD_PP	p,p'-DDD	72548	0.026	1
DDE_PP	p,p'-DDE	72559	0.033	1
DDT_PP	p,p'-DDT	50293	0.030	1
DDD_OP	o,p'-DDD	3424826	NA	1
DDE_PP	o,p'-DDE		NA	1
DDT_PP	o,p'-DDT		NA	1

Methods follow NS&T Program guidelines and SW-846 Method 8081 Modified. Reporting limit based on 20-g sample, 50% moisture, 2-mL final extract volume; lower reporting limits may be achieved if required by the project QAPjP.

NA – Not available, pesticide not included in most recent MDL study.

Table 3. continued.

OCPs

Reporting Name	Analyte	CAS NO	Tissue MDL ug/Kg dry	Tissue Reporting Limit ug/Kg dry
ABHC	Alpha-BHC	319846		5
ACHLOR	Alpha-Chlordane	5103719		5
BBHC	Beta-BHC	319857		5
DBHC	Delta-BHC	319868		5
DIELDRIN	Dieldrin	6057		5
ENDOSFN1	Endosulfan I	959988		5
ENDOSFN2	Endosulfan II	33212659		5
ENDOSO4	Endosulfan Sulfate	1031078		5
ENDRIN	Endrin	72208		5
ENDRINAD	Endrin Aldehyde	7421934		5
GBHC	Gamma-BHC(Lindane)	58899		5
GCHLOR	Gamma-Chlordane	5103742		5
HPTCHLOR	Heptachlor	76448		5
HPTEPOX	Heptachlor Epoxide	1024573		5
MTXYCHLR	Methoxychlor			25
TOXPHNE	Toxaphene	8001352		50
ALDRIN	Aldrin	309002		5
HCB	Hexachlorobenzene	118-74-1		5
MIREX	Mirex	2385855		5
DDD_PP	p,p'-DDD	72548		5
DDE_PP	p,p'-DDE	72559		5
DDT_PP	p,p'-DDT	50293		5
DDD_OP	o,p'-DDD	3424826		5
DDE_PP	o,p'-DDE			5
DDT_PP	o,p'-DDT			5

Methods follow NS&T Program guidelines and SW-846 Method 8081 Modified. Reporting limit based on 20-g sample, 90% moisture, 2-mL final extract volume.

Tissue MDL studies are in progress and due for completion 04/05/99.

Table 3. continued.

Dioxins/Dibenzofurans

Reporting Name	Analyte	CAS NO	Sediment Reporting Limit ng/g dry
1,2,3,4,6,7,8,9-OCDD	1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin	3268879	0.001
1,2,3,4,6,7,8,9-OCDF	1,2,3,4,6,7,8,9-Octachlorodibenzofuran	39001020	0.001
1,2,3,4,6,7,8-HpCDD	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	35822394	0.001
1,2,3,4,6,7,8-HpCDF	1,2,3,4,6,7,8-Heptachlorodibenzofuran	67562394	0.001
1,2,3,4,7,8,9-HpCDF	1,2,3,4,7,8,9-Heptachlorodibenzofuran	55673897	0.001
1,2,3,4,7,8-HxCDD	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	39227286	0.001
1,2,3,4,7,8-HxCDF	1,2,3,4,7,8-Hexachlorodibenzofuran	70648269	0.001
1,2,3,6,7,8-HxCDD	1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin	57653857	0.001
1,2,3,6,7,8-HxCDF	1,2,3,6,7,8-Hexachlorodibenzofuran	57117449	0.001
1,2,3,7,8,9-HxCDD	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin	19408743	0.001
1,2,3,7,8,9-HxCDF	1,2,3,7,8,9-Hexachlorodibenzofuran	72918219	0.001
1,2,3,7,8-PeCDD	1,2,3,7,8-Pentachlorodibenzo-p-dioxin	40321764	0.001
1,2,3,7,8-PeCDF	1,2,3,7,8-Pentachlorodibenzofuran	57117416	0.001
2,3,4,6,7,8-HxCDF	2,3,4,6,7,8-Hexachlorodibenzofuran	60581345	0.001
2,3,4,7,8-PeCDF	2,3,4,7,8-Pentachlorodibenzofuran	57117314	0.001
2,3,7,8-TCDD	2,3,7,8-Tetrachlorodibenzo-p-dioxin	1746016	0.001
2,3,7,8-TCDF	2,3,7,8-Tetrachlorodibenzofuran	51207319	0.001
Dibenzofuran	Dibenzofuran	132649	0.001
Total HpCDD	Total HpCDD		0.001
Total HpCDF	Total HpCDF		0.001
Total HxCDD	Total HxCDD		0.001
Total HxCDF	Total HxCDF		0.001
Total PeCDD	Total PeCDD		0.001
Total PeCDF	Total PeCDF		0.001
Total TCDD	Total TCDD		0.001
Total TCDF	Total TCDF		0.001

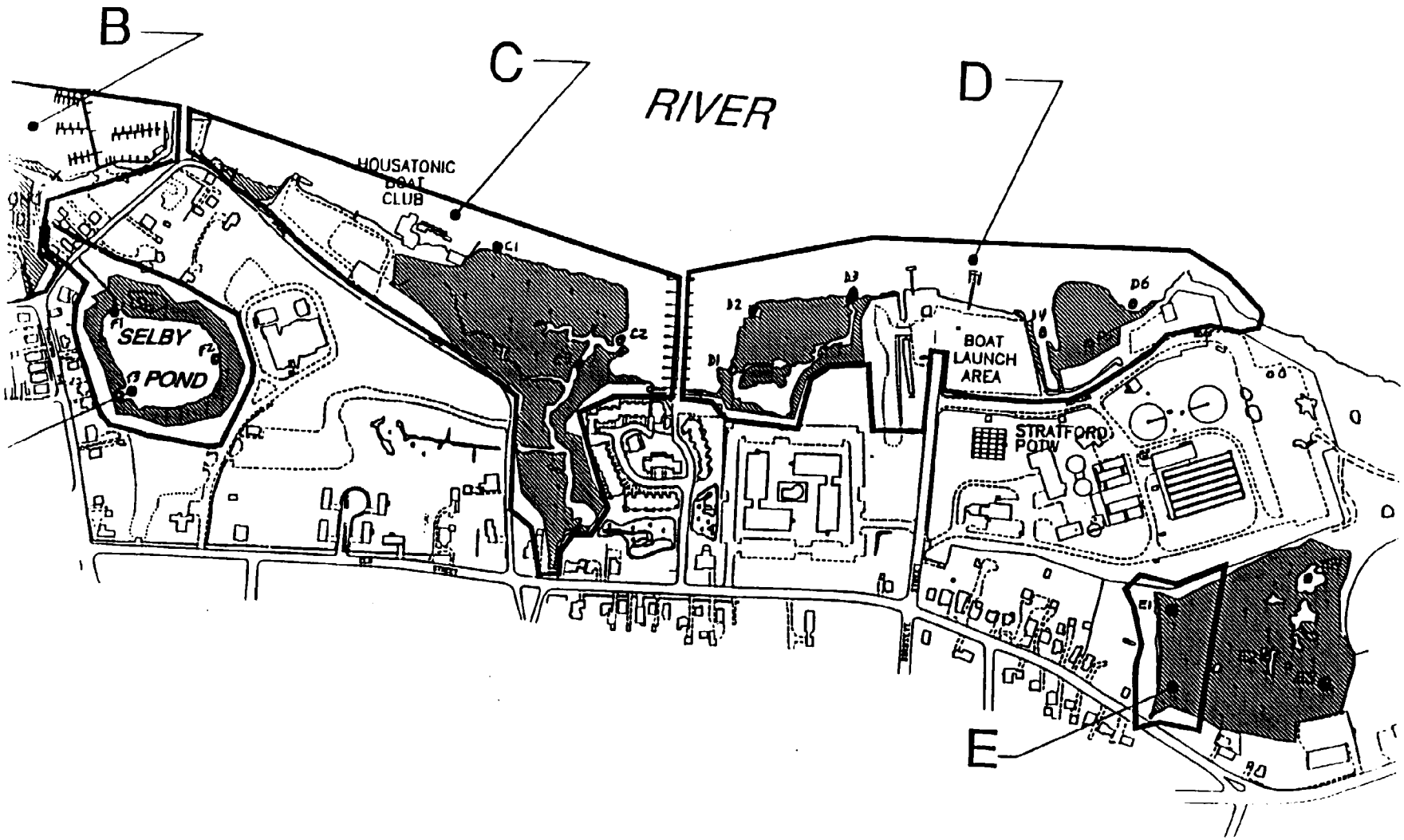
Methods follow SW-846 Method 1613B.

Table 4. Task schedule with completion dates.

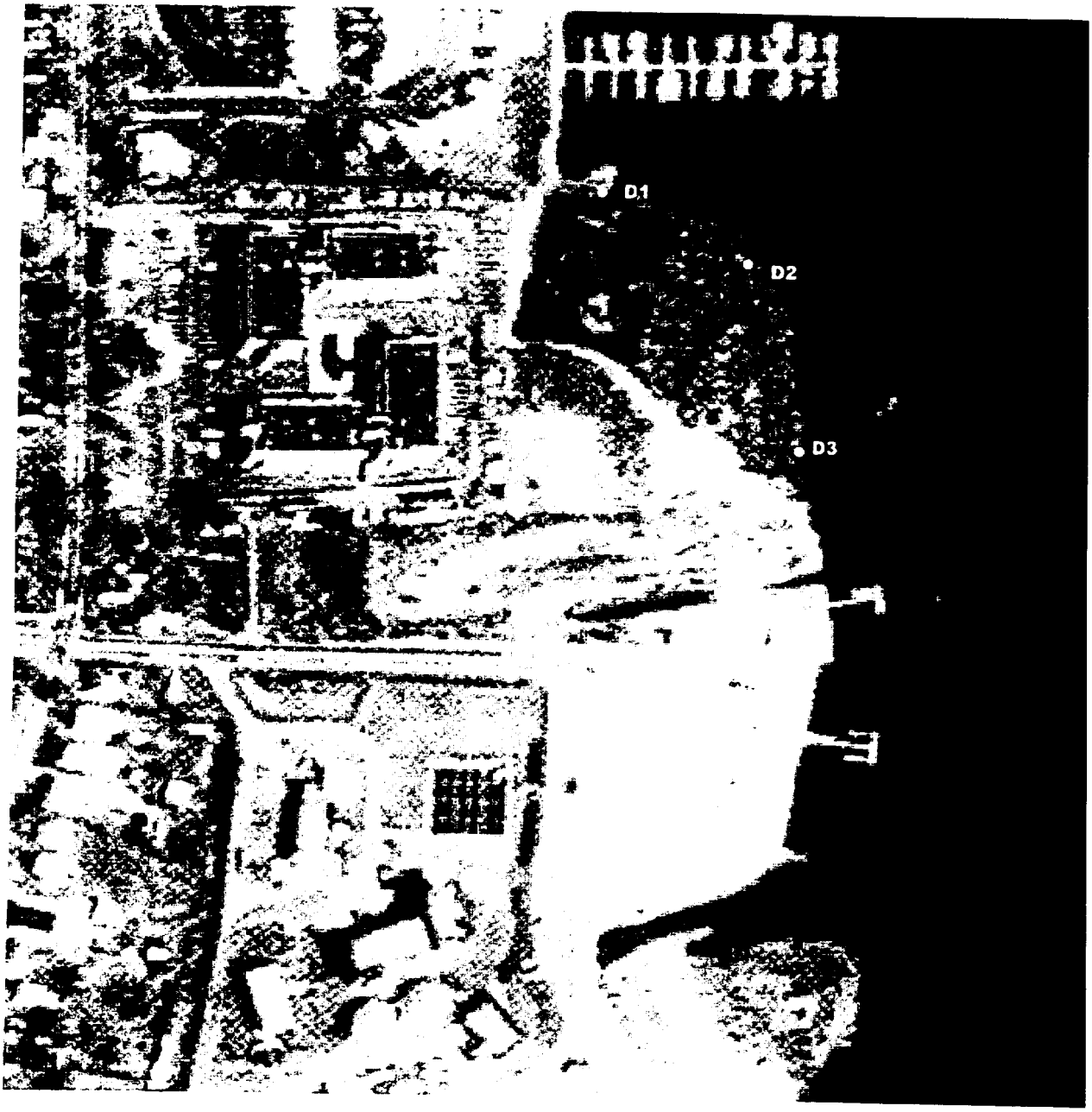
Task	Description	Completion Date
1	Develop Draft Work Plan	9-Apr
	Develop Final Work Plan	20-Apr
2.3.4	Collect Samples	23-Apr
5,6,7	Conduct Chemical Analyses/Validation	15-Jun
8	Perform Data Analysis and Prepare Draft Report	1-Jul
	Prepare Final Report	1-Aug

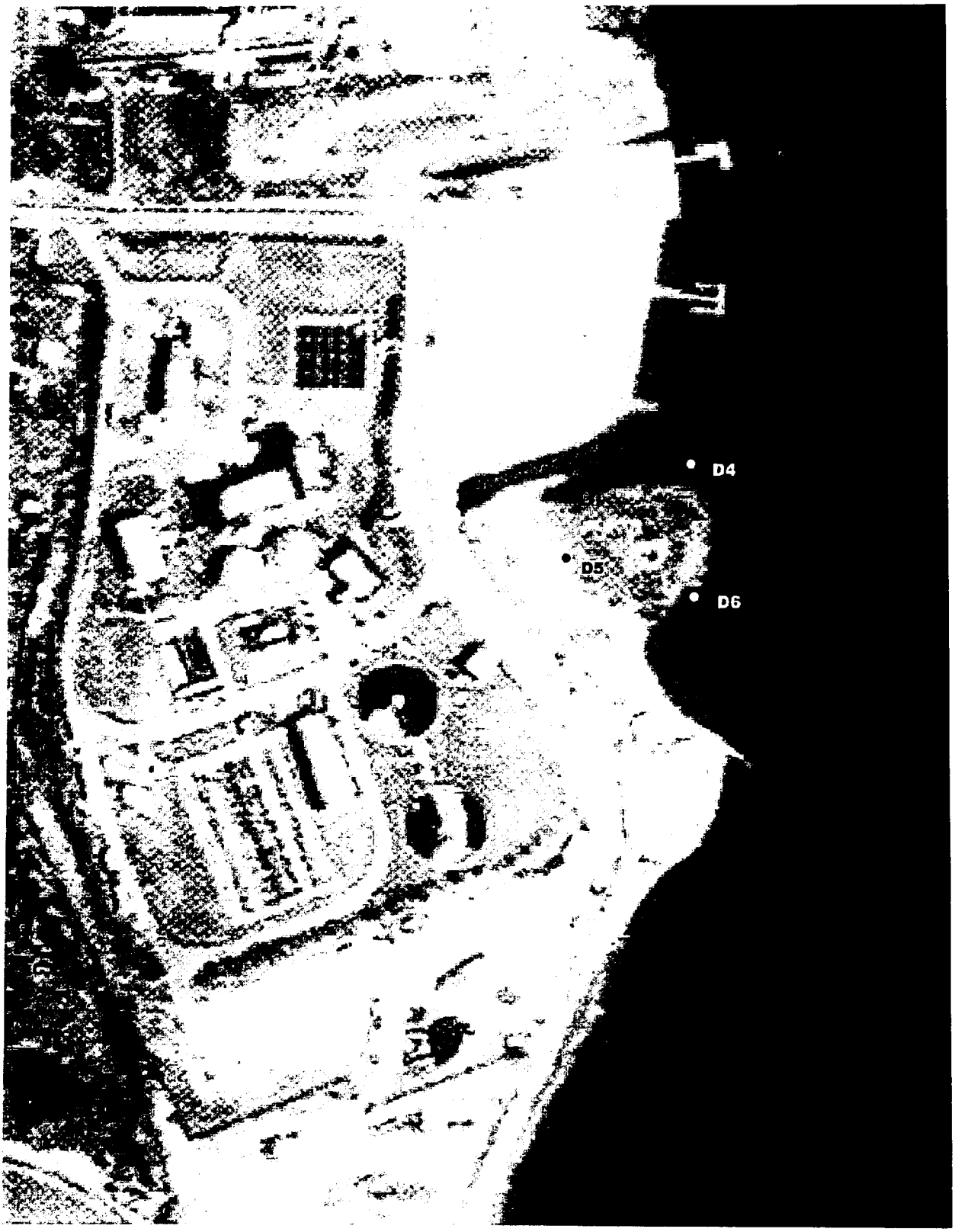
Attachment A

Schematic of Raymark Sampling Site

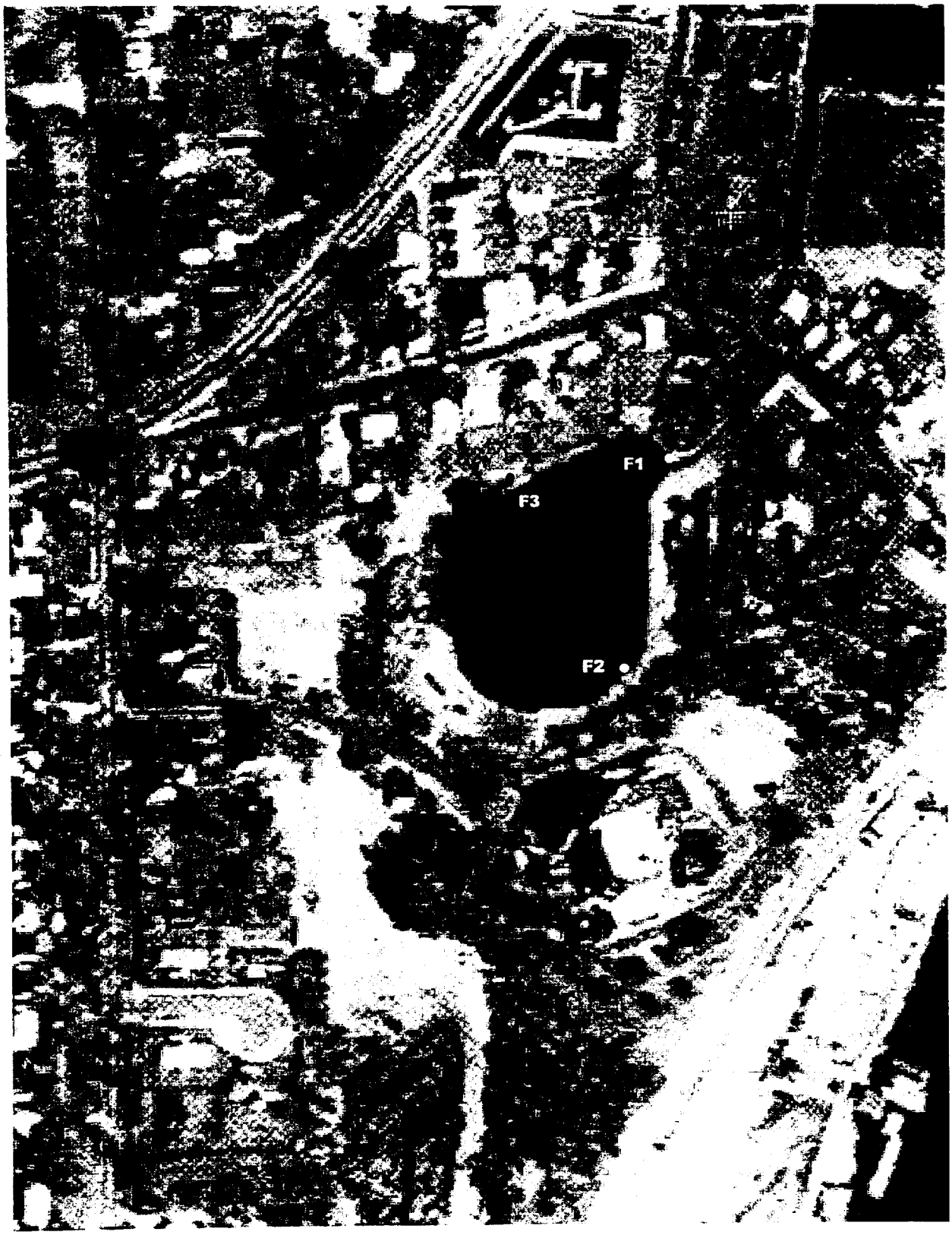


C1
C3
C2


D1
D2
D3


D4
D5
D6

E2
E4


F1
F3
F2

HB1
HB2
HB4
HB3
HB5
HB6
HB7
C1
HB8
HB9
C3
C2

APPENDIX E-2

SAMPLE LOG SHEETS FOR RAYMARK SUPERFUND SITE AREAS C-F.

SAMPLE LOG SHEET

Project Site Name: C-02-SED-SMP
Project Number: RAYMARK, CT

[ ] Surface Soil
[ ] Subsurface Soil
[X] Sediment
[ ] Other:
[ ] QA Sample Type:

Sample ID No.: C-02-SED-SMP
Sample Location: AREA C
Sampled By: NORRIS/INFANTINO
C.O.C. No.:

* GRAB SAMPLE DATA			
Date: 4/13/99	Depth	Description (Sand, Silt, Clay, Moisture, etc.)	
Time: 5:30 PM		BLACK SILTY SAND - Fairly Dry - Has small	
Method:		remnants of vegetation	
Scoop			

CORE SAMPLE DATA			
Date:	Depth	Description (Sand, Silt, Clay, Moisture, etc.)	
Time:			
Method:			

COMPOSITE SAMPLE DATA		
Date:	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Time:		
Method:		

SAMPLE COLLECTION INFORMATION			
Analysis	Container Requirements	Collected	Other
SEDIMENT CHEMISTRY (METALS PCBS PESTICIDES DAHS DRYW)	5 gal bucket (1)	✓	—
SEDIMENT TOXICITY			
PORE WATER CHEMISTRY (METALS)			
OTHER (AVS/SEM GRAINSIZE/TOC)			

OBSERVATIONS/NOTES	MAP
* Sampled with a plastic scoop	AREA C 41 10 59.956 73 07 26.956

Signature(s): Jean M. Infantino

SAMPLE LOG SHEET

Project Site Name: C-02-SED-SMP
Project Number: RAYMARK, CT

Sample ID No.: C-02-SED-SMP
Sample Location: AREA C
Sampled By: NETTU/INFANTINO
C.O.C. No.:

[ ] Surface Soil
[ ] Subsurface Soil
[✓] Sediment
[ ] Other:
[ ] QA Sample Type:

* GRAB SAMPLE DATA			
Date: 4/13/99	Depth	Description (Sand, Silt, Clay, Moisture, etc.)	
Time: 5:45 PM		Firm silty clay, H_2S smell	
Method: SCOOP			

CORE SAMPLE DATA			
Date:	Depth	Description (Sand, Silt, Clay, Moisture, etc.)	
Time:			
Method:			

COMPOSITE SAMPLE DATA		
Date:	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Time:		
Method:		

SAMPLE COLLECTION INFORMATION			
Analysis	Container Requirements	Collected	Other
Sediment chemistry	5 gal bucket (1)	✓	—
(metals PCB pest PAH dioxin)			
Sediment toxicity			
Surface water chemistry			
(metals)			
other (VOCs/semi-volatiles/TOC)			

OBSERVATIONS/NOTES	MAP
*Sampled with a plastic scoop	AREA C 41 10 56.003 73 07 30.285

Signature(s): Jason V. DeFalco

SAMPLE LOG SHEET

Project Site Name: C-03-SED-SMP
Project Number: RAYMARK, CT

[ ] Surface Soil
[ ] Subsurface Soil
[X] Sediment
[ ] Other:
[ ] QA Sample Type:

Sample ID No.: C-03-SED-SMP
Sample Location: AREA C
Sampled By: MORRIS/INFANTINO
C.O.C. No.:

* GRAB SAMPLE DATA

	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 4/13/99		
Time: 5:55 PM		Silt + clay, consolidated, firm
Method: SCOOP		H_2S smell

CORE SAMPLE DATA

	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Date:		
Time:		
Method:		

COMPOSITE SAMPLE DATA

	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Date:		
Time:		
Method:		

SAMPLE COLLECTION INFORMATION

Analysis	Container Requirements	Collected	Other
Sediment chemistry	5 gal bucket (1)	✓	—
(metals, PCB, pesticides, PAHs, dioxin)			
Sediment toxicity			
Pore water chemistry			
(metals)			
other (cyanide, sulfide, TOC)			

OBSERVATIONS/NOTES

* Sampled with a plastic scoop

MAP

AREA C

41 10 57.277
73 07 31.773

Signature(s): Jean M Infantino

SAMPLE LOG SHEET

Project Site Name: D-01-sed-samp
Project Number: RAYMARK, CT

[ ] Surface Soil
[ ] Subsurface Soil
[X] Sediment
[ ] Other:
[ ] QA Sample Type:

Sample ID No.: D-01-SED-SMP
Sample Location: AREA D
Sampled By: ROSENBERGER/INFANTINO
C.O.C. No.:

* GRAB SAMPLE DATA

	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 9/14/99		Clay, fine sand layer, brown, little odor
Time: 4:10 PM		worms
Method: scoop		

CORE SAMPLE DATA

	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Date:		
Time:		
Method:		

COMPOSITE SAMPLE DATA

	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Date:		
Time:		
Method:		

SAMPLE COLLECTION INFORMATION

Analysis	Container Requirements	Collected	Other
Sediment chemistry	5 gal bucket (1)	✓	—
metals/PAH/pesticide/dioxin			
sediment toxicity			
pore water chemistry (metals)			
other (AVS/SEM, grainsize/TOC)			

OBSERVATIONS/NOTES

* Sampled w/a plastic scoop

MAP

AREA D
41 10 52.309
73 07 31.679

Signature(s): Joan M Infantino

SAMPLE LOG SHEET

Project Site Name: D-02-Sed-Samp
Project Number: AMYMARK, CT

[ ] Surface Soil
[ ] Subsurface Soil
[X] Sediment
[ ] Other:
[ ] QA Sample Type:

Sample ID No.: D-02-SED-SMP
Sample Location: AREA D
Sampled By: ROSENBERGER/INFANTINO
C.O.C. No.:

✓ GRAB SAMPLE DATA

	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 4/14/99		
Time: 4:00PM		Brown, Black Fine silty
Method: SCOOP		

CORE SAMPLE DATA

	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Date:		
Time:		
Method:		

COMPOSITE SAMPLE DATA

	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Date:		
Time:		
Method:		

SAMPLE COLLECTION INFORMATION

Analysis	Container Requirements	Collected	Other
Sediment chemistry (total pcb pah pesticides cyan)	5 gal bucket (1)	✓	—
sediment toxicity			
pore water chemistry (metals)			
other (AVS/SEM grain size / TOC)			

OBSERVATIONS/NOTES

✓ Sampled w/a plastic scoop

MAP

AREA D

41 10 51.200
73 07 29.034

Signature(s): Joann M Infantino

SAMPLE LOG SHEET

Project Site Name: D-03-sed-smp
Project Number: Raymark, CT

Sample ID No.: D-03-SED-SMP
Sample Location: AREA D
Sampled By: ROSENBERGER, INFANTINO
C.O.C. No.:

[ ] Surface Soil
[ ] Subsurface Soil
[X] Sediment
[ ] Other:
[ ] QA Sample Type:

* GRAB SAMPLE DATA

	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 4/14/99		
Time: 3:45 PM		Sand, gravel, glass, brown, shell
Method: SCOOP		Black

CORE SAMPLE DATA

	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Date:		
Time:		
Method:		

COMPOSITE SAMPLE DATA

	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Date:		
Time:		
Method:		

SAMPLE COLLECTION INFORMATION

Analysis	Container Requirements	Collected	Other
Sediment chemistry (metals, pesticides, PAH, dioxin)	5 gal bucket (1)	✓	—
Sediment toxicity			
Pore water chemistry (metals)			
Other (AVS/SEM, grain sz/TOC)			

OBSERVATIONS/NOTES

* Sampled w/ a plastic scoop

MAP

AREA D

41 10 48.482
73 07 28.215

Signature(s): Joan M. Infantino

SAMPLE LOG SHEET

Project Site Name: D-04-SED RAYMARK CT
Project Number:

[ ] Surface Soil
[ ] Subsurface Soil
[X] Sediment
[ ] Other:
[ ] QA Sample Type:

Sample ID No.: D-04-SED-SMP
Sample Location: AREA-D
Sampled By: ROSENBERGER/INFANTINO
C.O.C. No.:

* GRAB SAMPLE DATA

Date: 4/14/99	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 3:25 PM		Silty, Clay, brown, black, shell/
Method: SCOOP		slight sulfric smell

CORE SAMPLE DATA

Date:	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Time:		
Method:		

COMPOSITE SAMPLE DATA

Date:	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Time:		
Method:		

SAMPLE COLLECTION INFORMATION

Analysis	Container Requirements	Collected	Other
Sediment chemistry (metals, PAH, pest/dioxin)	5 gal bucket (1)	✓	—
sediment toxicity			
surface water chemistry (metals)			
other (AVS/SEM, grain size/TOC)			

OBSERVATIONS/NOTES

* Sampled w/a plastic scoop

MAP

AREA D

41 10 42.243
73 07 27.355

Signature(s): James M Infantino

SAMPLE LOG SHEET

Project Site Name: D-05 RAYMARK, CT
Project Number:

[ ] Surface Soil
[ ] Subsurface Soil
[x] Sediment
[ ] Other:
[ ] QA Sample Type:

Sample ID No.: D-05-SED-SMP
Sample Location: AREA D
Sampled By: ROSENBERGER/INFANTINO
C.O.C. No.:

GRAB SAMPLE DATA

	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 4/14/99		
Time: 2:35 PM		Sandy, gravel, black, brown, shell
Method: SCOOP		

CORE SAMPLE DATA

	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Date:		
Time:		
Method:		

COMPOSITE SAMPLE DATA

	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Date:		
Time:		
Method:		

SAMPLE COLLECTION INFORMATION

Analysis	Container Requirements	Collected	Other
Sediment chemistry (metals, pah, pcb, pest, dioxin)	5 gal bucket (1)	✓	—
Sediment toxicity			
Pore water chemistry (metals)			
Other (AVS/SEM, grain size/TOC)			

OBSERVATIONS/NOTES

*No bivalves present @ site.
*sampled w/a plastic scoop

MAP

AREA D

41 10 40.898
73 07 29.745

Signature(s): Joan M Infantino

SAMPLE LOG SHEET

Project Site Name: D Ø6-SED RAYMARK, CT
Project Number:

[ ] Surface Soil
[ ] Subsurface Soil
[X] Sediment
[ ] Other:
[ ] QA Sample Type:

Sample ID No.: D-06-SED-SMP
Sample Location: AREA D
Sampled By: ROSENBERGER / INFANTINO
C.O.C. No.:

* GRAB SAMPLE DATA

Date: 4/14/99	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 2:55 PM		Fines, clay, very dense, black/brown shell
Method: SCOOP		

CORE SAMPLE DATA

Date:	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Time:		
Method:		

COMPOSITE SAMPLE DATA

Date:	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Time:		
Method:		

SAMPLE COLLECTION INFORMATION

Analysis	Container Requirements	Collected	Other
Sediment Chemistry (metals, pest/pcb, pest, dioxin)	5 gal bucket (1)	✓	—
Sediment Toxicity			
Pore water chemistry (metals)			
other (AVS/SEM, grain size/TOC)			

OBSERVATIONS/NOTES

* sampled w/ a plastic scoop

MAP

AREA D

41 10 40.381
73 07 27.356

Signature(s): Jason M Infantino

SAMPLE LOG SHEET

Project Site Name: D-06-SED * (duplicate) * RAYMARK
Project Number:

[ ] Surface Soil
[ ] Subsurface Soil
[X] Sediment
[ ] Other:
[ ] QA Sample Type:

Sample ID No.: D-06-SED-FD
Sample Location: AREA D
Sampled By: ROSENBERGER / INFANTINO
C.O.C. No.:

* GRAB SAMPLE DATA

Date: 4/14/99	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 3:00 PM		Fines, clay, very dense, black/brown
Method:		shell
SCOOP		

CORE SAMPLE DATA

Date:	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Time:		
Method:		

COMPOSITE SAMPLE DATA

Date:	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Time:		
Method:		

SAMPLE COLLECTION INFORMATION

Analysis	Container Requirements	Collected	Other
Sediment chemistry	5 gal bucket (1)	✓	—
(metals, PAH, pcb, dioxin, pest)			
Sediment toxicity			
Pore water chemistry			
(metals)			
other (AVS/SEM, grainsz/TOC)			

OBSERVATIONS/NOTES

* Sampled w/a plastic scoop

MAP

AREA D

41 10 40.381
73 07 27.356

Signature(s): Joan M Infantino

SAMPLE LOG SHEET

Project Site Name: RAYMARK, CT
Project Number:

[ ] Surface Soil
[ ] Subsurface Soil
[✓] Sediment
[ ] Other:
[ ] QA Sample Type:

Sample ID No.: E-01-SED-SM
Sample Location: AREA E
Sampled By: TIETJEN
C.O.C. No.:

* GRAB SAMPLE DATA

	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 15 APR 99		
Time: 1220 PM		Black, small cobbles and rocks in sediment.
Method: SCOOP		

CORE SAMPLE DATA

	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Date:		
Time:		
Method:		

COMPOSITE SAMPLE DATA

	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Date:		
Time:		
Method:		

SAMPLE COLLECTION INFORMATION

Analysis	Container Requirements	Collected	Other
Sediment chemistry (metals, pcb, pah, pesticides)	5 gal bucket (1)	✓	—
Sediment toxicity			
Pore water chemistry (metals)			
Other (AVS/SEM, grain size/TOC)			

OBSERVATIONS/NOTES

Picture Frame # 11
* sampled w/ a plastic scoop

MAP

AREA E

41 10 38.101
73 07 40.813

Signature(s): James M Tietjen

SAMPLE LOG SHEET

Project Site Name: RAYMARK, CT
Project Number:

[ ] Surface Soil
[ ] Subsurface Soil
[✓] Sediment
[ ] Other:
[ ] QA Sample Type:

Sample ID No.: E-02-SED-SMP
Sample Location: AREA E
Sampled By: TIETJEN
C.O.C. No.:

* GRAB SAMPLE DATA

Date: 15 APR 99	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1200pm		Black, alot of vegetative matter
Method:		
SCOOP		

CORE SAMPLE DATA

Date:	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Time:		
Method:		

COMPOSITE SAMPLE DATA

Date:	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Time:		
Method:		

SAMPLE COLLECTION INFORMATION

Analysis	Container Requirements	Collected	Other
Sediment Chemistry (metals/pch/pest/dioxin)	5 gal bucket(1)	✓	—
Sediment Toxicity			
Pore water chemistry (metals)			
Other (TWS/SPH, Grainsz/TOC)			

OBSERVATIONS/NOTES

Picture Frames # 13, 12
* Sampled w/ a plastic scoop

MAP

AREA E

41 10 34.788
73 07 43.348

Signature(s): Jason M Defantes

SAMPLE LOG SHEET

Project Site Name: RAYMARK, CT
Project Number:

[ ] Surface Soil
[ ] Subsurface Soil
[✓] Sediment
[ ] Other:
[ ] QA Sample Type:

Sample ID No.: E-03-SED-Sm
Sample Location: AREA E
Sampled By: INFANTINO
C.O.C. No.:

* GRAB SAMPLE DATA

Date: 15 APR 99	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1000A		Black, organic, alot of vegetative matter
Method:		high moisture content
SCOOP		

CORE SAMPLE DATA

Date:	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Time:		
Method:		

COMPOSITE SAMPLE DATA

Date:	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Time:		
Method:		

SAMPLE COLLECTION INFORMATION

Analysis	Container Requirements	Collected	Other
Sediment chemistry	5 gal bucket (1)	✓	—
(metals, ab, pesticides)			
Sediment toxicity			
Pore water chemistry			
(metals)			
other (HVS, SEM, grain sz / TOC)			

OBSERVATIONS/NOTES

Picture Frame #15

Black, alot of vegetative matter

* sampled w/a plastic scoop

MAP

AREA E

41 10 32.269
73 07 43.586

Signature(s): Joseph M. Infantino

SAMPLE LOG SHEET

Project Site Name: Raymark, CT
Project Number:

[ ] Surface Soil
[ ] Subsurface Soil
[✓] Sediment
[ ] Other:
[ ] QA Sample Type:

Sample ID No.: E-04-SED-SMP
Sample Location: AREA E
Sampled By: ROSENBERGER
C.O.C. No.:

* GRAB SAMPLE DATA

Date: 15 APR 99	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 10:30A		Black, alot of organic / plant matter
Method: GRAB/SCOOP		

CORE SAMPLE DATA

Date:	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Time:		
Method:		

COMPOSITE SAMPLE DATA

Date:	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Time:		
Method:		

SAMPLE COLLECTION INFORMATION

Analysis	Container Requirements	Collected	Other
Sediment chemistry	5 gal bucket (1)	✓	—
Metals, pah, pest, dioxin			
Sediment toxicity			
Pore water chemistry (metals)			
other (AVS/SEM, grainsize, TOC)			

OBSERVATIONS/NOTES

Picture Frame #14

Took one grab, then decided it was easier to scoop.

* sampled w/a plastic scoop

MAP

AREA E

41 10 33.575
73 07 40.951

Signature(s): Jason M Rosenberger

SAMPLE LOG SHEET

Project Site Name: RAYMARK, CT
Project Number:

[ ] Surface Soil
[ ] Subsurface Soil
[✓] Sediment
[ ] Other:
[ ] QA Sample Type:

Sample ID No.: F-01-SED-SMP
Sample Location: SELBY POND
Sampled By: K. ROSENBERGER IN FANTING
C.O.C. No.:

* GRAB SAMPLE DATA

	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 14 APR 99		
Time: 10:10 A	1 FOOT	Sandy Silt, Dark Brown
Method: Scoop		near culvert opening - stream
		that runs into pond, higher flow

CORE SAMPLE DATA

	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Date:		
Time:		
Method:		

COMPOSITE SAMPLE DATA

	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Date:		
Time:		
Method:		

SAMPLE COLLECTION INFORMATION

Analysis	Container Requirements	Collected	Other
Sediment chemistry (metals, pb, pH, pest, dioxin)	5 gal bucket (1)	✓	—
Sediment toxicity			
Porewater chemistry (metals)			
other (TOC/STEAL grain sz/TOC)			

OBSERVATIONS/NOTES

More flow near stream - shell fragments
Picture Frame #7
* Sampled w/a plastic scoop

MAP

AREA F
41 11 11.914
73 07 29.695

Signature(s): Jason M defanto

SAMPLE LOG SHEET

Project Site Name: RAYMARK, CT
Project Number:

[ ] Surface Soil
[ ] Subsurface Soil
[✓] Sediment
[ ] Other:
[ ] QA Sample Type:

Sample ID No.: F-2-SED-SMP
Sample Location: SELBY POND
Sampled By: KROSENBERGER, J INFANTINO
C.O.C. No.:

* GRAB SAMPLE DATA

Date: 14 APRIL 99	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 08:50AM	1 1/2 FOOT DEEP	odor, black, fine
Method: SCOOP SAMPLE	(1 1/2 FOOT WATER DEPTH)	

CORE SAMPLE DATA

Date:	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Time:		
Method:		

COMPOSITE SAMPLE DATA

Date:	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Time:		
Method:		

SAMPLE COLLECTION INFORMATION

Analysis	Container Requirements	Collected	Other
Sediment chemistry (metals, pcb, pah, pest, dioxin)	5 gal bucket (4)	✓	—
Sediment toxicity			
Pore water chemistry (metals)			
other (GRAIN SIZE, ORGANIC/TOC)			

OBSERVATIONS/NOTES

Swan nests, ducks, phragmites, marsh grass lower near H_2O.
Picture - Frame #6
* sampled w/ a plastic scoop

MAP

AREA F
41 11 08.922
73 07 30.596

Signature(s): Jason M. Krosenberger

SAMPLE LOG SHEET

Project Site Name: ADVMARK CT
Project Number:

[ ] Surface Soil
[ ] Subsurface Soil
[✓] Sediment
[ ] Other:
[ ] QA Sample Type:

Sample ID No.: F-3-SED-SMP
Sample Location: SELBY POND
Sampled By: JUNPANTING K. ROSENBURG
C.O.C. No.:

* GRAB SAMPLE DATA

Date: 14 APRIL 99	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 08:30 AM	1 FOOT (water depth)	Fine, black, very dark, high water content, odor
Method: SCOOP SAMPLE		

CORE SAMPLE DATA

Date:	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Time:		
Method:		

COMPOSITE SAMPLE DATA

Date:	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Time:		
Method:		

SAMPLE COLLECTION INFORMATION

Analysis	Container Requirements	Collected	Other
Sediment chemistry (metals, pcb, pesticides, dioxin)	5 gal bucket	✓	—
Sediment toxicity			
Pore water chemistry (metals)			
other (AVS/SEM, grain size, TOC)			

OBSERVATIONS/NOTES

* sampled w/a plastic scoop

MAP

AREA F

41 11 11.730
73 07 32.668

Signature(s): Juan M Delgado

SAMPLE LOG SHEET

Project Site Name: Raymark, CT
Project Number:

[ ] Surface Soil
[ ] Subsurface Soil
[ ] Sediment
[✓] Other: TISSUE
[ ] QA Sample Type:

Sample ID No.: C-1-TISS-MUSS (SHP)
Sample Location: AREA C
Sampled By: C. TIETJEN, K. ROSENBERG, J. INFANTINO, S. BEHR
~~C.O.C. No.:~~

TISSUE

~~GRAB~~ SAMPLE DATA

Date: 14 APR 99	Depth	Description (Sand, Silt, Clay, Moisture, etc.)	
Time: 07:00 am			
Method: hand sampled			

CORE SAMPLE DATA

Date:	Depth	Description (Sand, Silt, Clay, Moisture, etc.)	
Time:			
Method:			

COMPOSITE SAMPLE DATA

Date:	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Time:		
Method:		

SAMPLE COLLECTION INFORMATION

Analysis	Container Requirements	Collected	Other
metals pcb pest path, lipids	Ziploc Bags - Foil	✓	—

OBSERVATIONS/NOTES

Medium sized ribbed mussels

Phragmites - hand picked out of bank - Colocated with sediment Samples

30 mussels collected

MAP

Area adjacent to Housatonic Boat club.

41 10 59.956
73 07 26.956

Signature(s): Shannon Behr

SAMPLE LOG SHEET

Project Site Name: Raymark, CT
Project Number:

[ ] Surface Soil
[ ] Subsurface Soil
[ ] Sediment
[✓] Other: TISSUE · MUSSELS
[ ] QA Sample Type:

Sample ID No.: C-2-TISS-~~MUSS~~ SHP
Sample Location: AREA C
Sampled By: CTIETJEN/KROSENBERG/
~~C.O.C. No.:~~ JINFANTINO/SBEHR

TISSUE

~~GRAB~~ SAMPLE DATA

Date: 14 APRIL 99	Depth	Description (Sand, Silt, Clay, Moisture, etc.)	
Time: 07:15AM			
Method: hand sampled			

CORE SAMPLE DATA

Date:	Depth	Description (Sand, Silt, Clay, Moisture, etc.)	
Time:			
Method:			

COMPOSITE SAMPLE DATA

Date:	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Time:		
Method:		

SAMPLE COLLECTION INFORMATION

Analysis	Container Requirements	Collected	Other
metals pcb pest pah, lipids	Ziploc Bags & Foil	✓	—

OBSERVATIONS/NOTES

Ribbed mussels - Hand picked out of bank. Co-located with sediment grab samples.

30 mussels collected

MAP

Area adjacent to Housatonic Boat club

41 10 56.003
73 07 30.285

Signature(s): Shannon Behr

SAMPLE LOG SHEET

Project Site Name: Raymark, CT
Project Number:

[ ] Surface Soil
[ ] Subsurface Soil
[ ] Sediment
[✓] Other: TISSUE
[ ] QA Sample Type:

Sample ID No.: C-3-TISS-~~MUSS~~ SMP
Sample Location: AREA C
Sampled By: CTIETJEN, K ROSENBERG
C.O.C. No.: S BEHR/J INFANTINO

~~GRAB~~ TISSUE SAMPLE DATA

Date: 14 APRIL 99	Depth	Description (Sand, Silt, Clay, Moisture, etc.)	
Time: 07:30AM			
Method: hand sampled			

CORE SAMPLE DATA

Date:	Depth	Description (Sand, Silt, Clay, Moisture, etc.)	
Time:			
Method:			

COMPOSITE SAMPLE DATA

Date:	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Time:		
Method:		

SAMPLE COLLECTION INFORMATION

Analysis	Container Requirements	Collected	Other
metals pch pesticides	Ziploc Bags & Foil	✓	✓

OBSERVATIONS/NOTES

Fewer mussels here than other two "C" Stations
C-3- Phab-frame #5
Mussels were hand picked out of tank. Colocated tissue samples with sediment grab sample locations.
28 mussels collected

MAP

Area adjacent to Housatonic Boat Club
41 10 57.277
73 07 31.773

Signature(s):
Shannon Behr

SAMPLE LOG SHEET

Project Site Name: RAYMARK, CT
Project Number:

[ ] Surface Soil
[ ] Subsurface Soil
[ ] Sediment
[✓] Other: TISSUE
[ ] QA Sample Type:

Sample ID No.: D-01-TISS-SMP
Sample Location: AREA D
Sampled By: Behr/Tietjen
C.O.C. No.:

TISSUE

GRAB SAMPLE DATA

Date: 24 APR 99	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 15:40		
Method: hand sampled		

CORE SAMPLE DATA

Date:	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Time:		
Method:		

COMPOSITE SAMPLE DATA

Date:	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Time:		
Method:		

SAMPLE COLLECTION INFORMATION

Analysis	Container Requirements	Collected	Other
metals pest pcb pah hpid	Ziplock Bags & Foil	✓	—

OBSERVATIONS/NOTES

No oysters or mummichogs here - only mussels

30 mussels collected

MAP

41 10 52.309
73 07 31.679

Signature(s): Shannon Behr

SAMPLE LOG SHEET

Project Site Name: BAYMARK, CT
Project Number:

[ ] Surface Soil
[ ] Subsurface Soil
[ ] Sediment
[✓] Other: TISSUE - MUSSELS
[ ] QA Sample Type:

Sample ID No.: D-02-TISS-SMP
Sample Location: AREA D
Sampled By: Behr/Zitzer
C.O.C. No.:

GRAB SAMPLE DATA

Date: 14 APR 99	Depth	Description (Sand, Silt, Clay, Moisture, etc.)	
Time: 15:50			
Method: hand sampled			

CORE SAMPLE DATA

Date:	Depth	Description (Sand, Silt, Clay, Moisture, etc.)	
Time:			
Method:			

COMPOSITE SAMPLE DATA

Date:	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Time:		
Method:		

SAMPLE COLLECTION INFORMATION

Analysis	Container Requirements	Collected	Other
metal pch pest part lipid	Ziplock Bags & Foil	✓	—

OBSERVATIONS/NOTES

No oysters here, only mussels

30 mussels collected

MAP

41 10 51.200
73 07 29.034

Signature(s):
Shannon Behr

SAMPLE LOG SHEET

Project Site Name: Raymark, CT
Project Number:

[ ] Surface Soil
[ ] Subsurface Soil
[ ] Sediment
[✓] Other: TISSUE
[ ] QA Sample Type:

Sample ID No.: D-03-TISS-[illegible]
Sample Location: AREAD
Sampled By: Megan Bohn
C.O.C. No.:

GRAB SAMPLE DATA

Date: 14 Apr 99	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 1600		
Method: hand sampled		

CORE SAMPLE DATA

Date:	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Time:		
Method:		

COMPOSITE SAMPLE DATA

Date:	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Time:		
Method:		

SAMPLE COLLECTION INFORMATION

Analysis	Container Requirements	Collected	Other
metal pcb pest PAH lipid	Ziplock Bags & Foil	✓	—

OBSERVATIONS/NOTES

Mussels and oysters collected here

No ~~ceramics~~ nanninchogs in trap

30 mussels collected

MAP

41 10 48.482
73 07 28.215

Signature(s): Shannon Bohn

SAMPLE LOG SHEET

Project Site Name: RAYMARK, CT
Project Number:

Sample ID No.: D-04-TISS-MUSS
Sample Location: AREA D
Sampled By: TIETJEN/PEHR
C.O.C. No.:

[ ] Surface Soil
[ ] Subsurface Soil
[ ] Sediment
[✓] Other: TISSUE
[ ] QA Sample Type:

tissue

GRAB SAMPLE DATA

Date: 14 APR 94	Depth	Description (Sand, Silt, Clay, Moisture, etc.)	
Time: 14:30		~~30~~ MUSSELS	
Method:		29	
hand sampled			

CORE SAMPLE DATA

Date:	Depth	Description (Sand, Silt, Clay, Moisture, etc.)	
Time:			
Method:			

COMPOSITE SAMPLE DATA

Date:	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Time:		
Method:		

SAMPLE COLLECTION INFORMATION

Analysis	Container Requirements	Collected	Other
metal pcb pah pest lipid	Ziploc Bags & Foil	✓	—

OBSERVATIONS/NOTES

No mussels trap here
No oysters around, only a few empty shells

29 mussels collected

MAP

41 10 42.243
73 07 27.355

Signature(s): Shannon Behr

SAMPLE LOG SHEET

SMP MUSS

Project Site Name: RAYMARK, CT
Project Number:

[ ] Surface Soil
[ ] Subsurface Soil
[ ] Sediment
[✓] Other: Tissue
[ ] QA Sample Type:

Sample ID No.: D-06- TISS
Sample Location: AREA D
Sampled By: TIETJEN / BEHR
C.O.C. No.:

TISSUE

GRAB SAMPLE DATA

Date: 14 Apr 99	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Time: 14:40		35 Ribbed Mussels Collected
Method:		31
hand sampled mussels		
hand removed fish from trap		

CORE SAMPLE DATA

Date:	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Time:		
Method:		

COMPOSITE SAMPLE DATA

Date:	Depth	Description (Sand, Silt, Clay, Moisture, etc.)
Time:		
Method:		

SAMPLE COLLECTION INFORMATION

Analysis	Container Requirements	Collected	Other
retained pattern lipid	Ziplock Bags / Foil	✓	—

OBSERVATIONS/NOTES

Mummi trap here, but only one fish in trap. No oysters around at all.

31 mussels collected

MAP

41 10 40.381
73 07 27.356

Signature(s): Shannon Behr

Science Applications International Corporation

Chain of Custody Record

Environmental Testing Center / 165 Dean Knauss Dr. / Narragansett, RI 02882 / Tel. (401) 782-1900 / Fax (401) 782-2330

Project: Raymark Field Sampling 1999

Client Name and Contact: USACE

Sample No.	Containers No.	Containers Type	Collection Date	Collection Time	Sample Description	Requested Parameters
HB-1-SED-SMP	1	Poly Core Tube	4/13/99	17:02	Single 3" + Core Sample	Sediment Chemistry
HB-2-SED-SMP	1			16:48		
HB-3-SED-SMP	1			15:22		
HB-4-SED-SMP	1			14:42		
HB-5-SED-SMP	1			14:27		
HB-6-SED-SMP	1			14:20		
HB-6-SED-FD	1			14:20		
HB-7-SED-SMP	1			15:06		
HB-8-SED-SMP	1			16:10		
HB-9-SED-SMP	1			16:22		
C-1-SED-SMP	1	5gal pail	4/13/99	17.30	Composite Sediment Sample (5gal)	Sed Chem; Sed Tox; Pore Water
C-2-SED-SMP	1			17:45		
C-3-SED-SMP	1			17:55		
Total :	13					

Packed/Released By: SAIC Signature: [signature] Printed Name: John T. Morris (SAIC)	Date Time 4/14/99 0910	Received By: Cornelia Mueller SAIC Signature: [signature] Printed Name:	Date Time 4/14/99 0906	Remarks: SAMPLES WERE ICED UNTIL RELEASED SAIC 4/14/99 4/15/99 SAMPLES WERE REFRIGERATED UNTIL SUBSAMPLED. SAIC 4/15 4/16/99
Released By: Signature: Printed Name:	Date Time	Received By: Signature: Printed Name:	Date Time	
Final Destination: SAIC at GSO, HERL, ORI Room 107		Contact Name and Phone Number SAIC Greg Tracey 401 847 4631		
Shipping Method: Hand delivered by SAIC		Page 1 of 1		

Original Form Accompanies Shipment

Chain of Custody Record

Science Applications International Corporation

Environmental Testing Center / 165 Dean Knauss Dr. / Narragansett, RI 02882 / Tel. (401) 782-1900 / Fax (401) 782-2330

Project: Raymark Field Sampling 1999

Client Name and Contact: USACE

Sample No.	Containers No.	Containers Type	Collection Date	Collection Time	Sample Description	Requested Parameters
F-3-SED-SMP	1	5gal. Pail	4/14/99	08:30	Composite Sed. Sample (5gal)	Sed. Chem; Sed. Tox.; Pore Waters
F-2-SED-SMP				08:50		
F-1-SED-SMP				10:10		
D-5-SED-SMP				14:35		
D-6-SED-SMP				14:55		
D-6-SED-FD				15:00		
D-4-SED-SMP				15:25		
D-3-SED-SMP				15:45		
D-2-SED-SMP				16:00		
D-1-SED-SMP				16:10		

Total: 10

Packed/Released By: SAIC Date Time Signature: 0855 Printed Name: PHILIP FISCHMAN 4/15/99	Received By: SAIC Date Time Signature: 0855 Printed Name: Cornelia Mueller 4/15/99	Remarks: SAMPLES WERE ICED UNTIL RELEASED. SAIC 4/14-4/15 SAMPLES WERE REFRIGERATED UNTIL SUBSAMPLED SAIC 4/15/99-4/22/99
Released By: Date Time Signature: Printed Name:	Received By: Date Time Signature: Printed Name:	
Final Destination: SAIC at OSD, HERL, URI Room 107	Contact Name and Phone Number Cornelia Mueller SAIC 401 848 4632	
Shipping Method: HAND DELIVERED BY SAIC	Page 1 of 1	

Science Applications International Corporation

Chain of Custody Record

Environmental Testing Center / 165 Dean Knauss Dr. / Narragansett, RI 02882 / Tel. (401) 782-1900 / Fax (401) 782-2330

Project: Raymark Field Sampling 1999

Client Name and Contact: USACE

Sample No.	Containers No.	Containers Type	Collection Date	Collection Time	Sample Description			Requested Parameters
E-3-SED-SMP	1	5 Gal. Pail	4/15/99	10:00	Composite Sediment Sample (5gal.)			Sed. Chem; Sed. Tox; Pore Water
E-4-SED-SMP	↓	↓	↓	10:30	↓			↓
E-2-SED-SMP	↓	↓	↓	12:10	↓			↓
E-1-SED-SMP	↓	↓	↓	12:20	↓			↓

Total: 4

Packed/Released By: SAIC Signature: Printed Name: Shannon Behr Date Time: Apr 15 4:00 pm	Received By: SAIC Signature: Printed Name: Melissa Swanson Date Time: Apr 15 4:00 pm	Remarks: SAMPLES WERE ICED UNTIL RELEASED. 4/15/99 SAIC SAMPLES WERE REFRIGERATED UNTIL SUBSAMPLED 4/15-4/20 SAIC
Released By: Signature: Printed Name: Date Time:	Received By: Signature: Printed Name: Date Time:	
Final Destination: SMC at GSD, MERL, ORI Room 107	Contact Name and Phone Number Cornelia Mueller SAIC 401 848 4632	
Shipping Method: HAND DELIVERED BY SAIC	Page 1 of 1	

Science Applications International Corporation

Chain of Custody Record

Environmental Testing Center / 165 Dean Knauss Dr. / Narragansett, RI 02882 / Tel. (401) 782-1900 / Fax (401) 782-2330

Project: RAYMARK 1999

Client Name and Contact: USACE

Sample No.	Containers No.	Containers Type	Collection Date	Collection Time	Sample Description			Requested Parameters
HB-1-SED-SMP	1	8oz GLASS	4/15	11:50	SEDIMENT (CORE)	-	-	metals, pcbs, pesticides
HB-2-SED-SMP	1			12:10		-	-	
HB-3-SED-SMP	1			10:35		-	-	
HB-4-SED-SMP	1			11:01			-	
HB-5-SED-SMP	1			11:15		-	-	
HB-6-SED-SMP	1			11:26		-	-	
HB-6-SED-FD	1			11:40				
HB-7-SED-SMP	1			10:55		-	-	
HB-8-SED-SMP	1			11:58		-	-	
HB-9-SED-SMP	1			12:20		-	-	

Total: 10

Packed/Released By: SAIC Signature: [signature] Printed Name: CORNELIA MUELLER Date Time 4/15/99 2:57	Received By: Ed Butler Signature: WOODS HOLE GROUP Printed Name: E. D. BUTLER Date Time 4/15/99 2:57	Remarks: SAMPLES WERE FROZEN UNTIL RELEASED ON SAIC 4/16
Released By: Signature: Printed Name: Date Time	Received By: Signature: Printed Name: Date Time	
Final Destination: WOODS HOLE GROUP	Contact Name and Phone Number WOODS HOLE GROUP HELDER CASTA 508-872-9300	
Shipping Method: Courier from WOODS HOLE GROUP	Page 1 of 1	

Science Applications International Corporation

Chain of Custody Record

Environmental Testing Center / 165 Dean Knauss Dr. / Narragansett, RI 02882 / Tel. (401) 782-1900 / Fax (401) 782-2330

Project: Raymark Field Sampling '99

Client Name and Contact: USACOE

Sample No.	Containers No.	Containers Type	Collection Date	Collection Time	Sample Description			Requested Parameters
C-1-TISS-SMP	1	Foile Ziploc Bag	4/14/99	0700	Ribbed Mussels	30	—	Tissue Chem - Metals, PCBs, Pest, Lipids, PAHs
C-2-TISS-SMP	↓	↓	↓	0715	↓	30	—	↓
C-3-TISS-SMP	↓	↓	↓	0730	↓	28	—	↓
D-1-TISS-SMP	↓	↓	↓	1540	↓	30	—	↓
D-2-TISS-SMP	↓	↓	↓	1550	↓	30	—	↓
D-3-TISS-SMP	↓	↓	↓	1600	↓	30	—	↓
D-4-TISS-SMP	↓	↓	↓	1430	↓	29	—	↓
D-6-TISS-SMP	↓	↓	↓	1440	↓	31	—	↓
HB-9-TISS-SMP	↓	↓	↓	1740	↓	31	—	↓
Total:	9							

Packed/Released By: SAIC Signature: [signature] Printed Name: Christine A Tiefen Date Time 4/15/99 08:55	Received By: SAIC Signature: [signature] Printed Name: Cornelia Mueller Date Time 4/15/99 0855	Remarks: SAMPLES WERE ICED UNTIL RELEASED 4/15/99 SAIC [signature]
Released By: SAIC Signature: [signature] Printed Name: Cornelia Mueller Date Time 4/15/99	Received By: Ed Butler Woods Hole Group Signature: [signature] Printed Name: ED BUTLER Date Time 4/15/99 12:47	
Final Destination: Woods Hole Group	Contact Name and Phone Number Woods Hole Group Helder Costa 508-822-9300	SAMPLES WERE FROZEN UNTIL RELEASED. 4/15/99 - 4/19/99 SAIC [signature]
Shipping Method: Hand Carried by SAIC	Page 1 of 1	

Woods Hole Group Courier

Cornelia FAX 401 849 1585 Rel. Ed Butler 2:25 4/19

Science Applications International Corporation

Chain of Custody Record

Environmental Testing Center / 165 Dean Knauss Dr. / Narragansett, RI 02882 / Tel. (401) 782-1900 / Fax (401) 782-2330

Project: RAYMARK 1999

Client Name and Contact: USACE

Sample No.	Containers No.	Containers Type	Collection Date	Collection Time	Sample Description			Requested Parameters
C-1 - SED-SMP	1	Pro glass	4/16	2:20	SEDIMENT (GRAB)	—	—	metals, PCBs, PAHs, pesticides
C-2 - SED-SMP	1		4/16	1:37		—	—	
C-3 - SED-SMP	1			12:50		—	—	
D-1 - SED-SMP	1			12:15		—	—	
D-2 - SED-SMP	1			12:35		—	—	
D-3 - SED-SMP	1			2:00		—	—	
D-4 - SED-SMP	1			10:20		—	—	
D-5 - SED-SMP	1			2:46		—	—	
D-6 - SED-SMP	1			1:20		—	—	
D-6 - SED-FD	1			3:07		—	—	
E-1 - SED-SMP	1			10:55		—	—	
E-2 - SED-SMP	1			9:50		—	—	
E-3 - SED-SMP	1			11:45		—	—	
E-4 - SED-SMP	1			11:21		—	—	
F-1 - SED-SMP	1			2:35		—	—	
Total:	15							

Packed/Released By: SAIC Signature: [signature] Printed Name: Cornelia Butler Date Time 1:47 4/19/99	Received By: WOODS HOLE GROUP Signature: Ed Butler Printed Name: ED BUTLER Date Time 4/19 12:47	Remarks: SAMPLES WERE FROZEN UNTIL RELEASED. SAC 4/16/99 CW 4/19/99
Released By: Signature: Printed Name: Date Time	Received By: Signature: Printed Name: Date Time	
Final Destination: WOODS HOLE GROUP	Contact Name and Phone Number WOODS HOLE GROUP HELDER COSTA 508-822-9300	
Shipping Method: Courier from woodshole Group	Page 1 of 2	

Rel. Ed Butler 2:25 4/19

Cornelia FAX 401 849 1585

Science Applications International Corporation

Chain of Custody Record

Environmental Testing Center / 165 Dean Knauss Dr. / Narragansett, RI 02882 / Tel. (401) 782-1900 / Fax (401) 782-2330

Project: RAYMARK 1999

Client Name and Contact: USACE

Sample No.	Containers No.	Containers Type	Collection Date	Collection Time	Sample Description			Requested Parameters
F-2-SED-SHP	1	1gal	4/16	12:00	SEDIMENT (GRAB)	—	—	TOXICITY
F-3-SED-SHP	1	1gal	4/16	3:25	SEDIMENT (GRAB)	—	—	TOXICITY

Total: 2

Packed/Released By: SAIC Signature: Printed Name: Cornelia Huelker Date Time: 4/19/99 4:30pm	Received By: Signature: Printed Name: Brian Bozby Date Time: 4/20/99 1000am	Remarks: SAMPLES WERE REFRIGERATED UNTIL RELEASED on 4/19/99 4/19/99
Released By: Signature: Printed Name: Date Time:	Received By: Signature: Printed Name: Date Time:	
Final Destination: ENVIROSYSTEMS, INC.	Contact Name and Phone Number: PETRA KARGE 6039263345	
Shipping Method: FED EX	Page 2 of 2	

CORNELIA FAX 401 849 1585

Science Applications International Corporation

Environmental Testing Center / 165 Dean Knauss Dr. / Narragansett, RI 02882 / Tel. (401) 782-1900 / Fax (401) 782-2330

Chain of Custody Record

Project: RAYMARK 1999

Client Name and Contact: USACE

Sample No.	Containers No.	Containers Type	Collection Date	Collection Time	Sample Description			Requested Parameters
C-1-SED-SMP	1	8oz glass	4/16	2:20	SEDIMENT (GRAB)	–	–	DIOXIN
C-2-SED-SMP	1			1:37		–	–	
C-3-SED-SMP	1			12:50		–	–	
D-1-SED-SMP	1			12:15		–	–	
D-2-SED-SMP	1			12:35		–	–	
D-3-SED-SMP	1			2:00		–	–	
D-4-SED-SMP	1			10:20		–	–	
D-5-SED-SMP	1			2:45		–	–	
D-6-SED-SMP	1			1:20		–	–	
D-6-SED-FD	1			3:07		–	–	
E-1-SED-SMP	1			10:55		–	–	
E-2-SED-SMP	1			9:50		–	–	
E-3-SED-SMP	1			11:45		–	–	
E-4-SED-SMP	1			11:21		–	–	
F-1-SED-SMP	1			2:35		–	–	
Total:	15							

Packed/Released By: SAIC Signature: [signature] Printed Name: Cornelia Mueller Date Time 4/19/99 4:30pm	Received By: [illegible] Signature: [signature] Printed Name: Tracy L. Long Date Time 4/20/99 10:45	Remarks: SAMPLES WERE REFRIGERATED UNTIL RELEASED. SAIC am 4/16/99 - 4/19/99
Released By: Signature: Printed Name: Date Time	Received By: Signature: Printed Name: Date Time	
Final Destination: MIDWEST RESEARCH INSTITUTE (MRI)	Contact Name and Phone Number MRI KATHY BOGGESS 816-753-7600	
Shipping Method: FEDEX	Page 1 of 12	

Cornelia FAX 401 849 1585

THE FOLLOWING PAGE(S) HAVE BEEN EXACTLY DUPLICATED

EXACT COPY

By / Date: [signature] 4/20/99

PO(s): NA

Science Applications International Corporation

Environmental Testing Center / 165 Dean Knauss Dr. / Narragansett, RI 02882 / Tel. (401) 782-1900 / Fax (401) 782-2330

Chain of Custody Record

Project: RAYMARK 1999

Client Name and Contact: USACE

Sample No.	Containers No.	Containers Type	Collection Date	Collection Time	Sample Description			Requested Parameters
F-2-SED-SMP	1	8oz glass	4/16	12:00	SEDIMENT (GRAB)	-	-	DIOXIN
F-3-SED-SMP	1	8oz glass	4/16	3:25	SEDIMENT (GRAB)	-	-	DIOXIN
Total:	2							

Packed/Released By: SAIC Signature: Printed Name: Cornelia Mueller Date Time 4/19/99 4:30pm	Received By: Signature: Tracy L. Long Printed Name: Tracy L. Long Date Time 4/20/99 10:45	Remarks: SAMPLES WERE REFRIGERATED UNTIL RELEASED. SAIC 4/16/99 4/19/99
Released By: Signature: Printed Name: Date Time	Received By: Signature: Printed Name: Date Time	
Final Destination: MIDWEST RESEARCH INSTITUTE (MRI)	Contact Name and Phone Number MRI Kathy Bogyess 816-753-7600	
Shipping Method: FED EX	Page 2 of 2	

Cornelia fax 401 8-19 1585

THE FOLLOWING PAGE(S) HAVE BEEN EXACTLY DUPLICATED

Page(s): N/A

EXACT COPY

Date: 4/20/99

Chain of Custody Record

Science Applications International Corporation
Environmental Testing Center / 165 Dean Knauss Dr. / Narragansett, RI 02882 / Tel. (401) 782-1900 / Fax (401) 782-2330

Project: RAYMARK 1991

Client Name and Contact: USACE

Sample No.	Containers No.	Containers Type	Collection Date	Collection Time	Sample Description			Requested Parameters
C-1 - PW - SMP	1	500ml poly	4/19	9:02	REFWATER (SEDIMENT GRAB)	-	-	METALS
C-2 - PW - SMP				9:17		-	-	
C-3 - PW - SMP				9:32		-	-	
D-1 - PW - SMP				9:33		-	-	
D-2 - PW - SMP				9:27		-	-	
D-3 - PW - SMP				9:16		-	-	
D-4 - PW - SMP				8:58		-	-	
D-5 - PW - SMP				9:31		-	-	
D-6 - PW - SMP				9:15		-	-	
D-6 - PW - FD				9:01		-	-	
E-1 - PW - SMP				8:15		-	-	
E-2 - PW - SMP				9:26		-	-	
E-3 - PW - SMP				9:19		-	-	
E-4 - PW - SMP				9:00		-	-	
F-1 - PW - SMP				9:20		-	-	
Total:	15							

Packed/Released By: SAIC
Date Time: 4/20/99
Signature:
Printed Name: CORNELIA MUELLER

Received By: GSO/URI
Date Time: 4/20/99 10:45
Signature: Carol L. Gibson
Printed Name: Carol L. Gibson

Released By: SAIC
Date Time: 4/20/99 10:45
Signature: Christine A Tietjen
Printed Name: Christine A Tietjen

Received By:
Date Time:
Signature:
Printed Name:

Final Destination: URI JOHN KING

Contact Name and Phone Number 401-
JOHN KING URI 874-6182

Shipping Method: HAND DELIVERED BY SAIC

Page 1 of 2

Remarks: SAMPLES WERE REFRIGERATED UNTIL RELEASED. SAC on 4/19-4/20

Science Applications International Corporation

Chain of Custody Record

Environmental Testing Center / 165 Dean Knauss Dr. / Narragansett, RI 02882 / Tel. (401) 782-1900 / Fax (401) 782-2330

Project: RAYMARK 1999

Client Name and Contact: USACE

Sample No.	Containers No.	Containers Type	Collection Date	Collection Time	Sample Description			Requested Parameters
F-2 - PW - SMP	1	500 mL poly bottle	4/19	9:04	PORE WATER (SEDIMENT GRAB)	—	—	METALS
F-3 - PW - SMP	1	500 mL bottle	4/19	9:35	PORE WATER (SEDIMENT GRAB)	—	—	METALS
Total :	2							

Packed/Released By: SAIC Signature: Printed Name: CORNELIA MUELLER Date Time 4/22/99	*Received By:* GSO/URI Signature: Carol L. Gibson Printed Name: Carol L. Gibson Date Time 4/20/99 10:45	Remarks: SAMPLES WERE REFRIGERATED UNTIL RELEASED. CM SAIC 4/19-4/20
Released By: SAIC Signature: Christine A Tietjen Printed Name: Christine A Tietjen Date Time 4/20/99 10:45	*Received By:* Signature: Printed Name: Date Time	
Final Destination: URI JOHN KING	Contact Name and Phone Number URI JOHN KING 401 874 6182	
Shipping Method: HAND DELIVERED BY SAIC	Page 2 of 2	

Chain of Custody Record

Science Applications International Corporation

Environmental Testing Center / 165 Dean Knauss Dr. / Narragansett, RI 02882 / Tel. (401) 782-1900 / Fax (401) 782-2330

Project: RAY HARIL 1997

Client Name and Contact: USACE

Sample No.	Containers No.	Containers Type	Collection Date	Collection Time	Sample Description			Requested Parameters
HB-1-SED-SMP	1	50 ml tube	4/12/99	11:50	SEDIMENT (CORE)	-	-	TOC / GRAIN SIZE
HB-2-SED-SMP	1			12:10		-	-	
HB-3-SED-SMP	1			10:35		-	-	
HB-4-SED-SMP	1			11:01		-	-	
HB-5-SED-SMP	1			11:15		-	-	
HB-6-SED-SMP	1			11:26		-	-	
HB-6-SED-FD	1			11:40		-	-	
HB-7-SED-SMP	1			10:55			-	
HB-8-SED-SMP	1			11:58		-	-	
HB-9-SED-SMP	1			12:20		-	-	
Total:	10							

Packed/Released By: SAIC Signature: Christine A Tietjen Printed Name: Christine A Tietjen Date Time 4/19/99 13:00	Received By: URI Signature: Carol L Gibson Printed Name: Carol L. Gibson Date Time 4/19/99 13:00	Remarks: SAMPLES WERE REFRIGERATED UNTIL RELEASED CLL SAIC 4-15 4/19/99
Released By: Signature: Printed Name: Date Time	Received By: Signature: Printed Name: Date Time	
Final Destination: URI JOHN KING	Contact Name and Phone Number URI JOHN KING 4018746182	
Shipping Method: HANDDELIVERED BY SAIC	Page 1 of 1	

Science Applications International Corporation

Chain of Custody Record

Environmental Testing Center / 165 Dean Knauss Dr. / Narragansett, RI 02882 / Tel. (401) 782-1900 / Fax (401) 782-2330

Project: RAI/MMRK 1999

Client Name and Contact: USACE

Sample No.	Containers No.	Containers Type	Collection Date	Collection Time	Sample Description			Requested Parameters
C-1-SED-SMP	1	50mL tube	4/16	2:20	SEDIMENT (GRAB)	–	–	SEM/AVS
C-2-SED-SMP	1			1:37		–	–	
C-3-SED-SMP	1			12:50		–	–	
D-1-SED-SMP	1			12:15		–	–	
D-2-SED-SMP	1			12:35		–	–	
D-3-SED-SMP	1			2:00		–	–	
D-4-SED-SMP	1			10:20		–	–	
D-5-SED-SMP	1			2:45		–	–	
D-6-SED-SMP	1			1:20		–	–	
D-6-SED-FD	1			2:07		–	–	
E-1-SED-SMP	1			10:55		–	–	
E-2-SED-SMP	1			9:50		–	–	
E-3-SED-SMP	1			11:45		–	–	
E-4-SED-SMP	1			11:21		–	–	
F-1-SED-SMP	1			2:35		–	–	
Total:	15							

Packed/Released By: SAIC Signature: Christine A Tietjen Printed Name: Christine A Tietjen Date Time: 4/16/99 13:00	Received By: URI Signature: Carol L Gibson Printed Name: Carol L Gibson Date Time: 4/19/99 13:00	Remarks: SAMPLES WERE FROZEN UNTIL RELEASED. SMC 4/16/99 – 4/19/99
Released By: Signature: Printed Name: Date Time:	Received By: Signature: Printed Name: Date Time:	
Final Destination: URI John King	Contact Name and Phone Number URI JOHN KING 401 874 6182	
Shipping Method: HAND DELIVERED BY SAIC	Page 1 of 2	

Chain of Custody Record

Science Applications International Corporation

Environmental Testing Center / 165 Dean Knauss Dr. / Narragansett, RI 02882 / Tel. (401) 782-1900 / Fax (401) 782-2330

Project: RAYMARK 1999

Client Name and Contact: USACE

Sample No.	Containers No.	Containers Type	Collection Date	Collection Time	Sample Description			Requested Parameters
F-2-SED-SMP	1	50ml tube	4/16	12:00	SEDIMENT (GRAB)	—	—	SEM/AVS
F-3-SED.SMP	1	50ml tube	4/16	3:25	SEDIMENT (GRAB)	—	—	SEM/AVS

Total: 2

Packed/Released By:
Signature: Christine A Tietjen
Printed Name: Christine A Tietjen
Date Time: 4/19/99 13:00

Received By: URI
Signature: Carol L. Gibson
Printed Name: Carol L. Gibson
Date Time: 4/19/99 13:00

Released By:
Signature:
Printed Name:
Date Time

Received By:
Signature:
Printed Name:
Date Time

Final Destination:
URI JOHN KING

Contact Name and Phone Number URI
JOHN KING 4018746182

Shipping Method:
HAND DELIVERED BY SAIC

Page 2 of 2

Remarks:
SAMPLES WERE FROZEN UNTIL RELEASED. SAIC on 4/16/99 - 4/19/99

Science Applications International Corporation

Chain of Custody Record

Environmental Testing Center / 165 Dean Knauss Dr. / Narragansett, RI 02882 / Tel. (401) 782-1900 / Fax (401) 782-2330

Project: RAYMARK 1999

Client Name and Contact: USACE

Sample No.	Containers No.	Containers Type	Collection Date	Collection Time	Sample Description			Requested Parameters
C-1-SED-SMP	1	50mL tube	4/16	2:20	SEDIMENT (GRAB)	–	–	TOC / GRAINSIZE
C-2-SED-SMP	1			1:37		–	–	
C-3-SED-SMP	1			12:50		–	–	
D-1-SED-SMP	1			12:15		–	–	
D-2-SED-SMP	1			12:35		–	–	
D-3-SED-SMP	1			2:00		–	–	
D-4-SED-SMP	1			10:20		–	–	
D-5-SED-SMP	1			2:45		–	–	
D-6-SED-SMP	1			1:20		–	–	
D-6-SED-FD	1			3:07		–	–	
E-1-SED-SMP	1			10:55		–	–	
E-2-SED-SMP	1			9:50		–	–	
E-3-SED-SMP	1			11:45		–	–	
E-4-SED-SMP	1			11:21		–	–	
F-1-SED-SMP	1			2:35		–	–	
Total:	15							

Packed/Released By: SAIC Signature: Christine A Tietjen Printed Name: Christine A Tietjen Date Time 4/19/99 13:00	Received By: URI Signature: Carol L. Gibson Printed Name: Carol L. Gibson Date Time 4/19/99 13:00	Remarks: SAMPLES WERE REFRIGERATED UNTIL RELEASED. CM SAIC 4/16/99 – 4/19/99
Released By: Signature: Printed Name: Date Time	Received By: Signature: Printed Name: Date Time	
Final Destination: JOHN KING URI	Contact Name and Phone Number URI JOHN KING 401-874-6182	
Shipping Method: HANDDELIVERED BY SAIC	Page 1 of 2	

Chain of Custody Record

Science Applications International Corporation

Environmental Testing Center / 165 Dean Knauss Dr. / Narragansett, RI 02882 / Tel. (401) 782-1900 / Fax (401) 782-2330

Project: RAYMARK 1999

Client Name and Contact: USACE

Sample No.	Containers No.	Containers Type	Collection Date	Collection Time	Sample Description			Requested Parameters
F-2-SED-SMP	1	50mL tube	4/16	12:00	SEDIMENT (GRAB)	-	-	TOC/GRAIN SIZE
F-3-SED-SMP	1	50mL tube	4/16	3:25	SEDIMENT (GRAB)	-	-	TOC/GRAIN SIZE
Total:	2							

Packed/Released By: SAIC
Signature: Christine A Tietjen
Printed Name: Christine A Tietjen
Date Time: 4/19/99 13:00

Received By: URI
Signature: Carol L. Gibson
Printed Name: Carol L. Gibson
Date Time: 4/19/99 13:00

Released By:
Signature:
Printed Name:
Date Time:

Received By:
Signature:
Printed Name:
Date Time:

Final Destination: JOHN KING URI

Contact Name and Phone Number: JOHN KING URI 401-874-6182

Shipping Method: HAND DELIVERED BY SAIC

Page 1 2 of 1 2

Remarks: SAMPLES WERE ~~FROZEN~~ REFRIGERATED UNTIL RELEASED
CM 4/16/99 - 4/19/99