November 1998

Volume 3 of 3

Appendices

Sheboygan River and Harbor

Aquatic Ecological Risk Assessment

Prepared for:

United States Environmental Protection Agency

Chicago, Illinois

Prepared by:

EVS ENVIRONMENT CONSULTANTS

Seattle, Washington

National Oceanic and Atmospheric Administration

Seattle, Washington

Sheboygan River and Harbor

AQUATIC ECOLOGICAL RISK ASSESSMENT

Volume 3 of 3
Appendices

Prepared for

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TABLE OF CONTENTS

VOLUME 3 OF 3

APPENDIX A

Analytical Data

APPENDIX A-1

1997 Ecological Risk Assessment Results

LIST OF TABLES

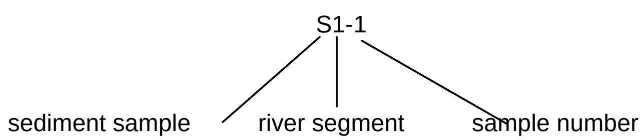
APPENDIX A-1
DEFINITION OF TERMS

Definition of qualifiers

> - sample over linear range of method
D - diluted sample
J - estimated value above detection limit below the quantitation limit
L - labeled compound
R - peak detected but did not meet quantification criteria
U - undetected
Y - raised detection limit due to interference

1997 ERA sample identification

T01 through T20 - sediment quality triad stations; FD indicates a field duplicate



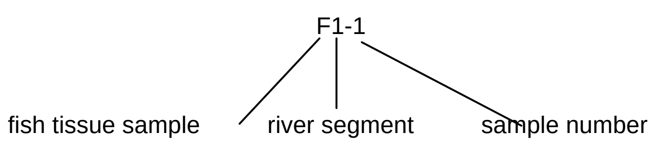


Table A1-1. Results of the metal analyses of sediment samples collected in August 1997

Station	Arsenic Conc (mg/kg dw)	Q	Cadmium Conc (mg/kg dw)	Q	Chromium Conc (mg/kg dw)	Q	Copper Conc (mg/kg dw)	Q	Lead Conc (mg/kg dw)	Q	Mercury Conc (mg/kg dw)	Q	Nickel Conc (mg/kg dw)	Q	Silver Conc (mg/kg dw)	Q	Zinc Conc (mg/kg dw)	Q
T01	0.9		0.05		7		4.4		4		0.02		5		0.03	U	14.8	
T02	1.4		0.23		18		15.1		13		0.08		11		0.05	U	46.2	
T03	0.8		0.06		9		6.5		5		0.01		6		0.03	U	17.4	
T04	1.9		0.25		18		16.6		16		0.08		11		0.04	U	60	
T07	2.4		0.47		78.6		29.1		47		0.2		15		0.25		96.1	
T08	1		0.19		12.5		11.7		12		0.04		7		0.03	U	38.8	
T09	0.9		0.12		16.8		25.1		32		0.03		8		0.03		44.1	
T10	2.4		0.41		33		36		36		0.08		19		0.05	U	98.2	
T10-FD	2.5		0.39		32		35.3		35		0.09		18		0.05	U	96.3	
T11	1.7		0.33		21.5		32		47		0.04		11		0.04		81.4	
T11-FD	2.1		0.28		21.8		32		44		0.06		11		0.04	U	86.3	
T12	0.8		0.13		13.4		16.3		21		0.03		8		0.03	U	39.5	
T13	1.9		0.7		28.4		29		128		0.07		14		0.05		94.4	
T14	1.9		0.46		26		29.6		49		0.06		12		0.05		93.2	
T15	2.1		0.42		28		34.2		45		0.08		16		0.05		99	
T16	2.2		0.48		30		35.4		49		0.08		18		0.06		111	
T17	1.3		0.21		16.5		18.6		23		0.04		9		0.03		52.5	
T18	2		0.36		27		30.9		34		0.07		15		0.05		89.9	
T19	2		0.34		25		28.3		48		0.07		15		0.04	U	87.2	
T20	2.8		0.47		36		37		37		0.1		19		0.06	U	112	

Table A1-2. Results of the PCB and pesticide analyses of sediment samples collected in August 1997

	Chlordane - alpha		Chlordane - gamma		gamma-HCH (Lindane)		Dibenzofuran		Dieldrin		Endrin	
Station	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
T01	1	U	1	U	1	U	5.8	U	1.9	U	1.9	U
T02	1	U	1	U	1	U	5.8	U	1.9	U	1.9	U
T03	1	U	1	U	1	U	5.9	U	2	U	2	U
T04	1	U	1	U	1	U	6	U	2	U	2	U
T07	310	Y	1000	Y	81	U	5.8	U	160	U	160	U
T08	4.9	Y	31	Y	0.9	U	5.7	U	12	Y	7	Y
T09	0.8	Y	7.1	Y	0.7	U	12		4.8	Y	2.3	Y
T10	1	U	5.8	Y	1	U	5.8	U	3	Y	1.9	U
T10-FD	1	U	6	Y	1	U	6	U	3.6	Y	2	U
T11	1	U	5.9	Y	1	U	26		2.6	Y	1.9	U
T11-FD	0.9	U	5.5	Y	0.9	U	27		3.3	Y	1.9	U
T12	1	U	5.3	Y	1	U	18		2.4	Y	1.9	U
T13	1	U	9	Y	1	U	18		5.2	Y	3	Y
T14	1	U	9.6	Y	1	U	24		5.8		2.7	Y
T15	1	U	8.6	Y	1	U	12		5	Y	2.6	Y
T16	1	U	9.9	Y	1	U	15		5.4	Y	2.8	Y
T17	1	U	10	Y	1	U	10		5.8	Y	3	Y
T18	1	U	9.5	Y	1	U	8.9		5.4	Y	3.2	Y
T19	1	U	9.3	Y	1	U	31		5.2	Y	2.6	Y
T20	1	U	8.7	Y	1	U	8.3		4.2	Y	2.1	Y

All concentrations are in ug/kg, dry weight.
HCH - Hexachlorocyclohexane-gamma (Lindane)

Table A1-2. Results of the PCB and pesticide analyses of sediment samples collected in August 1997

	Heptachlor epoxide		Aroclor 1016		Aroclor 1221		Aroclor 1232		Aroclor 1242		Aroclor 1248	
Station	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
T01	1	U	19	U	39	U	19	U	19	U	19	U
T02	1	U	19	U	39	U	19	U	19	U	19	U
T03	1	U	19	U	39	U	19	U	19	U	19	U
T04	1	U	20	U	40	U	20	U	20	U	20	U
T07	81	U	1600	U	3300	U	750000	D	1600	U	1600	U
T08	21	Y	19	U	38	U	19	U	920		19	U
T09	5.5	Y	15	U	30	U	15	U	78		15	U
T10	4.9	Y	19	U	38	U	19	U	71		19	U
T10-FD	5.2	Y	20	U	40	U	20	U	80		20	U
T11	4	Y	19	U	39	U	19	U	69		19	U
T11-FD	4.4	Y	19	U	38	U	19	U	84		19	U
T12	4.5	Y	19	U	38	U	19	U	71		19	U
T13	7.1	Y	19	U	39	U	19	U	140		19	U
T14	7.8	Y	19	U	38	U	19	U	150		19	U
T15	6.6	Y	20	U	39	U	20	U	120		20	U
T16	7.8	Y	19	U	39	U	19	U	150		19	U
T17	7.5	Y	19	U	38	U	19	U	150		19	U
T18	7.4	Y	20	U	39	U	20	U	120		20	U
T19	7.3	Y	19	U	39	U	19	U	170		19	U
T20	7.5	Y	20	U	40	U	20	U	150		20	U

All concentrations are in ug/kg, dry weight.

Table A1-2. Results of the PCB and pesticide analyses of sediment samples collected in August 1997

	Aroclor 1254		Aroclor 1260		p,p'-DDD		p,p'-DDE		p,p'-DDT	
Station	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
T01	19	U	19	U	1.9	U	1.9	U	1.9	U
T02	19	U	19	U	1.9	U	1.9	U	1.9	U
T03	19	U	19	U	2	U	2	U	2	U
T04	20	U	20	U	2	U	2	U	2	U
T07	8100	Y	1600	U	160	U	710	Y	240	Y
T08	1000		19	U	2.6	Y	16	Y	6.6	Y
T09	220		15	U	1.5	U	4.6	Y	3.7	Y
T10	150		19	U	1.9	U	3.7	Y	2.9	Y
T10-FD	160		20	U	2	U	3.9	Y	3	Y
T11	120		19	U	2.1	Y	3.5	Y	2.3	Y
T11-FD	160		19	U	1.9	U	3.6	Y	2.8	Y
T12	110		19	U	1.9	U	4	Y	2.8	Y
T13	270		19	U	2.7	Y	6.5	Y	4.8	Y
T14	290		19	U	2.5	Y	7.3		4.8	Y
T15	240		20	U	2	U	6.2	Y	3.9	Y
T16	270		19	U	2.2	Y	7.1	Y	3.9	Y
T17	260		19	U	1.9	U	6.4	Y	3.8	Y
T18	250		20	U	2	U	6.4	Y	3.9	Y
T19	270		19	U	1.9	U	5.8	Y	3.3	Y
T20	200		20	U	2	U	6	Y	3	Y

All concentrations are in ug/kg, dry weight.

Table A1-3. Results of the PAH analyses of sediment samples collected in August 1997

	Acenaphthene		Acenaphthylene		Anthracene		Benz(a)anthracene		Dibenz(a,h)anthracene		Benzo(a)pyrene	
Station	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
T01	5.8	U	5.8	U	5.8	U	16		5.8	U	26	
T02	5.8	U	5.8	U	5.8	U	12	J	5.8	U	16	
T03	5.9	U	5.9	U	5.9	U	5.9	U	5.9	U	5.9	J
T04	6	U	6	U	10		60		10		68	
T07	5.8	U	5.8	U	5.8	U	29		5.8	U	34	
T08	7.4	J	5.7	U	22		78		15		91	
T09	15		4.4	U	43		110		5.8		110	
T10	5.8	U	5.8	U	16		80		6.9		100	
T10-FD	6	U	6	U	12		71		7.2		92	
T11	44		7.5		120		490		34		490	
T11-FD	40		5.7	U	93		430		82		460	
T12	29		5.7	U	80		300		36		290	
T13	24		6.4		110		440		21		390	
T14	31		8		60		310		17		320	
T15	18		16		57		260		26		300	
T16	24		12		40		240		16		250	
T17	25		5.7	U	55		170		24		180	
T18	13		5.9	U	30		150		17		190	
T19	49		32		110		580		75		680	
T20	11		5.9	U	26		150		31		180	

All concentrations are in ug/kg, dry weight.
Note: Sum of PAHs does not include Dibenzofuran and Carbazole

Table A1-3. Results of the PAH analyses of sediment samples collected in August 1997

	Benzo(b)fluoranthene		Benzo(g,h,i)perylene		Benzo(k)fluoranthene		Carbazole		Chrysene	
Station	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
T01	22		14	J	21		7.5	J	27	
T02	17		5.8	U	11	J	5.8	U	14	J
T03	5.9	J	7	J	5.9	J	5.9	U	6.4	J
T04	80		30		64		13		72	
T07	47		18		31		5.8	U	44	
T08	83		42		91		12		94	
T09	160		35		78		25		95	
T10	160		40		87		17		99	
T10-FD	120		57		89		17		99	
T11	550		250		380		92		470	
T11-FD	480		240		410		92		460	
T12	350		90		180		51		240	
T13	420		140		410		60		410	
T14	440		120		270		64		350	
T15	350		190		290		39		330	
T16	320		100		230		36		270	
T17	180		90		160		25		200	
T18	200		130		180		27		190	
T19	670		260		490		68		550	
T20	200		98		170		30		190	

All concentrations are in ug/kg, dry weight.
Note: Sum of PAHs does not include Dibenzofuran and Carbazole

Table A1-3. Results of the PAH analyses of sediment samples collected in August 1997

	Fluoranthene		Fluorene		Indeno(1,2,3-c,d)pyrene		2-Methylnaphthalene		Naphthalene	
Station	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
T01	55		5.8	U	16		5.8	U	5.8	U
T02	27		5.8	U	10	J	5.8	U	5.8	U
T03	11	J	5.9	U	9.4	J	5.9	U	5.9	U
T04	160		8.4		43		6	U	6	U
T07	63		6.9	J	18		9.2	J	9.2	J
T08	160		13	J	53		5.7	U	5.7	U
T09	240		21		53		7.1		6.2	
T10	180		9.8		69		14		9.8	
T10-FD	230		11		75		14		11	
T11	1600		68		340		9.8		12	
T11-FD	1100		64		320		19		17	
T12	500		39		140		12		16	
T13	1300		49		200		18		18	
T14	860		47		170		24		27	
T15	800		33		230		17		17	
T16	560		31		150		28		24	
T17	420		36		110		17		21	
T18	380		19		150		9.4		10	
T19	1200		69		370		41		36	
T20	440		18		130		8.9		9.5	

All concentrations are in ug/kg, dry weight.
Note: Sum of PAHs does not include Dibenzofuran and Carbazole

Table A1-3. Results of the PAH analyses of sediment samples collected in August 1997

	Phenanthrene		Pyrene		PAHs, total	
Station	Conc	Q	Conc	Q	Conc	Q
T01	57		74		348.3	
T02	12	J	21		163.2	
T03	8.2	J	12	J	95.3	
T04	84		120		821.4	
T07	48		68		436.9	
T08	120		220		1097.95	
T09	190		170		1341.3	
T10	100		160		1137.3	
T10-FD	110		140		1144.2	
T11	770		860		6495.3	
T11-FD	700		1200		6117.85	
T12	360		410		3074.85	
T13	500		680		5136.4	
T14	440		600		4094	
T15	340		500		3774	
T16	260		430		2985	
T17	300		320		2310.85	
T18	200		400		2271.35	
T19	580		1400		7192	
T20	210		340		2215.35	

All concentrations are in ug/kg, dry weight.
Note: Sum of PAHs does not include Dibenzofuran and Carbazole

Table A1-4. Results of the conventional parameter analyses of sediment samples collected in August 1997

Station	Fines (%)	Gravel (%)	Sand (%)	Total solids (%)	Total organic carbon (%)
T01	12	5	83	63.8	5.2
T02	48	19	33	34.2	8.3
T03	20	9	71	69.8	4.9
T04	61	3	36	36.6	5.9
T07	60	2	38	50.3	6.3
T08	35	7	58	47.7	5.8
T09	26	1	73	64.3	4.6
T10	90	0	10	35.4	4.4
T10-FD	90	0	10	34.6	5.2
T11	45	5	50	45.9	5.2
T11-FD	44	4	52	44.6	4.6
T12	16	1	83	74	4.8
T13	62	4	34	47	5.6
T14	65	0	35	48.2	5
T15	79	0	21	40.6	5.5
T16	80	1	19	39.5	5.6
T17	30	3	67	58.8	5.1
T18	68	1	31	43.9	5.4
T19	58	4	38	45.2	5.4
T20	87	0	13	33.5	6.1
S1-1	8	6	86	77.9	5.1
S1-2	61	19	20	28.8	6.2
S1-3	24	6	70	57.4	5.2
S2-1	19	5	76	60.2	5.7
S2-2	54	6	40	56.3	6.4
S2-3	44	3	53	48	5.9
S3-1	8	1	91	76.1	4.7
S3-2	66	8	26	43.9	5.4
S3-3	40	6	54	42.8	5.8
S5-1	25	5	70	69.4	4.4
S5-2	9	1	90	77.6	3.4
S5-3	24	3	73	59.3	4.5
S5-4	31	1	68	63.6	5.1
S5-5	14	38	48	65.9	5.7

Table A1-5. Results of the SEM/AVS analyses of sediment samples collected in August 1997

Station	SEM/AVS (umol/g) Conc	Q	Acid Volatile Sulfides (mg/kg) Conc	Q	Cadmium (mg/kg) Conc	Q	Copper (mg/kg) Conc	Q	Lead (mg/kg) Conc	Q	Mercury (mg/kg) Conc	Q
T01	0.18517		39		0.4	U	2.3		4	U	0.004	U
T02	0.12893		200		0.2	U	11.2		9		0.01	U
T03	0.0797		130		0.3	U	5.3		4		0.006	U
T04	0.28953		110		0.4	U	13.3		12		0.009	U
T07	0.10075		530		0.4	U	19.7		40		0.009	U
T08	0.04908		450		0.3	U	8.9		9		0.008	U
T09	0.76609		42		0.3	U	16.2		32		0.007	U
T10	0.29186		180		0.5	U	24.5		31		0.01	U
T10-FD	0.22447		230		0.5	U	23.3		30		0.01	U
T11	0.35648		130		0.3	U	17.3		36		0.008	U
T11-FD	0.29502		130		0.3	U	14.3		29		0.007	U
T12	0.66978		40		0.3	U	10.5		19		0.003	U
T13	0.49856		110		0.4		20.3		61		0.006	U
T14	0.33418		160		0.4	U	20.2		43		0.01	U
T15	0.74732		78		0.4	U	24.2		36		0.01	U
T16	0.37578		170		0.4		25.6		39		0.01	U
T17	0.35134		100		0.2	U	15.2		26		0.005	U
T18	0.6645		88		0.3		23.5		32		0.01	U
T19	1.20699		41		0.4	U	20.9		32		0.01	U
T20	1.66342		40		0.4		28.8		33		0.01	U

Note: SEM/AVS was calculated as the sum of SEMs/AVS and does not include SEM mercury

Table A1-5. Results of the SEM/AVS analyses of sediment samples collected in August 1997

	Nickel (mg/kg)		Zinc (mg/kg)		SEM Cadmium (umol/g)		SEM Copper (umol/g)		SEM Lead (umol/g)	
Station	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
T01	2	U	10.5		0.00356	U	0.03619		0.01931	U
T02	5		32.6		0.00178	U	0.17624		0.04344	
T03	2		12.1		0.00267	U	0.0834		0.01931	
T04	5		41.8		0.00356	U	0.20928		0.05792	
T07	7		68.1		0.00356	U	0.30999		0.19305	
T08	4		28.5		0.00267	U	0.14005		0.04344	
T09	5		33.2		0.00267	U	0.25492		0.15444	
T10	8		63.1		0.00445	U	0.38552		0.14961	
T10-FD	8		62.8		0.00445	U	0.36664		0.14479	
T11	5		59.7		0.00267	U	0.27223		0.17375	
T11-FD	5		48.7		0.00267	U	0.22502		0.13996	
T12	4		33.3		0.00267	U	0.16522		0.0917	
T13	6		64.8		0.00356		0.31943		0.2944	
T14	6		67.9		0.00356	U	0.31786		0.20753	
T15	8		73.6		0.00356	U	0.3808		0.17375	
T16	8		82.5		0.00356		0.40283		0.18822	
T17	4		43.3		0.00178	U	0.23918		0.12548	
T18	8		75.9		0.00267		0.36979		0.15444	
T19	8		60.3		0.00356	U	0.32887		0.15444	
T20	9		85.4		0.00356		0.45319		0.15927	

Note: SEM/AVS was calculated as the sum of SEMs/AVS and does not include SEM mercury

Table A1-5. Results of the SEM/AVS analyses of sediment samples collected in August 1997

	SEM Nickel (umol/g)		SEM Zinc (umol/g)		SEM Sum (umol/g)	
Station	Conc	Q	Conc	Q	Conc	Q
T01	0.03408	U	0.16058		0.22525	
T02	0.08519		0.49855		0.80431	
T03	0.03408		0.18504		0.32317	
T04	0.08519		0.63924		0.99341	
T07	0.11927		1.04144		1.66553	
T08	0.06815		0.43585		0.68883	
T09	0.08519		0.50772		1.00361	
T10	0.13631		0.96498		1.63865	
T10-FD	0.13631		0.96039		1.61036	
T11	0.08519		0.91298		1.44549	
T11-FD	0.08519		0.74476		1.19627	
T12	0.06815		0.50925		0.83566	
T13	0.10223		0.99098		1.7106	
T14	0.10223		1.03839		1.66779	
T15	0.13631		1.12555		1.81819	
T16	0.13631		1.26166		1.99258	
T17	0.06815		0.66218		1.09588	
T18	0.13631		1.16073		1.82394	
T19	0.13631		0.92216		1.54356	
T20	0.15335		1.30601		2.07538	

Note: SEM/AVS was calculated as the sum of SEMs/AVS and does not include SEM mercury

Table A1-6. Results of the PCB congener analyses of sediment samples collected in August 1997

	PCB008/005		PCB015		PCB016/032		PCB017		PCB018		PCB019	
Station	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**
S1-1	0.12	R	0.75	R	0.14		0.16		0.08	U	0.08	U
S1-2	0.11		2.7	R	0.16	R	0.1		0.07	U	0.07	U
S1-3	0.06	U	3.7	R	0.12	R	0.04	U	0.04	U	0.04	U
S2-1	64		180		120		170		98		40	
S2-2	260		550		670		770		130		250	
S2-3	130		14	R	150		210		81		65	
S3-1	130		13	R	180		210		33		90	
S3-2	8000		1000		4900		5500		150		3900	
S3-3	66		10		75		130		35		23	
S5-1	19		26		35		32		20		12	
S5-2	3		1.1	U	6.3		7		5		1.5	
S5-3	19		3.1		29		38		19		5.7	
S5-4	10		1.8	R	12		20		7.9		3	
S5-5	13		24	R	14		21		9.9		5.9	

All concentrations are in ug/kg, dry weight, except where noted.
* PCB congeners analyzed under high resolution analysis method.

Table A1-6. Results of the PCB congener analyses of sediment samples collected in August 1997

	PCB022		PCB024/027		PCB025		PCB026		PCB031/028		PCB033	
Station	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**
S1-1	0.05	U	0.08	U	0.05	U	0.05	U	0.28		0.05	U
S1-2	0.05	U	0.07	U	0.05	U	0.05	U	0.31		0.05	
S1-3	0.03	R	0.06	R	0.03	U	0.03	U	0.03	U	0.03	U
S2-1	22		53		83		100		260		36	
S2-2	120		200		180		200		1000		76	
S2-3	21		75		79		100		290		30	
S3-1	9.5		120		44		61		140		12	
S3-2	36		2800		86		480		490		58	
S3-3	7		47		46		59		170		13	
S5-1	9.1		16		17		24		120		8.4	
S5-2	1.9		3.3		5.7		8.9		34		2.6	
S5-3	4.5		15		22		30		160		6.2	
S5-4	2.1		6.9		10		14		67		3.2	
S5-5	2.6		8.4		9.4	R	12		47		3.3	

All concentrations are in ug/kg, dry weight, except where noted.
* PCB congeners analyzed under high resolution analysis method.

Table A1-6. Results of the PCB congener analyses of sediment samples collected in August 1997

	PCB040		PCB041/071/006		PCB042		PCB044		PCB045		PCB046	
Station	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
S1-1	0.03	U	0.2		0.05		0.13		0.05	U	0.01	U
S1-2	0.07	U	0.46		0.13		0.47		0.05	U	0.05	U
S1-3	0.03	U	0.03	U	0.03	U	0.03	U	0.02	U	0.02	U
S2-1	5.2		200		83		160		25		7.1	
S2-2	31		1200		360		740		100		29	
S2-3	7.6		210		84		140		25		7.2	
S3-1	4.2		140		73		73		13		6.9	
S3-2	18		630		280		190		68		45	
S3-3	5.7		110		48		77		10		2.1	
S5-1	6.6	R	130		43		84		11		4.3	
S5-2	1.1	U	24		9.2		18		2.3		0.93	U
S5-3	3.4		86		30		66		5		0.28	R
S5-4	1.4		37		13		27		2.1		0.5	
S5-5	0.82		27		11		18		2.3		0.71	

All concentrations are in ug/kg, dry weight, except where noted.
* PCB congeners analyzed under high resolution analysis method.

Table A1-6. Results of the PCB congener analyses of sediment samples collected in August 1997

	PCB047/048		PCB049		PCB052		PCB056/060		PCB066		PCB070/076	
Station	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
S1-1	0.13		0.14		0.18		0.08		0.15		0.16	
S1-2	0.23		0.37		0.69		0.27		0.36		0.92	
S1-3	0.03	U	0.03	U	0.08		0.02	U	0.06	R	0.11	
S2-1	160		200		220		50		110		170	
S2-2	860		810		1100		420		720		780	
S2-3	170		190		240		49		100		160	
S3-1	180		160		170		22		54		62	
S3-2	1900		560		760		74		140		170	
S3-3	140		140		160		27		75		100	
S5-1	82		95		120		55		90		140	
S5-2	16		24		32		8.1		17		28	
S5-3	88		100		120		30		87		140	
S5-4	40		44		52		13		39		58	
S5-5	25		28		31		9		17		26	

All concentrations are in ug/kg, dry weight, except where noted.
* PCB congeners analyzed under high resolution analysis method.

Table A1-6. Results of the PCB congener analyses of sediment samples collected in August 1997

	PCB074		PCB077*		PCB083		PCB084/089		PCB085		PCB087	
Station	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
S1-1	0.12		0.00398		0.03	U	0.08		0.08		0.13	
S1-2	0.3		0.0363		0.08	U	0.48		0.31		0.64	
S1-3	0.03	U	0.00871		0.02	U	0.02	U	0.02	U	0.12	
S2-1	120		6.84		9.4		52		20		42	
S2-2	750		68.2	D	65		300		230		490	
S2-3	110		9.12		13	R	72		27		62	
S3-1	57		7.53		15	R	81		16		45	
S3-2	130		11.3		33		220		53		240	
S3-3	77		8.33		11		44		22		50	
S5-1	89		10.9		11		41		31		64	
S5-2	18		2.1		2.9		7.3		6.6		12	
S5-3	92		8.62		7.2		26		24		49	
S5-4	39		6.32		3.6		13		12		23	
S5-5	19		1.82	D	1.6		8		4.4		8.6	

All concentrations are in ug/kg, dry weight, except where noted.
* PCB congeners analyzed under high resolution analysis method.

Table A1-6. Results of the PCB congener analyses of sediment samples collected in August 1997

	PCB090/101		PCB091		PCB095		PCB097		PCB099		PCB105	
Station	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
S1-1	0.24		0.03		0.12		0.1		0.12		0.13	
S1-2	1.4		0.16		0.86		0.46		0.6		0.55	
S1-3	0.23		0.03	R	0.12		0.02	U	0.09		0.1	
S2-1	92		28		94		40		54		32	
S2-2	700		180		580		330		420		370	
S2-3	130		40		120		49		74		38	
S3-1	91		53		94		26		45		22	
S3-2	270		490		320		64		120		67	
S3-3	91		31		84		39		56		33	
S5-1	90		22		71		46		50		46	
S5-2	17		4.4		16		9.3		10		8.8	
S5-3	78		19		65		35		49		40	
S5-4	38		8.9		31		17		22		17	
S5-5	17		4.5		14		6.8		9.9		7.2	

All concentrations are in ug/kg, dry weight, except where noted.
* PCB congeners analyzed under high resolution analysis method.

Table A1-6. Results of the PCB congener analyses of sediment samples collected in August 1997

	PCB107		PCB110		PCB114*		PCB118		PCB123*		PCB126*	
Station	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
S1-1	0.02		0.4		0.00244	L	0.24		0.00109	L	0.00051	U
S1-2	0.11		2.1		0.0208	L	1.3		0.011		0.00714	L
S1-3	0.01	U	0.38		0.00462	L	0.24		0.00496	L	0.0005	U
S2-1	6.4		180		2.4		76		0.966		0.115	
S2-2	47		1300		23		710		10.7		1.76	
S2-3	10		240		3.17		99		1.42		0.203	
S3-1	6.6		180		2.93		56		1.2		0.177	
S3-2	19	R	660		5.87		120		1.71		0.34	
S3-3	7.5		170		3.73		73		1.54		0.229	
S5-1	7.5	R	180		4.99		81		2.18		0.299	
S5-2	1.8		34		0.954		15		0.344		0.0619	
S5-3	5.9		130		4.16		73		1.81		0.276	
S5-4	3.1		62		2.65		34		1.12		0.194	
S5-5	1.2		33		0.607		15		0.239		0.0479	

All concentrations are in ug/kg, dry weight, except where noted.
* PCB congeners analyzed under high resolution analysis method.

Table A1-6. Results of the PCB congener analyses of sediment samples collected in August 1997

	PCB128		PCB129		PCB130		PCB131		PCB134		PCB136	
Station	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
S1-1	0.1	U	0.06	U	0.06	U	0.05	U	0.05	U	0.05	U
S1-2	0.54		0.07		0.05	U	0.06	U	0.06	U	0.19	
S1-3	0.06	R	0.03	U	0.03	U	0.03	U	0.03	U	0.03	U
S2-1	9.3		2		0.05	U	0.63		4.4		11	
S2-2	130		33		8.4	U	8.2		31		84	
S2-3	17		3.5		0.42	U	1.2		6.3		18	
S3-1	9.8		2.2		0.26	U	0.48		9.2		25	
S3-2	25	R	12	U	12	U	13	U	58		200	
S3-3	12		3.4		1.1	U	1.5		6.6		17	
S5-1	19		7.9	U	7.9	U	9.5	U	9.5	U	13	
S5-2	2.1	U	1.2	U	1.2	U	2	U	2	U	2.8	
S5-3	7.6		2.5		0.21	U	0.78	R	2.8		9	
S5-4	4.2		1.2		0.1	U	0.43		1.6		5	
S5-5	2.5		0.5		0.03	U	0.16	R	0.72		1.8	

All concentrations are in ug/kg, dry weight, except where noted.
* PCB congeners analyzed under high resolution analysis method.

Table A1-6. Results of the PCB congener analyses of sediment samples collected in August 1997

	PCB137		PCB138/163/164		PCB141		PCB144/135		PCB146		PCB149	
Station	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
S1-1	0.06	U	0.25		0.06	U	0.05	U	0.04	U	0.09	
S1-2	0.11		1.8		0.2		0.22		0.18		0.98	
S1-3	0.03	U	0.31		0.04	R	0.03	U	0.03	U	0.18	
S2-1	2.4		44		4.7		8.8		5.5		40	
S2-2	38		510		78		73		45		310	
S2-3	5		83		8.5		17		11		69	
S3-1	2.8		77		4.6		23		13		84	
S3-2	12	U	480		19	R	210		69		750	
S3-3	4.4		71		8.1		15		9.6		66	
S5-1	7.9	U	60		11		11		6.9	U	51	
S5-2	1.2	U	6.5		1.3	U	2.1		1.4	U	8.1	
S5-3	3		52		6.5		8.6		5.2		40	
S5-4	1.6		27		3.5		4.6		2.9		21	
S5-5	0.57		11		1.1		1.7		1.2		8.1	

All concentrations are in ug/kg, dry weight, except where noted.
* PCB congeners analyzed under high resolution analysis method.

Table A1-6. Results of the PCB congener analyses of sediment samples collected in August 1997

	PCB151		PCB153		PCB156*		PCB156/157*		PCB157*		PCB158	
Station	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
S1-1	0.05	U	0.16		0.0115	L	0.0174	L	0.00237	L	0.06	U
S1-2	0.21		1.2		0.134		0.188		0.0289		0.33	
S1-3	0.03	U	0.22		0.026		0.0376	L	0.00593	L	0.03	U
S2-1	8.5		27		3.36		4.79		0.663		5.7	
S2-2	60		300		39.2		67.2		7.89		69	
S2-3	15		52		6.42		9.43		1.31		10	
S3-1	23		37		5.04		8.33		1.11		5.9	
S3-2	180		140		13.8		17.2		2.48		17	
S3-3	14		45		8.18		10.9		1.81		8.3	
S5-1	9.5	U	33		7.53		9.9		1.54		8.3	R
S5-2	2	U	3.8		1.43		1.83		0.299		1.2	U
S5-3	8.4		29		6.95		9.59		1.55		6.6	
S5-4	4.2		16		4.71		5.97		0.954		3.2	
S5-5	1.6		6.3		1.12		1.6		0.236		1.6	

All concentrations are in ug/kg, dry weight, except where noted.
* PCB congeners analyzed under high resolution analysis method.

Table A1-6. Results of the PCB congener analyses of sediment samples collected in August 1997

	PCB167*		PCB169*		PCB170*		PCB170/190		PCB171		PCB172	
Station	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
S1-1	0.00599	L	0.001	U	0.018	L	0.04	U	0.04	U	0.04	U
S1-2	0.059		0.001	U	0.288		0.24		0.06		0.02	U
S1-3	0.0109	L	0.001	U	0.0483		0.06	R	0.02	U	0.02	U
S2-1	1.27		0.00147	U	4.1		5.3		1		0.59	
S2-2	13		0.00735	U	43		67		14		7.9	U
S2-3	2.38		0.0022	U	8.41		9.1		1.8		1.1	
S3-1	1.82		0.00163	U	7.71		9.2		1.7		1.2	
S3-2	4.68		0.0028	U	31.3		44		13	U	13	U
S3-3	2.7		0.00125	U	8.67		9.2		2.5		1.6	U
S5-1	2.34		0.001	U	6.66		11		4.6	U	4.4	U
S5-2	0.46		0.001	U	1.02		0.74		0.44	U	0.41	U
S5-3	2.29		0.001	U	6.52		6.4		1.4		0.84	
S5-4	1.4		0.001	U	4.1		3.5		0.77		0.46	
S5-5	0.42		0.001	U	1.28		1.3		0.23		0.13	

All concentrations are in ug/kg, dry weight, except where noted.
* PCB congeners analyzed under high resolution analysis method.

Table A1-6. Results of the PCB congener analyses of sediment samples collected in August 1997

	PCB174		PCB175		PCB176		PCB177		PCB178		PCB179	
Station	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
S1-1	0.04	U	0.03	U	0.03	U	0.04	U	0.03	U	0.03	U
S1-2	0.17		0.02	U	0.04	R	0.09		0.03		0.1	R
S1-3	0.04	R	0.02	U	0.02	U	0.02	U	0.02	U	0.02	U
S2-1	2.7		0.14		0.65		2.3		0.82		1.8	
S2-2	35		7.4	U	7.8		27		9.1	R	18	
S2-3	4.9		0.2	U	1.4		4.5		1.9		3.8	
S3-1	3.9		0.23	R	1.6		5.9		2.4		5.1	
S3-2	19		12	U	18		71		25		61	
S3-3	5.8		1.5	U	1.7		4.5		1.7		4	
S5-1	4.8	U	4.1	U	4.1	U	4.8	U	4.1	U	4.1	U
S5-2	0.44	U	0.38	U	0.38	U	0.44	U	0.38	U	0.38	U
S5-3	3.7		0.22	U	0.68		2.7		0.85		2.1	
S5-4	2.1		0.12	R	0.47		1.4		0.47		1.2	
S5-5	0.63		0.05	U	0.14		0.48		0.19		0.4	

All concentrations are in ug/kg, dry weight, except where noted.
* PCB congeners analyzed under high resolution analysis method.

Table A1-6. Results of the PCB congener analyses of sediment samples collected in August 1997

	PCB180*		PCB183		PCB185		PCB187/182		PCB189*		PCB191	
Station	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**
S1-1	0.0316		0.04	U	0.04	U	0.03	U	0.001	U	0.04	U
S1-2	0.367		0.11		0.02	U	0.23		0.001	U	0.02	U
S1-3	0.0707		0.02	U	0.02	U	0.04	R	0.001	U	0.02	U
S2-1	6.28		1.7		0.26		3.7		0.182		0.16	
S2-2	62.2		27		8.7	U	34		1.9		7.9	U
S2-3	11.9		3.4		0.64		7.4		0.446		0.4	R
S3-1	12.2		2.9		0.43		9.1		0.364		0.44	
S3-2	51.2		15	R	14	U	100		2.49		13	U
S3-3	13.2		3.2		1.7	U	7.7		0.436		1.6	U
S5-1	10.6		4.8	U	4.8	U	5.1		0.316		4.4	U
S5-2	1.63		0.44	U	0.44	U	0.38	U	0.0458		0.41	U
S5-3	9.67		2.2		0.54		4.2		0.324		0.25	R
S5-4	6.38		1.4		0.26		2.5		0.232		0.12	
S5-5	1.88		0.36		0.06		0.81		0.0648		0.05	U

All concentrations are in ug/kg, dry weight, except where noted.
* PCB congeners analyzed under high resolution analysis method.

Table A1-6. Results of the PCB congener analyses of sediment samples collected in August 1997

	PCB193		PCB194		PCB195		PCB196/203		PCB197		PCB198	
Station	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
S1-1	0.04	U	0.1	U	0.08	U	0.08	U	0.09	R	0.08	U
S1-2	0.02	U	0.12	R	0.06	R	0.17		0.05	U	0.05	U
S1-3	0.02	U	0.1	U	0.08	U	0.08	U	0.09	U	0.09	U
S2-1	0.45		1.7		0.47		1.3		0.09	U	0.09	U
S2-2	7.9	U	20		7.7		16		8	U	8	U
S2-3	0.77		2.4		0.63		2.3		0.29	U	0.29	U
S3-1	0.67		2.6		0.75		2.2		0.35	R	0.17	U
S3-2	13	U	36	U	30	U	30	U	32	U	32	U
S3-3	1.6	U	4.8	U	3.4	U	3.4	U	3.4	U	3.4	U
S5-1	4.4	U	11	U	9.2	U	9.2	U	9.9	U	9.9	U
S5-2	0.41	U	0.68	U	0.59	U	0.59	U	0.61	U	0.61	U
S5-3	0.47	R	1.8		0.6		1.5		0.39	U	0.39	U
S5-4	0.29		1.1		0.25		0.95		0.2	U	0.2	U
S5-5	0.08		0.43		0.15		0.37		0.04	U	0.04	U

All concentrations are in ug/kg, dry weight, except where noted.
* PCB congeners analyzed under high resolution analysis method.

Table A1-6. Results of the PCB congener analyses of sediment samples collected in August 1997

	PCB199		PCB201		PCB205		PCB206		PCB207		PCB208	
Station	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
S1-1	0.08	U	0.04	U	0.1	U	0.14	U	0.14	U	0.14	U
S1-2	0.17		0.07		0.07	U	0.15	U	0.15	U	0.15	U
S1-3	0.09	U	0.04	U	0.1	U	0.36	U	0.36	U	0.36	U
S2-1	1.3		0.11		0.1		0.28		0.14	U	0.14	U
S2-2	13		3.3	U	9.1	U	14	U	14	U	14	U
S2-3	2.4		0.13	U	0.43	U	0.65		0.49	U	0.49	U
S3-1	2		0.24	R	0.29	R	0.63		0.24	U	0.48	
S3-2	32	U	13	U	36	U	32	U	32	U	32	U
S3-3	3.4	U	1.6	U	4.8	U	4.4	U	4.4	U	4.4	U
S5-1	9.9	U	4	U	11	U	9.2	U	9.2	U	9.2	U
S5-2	0.61	U	0.28	U	0.68	U	0.62	U	0.62	U	0.62	U
S5-3	1.5		0.18	U	0.55	U	0.41		0.36	U	0.36	U
S5-4	0.89		0.09	U	0.28	U	0.35		0.18		0.1	
S5-5	0.37		0.04	R	0.05	U	1.7		0.12	U	0.87	R

All concentrations are in ug/kg, dry weight, except where noted.
* PCB congeners analyzed under high resolution analysis method.

Table A1-6. Results of the PCB congener analyses of sediment samples collected in August 1997

	PCB209		PCB Sum		Percent Moisture	
Station	Conc	Q	Conc	Q	Conc	Q
S1-1	0.14	U	6.61		26	
S1-2	0.16	U	26.26		66	
S1-3	1.4	U	8.8		35	
S2-1	0.09	U	3694.13		40	
S2-2	9.5	U	20494.9		49	
S2-3	0.71	U	4133.73		47	
S3-1	0.3	U	3208.39		24	
S3-2	13	U	37922.87		49	
S3-3	2.6	U	2772.78		56	
S5-1	4.5	U	2417.91		23	
S5-2	0.37	U	470.59		17	
S5-3	0.32	U	2067.65		36	
S5-4	0.15	U	958.35		34	
S5-5	0.12	U	573.69		26	

All concentrations are in ug/kg, dry weight, except where noted.
* PCB congeners analyzed under high resolution analysis method.

Table A1-7. Results of the PCB congener analyses of juvenile smallmouth bass tissue samples collected in August 1997

	Percent Lipids		Percent Moisture		PCB008/005		PCB015		PCB016/032	
Station	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
F1-1	3.7		75		0.54		0.22	U	0.18	
F1-2	3.5		75		0.37		0.22	U	0.1	
F1-3	3.1		75		0.46		0.29	U	0.13	
F2-1	3.7	D	75	D	120	>D	44	D	200	>D
F2-2	2.9	D	75	D	78	D	31	D	140	D
F2-3	3.1	D	75	D	130	>D	39	D	170	>D
F3-1	2.5		76		200		62		260	
F3-2	2		76		140		42		210	
F3-3	2.4		76		160		54		230	
F5-1	2.7		76		94		42		96	
F5-2	2.5		76		90		35		89	
F5-3	2.8		76		140		51		140	

All concentrations are in ug/kg, wet weight, except where noted.
* PCB congeners analyzed under high resolution analysis method.

U - Undetected
R - Peak detected but did not meet quantification criteria
D - Diluted sample
L - Labelled compound
> - Sample over linear range of method
Note: No qualifier for the PCB_SUM values indicates that at least one value was detected in either sediment or tissue.

Table A1-7. Results of the PCB congener analyses of juvenile smallmouth bass tissue samples collected in August 1997

	PCB017		PCB018		PCB019		PCB022		PCB024/027		PCB025	
Station	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
F1-1	0.33		0.09		0.11		0.05		0.12		0.08	
F1-2	0.15		0.06		0.06		0.04		0.05		0.05	
F1-3	0.17		0.05		0.07	R	0.03		0.06		0.05	
F2-1	300	>D	81	D	71	D	31	D	97	D	91	D
F2-2	230	D	84	D	38	D	31	D	66	D	97	D
F2-3	240	>D	64	D	72	D	27	D	82	D	82	D
F3-1	430		85		100		32		150		130	
F3-2	310		62		79		30		110		100	
F3-3	330		70		90		30		130		110	
F5-1	210		48		61		17		87		61	
F5-2	200		43		59		16		82		55	
F5-3	330		71		94		21		140		84	

All concentrations are in ug/kg, wet weight, except where noted.
* PCB congeners analyzed under high resolution analysis method.

Table A1-7. Results of the PCB congener analyses of juvenile smallmouth bass tissue samples collected in August 1997

	PCB026		PCB031/028		PCB033		PCB040		PCB041/071/006		PCB042	
Station	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
F1-1	0.11		0.66		0.06		0.05	R	0.87		0.27	
F1-2	0.05		0.45		0.05		0.05	R	0.7		0.22	
F1-3	0.06		0.41		0.04	R	0.04	U	0.64		0.22	
F2-1	110	D	480	>D	42	D	21	D	700	>D	250	>D
F2-2	130	D	660	>D	47	D	16	D	750	>D	270	D
F2-3	100	D	450	>D	29	D	11	D	420	>D	150	D
F3-1	150		660		38		17		760		280	
F3-2	120		540		29		19		660		250	
F3-3	140		600		33		16		640		230	
F5-1	76		350		16		12		320		130	
F5-2	69		300		15		11		320		120	
F5-3	110		430		23		14	R	390		150	

All concentrations are in ug/kg, wet weight, except where noted.
* PCB congeners analyzed under high resolution analysis method.

Table A1-7. Results of the PCB congener analyses of juvenile smallmouth bass tissue samples collected in August 1997

	PCB044		PCB045		PCB046		PCB047/048		PCB049		PCB052	
Station	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
F1-1	0.69		0.03	U	0.03	U	0.9		1.1		1.7	
F1-2	0.54		0.02	U	0.02	U	1		1		1.6	
F1-3	0.49		0.03	U	0.03	U	0.67		0.91		1.5	
F2-1	440	>D	40	D	9	D	600	>D	540	>D	560	>D
F2-2	490	D	39	D	7.7	D	690	>D	790	>D	910	>D
F2-3	250	>D	24	D	5.8	D	480	>D	470	>D	500	>D
F3-1	430		38		11		1000		950		970	
F3-2	370		36		8.7		940		820		840	
F3-3	340		35		8.9		960		820		840	
F5-1	200		25		5.3		480		430		460	
F5-2	190		24		4.9		430		390		440	
F5-3	240		31		8.1	U	620		560		600	

All concentrations are in ug/kg, wet weight, except where noted.
* PCB congeners analyzed under high resolution analysis method.

Table A1-7. Results of the PCB congener analyses of juvenile smallmouth bass tissue samples collected in August 1997

	PCB056/060		PCB066		PCB070/076		PCB074		PCB077*		PCB083	
Station	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
F1-1	0.55		1.5		2		1.4		0.107		0.36	
F1-2	0.44		1.4		1.6		1.1		0.115		0.33	
F1-3	0.44		1.4		1.7		1.2		0.1		0.29	
F2-1	260	>D	490	>D	660	>D	620	>D	39.4	D	160	D
F2-2	260	D	780	>D	1000	>D	900	>D	53	D	240	D
F2-3	170	>D	420	>D	500	>D	510	>D	25.4		130	D
F3-1	270		870		760		940		35.2	D	85	
F3-2	250		750		610		840		24.4		74	
F3-3	230		740		640		820		26.6	D	71	
F5-1	120		320		280		370		10.3		38	
F5-2	110		320		270		360		10.3		41	
F5-3	120		360		270		410		10.5		45	

All concentrations are in ug/kg, wet weight, except where noted.
* PCB congeners analyzed under high resolution analysis method.

Table A1-7. Results of the PCB congener analyses of juvenile smallmouth bass tissue samples collected in August 1997

	PCB084/089		PCB085		PCB087		PCB090/101		PCB091		PCB095	
Station	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
F1-1	1.7		1.8		3.6		8.4		0.54		2.6	
F1-2	1.5		1.6		3.1		7.7		0.53		2.5	
F1-3	1.6		1.7		3.3		8.7		0.48		2.3	
F2-1	280	D	740	D	1500	>D	590	>D	160	D	430	>D
F2-2	280	D	830	D	1600	D	920	>D	170	D	500	>D
F2-3	170	D	550	D	1100	>D	530	>D	100	D	290	>D
F3-1	330		310		590		1100		200		580	
F3-2	300		300		520		990		180		480	
F3-3	300		260		480		950		180		490	
F5-1	150		140		270		480		85		250	
F5-2	150		150		280		500		91		250	
F5-3	190		180		340		590		120		310	

All concentrations are in ug/kg, wet weight, except where noted.
* PCB congeners analyzed under high resolution analysis method.

Table A1-7. Results of the PCB congener analyses of juvenile smallmouth bass tissue samples collected in August 1997

	PCB097		PCB099		PCB105		PCB107		PCB110		PCB114*	
Station	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
F1-1	2.2		4.3		2.4		0.76		10		0.186	L
F1-2	2.1		4.1		2.5		0.7		8.7		0.163	L
F1-3	2.1		4.2		2.3		0.72		9.5		0.277	
F2-1	1200	>D	520	>D	300	>D	70	D	2800	>D	28.7	
F2-2	1400	D	630	>D	330	D	75	D	4200	>D	32.7	
F2-3	810	D	410	>D	210	>D	53	D	2300	>D	24	
F3-1	450		750		390		84		1700		34.5	
F3-2	410		700		350		78		1500		33.3	
F3-3	380		670		330		75		1400		28.9	
F5-1	180		320		140		36		730		13.9	
F5-2	200		330		160		41		820		17.4	
F5-3	240		390		180		47		940		19.8	

All concentrations are in ug/kg, wet weight, except where noted.
* PCB congeners analyzed under high resolution analysis method.

Table A1-7. Results of the PCB congener analyses of juvenile smallmouth bass tissue samples collected in August 1997

	PCB118		PCB123*		PCB126*		PCB128		PCB129		PCB130	
Station	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
F1-1	7.8		0.0888		0.0144		2.6		0.46		0.14	U
F1-2	7.9		0.0722		0.0169		2.6		0.59		0.07	U
F1-3	7.5		0.152		0.0212		2.5		0.44		0.08	U
F2-1	570	>D	11.7		1.07		130	D	25	D	0.49	RD
F2-2	890	>D	11		1.51		98	D	24	D	0.27	RD
F2-3	480	>D	10.9		0.786		88	D	18	D	0.18	RD
F3-1	1100		13.2		1.59		150		31		2.9	U
F3-2	970		13.9		1.29		170		28		3.9	U
F3-3	970		11.5		1.45		170		32		4.6	U
F5-1	420		6.17		0.394		64		12		2.2	U
F5-2	460		8.08		0.522		81		14		4.2	U
F5-3	520		6.51		0.554		90		17		4.2	U

All concentrations are in ug/kg, wet weight, except where noted.
* PCB congeners analyzed under high resolution analysis method.

Table A1-7. Results of the PCB congener analyses of juvenile smallmouth bass tissue samples collected in August 1997

	PCB131		PCB134		PCB136		PCB137		PCB138/163/164		PCB141	
Station	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
F1-1	0.16	U	0.27		0.58		0.57		13		1.4	
F1-2	0.09		0.32		0.55		0.72		15		1.5	
F1-3	0.16		0.25		0.56		0.62		12		1.3	
F2-1	5.2	D	21	D	54	D	35	D	650	>D	68	D
F2-2	5.6	D	20	D	56	D	35	D	600	D	65	D
F2-3	3.5	D	14	D	33	D	26	D	460	>D	50	D
F3-1	8.4		30		79		45		800		95	
F3-2	6.6		30		78		44		830		95	
F3-3	6.9		27		72		49		830		97	
F5-1	2.7		15		40		20		340		36	
F5-2	4.9		16		36		23		400		45	
F5-3	5.4	U	26		49		25		450		54	

All concentrations are in ug/kg, wet weight, except where noted.
* PCB congeners analyzed under high resolution analysis method.

Table A1-7. Results of the PCB congener analyses of juvenile smallmouth bass tissue samples collected in August 1997

	PCB144/135		PCB146		PCB149		PCB151		PCB153		PCB156*	
Station	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
F1-1	1.1		1.5		5.8		1		9.9		0.958	
F1-2	0.91		1.4		5.2		1.1		12		1.01	
F1-3	0.94		1.5		5.6		0.97		9.5		0.874	
F2-1	59	D	60	D	340	D	66	D	420	>D	51.4	
F2-2	60	D	59	D	340	D	66	D	380	D	63	
F2-3	44	D	53	D	270	D	47	D	290	D	45.1	
F3-1	88		85		500		98		560		77.8	
F3-2	86		85		490		100		590		67.8	
F3-3	80		84		480		94		580		75.5	
F5-1	42		43		250		48		250		33.7	
F5-2	47		54		290		52		300		35.6	
F5-3	63		69		360		66		310		37.2	

All concentrations are in ug/kg, wet weight, except where noted.
* PCB congeners analyzed under high resolution analysis method.

Table A1-7. Results of the PCB congener analyses of juvenile smallmouth bass tissue samples collected in August 1997

	PCB156/157*		PCB157*		PCB158		PCB167*		PCB169*		PCB170*	
Station	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
F1-1	1.38		0.167		1.5		0.495		0.00172	U	0.907	
F1-2	1.64		0.186		1.6		0.573		0.00197	U	1.25	
F1-3	1.50		0.217		1.5		0.553		0.00192	U	0.919	
F2-1	76.6		10.9		76	D	18.7		0.00954	U	48.2	
F2-2	79.1		10.5		72	D	19.9		0.00627	U	45.4	
F2-3	60.4		8.16		52	D	15.7		0.00605	U	37.2	
F3-1	99.7		14		92		30.8		0.00813	U	55.5	
F3-2	83.5		14.5		96		22.1		0.01017	U	56.7	
F3-3	85.5		13.7		97		22.7		0.00669	U	51.7	
F5-1	36.3		5.17		36		10.5		0.00468	U	20.4	
F5-2	46.3		6.29		46		14		0.00585	U	25.1	
F5-3	45.8		6.63		45		13.3		0.00439	U	28.3	

All concentrations are in ug/kg, wet weight, except where noted.
* PCB congeners analyzed under high resolution analysis method.

Table A1-7. Results of the PCB congener analyses of juvenile smallmouth bass tissue samples collected in August 1997

	PCB170/190		PCB171		PCB172		PCB174		PCB175		PCB176	
Station	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
F1-1	1.2		0.22		0.16		0.67		0.04	R	0.14	R
F1-2	1.3		0.29		0.21		0.72		0.05		0.14	R
F1-3	1.2		0.23		0.19		0.72		0.03	R	0.14	
F2-1	57	D	11	D	6.1	D	25	D	1.4	D	5.5	D
F2-2	55	D	11	D	6	D	25	D	1.6	D	5.5	D
F2-3	42	D	7.8	D	4.8	D	19	D	0.97	D	3.7	D
F3-1	79		15		11		35		3	U	7.3	
F3-2	79		17		9.3		40		2.7	R	7	R
F3-3	74		18		9.6		38		3.9		9.8	
F5-1	30		7.1		5.2		13		3.3	U	3.3	U
F5-2	41		8.6		5.3		15		4.3	U	4.3	U
F5-3	42		9		7.9		19		1.8	U	2.1	R

All concentrations are in ug/kg, wet weight, except where noted.

* PCB congeners analyzed under high resolution analysis method.

Table A1-7. Results of the PCB congener analyses of juvenile smallmouth bass tissue samples collected in August 1997

	PCB177		PCB178		PCB179		PCB180*		PCB183		PCB185	
Station	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
F1-1	0.46		0.43		0.38		2.52		0.57		0.07	
F1-2	0.54		0.43		0.38		2.82		0.71		0.09	
F1-3	0.45		0.26		0.42		2.38		0.6		0.07	
F2-1	20	D	7.9	D	15	D	82.3		20	D	2.8	D
F2-2	19	D	7.8	D	15	D	75.4		19	D	2.8	D
F2-3	15	D	6.2	D	8.6	D	72		14	D	1.9	D
F3-1	31		13		21		98		25		6.1	R
F3-2	30		12		22		97.7		28		5.4	
F3-3	35		15		23		95		28		7.4	
F5-1	14		6		7.5		39.8		12		3.8	U
F5-2	16		6.4		7.6		48		15		4.9	U
F5-3	20		8.9		11		59.5		18		2.9	

All concentrations are in ug/kg, wet weight, except where noted.
* PCB congeners analyzed under high resolution analysis method.

Table A1-7. Results of the PCB congener analyses of juvenile smallmouth bass tissue samples collected in August 1997

	PCB187/182		PCB189*		PCB191		PCB193		PCB194		PCB195	
Station	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
F1-1	1.3		0.0524		0.03		0.12		0.25	R	0.13	U
F1-2	1.5		0.0658		0.04	U	0.17		0.33		0.19	
F1-3	1.4		0.0687		0.05		0.14		0.31		0.12	
F2-1	44	D	2.16		1.8	D	4.3	D	14	D	3.8	D
F2-2	41	D	2.35		1.8	D	4.5	D	16	D	3.6	D
F2-3	37	D	1.8		1.4	RD	3.6	D	9.9	D	2.3	RD
F3-1	70		2.99		3.3	U	5.8		22		3.8	U
F3-2	74		2.84		3.6		5.5		19		5.9	U
F3-3	87		3.18		4.7		7.8		20		6.9	U
F5-1	37		1.17		3.7	U	4.8		7.2		2.8	
F5-2	40		1.67		4.7	U	4.7	U	7.5		4.9	U
F5-3	51		1.53		2	U	5.1		12		3.7	U

All concentrations are in ug/kg, wet weight, except where noted.

* PCB congeners analyzed under high resolution analysis method.

Table A1-7. Results of the PCB congener analyses of juvenile smallmouth bass tissue samples collected in August 1997

	PCB196/203		PCB197		PCB198		PCB199		PCB201		PCB205	
Station	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
F1-1	0.4		0.14	U	0.14	U	0.41		0.07	U	0.15	U
F1-2	0.54		0.14	U	0.14	U	0.56		0.07	U	0.15	U
F1-3	0.45		0.11	U	0.11	U	0.54		0.07		0.12	U
F2-1	12	D	0.93	RD	0.45	RD	11	D	0.95	D	0.79	RD
F2-2	13	D	0.83	D	0.49	RD	12	D	0.95	D	1.5	RD
F2-3	8.9	D	0.53	UD	0.53	UD	8.4	D	0.64	RD	0.98	UD
F3-1	15		4.1	U	4.1	U	15		2	U	4.6	U
F3-2	17		6.3	U	6.3	U	17		3	U	7.1	U
F3-3	17		7.3	U	7.3	U	16		3.6	U	8.3	U
F5-1	6.7		1.8	U	1.8	U	7.2		0.85	U	2	U
F5-2	8.7		5.2	U	5.2	U	9.1		2.5	U	5.9	U
F5-3	11		3.9	U	3.9	U	12		1.9	U	4.5	U

All concentrations are in ug/kg, wet weight, except where noted.
* PCB congeners analyzed under high resolution analysis method.

Table A1-7. Results of the PCB congener analyses of juvenile smallmouth bass tissue samples collected in August 1997

	PCB206		PCB207		PCB208		PCB209		PCB Sum	
Station	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
F1-1	0.3	U	0.3	U	0.3	U	0.3	U	114.4	
F1-2	0.4	U	0.4	U	0.4	U	0.4	UR	115.2	
F1-3	0.4	U	0.4	U	0.4	U	0.4	U	108.9	
F2-1	3.1	RD	1.2	UD	1.5	D	1.2	UD	18829.3	
F2-2	3.1	RD	0.82	RD	1.2	RD	0.75	UD	23143.3	
F2-3	1.8	RD	1.1	UD	1.1	UD	1.1	UD	14479.5	
F3-1	5.1	R	4.9	U	4.9	U	3.2	U	20783.4	
F3-2	3.6	R	1.8	U	1.8	U	3.9	U	18576.4	
F3-3	6.4	U	6.4	U	6.4	U	5.1	U	18412.9	
F5-1	3.1	U	3.1	U	3.1	U	3.3	U	9104.0	
F5-2	4	U	4	U	4	U	2.6	U	9351.0	
F5-3	2.6	U	2.6	U	2.6	U	3.6	U	11601.9	

All concentrations are in ug/kg, wet weight, except where noted.
* PCB congeners analyzed under high resolution analysis method.

APPENDIX A-2

Quality Assurance Review Summaries
Chemical Analyses of Sediment
and Fish Tissue Samples

QUALITY ASSURANCE REVIEW SUMMARY—CHEMICAL ANALYSES OF SEDIMENT SAMPLES

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QUALITY ASSURANCE REVIEW SUMMARY—CHEMICAL ANALYSES OF SEDIMENT SAMPLES

INTRODUCTION

This report documents the results of a quality assurance review of data reported for chemical analyses conducted on sediment samples and associated field quality control samples collected in support of the Sheboygan River and Harbor project conducted by EVS Consultants (Seattle, Washington). The results of the quality assurance review are presented herein. The chemical analyses completed included the analysis of polychlorinated biphenyl (PCB) congeners, polycyclic aromatic hydrocarbons (PAHs), a selected list of organochlorine pesticides, PCBs (as Aroclor® mixtures), a selected list of metals (as total metals and simultaneously extracted metals), and various conventional parameters (i.e., total solids, total organic carbon, and grain size distribution). The chemical analyses were conducted by Axys Analytical Services, Ltd. (Sidney, British Columbia, Canada) for PCB congeners and Analytical Resources, Inc. (Seattle, Washington) for all other chemical analyses.

The quality assurance review was conducted to verify that the laboratory quality assurance and quality control (QA/QC) procedures were documented and that the quality of the data is sufficient to meet the project DQOs and support the use of the data for its intended purposes. Data validation procedures and qualifier assignments were generally based on U.S. Environmental Protection Agency (EPA) contract laboratory program national functional guidelines for dioxin/furan data validation (U.S. EPA 1993), inorganic data review (U.S. EPA 1994a), and organic data review (U.S. EPA 1994b), as applicable. Modifications of data validation procedures were made, as appropriate, to accommodate project–specific DQOs and quality control requirements for methods not specifically addressed by the national functional guidelines documents (e.g., conventional analyses). The data validation review summaries are included as attachments after this report and the fish tissue data report.

A summary of the data quality objectives (DQOs) established for the chemical analyses completed and the analytical methods used are provided in the quality assurance project plan (QAPP) and applicable laboratory statements of work prepared by EVS Consultants.

DATA VALIDATION PROCEDURES

Data validation was completed to a slightly modified version of EPA Level 2 specifications (U.S. EPA 1995 and PSEP 1991). The level-of-effort included completing a 10 percent review data and calculation checks for all calibration and quality control data, compound quantification and identification; verification of 100 percent of transcriptions; and, a 10 percent calculation checks of positive identifications reported by the laboratories. The following laboratory deliverables were reviewed during the data validation process:

- Chain-of-custody documentation to verify completeness of the data
- The case narrative discussing analytical problems (if any) and procedures
- Sample preparation logs or data summary sheets to verify analytical holding times
- Applicable instrument tuning, instrument calibration, and calibration blank results to assess instrument performance
- Applicable method blanks associated with each sample delivery group (SDG) to check for laboratory contamination
- Results for all applicable laboratory quality control check samples including surrogate compounds (organic analyses only), laboratory control samples (LCSs), matrix spikes, and internal standards (organic analyses only) to check analytical accuracy
- Results for all applicable laboratory duplicate matrix spike analyses, and applicable duplicate or triplicate sample analyses to check analytical precision
- Applicable Mass spectra, chromatograms, and instrument printouts to confirm the reporting of target analytes as detected on undetected were correct
- Applicable instrument and method detection limits for all target analytes.

In addition, results for all applicable field quality control samples (e.g., equipment rinsate blanks and filter wipes) were reviewed. These results provide additional information in support of the quality assurance review (see *Field Quality Control* section for details).

SAMPLE DELIVERY GROUPS

The sample delivery groups (SDGs) contained all documentation and data necessary to conduct the level of effort required to complete the quality assurance review.

DATA QUALITY ASSESSMENT

The results of the quality control procedures used during sample analysis are discussed below. The laboratory data were evaluated in terms of completeness, holding times, instrument performance, accuracy, precision, method reporting limits, and field quality control samples. During the quality assurance review, no data were qualified as estimated (*J*) and no data were rejected.

COMPLETENESS

The results reported by the laboratory were 100 percent complete. No data were rejected during the quality assurance review.

HOLDING TIMES AND SAMPLE PRESERVATION

The analytical holding time constraints and sample preservation requirements specified in QAPP were met for all samples and analyses, with one exception. The analysis of mercury, as a simultaneously extracted metal, in Sample SR-20-SS-F was completed 3 days past the recommended 28-day holding time constraint specified by the analytical method. The undetected result reported for mercury in this sample was not qualified during the data review because the holding time constraint was only slightly exceeded.

INSTRUMENT PERFORMANCE

The performance of the analytical instruments, as documented by the laboratory, was acceptable. No changes in instrument performance that would have resulted in the degradation of data quality were indicated during any analysis sequence.

Initial and Continuing Calibration

Initial and continuing calibrations were completed for all applicable target analytes and met the criteria for acceptable performance and frequency of analysis, with the exceptions discussed below. Complete details of all calibration data are presented in the attached data review summaries.

For the analysis of metals, a recovery of 112 percent was reported for cadmium in one continuing calibration verification (CCV) analysis and is above the upper control limit of 110 percent. No sample required qualification for this exceedance because the recoveries of the CCV analyzed just prior to, and just after the affected CCV were in control, suggesting the elevated recovery was an isolated occurrence.

For the analysis of organochlorine pesticides, the following CCV exceedances were noted:

- A percent difference of 26 percent was reported for 4,4'-DDT in the CCV analyzed on 9/5/97 at 1046 on the DB-5 column
- Percent differences or 40 percent, 40 percent, 40 percent, and 27 percent were reported for alpha-BHC, beta-BHC, gamma-BHC, and 4,4'-DDT, respectively, for the CCV analyzed on 9/5/97 at 1046 on the DB-608 column

- A percent difference of 30 percent was reported for delta-BHC for the CCV analyzed on 9/5/97 at 1819 on the DB-608 column

- Percent differences of 40, 40, 40, and 31 percent were reported for alpha-BHC, beta-BHC, gamma-BHC, and 4,4'-DDT, respectively, for the CCV analyzed on 9/6/97 at 0128 on the DB-608 column

- Percent differences of 30, 30, 30, 30, 28, and 33 percent were reported for alpha-BHC, gamma-BHC, hepatachlor, endosulfan I, dieldrin, and 4,4'-DDT, respectively, for the CCV analyzed on 9/6/97 at 0730 on the DB-608 column

- Percent differences of 35, 30, 30, 28,and 30 percent were reported for delta-BHC, aldrin, heptachlor epoxide, endosulfan II, and gamma-chlordane, respectively, for the CCV analyzed on 9/6/97 at 0730 on the DB-608 column

- A percent difference of 29 percent was reported for 4,4'-DDT for the CCV analyzed on 9/6/97 at 1154 on the DB-5 column

- Percent differences of 40, 40 30, and 35 percent were reported for alpha-BHC, beta-BHC, gamma-BHC, and 4,4'-DDT, respectively for the CCV analyzed on 9/6/97 1154 on the DB-608 column.

Of the percent difference exceedances listed above, only gamma-BHC, dieldrin, 4,4'-DDT, heptachlor epoxide, and gamma-chlordane are project-specified target analytes. All the percent difference exceedances were due to an increase in instrument sensitivity. None of the affected target analyte pesticides associated with the affected CCVs were detected in the samples associated with the affected CCVs. No data required qualification for the percent difference exceedances because greater instrument sensitivity was observed. Since greater instrument sensitivity was observed, the reported detection limits were not compromised and the reporting of false negatives is unlikely than had the exceedances been due to a decrease in sensitivity.

Initial and Continuing Calibration Blanks

The initial and continuing calibration blank (ICB and CCB) analyses were completed for all applicable target analytes and met the criteria for acceptable performance. No target analytes were detected in any applicable ICBs and CCBs at a concentration above the applicable action limits that would have resulted in qualification of data. Complete details of all calibration blank data are presented in the attached data review summaries.

Method Blank Analyses

No target analytes were detected in any applicable method blank at a concentration above applicable action limits specified by the analytical methods. Some PCB congeners and zinc were detected in a few of the method blanks; however, no data required qualification. Complete details of all method data blanks are presented in the applicable data review summaries included in the attachments to this report.

Instrument-Specific Quality Control Procedures

Instrument-specific quality control procedures for analyses by ICP-AES include interference check samples and serial dilution of field samples. Results for these procedures are discussed below. Complete details are presented in the attached data review summaries.

Interference Check Sample Analyses

All interference check sample results for the analysis of metals met the criteria for acceptable performance and frequency of analysis.

Serial Dilution of Sample Analyses

All serial dilution results for the analysis of metals met the criteria for acceptable performance and frequency of analysis, with three exceptions.

ACCURACY

The accuracy of the analytical results is evaluated in the following sections in terms of analytical bias (surrogate compound, matrix spike, LCS recoveries, and internal standards) and precision (duplicate matrix spikes, duplicate LCSs, duplicate sample analyses, or triplicate sample analyses). Complete details of all surrogate compound, matrix spike, LCS recoveries, internal standards data, and duplicate or triplicate analytical data are presented in the attached data review summaries.

Surrogate Compound Recoveries

The recoveries reported by the laboratory for the applicable surrogate compounds added to all field and quality control samples analyzed for organic compounds generally met the criteria for acceptable performance, with the exceptions discussed below.

Some surrogate recoveries associated with analyses conducted for PAHs were below the lower project-specific control limit of 50 percent. No action was taken for these exceedances because it was deemed more appropriate to defer to laboratory-established control limits for samples processed using larger sample sized and smaller final extract volumes than are routinely specified by the analytical method.

Recoveries of 45.6 percent and 47.8 percent were reported for tetrachloro-m-xylene for the analysis of the matrix spike duplicate analysis conducted on Sample SR-10-SS-F and one LCS (laboratory ID 090397SB). These recoveries were below the lower project-established control limit of 50 percent. No sample data required qualification for this exceedance because surrogate recoveries are used to assess the extraction efficiency of each unique sample.

Matrix Spike Recoveries

The recoveries reported by the laboratory for applicable matrix and duplicate matrix spike analyses and the frequency of analysis met the criteria for acceptable performance, with the following exceptions:

- For the analysis of organochlorine pesticides and PCBs, no recovery was reported for endrin for the matrix spike analysis conducted on Sample SR-10-SS-F. The laboratory case narrative stated that no recovery could be quantified because of significant interference observed in this matrix spike. No sample data were qualified for the lack of this recovery because results for organic compound analyses are not qualified solely on the basis of matrix spike data and because the recovery of endrin in the duplicate matrix spike was acceptable.

- For the analysis of organochlorine pesticides and PCBs, a recovery of 44.9 percent was reported for dieldrin in the matrix spike duplicate analysis conducted on Sample SR-10-SS-F. This recovery was below the lower project-established control limit of 50 percent. No data required qualification for this exceedance because data are not qualified based solely on matrix spike recoveries, the recoveries of dieldrin in the matrix spike of this sample and in the other matrix spikes were acceptable, and the recovery of dieldrin in the LCSs were acceptable.

- For the analysis of TOC, a recovery of 70 percent was reported for the matrix spike duplicate conducted on Sample SR-20-SS-F and is below the lower project-established control limit of 80 percent. No data were qualified for this exceedance because the recovery reported for the matrix spike conducted on this sample was in control.

- Some matrix spike data were not reported if the samples required dilutions to bring the analytes into calibration range and, therefore, the spiking compounds could not be detected. In other instances, matrix spike data were not reported if the concentration of one, or more, analytes used in the spiking solution were present in the sample selected for spiking at a concentration significantly above the spiking concentration.

Laboratory Control Sample Recoveries

The recoveries reported by the laboratory for all applicable LCS and duplicate LCS analyses and the frequency of analysis met the criteria for acceptable performance, with one exception.

For the analysis of acid volatile sulfide, a recovery of 73.8 percent was reported for one LCS analysis and is below the lower project-established control limit of 75 percent. No action was taken for this exceedance because the recoveries reported for the associated matrix spike analysis (92 percent recovery) and standard reference material sample (92 percent recovery) in the affected data set were acceptable, which are more representative of the accuracy of the natural sample than is the analysis of an LCS.

Internal Standard Performance

Criteria for retention time and area count were met of all applicable internal standards added to all samples analyzed for organic target analytes.

Precision

The results reported by the laboratory for duplicate analyses and applicable triplicate analyses and the frequency of analysis met the criteria for acceptable performance, with the following exceptions:

- For the duplicate sample analysis of total solids conducted on Sample SR-S2-SC-F-3, a relative percent difference (RPD) of 21 percent was reported and is above the project-established control limit of 20 percent. No data were qualified because the control limit was only slightly exceeded.
- For the duplicate matrix spike analyses conducted for TOC on Sample SR-20-SS-F, an RPD of 52 percent was reported and is above the upper project-established control limit of 20 percent. No data were qualified for this exceedance because the RPDs reported for the analysis of all natural duplicate samples were in control and this exceedance may be due to incorrect spiking technique at the laboratory.
- Some of the RPDs between the duplicate results reported for the PCB congener analysis of Sample SR-S5-SC-F-4 were between 50 to 70 percent and above the project-established control limit of 50 percent. The laboratory case narrative stated that the congener patterns observed, and the physical appearance of the sample strongly suggested an inhomogeneous sample. Additionally, a high degree of precision for some PCB congeners was also observed for the analysis of field duplicate analysis of Sample SR-S3-SC-F-3 taken from separate containers. No data were qualified for these elevated RPDs because other duplicate data were in control, and that it appears that the duplicate results are very sample dependent and is not indicative of poor laboratory performance. In addition, elevated RPDs

are expected when concentrations of the target analytes are near the detection limits; therefore, any slight variability will result in an elevated RPD.

TARGET ANALYE IDENTIFICATION

All criteria for the identification of target analytes reported as detected or undetected, as specified in the applicable analytical methods, were met. Complete details of target analyte identifications are presented in the attached data review summaries.

In some instances some results reported for the analysis of PCB congeners by low resolution gas chromatography/mass spectrometry were flagged 'NDR' by the laboratory to indicate that the ion ratios failed method-specific criteria. None of these results were additionally qualified during the data review because other identification criteria were met, such as retention times and the actual presence of the appropriate ions.

For the analysis of organochlorine pesticides and PCBs, some target pesticides were reported as detected in one sample. Although method-specific criteria for identification of these pesticides were met, their identifications may be due to co-elution with specific PCB congeners eluting at the same retention time (or within the same retention time window). In addition, further evidence that the pesticides reported as detected in the one sample may be the result of co-elution with PCB congeners is that pesticides were not reported as detected in any other sample.

METHOD DETECTION LIMITS AND METHOD REPORTING LIMITS

The method detection limits (MDLs) and method reporting limits (MRLs) used by the laboratories met project DQOs; however, in some instances elevated MDLs/MRLs were reported for some samples and target analytes. Elevated MDLs/MRLs were reported because dilutions were necessary to conduct the analyses because elevated concentrations of target analytes, matrix interferences present in the samples, or both, prevented reliable identification and quantification of the target analytes. Complete details of MDLs/MRLs are presented in the attached data review summaries.

For the analysis of PAHs, the laboratory reported both detection limits (DLs) and practical quantification limits (PQLs). All results were reported down to the DL if not detected. When an analyte was detected, but present at a concentration above the DL, but less than the PQL, the laboratory assigned a *J* qualifier to indicate there is a greater degree of uncertainty associated with this result than with results reported at a concentration above the PQL.

For the analysis of organochlorine pesticides and PCBs, the laboratory also reported both detection limits (DLs) and reporting limits (i.e., practical quantification limits). All results were reported down to the DL if not detected; however, in some instances, the DLs were elevated for some of the target pesticides. These elevated DLs were reported when PCBs (primarily A1242 and A1254) were reported as detected in the affected samples.

FIELD QUALITY CONTROL SAMPLES

The results for all field quality control samples were acceptable. The field quality control samples included equipment rinsate blanks, filter wipes, and multiple sets of field duplicate samples.

No target analytes were detected in any equipment rinsate blank or filter blank at a concentration that would result in qualification of the sample data.

The field duplicates collected are co-located samples. They provide information regarding variability in analyte concentration in the area from which they were collected and are not used to assess laboratory precision. The results of the co-located samples were acceptable.

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QUALITY ASSURANCE REVIEW SUMMARY–
CHEMICAL ANALYSES OF FISH TISSUE SAMPLES

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QUALITY ASSURANCE REVIEW SUMMARY—CHEMICAL ANALYSES OF FISH SAMPLES

INTRODUCTION

This report documents the results of a quality assurance review of data reported for chemical analyses conducted on fish tissue samples and associated field quality control samples collected in support of the Sheboygan River and Harbor project conducted by EVS Consultants (Seattle, Washington). The results of the quality assurance review are presented herein. The chemical analyses completed included the analysis of polychlorinated dibenzo-*p*-dioxins and polychlorinated dibenzofurans (PCDDs/Fs), polychlorinated biphenyl (PCB) congeners, percent lipids, and moisture content. The chemical analyses were conducted by Axys Analytical Services, Ltd. (Sidney, British Columbia, Canada.

The quality assurance review was conducted to verify that the laboratory quality assurance and quality control (QA/QC) procedures were documented and that the quality of the data is sufficient to meet the project DQOs and support the use of the data for its intended purposes. Data validation procedures and qualifier assignments were generally based on U.S. Environmental Protection Agency (EPA) contract laboratory program national functional guidelines for dioxin/furan data validation (U.S. EPA 1993), U.S. Environmental Protection Agency (EPA) contract laboratory program national functional guidelines organic data review (U.S. EPA 1994), or specific quality control criteria specified in the applicable analytical methods used to complete the chemical analyses, as applicable. Modifications of data validation procedures were made, as appropriate, to accommodate project-specific DQOs and quality control requirements for methods not specifically addressed by the national functional guidelines documents. The data validation review summaries are included as attachments after this report and the sediment data report.

A summary of the data quality objectives (DQOs) established for the chemical analyses completed and the analytical methods used are provided in the quality assurance project plan (QAPP) and applicable laboratory statements of work prepared by EVS Consultants.

DATA VALIDATION PROCEDURES

Data validation was completed to a slightly modified version of EPA Level 2 specifications (U.S. EPA 1995 and PSEP 1991). The level-of-effort included completing a 10 percent review data and calculation checks for all calibration and quality control data, compound quantification and identification; verification of 100 percent of transcriptions; and, a 10 percent calculation checks of positive identifications reported by the laboratories. The following laboratory deliverables were reviewed during the data validation process:

- Chain-of-custody documentation to verify completeness of the data
- The case narrative discussing analytical problems (if any) and procedures
- Sample preparation logs or data summary sheets to verify analytical holding times
- Instrument tuning, instrument calibration, and calibration blank results to assess instrument performance
- Results of all applicable method blanks associated with each sample delivery group (SDG) to check for laboratory contamination
- Results for all applicable laboratory quality control check samples including surrogate compounds, laboratory control samples (LCSs), matrix spikes, and internal standards to check analytical accuracy
- Results for all applicable laboratory duplicate sample analyses to check analytical precision
- Applicable mass spectra, chromatograms, and instrument printouts to confirm the reporting of target analytes as detected on undetected were correct
- Applicable instrument and method detection limits for all target analytes.

In addition, results for all applicable field quality control samples (i.e., field duplicate samples) were reviewed. These results provide additional information in support of the quality assurance review (see *Field Quality Control* section for details).

SAMPLE DELIVERY GROUPS

The sample delivery groups (SDGs) contained all documentation and data necessary to conduct the level of effort required to complete the quality assurance review.

DATA QUALITY ASSESSMENT

The results of the quality control procedures used during sample analysis are discussed below. The laboratory data were evaluated in terms of completeness, holding times, instrument performance, accuracy, precision, method reporting limits, and field quality control samples. During the quality assurance review, no data were qualified as estimated (*J*) and no data were rejected.

COMPLETENESS

The results reported by the laboratory were 100 percent complete. No data were rejected during the quality assurance review.

HOLDING TIMES AND SAMPLE PRESERVATION

The analytical holding time constraints and sample preservation requirements specified in QAPP were met for all samples and analyses.

INSTRUMENT PERFORMANCE

The performance of the analytical instruments, as documented by the laboratory, was acceptable. No changes in instrument performance that would have resulted in the degradation of data quality were indicated during any analysis sequence.

Initial and Continuing Calibration

Initial and continuing calibrations were completed for all applicable target analytes and met the criteria for acceptable performance and frequency of analysis. Complete details of all calibration data are presented in the attached data review summaries.

Initial and Continuing Calibration Blanks

The initial and continuing calibration blank (ICB and CCB) analyses were completed for all applicable target analytes and met the criteria for acceptable performance. No target analytes were detected in any applicable ICBs and CCBs at a concentration above the applicable action limits that would have resulted in qualification of data. Complete details of all calibration blank data are presented in the attached data review summaries.

Method Blank and Grinder Proof Blanks

No target analytes were detected in any applicable method blank or grinder proof blank (i.e., an equipment rinsate blank of the grinder used to homogenize the fish tissue samples) at a concentration above applicable action limits specified by the analytical methods. Some PCB congeners were detected in a few of the method blanks; however, no data required qualification. Complete details of all method data blanks are presented in the attached data review summaries.

ACCURACY

The accuracy of the analytical results is evaluated in the following sections in terms of analytical bias (surrogate compound, matrix spike, LCS recoveries, and internal standards) and precision (duplicate sample analyses). Complete details of all surrogate compound, matrix spike, LCS recoveries, internal standards data, and duplicate or triplicate analytical data are presented in the attached data review summaries.

Surrogate Compound Recoveries

The recoveries reported by the laboratory for the applicable surrogate compounds added to all field and quality control samples met the criteria for acceptable performance.

Matrix Spike Recoveries

The recoveries reported by the laboratory for the matrix spike analyses conducted for the low resolution PCB congener analyses and the frequency of analysis met the criteria for acceptable performance, with the following exception. A recovery of 68 percent was reported for PCB 31/28) and is slightly below the project-established lower control limit of 70 percent. No data required qualification because the concentration of PCB 31/28 in the natural sample was at a much greater concentration (180 ng/g) than the amount spiked (7.6 ng/kg) in to the sample.

Matrix spike analyses were not conducted for the analysis of PCDDs/Fs or for the HRGC/HRMS PCB congener analyses nor are they required. The lack of matrix spike data does not affect the overall quality of the data set because the analytical method are an isotope dilution technique, and as such each sample is essentially a "matrix spike" (i.e., isotopically labeled surrogate compounds and internal standards are added to each sample).

Laboratory Control Sample Recoveries

The recoveries reported by the laboratory for all applicable LCS analyses (i.e. reference material samples and ongoing precision and recovery samples) and the frequency of analysis met the criteria for acceptable performance. Analyses of ongoing precision and recovery (OPR) samples, as specified by EPA Method 1613B, was completed with each set of analyses. The OPR sample analyses are laboratory blanks spiked with known concentrations of target analytes. The OPRs are processed and analyzed exactly like the samples to assess the adequacy of laboratory performance in the absence of potential matrix effects/interferences.

Internal Standard Performance

Criteria for retention time and area count were met of all applicable internal standards added to all samples analyzed for organic target analytes.

Precision

The results reported by the laboratory for duplicate analyses and the frequency of analysis met the criteria for acceptable performance.

Some of the relative percent differences (RPDs) between the duplicate results reported for the PCB congener analyses were above the project-established control limit of 50 percent. No data were qualified for these elevated RPDs because elevated RPDs are expected when concentrations of the target analytes are near the detection limits and any slight variability will result in elevated RPDs.

For the analysis of PCDDs/Fs, Sample SR-S2-FT-F3 was analyzed in duplicate. The ±50 RPD project-specific control limit was met, with five exceptions. Elevated RPDs were reported for 1,2,3,4,6,7,8-HpCDD (124 RPD); OCDD (132 RPD); 1,2,3,4,6,7,8-HpCDF (93 RPD); Total Hepta Dioxins (110 RPD); and, Total Hepta Furans (69 RPD). No sample results were qualified on the basis of these duplicate sample results because the concentrations of the affected PCDDs/Fs were very low and are well below the routine reporting limits specified by the analytical method. These elevated RPDs are not unusual because any slight change of concentrations when near the detection limits will result in elevated RPDs.

TARGET ANALYE IDENTIFICATION

All criteria for the identification of target analytes reported as detected or undetected, as specified in the applicable analytical methods, were met. Complete details of target analyte identifications are presented in the attached data review summaries.

In some instances some results reported for the analysis of PCB congeners by low resolution gas chromatography/mass spectrometry were flagged 'NDR' by the laboratory to indicate that the ion ratios failed method-specific criteria. None of these results were additionally qualified during the data review because other identification criteria were met, such as retention times and the actual presence of the appropriate ions.

METHOD DETECTION LIMITS AND METHOD REPORTING LIMITS

The method detection limits (MDLs) and method reporting limits (MRLs) used by the laboratories met project DQOs; however, in some instances elevated MDLs/MRLs were reported for some samples and target analytes. Elevated MDLs/MRLs were reported because dilutions were necessary to conduct the analyses because elevated concentrations of target analytes, matrix interferences present in the samples, or both, prevented reliable identification and quantification of the target analytes. Complete details of MDLs/MRLs are presented in the attached data review summaries.

FIELD QUALITY CONTROL SAMPLES

No field quality control samples are known to be associated with the analysis of the fish tissue samples.

REFERENCES

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U.S. EPA. 1995. QA/QC guidance for sampling and analysis of sediments, water, and tissues for dredged material evaluations–chemical evaluations. EPA 823-B-95-001. April, 1995. Office of Water, Office of Science and Technology, Standards and Applied Science Division, U.S. Environmental Protection Agency, Washington, DC.

APPENDIX A-3

WDNR Food Chain Study Results

LIST OF TABLES

Table A3-1. Continued

Station	Sample	Location	PCB019 (ug/kg) Conc	Q	PCB022 (ug/kg) Conc	Q	PCB024/027 (ug/kg) Conc	Q	PCB026 (ug/kg) Conc	Q	PCB031/028 (ug/kg) Conc	Q	PCB033 (ug/kg) Conc	Q
603363	6A	Camp Marina	7.5		12		14		33		150		21	U*I
603364	6B	Camp Marina	11		13		18		44		160		34	U*I
603365	6C	Camp Marina	6.8		15		17		38		180		25	U*I
603366	6D	Camp Marina	8.7		14		15		34		160		23	U*I
603367	6E	Camp Marina	5.9		7.9		8.3		27		98		16	U*I
603368	5A	Kiwanis Park	7		19		20		49		200		30	U*I
603369	5B	Kiwanis Park	8.4		17		16		47		210		32	U*I
603370	5C	Kiwanis Park	3.9		8.2		6.5		18		110		12	U*I
603371	5D	Kiwanis Park	6.2		14		11		29		150		20	U*I
603372	3A	Between Kohler Dams	21		20		33		50		240		42	U*I
603373	3B	Between Kohler Dams	24		27		30		73		220		43	U*I
603374	3C	Between Kohler Dams	21		16		27		42		180		31	U*I
603375	3D	Between Kohler Dams	71		26		81		99		320		71	U*I
603376	3E	Between Kohler Dams	51		35		57		98		370		64	U*I
603377	2A	Rochester Park	30		23		32		47		210		37	U*I
603378	2B	Rochester Park	43		65		44		100		470		74	U*I
603379	2C	Rochester Park	46		26		50		63		330		51	U*I
603380	2D	Rochester Park	270		89		280		300		1500		190	U*I
603381	2E	Rochester Park	46		160		45		190		820		160	U*I
603392	1A	Control	0.3	U	0.6	U	0.3	U	0.35	U	1.4	U	0.45	U
603393	1B	Control	0.3	U	0.6	U	0.3	U	0.35	U	1.4	U	0.45	U
603394	1C	Control	0.3	U	0.6	U	0.3	U	0.35	U	1.4	U	0.45	U
603395	1D	Control	0.3	U	0.6	U	0.3	U	0.35	U	1.4	U	0.45	U
603396	1E	Control	0.3	U	0.6	U	0.3	U	0.35	U	1.4	U	0.45	U

Table A3-1. Continued

Station	Sample	Location	PCB037/042 (ug/kg) Conc	Q	PCB040 (ug/kg) Conc	Q	PCB041/071/006 (ug/kg) Conc	Q	PCB044 (ug/kg) Conc	Q	PCB045 (ug/kg) Conc	Q	PCB046 (ug/kg) Conc	Q
603363	6A	Camp Marina	32		7.3		60		45		6.2		2.4	
603364	6B	Camp Marina	36		8.8		64		52		6.9		5.9	
603365	6C	Camp Marina	36		9.9		76		58		8.1		3.4	
603366	6D	Camp Marina	34		9.5		72		56		7.8		3.4	
603367	6E	Camp Marina	22		5.6		40		32		4.3		2.4	
603368	5A	Kiwanis Park	43		11		87		62		8.5		3.8	
603369	5B	Kiwanis Park	44		12		83		64		8.8		4.9	
603370	5C	Kiwanis Park	19		5.2		45		35		4.4		1.6	
603371	5D	Kiwanis Park	33		8.8		74		59		7.4		2.8	
603372	3A	Between Kohler Dams	59		16		130		100		16		5.8	
603373	3B	Between Kohler Dams	67		19		130		110		18		7.2	
603374	3C	Between Kohler Dams	37		9.9		78		54		11		4.5	
603375	3D	Between Kohler Dams	74		19		160		110		27		8.4	
603376	3E	Between Kohler Dams	84		25		180		140		29		9.6	
603377	2A	Rochester Park	49		16		110		87		17		6.1	
603378	2B	Rochester Park	110		39		250		200		38		15	
603379	2C	Rochester Park	56		18		120		98		20		6.6	
603380	2D	Rochester Park	220		57		510		340		92		30	
603381	2E	Rochester Park	250		100		530		500		84		41	
603392	1A	Control	0.4	U	0.3	U	0.5	U	0.3	U	0.3	U	0.35	U
603393	1B	Control	0.4	U	0.3	U	0.5	U	0.3	U	0.3	U	0.35	U
603394	1C	Control	0.4	U	0.3	U	0.5	U	0.3	U	0.3	U	0.35	U
603395	1D	Control	0.4	U	0.3	U	0.5	U	0.3	U	0.3	U	0.44	U*I
603396	1E	Control	0.4	U	0.3	U	0.5	U	0.3	U	0.3	U	0.35	U

Table A3-1. Continued

Station	Sample	Location	PCB047/048 (ug/kg) Conc	Q	PCB049 (ug/kg) Conc	Q	PCB052 (ug/kg) Conc	Q	PCB056/060 (ug/kg) Conc	Q	PCB066/095 (ug/kg) Conc	Q	PCB070/076 (ug/kg) Conc	Q
603363	6A	Camp Marina	120		57		62		48		100		63	
603364	6B	Camp Marina	160		73		74		42		92		60	
603365	6C	Camp Marina	130		65		73		56		120		78	
603366	6D	Camp Marina	130		62		69		54		120		75	
603367	6E	Camp Marina	74		41		45		30		64		42	
603368	5A	Kiwanis Park	160		77		84		62		130		83	
603369	5B	Kiwanis Park	150		85		87		56		130		82	
603370	5C	Kiwanis Park	67		36		42		38		78		53	
603371	5D	Kiwanis Park	110		57		69		60		120		80	
603372	3A	Between Kohler Dams	250		110		120		92		200		110	
603373	3B	Between Kohler Dams	220		110		140		71		160		91	
603374	3C	Between Kohler Dams	170		67		73		43		98		57	
603375	3D	Between Kohler Dams	410		150		150		76		230		100	
603376	3E	Between Kohler Dams	370		150		170		94		250		130	
603377	2A	Rochester Park	200		86		99		70		150		98	
603378	2B	Rochester Park	340		180		210		160		320		200	
603379	2C	Rochester Park	250		100		110		69		150		100	
603380	2D	Rochester Park	1300		430		480		200		780		280	
603381	2E	Rochester Park	500		360		480		350		700		550	
603392	1A	Control	0.5	U	0.3	U	0.3	U	0.8	U	0.6	U	0.45	U
603393	1B	Control	0.5	U	0.3	U	0.3	U	0.8	U	0.7		0.53	
603394	1C	Control	0.5	U	0.3	U	0.3	U	0.8	U	0.71	U*I	0.53	U*I
603395	1D	Control	0.5	U	0.3	U	0.38	U*I	0.8	U	0.88		0.89	U*I
603396	1E	Control	0.5	U	0.3	U	0.3	U	0.8	U	0.81		0.9	U*I

Table A3-1. Continued

Station	Sample	Location	PCB074 (ug/kg) Conc	Q	PCB077 (ug/kg) Conc	Q	PCB077/110 (ug/kg) Conc	Q	PCB082 (ug/kg) Conc	Q	PCB084/092 (ug/kg) Conc	Q	PCB085 (ug/kg) Conc	Q
603363	6A	Camp Marina	31		5.8		92		8.2		42		10	
603364	6B	Camp Marina	29		5.6		93		7.3		44		8.3	
603365	6C	Camp Marina	39		8		110		10		52		12	
603366	6D	Camp Marina	36		7.9		100		10		50		12	
603367	6E	Camp Marina	20		4		59		5		27		6.9	
603368	5A	Kiwanis Park	44		7.3		120		11		57		12	
603369	5B	Kiwanis Park	40		7.5		120		10		60		15	
603370	5C	Kiwanis Park	25		4.6		69		6.8		30		10	
603371	5D	Kiwanis Park	39		6.2		98		9.9		47		15	
603372	3A	Between Kohler Dams	61		10		190		18		99		30	
603373	3B	Between Kohler Dams	51		8.6		170		14		94		22	
603374	3C	Between Kohler Dams	35		5.2		100		7.6		52		11	
603375	3D	Between Kohler Dams	57		9		210		13		110		18	
603376	3E	Between Kohler Dams	69		9.8		230		16		130		26	
603377	2A	Rochester Park	47		7		130		12		75		22	
603378	2B	Rochester Park	110		15		280		29		160		52	
603379	2C	Rochester Park	51		7.3		150		11		79		20	
603380	2D	Rochester Park	180		27		720		46		390		79	
603381	2E	Rochester Park	220		30		590		69		350		120	
603392	1A	Control	0.85	U*I	0.2	U	0.53		0.3	U	0.7	U	0.76	U*I
603393	1B	Control	0.65	U*I	0.2	U	0.82		0.3	U	0.7	U	0.79	U*I
603394	1C	Control	0.95	U*I	0.2	U	0.68		0.3	U	0.7	U	0.65	U*I
603395	1D	Control	0.86	U*I	0.2	U	1.2		0.3	U	0.7	U	1.3	U*I
603396	1E	Control	0.54	U*I	0.2	U	1		0.3	U	0.7	U	1.1	U*I

Table A3-1. Continued

Station	Sample	Location	PCB087 (ug/kg) Conc	Q	PCB091 (ug/kg) Conc	Q	PCB097 (ug/kg) Conc	Q	PCB099 (ug/kg) Conc	Q	PCB101 (ug/kg) Conc	Q	PCB105 (ug/kg) Conc	Q
603363	6A	Camp Marina	23		24		18		26		38		24	
603364	6B	Camp Marina	18		34		16		23		39		19	
603365	6C	Camp Marina	28		28		22		31		45		30	
603366	6D	Camp Marina	27		27		21		29		44		29	
603367	6E	Camp Marina	14		16		11		15		23		15	
603368	5A	Kiwanis Park	30		32		23		33		47		34	
603369	5B	Kiwanis Park	28		33		23		32		48		30	
603370	5C	Kiwanis Park	20		15		14		19		29		20	
603371	5D	Kiwanis Park	28		24		21		28		41		29	
603372	3A	Between Kohler Dams	48		52		39		53		79		47	
603373	3B	Between Kohler Dams	38		48		33		45		65		34	
603374	3C	Between Kohler Dams	21		32		19		27		40		19	
603375	3D	Between Kohler Dams	37		75		37		55		85		33	
603376	3E	Between Kohler Dams	45		72		44		62		94		37	
603377	2A	Rochester Park	34		39		29		39		57		29	
603378	2B	Rochester Park	81		74		65		79		120		66	
603379	2C	Rochester Park	31		42		29		40		59		25	
603380	2D	Rochester Park	140		230		140		210		300		100	
603381	2E	Rochester Park	210		140		150		170		280		160	
603392	1A	Control	0.62		0.4	U	0.3	U	0.32	U*I	0.3	U	0.2	U
603393	1B	Control	0.63		0.4	U	0.3	U	0.3	U	0.3	U	0.23	
603394	1C	Control	0.63		0.4	U	0.3	U	0.36	U*I	0.3	U	0.2	U
603395	1D	Control	0.69		0.4	U	0.3	U	0.7	U*I	0.3	U	0.34	
603396	1E	Control	0.7		0.4	U	0.3	U	0.61	U*I	0.3	U	0.28	

Table A3-1. Continued

Station	Sample	Location	PCB118 (ug/kg) Conc	Q	PCB123 (ug/kg) Conc	Q	PCB126 (ug/kg) Conc	Q	PCB128 (ug/kg) Conc	Q	PCB132/153 (ug/kg) Conc	Q	PCB136 (ug/kg) Conc	Q
603363	6A	Camp Marina	45		2.3	U*I	0.26		6.3		35		1.9	
603364	6B	Camp Marina	39		2	U*I	0.2	U	5.6		34		2.1	
603365	6C	Camp Marina	55		2.6	U*I	0.41	U*I	8		42		2	
603366	6D	Camp Marina	53		2.9	U*I	0.3	U*I	8		42		2.1	
603367	6E	Camp Marina	26		2.6	U*I	0.2	U	3.7		21		1.3	
603368	5A	Kiwanis Park	59		3	U*I	0.2	U	8.7		44		2.1	
603369	5B	Kiwanis Park	55		3	U*I	0.23	U*I	8.6		44		3.2	
603370	5C	Kiwanis Park	35		1.1	U*I	0.2	U	5.1		26		1.5	
603371	5D	Kiwanis Park	48		1.4	U*I	0.2	U	6.8		35		2.2	
603372	3A	Between Kohler Dams	89		3.3	U*I	0.27		13		76		6	
603373	3B	Between Kohler Dams	68		2.5	U*I	0.36	U*I	11		62		5.6	
603374	3C	Between Kohler Dams	40		3.5	U*I	0.23	U*I	5.9		42		3	
603375	3D	Between Kohler Dams	79		4.7	U*I	0.2	U	12		86		7.7	
603376	3E	Between Kohler Dams	88		4.9	U*I	0.35	U*I	14		92		8.6	
603377	2A	Rochester Park	59		2.3	U*I	0.26	U*I	8.7		51		4.7	
603378	2B	Rochester Park	120		3.3	U*I	0.6	U*I	17		89		8.6	
603379	2C	Rochester Park	60		2.7	U*I	0.22	U*I	8.4		52		4.6	
603380	2D	Rochester Park	290		15	U*I	1.2	U*I	47		330		31	
603381	2E	Rochester Park	290		9	U*I	0.65	U*I	47		220		20	
603392	1A	Control	0.45	U	0.2	U	0.22	U	0.5	U	0.56		0.38	U*I
603393	1B	Control	0.54		0.2	U	0.2	U	0.5	U	0.82		0.4	U*I
603394	1C	Control	0.46		0.2	U	0.2	U	0.5	U	0.71		0.32	U*I
603395	1D	Control	0.82		0.2	U	0.2	U	0.5	U	1.3		0.64	U*I
603396	1E	Control	0.76		0.2	U	0.2	U	0.5	U	1.2		0.55	U*I

Table A3-1. Continued

Station	Sample	Location	PCB137/176 (ug/kg) Conc	Q	PCB138/163 (ug/kg) Conc	Q	PCB141 (ug/kg) Conc	Q	PCB144/135 (ug/kg) Conc	Q	PCB146 (ug/kg) Conc	Q	PCB149 (ug/kg) Conc	Q
603363	6A	Camp Marina	2.2	U*I	39		4.2	U	5.6		6.8		23	
603364	6B	Camp Marina	2	U*I	39		4	U*I	6.7		8.5		24	
603365	6C	Camp Marina	2.7	U*I	48		5.3	U*I	6.8		8.4		27	
603366	6D	Camp Marina	2.7	U*I	47		5.3	U*I	6.5		8.3		27	
603367	6E	Camp Marina	1.4	U*I	23		2.6	U*I	3.1		3.7		13	
603368	5A	Kiwanis Park	3	U*I	52		5.6	U*I	7.3		9		29	
603369	5B	Kiwanis Park			50		5.4	U*I	7.5		8.8		30	
603370	5C	Kiwanis Park	1.9	U*I	31		3.5	U*I	3.7		4.7		16	
603371	5D	Kiwanis Park	3.4	U*I	41		4.8	U*I	5.4		6.7		23	
603372	3A	Between Kohler Dams	4.7	U*I	83		9.1	U*I	13		15		51	
603373	3B	Between Kohler Dams			66		7.6	U*I	11		13		42	
603374	3C	Between Kohler Dams	2.2	U*I	40		4.1	U*I	7.4		9.2		28	
603375	3D	Between Kohler Dams			82		8.2	U*I	18		20		63	
603376	3E	Between Kohler Dams			90		9	U*I	18		21		64	
603377	2A	Rochester Park			53		6.1	U*I	9.1		11		33	
603378	2B	Rochester Park			100		13	U*I	14		17		57	
603379	2C	Rochester Park			50		5.5	U*I	9		11		34	
603380	2D	Rochester Park			290		33	U*I	57		70		200	
603381	2E	Rochester Park			260		36	U*I	31		39		130	
603392	1A	Control	0.3	U	0.57		0.3	U	0.3	U	0.35	U	0.3	U
603393	1B	Control	0.45	U*I	0.86		0.3	U	0.3	U	0.35	U	0.33	
603394	1C	Control	0.39	U*I	0.74		0.3	U	0.3	U	0.35	U	0.3	U
603395	1D	Control	0.3	U*I	1.4		0.3	U	0.3	U	0.35	U	0.5	
603396	1E	Control	0.3	U	1.3		0.3	U	0.3	U	0.35	U	0.48	

Table A3-1. Continued

Station	Sample	Location	PCB151 (ug/kg) Conc	Q	PCB156 (ug/kg) Conc	Q	PCB157 (ug/kg) Conc	Q	PCB167 (ug/kg) Conc	Q	PCB169 (ug/kg) Conc	Q	PCB170/190 (ug/kg) Conc	Q
603363	6A	Camp Marina	6		4.1		1.1		1.4		0.2	U	8.4	
603364	6B	Camp Marina	8		3.2		0.93		1.2		0.2	U	12	
603365	6C	Camp Marina	7.2		4.6		1.4		1.7		0.2	U	10	
603366	6D	Camp Marina	7.1		4.5		1.3		1.7		0.2	U	9.9	
603367	6E	Camp Marina	3.5		2.3		0.69		0.85		0.2	U	5.2	
603368	5A	Kiwanis Park	7.8		5.3		1.4		1.9		0.2	U	11	
603369	5B	Kiwanis Park	8		4.9		1.5		1.8		0.2	U	11	
603370	5C	Kiwanis Park	3.9		3		0.92		1		0.2	U	5.7	
603371	5D	Kiwanis Park	5.9		3.9		1.2		1.4		0.2	U	8.2	
603372	3A	Between Kohler Dams	13		7.9		2.3		2.8		0.2	U	18	
603373	3B	Between Kohler Dams	12		6.7		2		2.4		0.2	U	15	
603374	3C	Between Kohler Dams	7.5		3.5		1.1		1.3		0.2	U	10	
603375	3D	Between Kohler Dams	18		7.1		2.2		2.7		0.2	U	19	
603376	3E	Between Kohler Dams	18		7.9		2.3		2.8		0.25	U*D	19	
603377	2A	Rochester Park	9		5		1.6		1.9		0.2	U	11	
603378	2B	Rochester Park	15		10		3		3.5		0.27	U*D	21	
603379	2C	Rochester Park	9.2		4.5		1.3		1.8		0.2	U	11	
603380	2D	Rochester Park	56		26		8		9.8		0.64	U*D	63	
603381	2E	Rochester Park	33		27		8.1		9.3		0.5	U*D	48	
603392	1A	Control	0.3	U	0.2	U	0.2	U	0.5	U	0.2	U	0.7	U
603393	1B	Control	0.3	U	0.2	U	0.2	U	0.5	U	0.2	U	0.7	U
603394	1C	Control	0.3	U	0.2	U	0.2	U	0.5	U	0.2	U	0.7	U
603395	1D	Control	0.3	U	0.2	U	0.2	U	0.5	U	0.2	U	0.7	U
603396	1E	Control	0.3	U	0.2	U	0.2	U	0.5	U	0.2	U	0.7	U

Table A3-1. Continued

Station	Sample	Location	PCB171/202 (ug/kg) Conc	Q	PCB172/197 (ug/kg) Conc	Q	PCB174 (ug/kg) Conc	Q	PCB177 (ug/kg) Conc	Q	PCB178 (ug/kg) Conc	Q	PCB180 (ug/kg) Conc	Q
603363	6A	Camp Marina	1.1		1.1		3		2.9		1.1		7.5	
603364	6B	Camp Marina	2		2		3.9		4.7		2.8		12	
603365	6C	Camp Marina	1.4	U*I	1.3		3.4		3.6		1.3		8.2	
603366	6D	Camp Marina	1.4	U*I	1.3		2.8		3.2		1.4		8.1	
603367	6E	Camp Marina	0.74				1.9		1.6		0.64		4.6	
603368	5A	Kiwanis Park	1.4		1.4		3.5		3.6		1.5		9	
603369	5B	Kiwanis Park	1.4	U*I	1.3		2.5	U*I	3.4		1.5		8.7	
603370	5C	Kiwanis Park					1.9		1.7		0.63		4.6	
603371	5D	Kiwanis Park	0.96		1		2.7		2.5		0.92		6.6	
603372	3A	Between Kohler Dams	2.4		2.2		5.9		6.5		2.4		14	
603373	3B	Between Kohler Dams	1.9		1.9		4.7		5.2		2.1		12	
603374	3C	Between Kohler Dams	1.4		1.3		3		3.7		1.5		8	
603375	3D	Between Kohler Dams	2.9		2.5		4.9		8.2		3.7		15	
603376	3E	Between Kohler Dams	2.8	U*I	2.5		4.7		5.9		3.6		16	
603377	2A	Rochester Park	1.7	U*I	1.6		3.8		4.3		1.8		10	
603378	2B	Rochester Park	2.9	U*I	2.6		7.3		7.1		2.4		17	
603379	2C	Rochester Park	1.6	U*I	1.4		3.6	U*I	3.9		2		9.1	
603380	2D	Rochester Park	7.2		7.6		19		22		8.2		45	
603381	2E	Rochester Park	6.1		5.9		16		13		4.1		38	
603392	1A	Control	0.3	U	0.5	U	0.3	U	0.35	U	0.4	U	0.35	U
603393	1B	Control	0.3	U	0.5	U	0.3	U	0.35	U	0.4	U	0.35	U
603394	1C	Control	0.3	U	0.5	U	0.3	U	0.35	U	0.4	U	0.35	U
603395	1D	Control	0.3	U	0.5	U	0.3	U	0.35	U	0.4	U	0.35	U
603396	1E	Control	0.3	U	0.5	U	0.3	U	0.35	U	0.4	U	0.35	U

Table A3-1. Continued

Station	Sample	Location	PCB183 (ug/kg) Conc	Q	PCB185 (ug/kg) Conc	Q	PCB187/182 (ug/kg) Conc	Q	PCB194 (ug/kg) Conc	Q	PCB195/208 (ug/kg) Conc	Q	PCB196/203 (ug/kg) Conc	Q
603363	6A	Camp Marina	2.3				3		1.5		1.7		2.5	
603364	6B	Camp Marina	3.5				6.8		5.2		5.1		7.7	
603365	6C	Camp Marina	2.7				2.8		1.5		1.9		2.6	
603366	6D	Camp Marina	2.8				2.6		1.4		1.7		2.5	
603367	6E	Camp Marina	1.4				2		0.95				1.6	
603368	5A	Kiwanis Park	2.8				3.8		1.6		2		2.8	
603369	5B	Kiwanis Park	2.9				3.8		1.4		1.7		2.4	
603370	5C	Kiwanis Park	1.5				2.1		0.69					
603371	5D	Kiwanis Park	2.1				3.3		1		1.4		1.8	
603372	3A	Between Kohler Dams	4.7				5		2.8		3.2		4.6	
603373	3B	Between Kohler Dams	4		0.58		5.5		2.2		2.6		3.8	
603374	3C	Between Kohler Dams	2.6				4		1.6		1.9		2.8	
603375	3D	Between Kohler Dams	5.2				8.6		3.3		3.6		5.8	
603376	3E	Between Kohler Dams	5.4				5.1		2.9		3.5		5	
603377	2A	Rochester Park	3.3				2.9		1.9		2.2		3.3	
603378	2B	Rochester Park	5.8				7.4		3		3.6		5.1	
603379	2C	Rochester Park	3.1				2.4	U*I	1.6		2		2.6	
603380	2D	Rochester Park	16				28		6.4		7.8		12	
603381	2E	Rochester Park	13				16		4.4		5.3	U*I	8	
603392	1A	Control	0.4	U	0.3	U	0.4	U	0.5	U	0.7	U	0.7	U
603393	1B	Control	0.4	U	0.3	U	0.4	U	0.5	U	0.7	U	0.7	U
603394	1C	Control	0.4	U	0.3	U	0.53	U*I	0.5	U	0.7	U	0.7	U
603395	1D	Control	0.4	U	0.3	U	0.4	U	0.5	U	0.7	U	0.7	U
603396	1E	Control	0.4	U	0.3	U	0.4	U	0.5	U	0.7	U	0.7	U

Table A3-1. Continued

Station	Sample	Location	PCB199 (ug/kg) Conc	Q	PCB201 (ug/kg) Conc	Q	PCB206 (ug/kg) Conc	Q
603363	6A	Camp Marina			2.2		0.84	
603364	6B	Camp Marina			6.3		2.5	
603365	6C	Camp Marina			2.2			
603366	6D	Camp Marina			2.1			
603367	6E	Camp Marina			1.4			
603368	5A	Kiwanis Park			2.5		1	
603369	5B	Kiwanis Park			2			
603370	5C	Kiwanis Park			1			
603371	5D	Kiwanis Park			1.6			
603372	3A	Between Kohler Dams			3.8		1.9	U*I
603373	3B	Between Kohler Dams			3.1		0.86	
603374	3C	Between Kohler Dams			2.3			
603375	3D	Between Kohler Dams			4.8			
603376	3E	Between Kohler Dams			4.2			
603377	2A	Rochester Park			2.8		1.1	
603378	2B	Rochester Park			4.3			
603379	2C	Rochester Park			2.5			
603380	2D	Rochester Park			9.8			
603381	2E	Rochester Park			6.2			
603392	1A	Control	0.3	U	0.5	U	0.4	U
603393	1B	Control	0.3	U	0.5	U	0.4	U
603394	1C	Control	0.3	U	0.5	U	0.4	U
603395	1D	Control	0.3	U	0.5	U	0.4	U
603396	1E	Control	0.3	U	0.5	U	0.4	U

Table A3-2. Results of the PAH analyses of sediment samples collected for the WDNR food chain study

Station	Sample	Location	Organic carbon, total (mg/kg) Conc	Q	Acenaphthene (ug/kg) Conc	Q	Acenaphthylene (ug/kg) Conc	Q	Anthracene (ug/kg) Conc	Q
603363	6A	Camp Marina	21300		100	U	100	U	110	
603364	6B	Camp Marina	24000							
603365	6C	Camp Marina	33200		220		100	U	240	
603365	6DUP	Camp Marina			400		110		460	
603365	6DUPPAH	Camp Marina	66500		400000		16000		330000	
603366	6D	Camp Marina	35900		220		220		300	
603367	6E	Camp Marina	9300							
603368	5A	Kiwanis Park	35100		100	U	100	U	130	
603368	5DUP	Kiwanis Park			100	U	100	U	100	U
603369	5B	Kiwanis Park	10200		100	U	100	U	100	U
603370	5C	Kiwanis Park	8740		100	U	100	U	100	U
603371	5D	Kiwanis Park	12500							
603372	3A	Between Kohler Dams	20100		100	U	100	U	100	U
603373	3B	Between Kohler Dams	20800							
603374	3C	Between Kohler Dams	10200							
603375	3D	Between Kohler Dams	30800		100	U	100	U	100	U
603375	3DUP	Between Kohler Dams			100	U	100	U	100	U
603376	3E	Between Kohler Dams	33100		100	U	100	U	100	U
603377	2A	Rochester Park	23100		100	U	100	U	100	U
603378	2B	Rochester Park	33600							
603379	2C	Rochester Park	19500		100	U	100	U	100	U
603380	2D	Rochester Park	16200		500	U*D	500	U*D	670	
603381	2E	Rochester Park	14100							
603392	1A	Control	22100							
603393	1B	Control	22600		100	U	100	U	100	U
603394	1C	Control	23200							
603395	1D	Control	40900		100	U	100	U	100	U
603396	1E	Control	34300		100	U	100	U	100	U

Table A3-2. Results of the PAH analyses of sediment samples collected for the WDNR food chain study

			Benz(a)anthracene (ug/kg)		Dibenz(a,h)anthracene (ug/kg)		Benzo(a)pyrene (ug/kg)		Benzo(b)fluoranthene (ug/kg)	
Station	Sample	Location	Conc	Q	Conc	Q	Conc	Q	Conc	Q
603363	6A	Camp Marina	420		100	U	400		440	
603364	6B	Camp Marina								
603365	6C	Camp Marina	800		100	U	600		760	
603365	6DUP	Camp Marina	1400		100	U	820		860	
603365	6DUPPAH	Camp Marina	180000		13000		210000		170000	
603366	6D	Camp Marina	1800		100	U	1000		1200	
603367	6E	Camp Marina								
603368	5A	Kiwanis Park	730		100	U	640		770	
603368	5DUP	Kiwanis Park	420		100	U	440		580	
603369	5B	Kiwanis Park	100	U	100	U	100	U	100	U
603370	5C	Kiwanis Park	100	U	100	U	100	U	100	U
603371	5D	Kiwanis Park								
603372	3A	Between Kohler Dams	100	U	100	U	100	U	100	U
603373	3B	Between Kohler Dams								
603374	3C	Between Kohler Dams								
603375	3D	Between Kohler Dams	120		100	U	110		180	
603375	3DUP	Between Kohler Dams	120		100	U	120		190	
603376	3E	Between Kohler Dams	100	U	100	U	170		100	U
603377	2A	Rochester Park	100	U	100	U	100	U	100	U
603378	2B	Rochester Park								
603379	2C	Rochester Park	100	U	100	U	100	U	130	
603380	2D	Rochester Park	1800		500	U*D	1500		2100	
603381	2E	Rochester Park								
603392	1A	Control								
603393	1B	Control	100	U	100	U	100	U	100	U
603394	1C	Control								
603395	1D	Control	100	U	100	U	100	U	100	U
603396	1E	Control	100	U	100	U	100	U	100	U

Table A3-2. Results of the PAH analyses of sediment samples collected for the WDNR food chain study

Station	Sample	Location	Benzo(e)pyrene (ug/kg) Conc	Q	Benzo(g,h,i)perylene (ug/kg) Conc	Q	Benzo(k)fluoranthene (ug/kg) Conc	Q	Chrysene (ug/kg) Conc	Q
603363	6A	Camp Marina	320		160		220		380	
603364	6B	Camp Marina								
603365	6C	Camp Marina	480		100	U	380		600	
603365	6DUP	Camp Marina	560		100	U	420		920	
603365	6DUPPAH	Camp Marina	90000		43000		67000		130000	
603366	6D	Camp Marina	790		380		480		1400	
603367	6E	Camp Marina								
603368	5A	Kiwanis Park	480		190		320		700	
603368	5DUP	Kiwanis Park	400		160		240		400	
603369	5B	Kiwanis Park	100	U	100	U	100	U	100	U
603370	5C	Kiwanis Park	100	U	100	U	100	U	100	U
603371	5D	Kiwanis Park								
603372	3A	Between Kohler Dams	100	U	100	U	100	U	100	U
603373	3B	Between Kohler Dams								
603374	3C	Between Kohler Dams								
603375	3D	Between Kohler Dams	100	U	100	U	100	U	100	
603375	3DUP	Between Kohler Dams	100	U	100	U	100	U	110	
603376	3E	Between Kohler Dams	180		100	U	100	U	130	
603377	2A	Rochester Park	100	U	100	U	100	U	100	U
603378	2B	Rochester Park								
603379	2C	Rochester Park	100	U	100	U	100	U	100	U
603380	2D	Rochester Park	1000		540		920		1600	
603381	2E	Rochester Park								
603392	1A	Control								
603393	1B	Control	100	U	100	U	100	U	100	U
603394	1C	Control								
603395	1D	Control	100	U	100	U	100	U	100	U
603396	1E	Control	100	U	100	U	100	U	100	U

Table A3-2. Results of the PAH analyses of sediment samples collected for the WDNR food chain study

Station	Sample	Location	Fluoranthene (ug/kg) Conc	Q	Fluorene (ug/kg) Conc	Q	Indeno(1,2,3-c,d)pyrene (ug/kg) Conc	Q	Perylene (ug/kg) Conc	Q
603363	6A	Camp Marina	1200		100	U	140		110	
603364	6B	Camp Marina								
603365	6C	Camp Marina	1900		170		250		170	
603365	6DUP	Camp Marina	2400		320		260		240	
603365	6DUPPAH	Camp Marina	290000		250000		56000		27000	
603366	6D	Camp Marina	2200		190		460		260	
603367	6E	Camp Marina								
603368	5A	Kiwanis Park	2400		100	U	260		150	
603368	5DUP	Kiwanis Park	1600		100	U	200		120	
603369	5B	Kiwanis Park	190		100	U	100	U	100	U
603370	5C	Kiwanis Park	130		100	U	100	U	100	U
603371	5D	Kiwanis Park								
603372	3A	Between Kohler Dams	120		100	U	100	U	100	U
603373	3B	Between Kohler Dams								
603374	3C	Between Kohler Dams								
603375	3D	Between Kohler Dams	300		100	U	100	U	100	U
603375	3DUP	Between Kohler Dams	310		100	U	100	U	100	U
603376	3E	Between Kohler Dams	240		100	U	100	U	120	
603377	2A	Rochester Park	160		100	U	100	U	100	U
603378	2B	Rochester Park								
603379	2C	Rochester Park	160		100	U	100	U	100	U
603380	2D	Rochester Park	5200		500	U*D	680		500	U*D
603381	2E	Rochester Park								
603392	1A	Control								
603393	1B	Control	100	U	100	U	100	U	100	U
603394	1C	Control								
603395	1D	Control	100	U	100	U	100	U	100	U
603396	1E	Control	100	U	100	U	100	U	100	U

Table A3-2. Results of the PAH analyses of sediment samples collected for the WDNR food chain study

Station	Sample	Location	Phenanthrene (ug/kg) Conc	Q	Pyrene (ug/kg) Conc	Q
603363	6A	Camp Marina	560		1000	
603364	6B	Camp Marina				
603365	6C	Camp Marina	1200		1900	
603365	6DUP	Camp Marina	2000		2800	
603365	6DUPPAH	Camp Marina	840000		340000	
603366	6D	Camp Marina	1300		2900	
603367	6E	Camp Marina				
603368	5A	Kiwanis Park	940		2100	
603368	5DUP	Kiwanis Park	600		1300	
603369	5B	Kiwanis Park	160		140	
603370	5C	Kiwanis Park	100	U	100	U
603371	5D	Kiwanis Park				
603372	3A	Between Kohler Dams	100	U	100	U
603373	3B	Between Kohler Dams				
603374	3C	Between Kohler Dams				
603375	3D	Between Kohler Dams	160		220	
603375	3DUP	Between Kohler Dams	180		230	
603376	3E	Between Kohler Dams	130		200	
603377	2A	Rochester Park	100	U	120	
603378	2B	Rochester Park				
603379	2C	Rochester Park	100	U	120	
603380	2D	Rochester Park	3500		4000	
603381	2E	Rochester Park				
603392	1A	Control				
603393	1B	Control	100	U	100	U
603394	1C	Control				
603395	1D	Control	100	U	100	U
603396	1E	Control	100	U	100	U

Table A3-4. Continued

Species	Age Class	Station	Sample	Location	PCB018 (µg/kg) Conc	Q	PCB019 (µg/kg) Conc	Q	PCB022 (µg/kg) Conc	Q	PCB024/027 (µg/kg) Conc	Q	PCB026 (µg/kg) Conc	Q
Crayfish		603384	9409	Control	1	U	1	U	1.2	U	1	U	0.8	U
Crayfish		603384	9410	Control	1	U	1	U	1.2	U	1	U	0.8	U
Crayfish		603384	9411	Control	1	U	1	U	1.2	U	1	U	0.8	U
Crayfish		603385	9409	Rochester Park	3.4				9.5				23	
Crayfish		603385	9410	Rochester Park					11				22	
Crayfish		603385	9411	Rochester Park	3.5				9.5				25	
Crayfish		603386	9409	Between Kohler Dams	3.3		1		14		2.7		34	
Crayfish		603386	9410	Between Kohler Dams	3.6				15		3.3		36	
Crayfish		603386	9411	Between Kohler Dams	3.4				13		2.6		38	
Crayfish		603387	9409	Esselingen Park	1.7		1	U	6.9		1.1		22	
Crayfish		603387	9410	Esselingen Park	1.9		1	U	7.8		1	U	25	
Crayfish		603387	9411	Esselingen Park	2				6.2				25	
Emergent Insects		603384	9401	Control	1	U	1	U	1.2	U	1	U	1.1	U*I
Emergent Insects		603384	9402	Control	1	U	1	U	1.2	U	1	U	0.8	U
Emergent Insects		603384	9403	Control	1	U	1	U	1.2	U	1	U	0.8	U
Emergent Insects		603384	9404	Control	1	U	1	U	1.2	U	1	U	0.8	U
Emergent Insects		603385	9401	Rochester Park	64		49		58		64		130	
Emergent Insects		603385	9402	Rochester Park	110		54		120		84		230	
Emergent Insects		603385	9403	Rochester Park	68		31		59		61		120	
Emergent Insects		603385	9404	Rochester Park	68		43		57		69		130	
Emergent Insects		603386	9401	Between Kohler Dams	87		100		67		150		240	
Emergent Insects		603386	9402	Between Kohler Dams	74		73		68		130		260	
Emergent Insects		603386	9403	Between Kohler Dams	36		31		40		67		120	
Emergent Insects		603386	9404	Between Kohler Dams	53		54		45		97		140	
Emergent Insects		603387	9401	Esselingen Park	33		37		54		54		110	
Emergent Insects		603387	9402	Esselingen Park	27		22		29		43		87	
Emergent Insects		603387	9403	Esselingen Park	33		25		39		52		110	
Emergent Insects		603387	9404	Esselingen Park	39		11		40		70		140	
Larval Insects		603384	9405	Control	1	U	1	U	1.2	U	1	U	0.8	U
Larval Insects		603384	9406	Control	1	U	1	U	1.2	U	1	U	0.8	U
Larval Insects		603384	9407	Control	1	U	1	U	1.2	U	1	U	0.8	U
Larval Insects		603384	9408	Control	1	U	1	U	1.2	U	1	U	0.8	U
Larval Insects		603385	9405	Rochester Park	79		15		93		49		110	
Larval Insects		603385	9406	Rochester Park	47		6.2		77		31		86	
Larval Insects		603385	9407	Rochester Park	70		17		85		46		100	
Larval Insects		603385	9408	Rochester Park	46		28		70		38		93	
Larval Insects		603386	9405	Between Kohler Dams	66		68		68		110		160	
Larval Insects		603386	9406	Between Kohler Dams	54		33		63		100		160	
Larval Insects		603386	9407	Between Kohler Dams	51		55		62		96		140	
Larval Insects		603386	9408	Between Kohler Dams	42		43		62		77		130	
Larval Insects		603387	9406	Esselingen Park	30		32		45		51		95	
Larval Insects		603387	9407	Esselingen Park	32		28		53		55		100	
Larval Insects		603387	9408	Esselingen Park	31		25		54		54		110	

Table A3-4. Continued

Species	Age Class	Station	Sample	Location	PCB018 (µg/kg) Conc	Q	PCB019 (µg/kg) Conc	Q	PCB022 (µg/kg) Conc	Q	PCB024/027 (µg/kg) Conc	Q	PCB026 (µg/kg) Conc	Q
Longnose Dace	Young of year	603388	9413	Control	1.2		1	U	1.6		1	U	2.5	
Longnose Dace	Young of year	603388	9414	Control	1	U	1	U	1.2	U	1	U	0.8	U
Longnose Dace	Young of year	603388	9415	Control	1	U	1	U	1.2	U	1	U	0.8	U
Longnose Dace	Young of year	603389	9413	Rochester Park	44		63		38		69		58	
Longnose Dace	Young of year	603389	9414	Rochester Park	45		67		42		77		65	
Longnose Dace	Young of year	603389	9415	Rochester Park	66		51		63		120		95	
Longnose Dace	Young of year	603390	9413	Esselingen Park	67		110		99		140		180	
Longnose Dace	Young of year	603390	9414	Esselingen Park	70		100		67		160		160	
Longnose Dace	Young of year	603390	9415	Esselingen Park	60		100		62		130		150	
Longnose Dace	Young of year	603391	9413	Between Kohler Dams	53		39		53		130		120	
Longnose Dace	Young of year	603391	9414	Between Kohler Dams	64		26		68		160		160	
Longnose Dace	Young of year	603391	9415	Between Kohler Dams	82		130		90		240		170	
Smallmouth Bass	Adult	603388	9401	Control					1.4				1.5	
Smallmouth Bass	Adult	603388	9402	Control	1.3				1.4		1	U	0.97	
Smallmouth Bass	Adult	603388	9403	Control							1	U	0.8	U
Smallmouth Bass	Young of year	603388	9404	Control	1	U	1	U	1.2	U	1	U	0.8	U
Smallmouth Bass	Young of year	603388	9405	Control	1	U	1	U	1.2	U	1	U	0.8	U
Smallmouth Bass	Young of year	603388	9406	Control					1.2	U	1	U	0.8	U
Smallmouth Bass	Adult	603389	9401	Rochester Park	83		60		140		83		280	
Smallmouth Bass	Adult	603389	9402	Rochester Park	85		110		140		110		290	
Smallmouth Bass	Adult	603389	9403	Rochester Park	78		74		110		87		200	
Smallmouth Bass	Young of year	603389	9404	Rochester Park	99		170		84		180		200	
Smallmouth Bass	Young of year	603389	9405	Rochester Park	93		110		82		180		190	
Smallmouth Bass	Young of year	603389	9406	Rochester Park	61		32		67		94		140	
Smallmouth Bass	Adult	603390	9401	Esselingen Park	68		26		71		92		180	
Smallmouth Bass	Adult	603390	9402	Esselingen Park	77		34		84		110		250	
Smallmouth Bass	Adult	603390	9403	Esselingen Park	59		18		68		84		170	
Smallmouth Bass	Young of year	603390	9404	Esselingen Park	64		86		59		92		120	
Smallmouth Bass	Young of year	603390	9405	Esselingen Park	93		120		82		130		170	
Smallmouth Bass	Young of year	603390	9406	Esselingen Park	76		34		69		120		170	
Smallmouth Bass	Adult	603391	9401	Between Kohler Dams	71		120		95		110		210	
Smallmouth Bass	Adult	603391	9402	Between Kohler Dams	58		91		73		92		180	
Smallmouth Bass	Adult	603391	9403	Between Kohler Dams	95		20		140		150		270	
Smallmouth Bass	Young of year	603391	9404	Between Kohler Dams	110		150		110		220		330	
Smallmouth Bass	Young of year	603391	9405	Between Kohler Dams	84		86		91		160		240	
Smallmouth Bass	Young of year	603391	9406	Between Kohler Dams	110		150		140		230		370	
White Sucker	Adult	603388	9407	Control					1.2	U	1	U	0.8	U
White Sucker	Adult	603388	9408	Control	1	U	1	U	1.2	U	1	U	0.8	U
White Sucker	Adult	603388	9409	Control	1	U	1	U	1.2	U	1	U	0.8	U
White Sucker	Young of year	603388	9410	Control	1	U	1	U	1.2	U	1	U	0.8	U
White Sucker	Young of year	603388	9411	Control	1	U	1	U	1.2	U	1	U	0.8	U
White Sucker	Young of year	603388	9412	Control					1.2	U	1	U	1.3	
White Sucker	Adult	603389	9407	Rochester Park	11		15		11		48		37	

Table A3-4. Continued

Species	Age Class	Station	Sample	Location	PCB018 (µg/kg) Conc	Q	PCB019 (µg/kg) Conc	Q	PCB022 (µg/kg) Conc	Q	PCB024/027 (µg/kg) Conc	Q	PCB026 (µg/kg) Conc	Q
White Sucker	Adult	603389	9408	Rochester Park	16		10		27		14		33	
White Sucker	Adult	603389	9409	Rochester Park	50				79		38		99	
White Sucker	Young of year	603389	9410	Rochester Park	56		35		67		45		83	
White Sucker	Young of year	603389	9411	Rochester Park	49		56		53		70		86	
White Sucker	Young of year	603389	9412	Rochester Park	64		21		65		77		100	
White Sucker	Adult	603390	9407	Esselingen Park	14		8.8		13		24		33	
White Sucker	Adult	603390	9408	Esselingen Park	48		58		59		70		100	
White Sucker	Adult	603390	9409	Esselingen Park	15		21		20		25		36	
White Sucker	Young of year	603390	9410	Esselingen Park	25		24		25		32		59	
White Sucker	Young of year	603390	9411	Esselingen Park	17		17		19		29		48	
White Sucker	Young of year	603390	9412	Esselingen Park	27		39		35		50		70	
White Sucker	Adult	603391	9407	Between Kohler Dams	16				23		47		47	
White Sucker	Adult	603391	9408	Between Kohler Dams	18		18		21		37		40	
White Sucker	Adult	603391	9409	Between Kohler Dams	49		57		59		100		130	
White Sucker	Young of year	603391	9410	Between Kohler Dams	40		44		39		83		93	
White Sucker	Young of year	603391	9411	Between Kohler Dams	72		90		79		170		200	
White Sucker	Young of year	603391	9412	Between Kohler Dams	40		36		57		84		110	

Table A3-4. Continued

Species	Age Class	Station	Sample	Location	PCB031/028 (µg/kg) Conc	Q	PCB033 (µg/kg) Conc	Q	PCB037/042 (µg/kg) Conc	Q	PCB040 (µg/kg) Conc	Q	PCB041/071/006 (µg/kg) Conc	Q
Crayfish		603384	9409	Control	2.5	U	1	U	1.1	U	1	U	2	U
Crayfish		603384	9410	Control	2.5	U	1	U	1.1	U	1	U	2	U
Crayfish		603384	9411	Control	3.8		1	U	1.1	U	1	U	2	U
Crayfish		603385	9409	Rochester Park	250		4.5		15				44	
Crayfish		603385	9410	Rochester Park	250		4.6		16				45	
Crayfish		603385	9411	Rochester Park	250		5.7	U*I	16		1.6		47	
Crayfish		603386	9409	Between Kohler Dams	400		5	U*I	18		1.6		52	
Crayfish		603386	9410	Between Kohler Dams	320		6	U*I	20		1.9		58	
Crayfish		603386	9411	Between Kohler Dams	310		5.8	U*I	19		1.5		57	
Crayfish		603387	9409	Esselingen Park	190		2	U*I	12		1	U	36	
Crayfish		603387	9410	Esselingen Park	210		2	U*I	13		1	U	39	
Crayfish		603387	9411	Esselingen Park	230		1.3	U*I	13				46	
Emergent Insects		603384	9401	Control	8		1	U	3		1	U	5.3	
Emergent Insects		603384	9402	Control	4.5	U*I	1	U	1.1	U	1	U	2	U
Emergent Insects		603384	9403	Control	2.5	U	1	U	1.1	U	1	U	2	U
Emergent Insects		603384	9404	Control	3.5	U*I	1	U	1.1	U	1	U	2	U
Emergent Insects		603385	9401	Rochester Park	880		85	U*I	290		61		560	
Emergent Insects		603385	9402	Rochester Park	1500		61	U*I	490		100		1000	
Emergent Insects		603385	9403	Rochester Park	800		77	U*I	270		52		540	
Emergent Insects		603385	9404	Rochester Park	840		36	U*I	310		58		580	
Emergent Insects		603386	9401	Between Kohler Dams	1200		81	U*I	360		66		730	
Emergent Insects		603386	9402	Between Kohler Dams	1200		73	U*I	310		52		640	
Emergent Insects		603386	9403	Between Kohler Dams	540		12	U*I	140		25		300	
Emergent Insects		603386	9404	Between Kohler Dams	630		91	U*I	180		37		370	
Emergent Insects		603387	9401	Esselingen Park	780		80	U*I	140		29		330	
Emergent Insects		603387	9402	Esselingen Park	520		67	U*I	130		22		270	
Emergent Insects		603387	9403	Esselingen Park	700		62	U*I	160		25		340	
Emergent Insects		603387	9404	Esselingen Park	660		93	U*I	190		24		380	
Larval Insects		603384	9405	Control	2.5	U	1	U	1.1	U	1	U	2	U
Larval Insects		603384	9406	Control	4.7		1	U	1.1	U	1	U	2	U
Larval Insects		603384	9407	Control	2.5	U	1	U	1.1	U	1	U	2	U
Larval Insects		603384	9408	Control	3.3	U*I	1	U	1.1	U	1	U	2	U
Larval Insects		603385	9405	Rochester Park	790		58	U*I	190		43		420	
Larval Insects		603385	9406	Rochester Park	640		64	U*I	130		26		330	
Larval Insects		603385	9407	Rochester Park	760		58	U*I	190		45		410	
Larval Insects		603385	9408	Rochester Park	770		50	U*I	140		40		340	
Larval Insects		603386	9405	Between Kohler Dams	820		130	U*I	170		37		370	
Larval Insects		603386	9406	Between Kohler Dams	820		54	U*I	150		30		350	
Larval Insects		603386	9407	Between Kohler Dams	750		64	U*I	140		32		320	
Larval Insects		603386	9408	Between Kohler Dams	760		62	U*I	120		30		310	
Larval Insects		603387	9406	Esselingen Park	470		37	U*I	100		24		230	
Larval Insects		603387	9407	Esselingen Park	620		33	U*I	110		24		240	
Larval Insects		603387	9408	Esselingen Park	610		34	U*I	110		23		250	

Table A3-4. Continued

Species	Age Class	Station	Sample	Location	PCB031/028 (µg/kg) Conc	Q	PCB033 (µg/kg) Conc	Q	PCB037/042 (µg/kg) Conc	Q	PCB040 (µg/kg) Conc	Q	PCB041/071/006 (µg/kg) Conc	Q
Longnose Dace	Young of year	603388	9413	Control	19		3	U*I	4.8		1.2		12	
Longnose Dace	Young of year	603388	9414	Control	2.5	U	1	U	1.1	U	1	U	2	U
Longnose Dace	Young of year	603388	9415	Control	2.5	U	1	U	1.1	U	1	U	2	U
Longnose Dace	Young of year	603389	9413	Rochester Park	720		35	U*I	100		41		330	
Longnose Dace	Young of year	603389	9414	Rochester Park	790		40	U*I	120		47		390	
Longnose Dace	Young of year	603389	9415	Rochester Park	1400		100	U*I	350		74		800	
Longnose Dace	Young of year	603390	9413	Esselingen Park	1500		160	U*I	380		96		940	
Longnose Dace	Young of year	603390	9414	Esselingen Park	1400		170	U*I	350		84		890	
Longnose Dace	Young of year	603390	9415	Esselingen Park	1100		140	U*I	260		66		650	
Longnose Dace	Young of year	603391	9413	Between Kohler Dams	1200		120	U*I	250		42		600	
Longnose Dace	Young of year	603391	9414	Between Kohler Dams	1600		160	U*I	320		46		790	
Longnose Dace	Young of year	603391	9415	Between Kohler Dams	1700		190	U*I	380		85		890	
Smallmouth Bass	Adult	603388	9401	Control	15		1	U	7.2		1.7		19	
Smallmouth Bass	Adult	603388	9402	Control	9.1		1.6		1.8		1	U	3.9	
Smallmouth Bass	Adult	603388	9403	Control	3.2								2	U
Smallmouth Bass	Young of year	603388	9404	Control	2.5	U	1	U	1.1	U	1	U	2	U
Smallmouth Bass	Young of year	603388	9405	Control	2.5	U	1	U	1.1	U	1	U	2	U
Smallmouth Bass	Young of year	603388	9406	Control	5				1.1	U			2.8	
Smallmouth Bass	Adult	603389	9401	Rochester Park	1900		130	U*I	430		130		1400	
Smallmouth Bass	Adult	603389	9402	Rochester Park	2000		120	U*I	360		120		1300	
Smallmouth Bass	Adult	603389	9403	Rochester Park	1500		90	U*I	220		75		820	
Smallmouth Bass	Young of year	603389	9404	Rochester Park	1500		180	U*I	320		76		720	
Smallmouth Bass	Young of year	603389	9405	Rochester Park	1500		99	U*I	210		74		720	
Smallmouth Bass	Young of year	603389	9406	Rochester Park	1200		80	U*I	300		52		630	
Smallmouth Bass	Adult	603390	9401	Esselingen Park	1300		120	U*I	270		42		700	
Smallmouth Bass	Adult	603390	9402	Esselingen Park	1500		120	U*I	300		44		770	
Smallmouth Bass	Adult	603390	9403	Esselingen Park	1300		89	U*I	230		32		610	
Smallmouth Bass	Young of year	603390	9404	Esselingen Park	860		65	U*I	130		50		430	
Smallmouth Bass	Young of year	603390	9405	Esselingen Park	1200		55	U*I	180		71		670	
Smallmouth Bass	Young of year	603390	9406	Esselingen Park	1300		130	U*I	280		46		640	
Smallmouth Bass	Adult	603391	9401	Between Kohler Dams	1400		74	U*I	250		52		670	
Smallmouth Bass	Adult	603391	9402	Between Kohler Dams	1100		64	U*I	200		48		540	
Smallmouth Bass	Adult	603391	9403	Between Kohler Dams	1800		130	U*I	540		72		1100	
Smallmouth Bass	Young of year	603391	9404	Between Kohler Dams	1800		260	U*I	390		82		960	
Smallmouth Bass	Young of year	603391	9405	Between Kohler Dams	1400		190	U*I	310		66		780	
Smallmouth Bass	Young of year	603391	9406	Between Kohler Dams	1800		160	U*I	530		110		1200	
White Sucker	Adult	603388	9407	Control	5.1				1.1	U			2.6	
White Sucker	Adult	603388	9408	Control	2.5	U	1	U	1.1	U	1	U	2	U
White Sucker	Adult	603388	9409	Control	2.5	U	1	U	1.1	U	1	U	2	U
White Sucker	Young of year	603388	9410	Control	2.5	U	1	U	1.1	U	1	U	2	U
White Sucker	Young of year	603388	9411	Control	2.5	U	1	U	1.1	U	1	U	2	U
White Sucker	Young of year	603388	9412	Control	13	U*I	1	U	2.4				5.4	
White Sucker	Adult	603389	9407	Rochester Park	410		39	U*I	85		9.4		210	

Table A3-4. Continued

Species	Age Class	Station	Sample	Location	PCB031/028 (µg/kg) Conc	Q	PCB033 (µg/kg) Conc	Q	PCB037/042 (µg/kg) Conc	Q	PCB040 (µg/kg) Conc	Q	PCB041/071/006 (µg/kg) Conc	Q
White Sucker	Adult	603389	9408	Rochester Park	370		23	U*I	120		29		310	
White Sucker	Adult	603389	9409	Rochester Park	1200		70	U*I	270		74		960	
White Sucker	Young of year	603389	9410	Rochester Park	690		60	U*I	160		50		520	
White Sucker	Young of year	603389	9411	Rochester Park	860		50	U*I	140		43		450	
White Sucker	Young of year	603389	9412	Rochester Park	880		85	U*I	220		41		540	
White Sucker	Adult	603390	9407	Esselingen Park	230				54		8		140	
White Sucker	Adult	603390	9408	Esselingen Park	1000		35	U*I	170		45		700	
White Sucker	Adult	603390	9409	Esselingen Park	390		14	U*I	69		19		260	
White Sucker	Young of year	603390	9410	Esselingen Park	380		46	U*I	79		17		200	
White Sucker	Young of year	603390	9411	Esselingen Park	330		40	U*I	76		13		170	
White Sucker	Young of year	603390	9412	Esselingen Park	470		57	U*I	110		24		260	
White Sucker	Adult	603391	9407	Between Kohler Dams	430		58	U*I	140		13		330	
White Sucker	Adult	603391	9408	Between Kohler Dams	540		63	U*I	150		23		390	
White Sucker	Adult	603391	9409	Between Kohler Dams	920		120	U*I	210		43		530	
White Sucker	Young of year	603391	9410	Between Kohler Dams	710		92	U*I	160		28		360	
White Sucker	Young of year	603391	9411	Between Kohler Dams	1400		180	U*I	300		56		720	
White Sucker	Young of year	603391	9412	Between Kohler Dams	860		60	U*I	180		32		370	

Table A3-4. Continued

Species	Age Class	Station	Sample	Location	PCB044 (µg/kg) Conc	Q	PCB045 (µg/kg) Conc	Q	PCB046 (µg/kg) Conc	Q	PCB047/048 (µg/kg) Conc	Q	PCB049 (µg/kg) Conc	Q
Crayfish		603384	9409	Control	1.1	U	0.8	U	1	U	1.2	U	0.6	U
Crayfish		603384	9410	Control	1.1	U	0.8	U	1	U	1.2	U	0.6	U
Crayfish		603384	9411	Control	1.2		0.8	U	1	U	4.5		2	
Crayfish		603385	9409	Rochester Park	12						240		86	
Crayfish		603385	9410	Rochester Park	11						230		83	
Crayfish		603385	9411	Rochester Park	12						250		85	
Crayfish		603386	9409	Between Kohler Dams	11						410		110	
Crayfish		603386	9410	Between Kohler Dams	13						390		110	
Crayfish		603386	9411	Between Kohler Dams	12				1	U	330		110	
Crayfish		603387	9409	Esselingen Park	8		0.8	U	1	U	210		72	
Crayfish		603387	9410	Esselingen Park	8		0.8	U	1	U	240		81	
Crayfish		603387	9411	Esselingen Park	8.8						270		93	
Emergent Insects		603384	9401	Control	5.2		0.8	U	1	U	6.4		4.6	
Emergent Insects		603384	9402	Control	1.2		0.8	U	1	U	3.1		1.5	
Emergent Insects		603384	9403	Control	1.1	U	0.8	U	1	U	1.2	U	0.6	U
Emergent Insects		603384	9404	Control	1.5		0.8	U	1	U	3.1		1.7	
Emergent Insects		603385	9401	Rochester Park	460		45		19		940		540	
Emergent Insects		603385	9402	Rochester Park	800		77		30		1400		810	
Emergent Insects		603385	9403	Rochester Park	420		39		17		920		440	
Emergent Insects		603385	9404	Rochester Park	440		42		20		1000		470	
Emergent Insects		603386	9401	Between Kohler Dams	520		61		25		1900		700	
Emergent Insects		603386	9402	Between Kohler Dams	450		48		18		1600		600	
Emergent Insects		603386	9403	Between Kohler Dams	210		23		8		640		280	
Emergent Insects		603386	9404	Between Kohler Dams	260		34		13		760		330	
Emergent Insects		603387	9401	Esselingen Park	200		26		6.6		670		280	
Emergent Insects		603387	9402	Esselingen Park	180		18		6.3		600		280	
Emergent Insects		603387	9403	Esselingen Park	200		23		7.5		760		340	
Emergent Insects		603387	9404	Esselingen Park	240		21		7		750		340	
Larval Insects		603384	9405	Control	1.1	U	0.8	U	1	U	1.2	U	0.6	U
Larval Insects		603384	9406	Control	1.3		0.8	U	1	U	4		2	
Larval Insects		603384	9407	Control	1.1	U	0.8	U	1	U	1.2	U	0.6	U
Larval Insects		603384	9408	Control	1.1	U	0.8	U	1	U	1.2	U	0.6	U
Larval Insects		603385	9405	Rochester Park	320		32		14		660		340	
Larval Insects		603385	9406	Rochester Park	200		17		6.7		430		250	
Larval Insects		603385	9407	Rochester Park	300		31		14		640		320	
Larval Insects		603385	9408	Rochester Park	190		23		9.4		610		280	
Larval Insects		603386	9405	Between Kohler Dams	250		37		14		730		310	
Larval Insects		603386	9406	Between Kohler Dams	210		27		9.1		740		320	
Larval Insects		603386	9407	Between Kohler Dams	180		28		10		640		280	
Larval Insects		603386	9408	Between Kohler Dams	120		21		6.8		630		280	
Larval Insects		603387	9406	Esselingen Park	130		18		6.7		410		190	
Larval Insects		603387	9407	Esselingen Park	120		16		6		480		240	
Larval Insects		603387	9408	Esselingen Park	120		16		5.4		470		230	

Table A3-4. Continued

					PCB044 (µg/kg)		PCB045 (µg/kg)		PCB046 (µg/kg)		PCB047/048 (µg/kg)		PCB049 (µg/kg)	
Species	Age Class	Station	Sample	Location	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
Longnose Dace	Young of year	603388	9413	Control	8.4		0.92				22		12	
Longnose Dace	Young of year	603388	9414	Control	1.1	U	0.8	U	1	U	1.2	U	0.7	
Longnose Dace	Young of year	603388	9415	Control	1.1	U	0.8	U	1	U	1.2	U	0.6	
Longnose Dace	Young of year	603389	9413	Rochester Park	260		40		8.2		870		340	
Longnose Dace	Young of year	603389	9414	Rochester Park	290		45		8.3		1000		390	
Longnose Dace	Young of year	603389	9415	Rochester Park	620		63		9		1400		760	
Longnose Dace	Young of year	603390	9413	Esselingen Park	700		80		12		1700		910	
Longnose Dace	Young of year	603390	9414	Esselingen Park	640		82		11		1700		850	
Longnose Dace	Young of year	603390	9415	Esselingen Park	470		66		10		1300		630	
Longnose Dace	Young of year	603391	9413	Between Kohler Dams	420		46		7.6		1500		610	
Longnose Dace	Young of year	603391	9414	Between Kohler Dams	520		50		8		1900		790	
Longnose Dace	Young of year	603391	9415	Between Kohler Dams	660		86		17		2200		920	
Smallmouth Bass	Adult	603388	9401	Control	13		0.93				22		15	
Smallmouth Bass	Adult	603388	9402	Control	3.3		0.8	U	1	U	6		3.7	
Smallmouth Bass	Adult	603388	9403	Control	1.3						3.7		2.1	
Smallmouth Bass	Young of year	603388	9404	Control	1.1	U	0.8	U	1	U	1.2	U	0.6	U
Smallmouth Bass	Young of year	603388	9405	Control	1.1	U	0.8	U	1	U	1.2	U	0.6	U
Smallmouth Bass	Young of year	603388	9406	Control	1.9		0.8	U	1	U	5.3		2.9	
Smallmouth Bass	Adult	603389	9401	Rochester Park	940		82		27		2400		1300	
Smallmouth Bass	Adult	603389	9402	Rochester Park	790		75		23		2500		1200	
Smallmouth Bass	Adult	603389	9403	Rochester Park	520		55		16		1800		850	
Smallmouth Bass	Young of year	603389	9404	Rochester Park	480		84		23		1900		750	
Smallmouth Bass	Young of year	603389	9405	Rochester Park	490		72		20		1300		590	
Smallmouth Bass	Young of year	603389	9406	Rochester Park	480		43		12		1400		680	
Smallmouth Bass	Adult	603390	9401	Esselingen Park	460		44		11		1600		740	
Smallmouth Bass	Adult	603390	9402	Esselingen Park	490		46		13		1700		780	
Smallmouth Bass	Adult	603390	9403	Esselingen Park	380		33		8.1		1500		700	
Smallmouth Bass	Young of year	603390	9404	Esselingen Park	310		50		15		1200		460	
Smallmouth Bass	Young of year	603390	9405	Esselingen Park	490		71		22		1600		630	
Smallmouth Bass	Young of year	603390	9406	Esselingen Park	460		47		12		1500		680	
Smallmouth Bass	Adult	603391	9401	Between Kohler Dams	390		53		17		2100		810	
Smallmouth Bass	Adult	603391	9402	Between Kohler Dams	350		46		14		1500		600	
Smallmouth Bass	Adult	603391	9403	Between Kohler Dams	710		62		18		2600		1100	
Smallmouth Bass	Young of year	603391	9404	Between Kohler Dams	610		97		27		2200		890	
Smallmouth Bass	Young of year	603391	9405	Between Kohler Dams	460		71		19		1700		680	
Smallmouth Bass	Young of year	603391	9406	Between Kohler Dams	840		97		34		2700		1200	
White Sucker	Adult	603388	9407	Control	1.7						4.9		2.7	
White Sucker	Adult	603388	9408	Control	1.1	U	0.8	U	1	U	1.2	U	0.6	U
White Sucker	Adult	603388	9409	Control	1.1	U	0.8	U	1	U	1.2	U	0.6	U
White Sucker	Young of year	603388	9410	Control	1.1	U	0.8	U	1	U	1.2	U	0.6	U
White Sucker	Young of year	603388	9411	Control	1.1	U	0.8	U	1	U	1.2	U	0.6	U
White Sucker	Young of year	603388	9412	Control	3.8		0.8	U			13		7.4	
White Sucker	Adult	603389	9407	Rochester Park	110		11				600		190	

Table A3-4. Continued

Species	Age Class	Station	Sample	Location	PCB044 (µg/kg) Conc	Q	PCB045 (µg/kg) Conc	Q	PCB046 (µg/kg) Conc	Q	PCB047/048 (µg/kg) Conc	Q	PCB049 (µg/kg) Conc	Q
White Sucker	Adult	603389	9408	Rochester Park	210		17		6.8		660		260	
White Sucker	Adult	603389	9409	Rochester Park	600		51		19		1600		730	
White Sucker	Young of year	603389	9410	Rochester Park	350		45		14		900		380	
White Sucker	Young of year	603389	9411	Rochester Park	300		42		11		1200		410	
White Sucker	Young of year	603389	9412	Rochester Park	330		40		12		1200		400	
White Sucker	Adult	603390	9407	Esselingen Park	84		7.9				290		130	
White Sucker	Adult	603390	9408	Esselingen Park	450		45		12		1500		620	
White Sucker	Adult	603390	9409	Esselingen Park	150		15				450		220	
White Sucker	Young of year	603390	9410	Esselingen Park	130		16		4.5		410		190	
White Sucker	Young of year	603390	9411	Esselingen Park	120		13		3		420		180	
White Sucker	Young of year	603390	9412	Esselingen Park	160		22		6.5		580		250	
White Sucker	Adult	603391	9407	Between Kohler Dams	170		14				860		330	
White Sucker	Adult	603391	9408	Between Kohler Dams	230		21		6.1		880		360	
White Sucker	Adult	603391	9409	Between Kohler Dams	350		42		14		1100		480	
White Sucker	Young of year	603391	9410	Between Kohler Dams	250		35		8.2		920		360	
White Sucker	Young of year	603391	9411	Between Kohler Dams	470		72		14		1900		680	
White Sucker	Young of year	603391	9412	Between Kohler Dams	240		35		8.1		1100		410	

Table A3-4. Continued

Species	Age Class	Station	Sample	Location	PCB052 (µg/kg) Conc	Q	PCB056/060 (µg/kg) Conc	Q	PCB066/095 (µg/kg) Conc	Q	PCB070/076 (µg/kg) Conc	Q	PCB074 (µg/kg) Conc	Q
Crayfish		603384	9409	Control	1	U	1.8	U	2.8	U	2.4	U	1	U
Crayfish		603384	9410	Control	1	U	1.8	U	2.8	U	2.4	U	1	U
Crayfish		603384	9411	Control	2.2		1.8	U	2.8	U	2.4	U	1.1	
Crayfish		603385	9409	Rochester Park	85		64		200		59		78	
Crayfish		603385	9410	Rochester Park	83		55		180		58		69	
Crayfish		603385	9411	Rochester Park	82		56		170		54		68	
Crayfish		603386	9409	Between Kohler Dams	98		67		200		53		84	
Crayfish		603386	9410	Between Kohler Dams	100		67		200		58		79	
Crayfish		603386	9411	Between Kohler Dams	99		62		190		55		75	
Crayfish		603387	9409	Esselingen Park	68		54		150		41		60	
Crayfish		603387	9410	Esselingen Park	76		64		180		46		69	
Crayfish		603387	9411	Esselingen Park	87		59		170		47		68	
Emergent Insects		603384	9401	Control	6.6		5.3		14		20	U*I	6.6	
Emergent Insects		603384	9402	Control	2.4		1.8	U	7.5	U*I	8	U*I	4	U*I
Emergent Insects		603384	9403	Control	1	U	1.8	U	2.8	U	2.4	U	1.5	U*I
Emergent Insects		603384	9404	Control	2.2		1.8	U	4		3.3		2	U*I
Emergent Insects		603385	9401	Rochester Park	650		390		1100		890		400	
Emergent Insects		603385	9402	Rochester Park	1000		680		1700		1400		610	
Emergent Insects		603385	9403	Rochester Park	530		400		870		740		340	
Emergent Insects		603385	9404	Rochester Park	570		410		890		790		360	
Emergent Insects		603386	9401	Between Kohler Dams	790		360		980		810		400	
Emergent Insects		603386	9402	Between Kohler Dams	660		310		940		680		340	
Emergent Insects		603386	9403	Between Kohler Dams	300		170		440		330		170	
Emergent Insects		603386	9404	Between Kohler Dams	370		200		490		360		190	
Emergent Insects		603387	9401	Esselingen Park	330		230		550		360		220	
Emergent Insects		603387	9402	Esselingen Park	320		180		540		370		170	
Emergent Insects		603387	9403	Esselingen Park	370		210		630		410		190	
Emergent Insects		603387	9404	Esselingen Park	370		250		590		410		220	
Larval Insects		603384	9405	Control	1	U	1.8	U	2.8	U	2.4	U	4	U*I
Larval Insects		603384	9406	Control	2.3		1.8	U	3.3		2.4	U	3	U*I
Larval Insects		603384	9407	Control	1	U	1.8	U	2.8	U	2.4	U	3.5	U*I
Larval Insects		603384	9408	Control	1	U	1.8	U	2.8	U	2.4	U	4	U*I
Larval Insects		603385	9405	Rochester Park	400		310		710		560		240	
Larval Insects		603385	9406	Rochester Park	290		230		580		470		210	
Larval Insects		603385	9407	Rochester Park	380		310		730		580		250	
Larval Insects		603385	9408	Rochester Park	320		250		660		510		220	
Larval Insects		603386	9405	Between Kohler Dams	340		200		500		360		200	
Larval Insects		603386	9406	Between Kohler Dams	350		190		480		340		190	
Larval Insects		603386	9407	Between Kohler Dams	310		170		420		310		170	
Larval Insects		603386	9408	Between Kohler Dams	310		160		400		300		170	
Larval Insects		603387	9406	Esselingen Park	210		150		350		240		140	
Larval Insects		603387	9407	Esselingen Park	260		160		400		240		140	
Larval Insects		603387	9408	Esselingen Park	250		160		370		250		140	

Table A3-4. Continued

Species	Age Class	Station	Sample	Location	PCB052 (µg/kg) Conc	Q	PCB056/060 (µg/kg) Conc	Q	PCB066/095 (µg/kg) Conc	Q	PCB070/076 (µg/kg) Conc	Q	PCB074 (µg/kg) Conc	Q
Longnose Dace	Young of year	603388	9413	Control	14		9.5		33		18		13	
Longnose Dace	Young of year	603388	9414	Control	1.4		1.8	U	6.4		4.6		2.9	
Longnose Dace	Young of year	603388	9415	Control	1	U	1.8	U	3.1		2.6		1.6	
Longnose Dace	Young of year	603389	9413	Rochester Park	390		160		470		260		180	
Longnose Dace	Young of year	603389	9414	Rochester Park	440		180		560		300		210	
Longnose Dace	Young of year	603389	9415	Rochester Park	930		400		1500		740		530	
Longnose Dace	Young of year	603390	9413	Esselingen Park	1000		430		1100		530		480	
Longnose Dace	Young of year	603390	9414	Esselingen Park	980		370		1200		490		470	
Longnose Dace	Young of year	603390	9415	Esselingen Park	720		260		830		410		320	
Longnose Dace	Young of year	603391	9413	Between Kohler Dams	670		200		780		360		290	
Longnose Dace	Young of year	603391	9414	Between Kohler Dams	880		250		1000		480		380	
Longnose Dace	Young of year	603391	9415	Between Kohler Dams	1000		310		1300		510		390	
Smallmouth Bass	Adult	603388	9401	Control	16		18		55		31		17	
Smallmouth Bass	Adult	603388	9402	Control	4.8		3.9		11		6		3.2	
Smallmouth Bass	Adult	603388	9403	Control	2.7		1.8	U	6.3		2.8		1.8	
Smallmouth Bass	Young of year	603388	9404	Control	1	U	1.8	U	2.8	U	2.4	U	1	U
Smallmouth Bass	Young of year	603388	9405	Control	1	U	1.8	U	2.8	U	2.4	U	1	U
Smallmouth Bass	Young of year	603388	9406	Control	3.5		2.1		7.4		4.2		2.7	
Smallmouth Bass	Adult	603389	9401	Rochester Park	1300		920		3300		1700		1100	
Smallmouth Bass	Adult	603389	9402	Rochester Park	1300		980		2900		1500		1000	
Smallmouth Bass	Adult	603389	9403	Rochester Park	910		640		1900		900		660	
Smallmouth Bass	Young of year	603389	9404	Rochester Park	640		430		1500		800		520	
Smallmouth Bass	Young of year	603389	9405	Rochester Park	770		420		1200		670		410	
Smallmouth Bass	Young of year	603389	9406	Rochester Park	750		420		1400		810		520	
Smallmouth Bass	Adult	603390	9401	Esselingen Park	840		380		1200		530		460	
Smallmouth Bass	Adult	603390	9402	Esselingen Park	850		430		1300		580		510	
Smallmouth Bass	Adult	603390	9403	Esselingen Park	780		370		1200		430		480	
Smallmouth Bass	Young of year	603390	9404	Esselingen Park	500		200		540		290		210	
Smallmouth Bass	Young of year	603390	9405	Esselingen Park	700		280		870		400		280	
Smallmouth Bass	Young of year	603390	9406	Esselingen Park	800		270		910		490		350	
Smallmouth Bass	Adult	603391	9401	Between Kohler Dams	820		450		1400		470		560	
Smallmouth Bass	Adult	603391	9402	Between Kohler Dams	620		330		890		410		340	
Smallmouth Bass	Adult	603391	9403	Between Kohler Dams	1200		690		2000		760		740	
Smallmouth Bass	Young of year	603391	9404	Between Kohler Dams	950		450		1400		710		500	
Smallmouth Bass	Young of year	603391	9405	Between Kohler Dams	690		410		1200		590		450	
Smallmouth Bass	Young of year	603391	9406	Between Kohler Dams	1200		600		1800		900		670	
White Sucker	Adult	603388	9407	Control	3		2.1		7.1		3.9		2.5	
White Sucker	Adult	603388	9408	Control	1	U	1.8	U	2.8	U	2.4	U	1	U
White Sucker	Adult	603388	9409	Control	1	U	1.8	U	2.8	U	2.4	U	1	U
White Sucker	Young of year	603388	9410	Control	1	U	1.8	U	2.8	U	2.4	U	1	U
White Sucker	Young of year	603388	9411	Control	1	U	1.8	U	2.8	U	2.4	U	1	U
White Sucker	Young of year	603388	9412	Control	5.9		4.5		15		7.9		5.6	
White Sucker	Adult	603389	9407	Rochester Park	100		110		420		190		160	

Table A3-4. Continued

Species	Age Class	Station	Sample	Location	PCB052 (µg/kg) Conc	Q	PCB056/060 (µg/kg) Conc	Q	PCB066/095 (µg/kg) Conc	Q	PCB070/076 (µg/kg) Conc	Q	PCB074 (µg/kg) Conc	Q
White Sucker	Adult	603389	9408	Rochester Park	170		220		690		330		240	
White Sucker	Adult	603389	9409	Rochester Park	560		430		1400		800		520	
White Sucker	Young of year	603389	9410	Rochester Park	300		280		790		460		270	
White Sucker	Young of year	603389	9411	Rochester Park	300		240		750		380		250	
White Sucker	Young of year	603389	9412	Rochester Park	320		210		670		370		260	
White Sucker	Adult	603390	9407	Esselingen Park	130		66		220		110		87	
White Sucker	Adult	603390	9408	Esselingen Park	650		310		1100		530		400	
White Sucker	Adult	603390	9409	Esselingen Park	190		130		400		180		160	
White Sucker	Young of year	603390	9410	Esselingen Park	150		99		280		160		100	
White Sucker	Young of year	603390	9411	Esselingen Park	140		83		260		130		91	
White Sucker	Young of year	603390	9412	Esselingen Park	180		140		380		200		140	
White Sucker	Adult	603391	9407	Between Kohler Dams	280		160		520		210		200	
White Sucker	Adult	603391	9408	Between Kohler Dams	270		200		690		290		270	
White Sucker	Adult	603391	9409	Between Kohler Dams	330		290		840		470		330	
White Sucker	Young of year	603391	9410	Between Kohler Dams	320		170		510		250		180	
White Sucker	Young of year	603391	9411	Between Kohler Dams	560		330		950		480		350	
White Sucker	Young of year	603391	9412	Between Kohler Dams	320		190		540		290		200	

Table A3-4. Continued

Species	Age Class	Station	Sample	Location	PCB077 (µg/kg) Conc	Q	PCB077/110 (µg/kg) Conc	Q	PCB082 (µg/kg) Conc	Q	PCB084/092 (µg/kg) Conc	Q	PCB085 (µg/kg) Conc	Q
Crayfish		603384	9409	Control	1	U	1.3	U	1	U	1.3	U	1	U
Crayfish		603384	9410	Control	1	U	1.3	U	1	U	1.3	U	1	U
Crayfish		603384	9411	Control			2.7		1	U	1.3	U	1	U
Crayfish		603385	9409	Rochester Park	5.2		54		4.6		7.9		30	
Crayfish		603385	9410	Rochester Park	4.4		48		3.3				24	
Crayfish		603385	9411	Rochester Park			55		4.7		7.9		29	
Crayfish		603386	9409	Between Kohler Dams	2.5	*Q	64		4.9		7.9		30	
Crayfish		603386	9410	Between Kohler Dams	1.9	*Q	69		5.7		10		29	
Crayfish		603386	9411	Between Kohler Dams			67		4.8		7.7		26	
Crayfish		603387	9409	Esselingen Park	2.3		51		4		6.1		24	
Crayfish		603387	9410	Esselingen Park	2.8		57		4.5		6.3		28	
Crayfish		603387	9411	Esselingen Park			64		4.8		6.4		27	
Emergent Insects		603384	9401	Control	1	U	12		1.2		4.7		1.3	U*I
Emergent Insects		603384	9402	Control	1	U	6.1		1	U	1.6		1.5	U*I
Emergent Insects		603384	9403	Control	1	U	3.7		1	U	1.3	U	1	U
Emergent Insects		603384	9404	Control	1	U	5.6		1	U	1.5		1.5	U*I
Emergent Insects		603385	9401	Rochester Park	30		910		85		390		150	
Emergent Insects		603385	9402	Rochester Park	49		1300		120		670		240	
Emergent Insects		603385	9403	Rochester Park	32		770		77		290		120	
Emergent Insects		603385	9404	Rochester Park	32		820		87		330		140	
Emergent Insects		603386	9401	Between Kohler Dams	31		1100		86		450		140	
Emergent Insects		603386	9402	Between Kohler Dams	25		900		66		320		100	
Emergent Insects		603386	9403	Between Kohler Dams	12	*Q	480		40		160		57	
Emergent Insects		603386	9404	Between Kohler Dams	12	*Q	510		43		210		68	
Emergent Insects		603387	9401	Esselingen Park	13	*Q	430		38		150		69	
Emergent Insects		603387	9402	Esselingen Park	10	*Q	540		41		150		68	
Emergent Insects		603387	9403	Esselingen Park	12	*Q	630		47		170		77	
Emergent Insects		603387	9404	Esselingen Park	12		610		55		200		91	
Larval Insects		603384	9405	Control	1	U	1.6		1	U	1.3	U	1	U
Larval Insects		603384	9406	Control			3.8		1	U	1.3	U	1	U
Larval Insects		603384	9407	Control	1	U	1.3	U	1	U	1.3	U	1	U
Larval Insects		603384	9408	Control	1	U	1.4		1	U	1.3	U	1	U
Larval Insects		603385	9405	Rochester Park	23		470		51		200		93	
Larval Insects		603385	9406	Rochester Park			380		38		130		80	
Larval Insects		603385	9407	Rochester Park	22		470		55		200		98	
Larval Insects		603385	9408	Rochester Park	20		400		46		150		80	
Larval Insects		603386	9405	Between Kohler Dams	10	*Q	410		40		180		57	
Larval Insects		603386	9406	Between Kohler Dams			400		35		160		54	
Larval Insects		603386	9407	Between Kohler Dams	7.5	*Q	360		31		150		48	
Larval Insects		603386	9408	Between Kohler Dams	8.6	*Q	370		32		140		50	
Larval Insects		603387	9406	Esselingen Park	5.9		300		28		120		44	
Larval Insects		603387	9407	Esselingen Park	7.8		320		30		120		46	
Larval Insects		603387	9408	Esselingen Park	5.8		320		29		120		47	

Table A3-4. Continued

					PCB077 (µg/kg)		PCB077/110 (µg/kg)		PCB082 (µg/kg)		PCB084/092 (µg/kg)		PCB085 (µg/kg)	
Species	Age Class	Station	Sample	Location	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
Longnose Dace	Young of year	603388	9413	Control	1	U	29		2.5		7.2		7.5	U*I
Longnose Dace	Young of year	603388	9414	Control			8.1		1	U	1.5		1.8	U*I
Longnose Dace	Young of year	603388	9415	Control			3.9		1	U	1.3	U	1	U
Longnose Dace	Young of year	603389	9413	Rochester Park			470		38		190		79	
Longnose Dace	Young of year	603389	9414	Rochester Park			600		43		210		94	
Longnose Dace	Young of year	603389	9415	Rochester Park	16		1200		98		350		180	
Longnose Dace	Young of year	603390	9413	Esselingen Park	20		1300		120		500		170	
Longnose Dace	Young of year	603390	9414	Esselingen Park			1300		110		480		160	U*I
Longnose Dace	Young of year	603390	9415	Esselingen Park			920		72		360		120	U*I
Longnose Dace	Young of year	603391	9413	Between Kohler Dams			830		60		300		100	
Longnose Dace	Young of year	603391	9414	Between Kohler Dams			1000		70		300		130	
Longnose Dace	Young of year	603391	9415	Between Kohler Dams	17		1200		89		400		120	
Smallmouth Bass	Adult	603388	9401	Control	1.2		45		4.8		12		6.3	
Smallmouth Bass	Adult	603388	9402	Control	1	U	13		1	U	2.4		3	U*I
Smallmouth Bass	Adult	603388	9403	Control	1	U	8				1.4		2.6	U*I
Smallmouth Bass	Young of year	603388	9404	Control			3.8		1	U	1.3	U	1	U
Smallmouth Bass	Young of year	603388	9405	Control			4.5		1	U	1.3	U	1	U
Smallmouth Bass	Young of year	603388	9406	Control	1	U	8.6		1	U	1.7		2	U*I
Smallmouth Bass	Adult	603389	9401	Rochester Park	98		2700		240		580		560	
Smallmouth Bass	Adult	603389	9402	Rochester Park	86		2400		210		590		530	
Smallmouth Bass	Adult	603389	9403	Rochester Park	48		1400		120		380		320	
Smallmouth Bass	Young of year	603389	9404	Rochester Park			1200		99		390		220	
Smallmouth Bass	Young of year	603389	9405	Rochester Park			1100		130		390		220	
Smallmouth Bass	Young of year	603389	9406	Rochester Park	29		1200		100		310		220	
Smallmouth Bass	Adult	603390	9401	Esselingen Park	17		1100		73		280		160	
Smallmouth Bass	Adult	603390	9402	Esselingen Park	16		1200		82		300		170	
Smallmouth Bass	Adult	603390	9403	Esselingen Park	13		1000		65		220		170	
Smallmouth Bass	Young of year	603390	9404	Esselingen Park			670		44		240		80	
Smallmouth Bass	Young of year	603390	9405	Esselingen Park			900		59		330		110	
Smallmouth Bass	Young of year	603390	9406	Esselingen Park	14		940		60		280		110	
Smallmouth Bass	Adult	603391	9401	Between Kohler Dams	36		1100		90		250		220	
Smallmouth Bass	Adult	603391	9402	Between Kohler Dams	26		830		68		230		150	
Smallmouth Bass	Adult	603391	9403	Between Kohler Dams	42		1700		160		420		330	
Smallmouth Bass	Young of year	603391	9404	Between Kohler Dams			1400		100		540		200	
Smallmouth Bass	Young of year	603391	9405	Between Kohler Dams			1100		92		420		170	
Smallmouth Bass	Young of year	603391	9406	Between Kohler Dams	41		2000		170		760		280	
White Sucker	Adult	603388	9407	Control	1	U	8.3		1	U	1.8		2	U*I
White Sucker	Adult	603388	9408	Control			2		1	U	1.3	U	1	U
White Sucker	Adult	603388	9409	Control			1.3	U	1	U	1.3	U	1	U
White Sucker	Young of year	603388	9410	Control			1.6		1	U	1.3	U	1	U
White Sucker	Young of year	603388	9411	Control			2.1		1	U	1.3	U	1	U
White Sucker	Young of year	603388	9412	Control	1	U	12		1		3		2	U*I
White Sucker	Adult	603389	9407	Rochester Park	4		440		34		100		99	

Table A3-4. Continued

Species	Age Class	Station	Sample	Location	PCB077 (µg/kg) Conc	Q	PCB077/110 (µg/kg) Conc	Q	PCB082 (µg/kg) Conc	Q	PCB084/092 (µg/kg) Conc	Q	PCB085 (µg/kg) Conc	Q
White Sucker	Adult	603389	9408	Rochester Park			530		57		160		140	
White Sucker	Adult	603389	9409	Rochester Park			1100		89		360		210	
White Sucker	Young of year	603389	9410	Rochester Park			640		55		250		130	
White Sucker	Young of year	603389	9411	Rochester Park			660		52		240		130	
White Sucker	Young of year	603389	9412	Rochester Park	11		590		43		200		100	
White Sucker	Adult	603390	9407	Esselingen Park	2.3		250		16		61		32	
White Sucker	Adult	603390	9408	Esselingen Park			1100		69		290		140	
White Sucker	Adult	603390	9409	Esselingen Park			400		28		120		58	
White Sucker	Young of year	603390	9410	Esselingen Park			260		20		95		34	U*I
White Sucker	Young of year	603390	9411	Esselingen Park			240		20		90		35	U*I
White Sucker	Young of year	603390	9412	Esselingen Park	6.4		330		29		130		51	
White Sucker	Adult	603391	9407	Between Kohler Dams	5.6		480		40		140		83	
White Sucker	Adult	603391	9408	Between Kohler Dams			650		51		190		68	U*I
White Sucker	Adult	603391	9409	Between Kohler Dams			800		64		270		78	U*I
White Sucker	Young of year	603391	9410	Between Kohler Dams			470		35		200		72	
White Sucker	Young of year	603391	9411	Between Kohler Dams			860		66		390		130	
White Sucker	Young of year	603391	9412	Between Kohler Dams	7.8		450		38		180		78	

Table A3-4. Continued

Species	Age Class	Station	Sample	Location	PCB087 (µg/kg) Conc	Q	PCB091 (µg/kg) Conc	Q	PCB097 (µg/kg) Conc	Q	PCB099 (µg/kg) Conc	Q	PCB101 (µg/kg) Conc	Q
Crayfish		603384	9409	Control	1	U	1	U	0.8	U	0.6	U	0.6	
Crayfish		603384	9410	Control	1	U	1	U	0.8	U	0.6	U	0.63	
Crayfish		603384	9411	Control	1	U	1	U	0.8	U	1.1		1.7	
Crayfish		603385	9409	Rochester Park	37		18		25		66		87	
Crayfish		603385	9410	Rochester Park	30		16		22		58		75	
Crayfish		603385	9411	Rochester Park	33		17		25		60		78	
Crayfish		603386	9409	Between Kohler Dams	38		26		30		76		120	
Crayfish		603386	9410	Between Kohler Dams	36		26		30		71		94	
Crayfish		603386	9411	Between Kohler Dams	36		22		29		69		94	
Crayfish		603387	9409	Esselingen Park	32		19		23		56		75	
Crayfish		603387	9410	Esselingen Park	37		20		27		64		85	
Crayfish		603387	9411	Esselingen Park	38		19		28		66		92	
Emergent Insects		603384	9401	Control	3.7		2.4		3		4.2		7.2	
Emergent Insects		603384	9402	Control	1.9		1.2		1.4		2.8		4.8	
Emergent Insects		603384	9403	Control	1.1		1	U	0.8	U	1.6		2.8	
Emergent Insects		603384	9404	Control	1.6		1	U	1.3		2.3		3.7	
Emergent Insects		603385	9401	Rochester Park	260		210		230		330		510	
Emergent Insects		603385	9402	Rochester Park	400		330		360		500		740	
Emergent Insects		603385	9403	Rochester Park	250		160		170		290		430	
Emergent Insects		603385	9404	Rochester Park	260		190		220		310		460	
Emergent Insects		603386	9401	Between Kohler Dams	270		280		260		390		580	
Emergent Insects		603386	9402	Between Kohler Dams	190		220		170		320		470	
Emergent Insects		603386	9403	Between Kohler Dams	110		130		100		160		240	
Emergent Insects		603386	9404	Between Kohler Dams	120		150		110		180		260	
Emergent Insects		603387	9401	Esselingen Park	110		130		100		180		250	
Emergent Insects		603387	9402	Esselingen Park	120		130		110		170		280	
Emergent Insects		603387	9403	Esselingen Park	130		160		120		190		330	
Emergent Insects		603387	9404	Esselingen Park	160		170		140		220		300	
Larval Insects		603384	9405	Control	1	U	1	U	0.8	U	0.65		1.1	
Larval Insects		603384	9406	Control	1	U	1	U	0.8	U	1.5		2.3	
Larval Insects		603384	9407	Control	1	U	1	U	0.8	U	0.6	U	0.61	
Larval Insects		603384	9408	Control	1	U	1	U	0.8	U	0.62		0.86	
Larval Insects		603385	9405	Rochester Park	160		120		120		170		260	
Larval Insects		603385	9406	Rochester Park	120		82		95		140		200	
Larval Insects		603385	9407	Rochester Park	160		120		130		180		260	
Larval Insects		603385	9408	Rochester Park	130		94		97		150		220	
Larval Insects		603386	9405	Between Kohler Dams	100		130		99		160		210	
Larval Insects		603386	9406	Between Kohler Dams	100		110		94		150		220	
Larval Insects		603386	9407	Between Kohler Dams	89		110		78		130		180	
Larval Insects		603386	9408	Between Kohler Dams	85		110		71		130		190	
Larval Insects		603387	9406	Esselingen Park	79		83		65		100		140	
Larval Insects		603387	9407	Esselingen Park	80		88		65		110		150	
Larval Insects		603387	9408	Esselingen Park	83		91		67		110		150	

Table A3-4. Continued

Species	Age Class	Station	Sample	Location	PCB087 (µg/kg) Conc	Q	PCB091 (µg/kg) Conc	Q	PCB097 (µg/kg) Conc	Q	PCB099 (µg/kg) Conc	Q	PCB101 (µg/kg) Conc	Q
Longnose Dace	Young of year	603388	9413	Control	10		6.1		8.1		14		22	
Longnose Dace	Young of year	603388	9414	Control	2.7		1		1.8		3.3		6.7	
Longnose Dace	Young of year	603388	9415	Control	1.3		1	U	0.85		1.6		3.1	
Longnose Dace	Young of year	603389	9413	Rochester Park	140		130		120		180		310	
Longnose Dace	Young of year	603389	9414	Rochester Park	160		150		140		200		350	
Longnose Dace	Young of year	603389	9415	Rochester Park	370		220		300		440		700	
Longnose Dace	Young of year	603390	9413	Esselingen Park	360		300		300		450		760	
Longnose Dace	Young of year	603390	9414	Esselingen Park	350		380		300		450		740	
Longnose Dace	Young of year	603390	9415	Esselingen Park	240		290		210		320		520	
Longnose Dace	Young of year	603391	9413	Between Kohler Dams	200		200		160		320		490	
Longnose Dace	Young of year	603391	9414	Between Kohler Dams	250		250		210		400		610	
Longnose Dace	Young of year	603391	9415	Between Kohler Dams	290		290		260		450		700	
Smallmouth Bass	Adult	603388	9401	Control	17		8.8		13		20		29	
Smallmouth Bass	Adult	603388	9402	Control	4.4		1.8		3		6		10	
Smallmouth Bass	Adult	603388	9403	Control	3		1.2		2		4.2		7	
Smallmouth Bass	Young of year	603388	9404	Control	1.1		1	U	0.81		1.7		2.8	
Smallmouth Bass	Young of year	603388	9405	Control	1.5		1	U	0.96		2.1		3.5	
Smallmouth Bass	Young of year	603388	9406	Control	3		1.4		2.2		4.2		6.8	
Smallmouth Bass	Adult	603389	9401	Rochester Park	780		470		650		1200		1700	
Smallmouth Bass	Adult	603389	9402	Rochester Park	720		520		600		1100		1500	
Smallmouth Bass	Adult	603389	9403	Rochester Park	440		330		360		620		920	
Smallmouth Bass	Young of year	603389	9404	Rochester Park	290		270		250		510		690	
Smallmouth Bass	Young of year	603389	9405	Rochester Park	340		240		270		410		640	
Smallmouth Bass	Young of year	603389	9406	Rochester Park	320		220		260		510		710	
Smallmouth Bass	Adult	603390	9401	Esselingen Park	330		220		260		470		680	
Smallmouth Bass	Adult	603390	9402	Esselingen Park	350		280		280		530		730	
Smallmouth Bass	Adult	603390	9403	Esselingen Park	330		210		260		520		740	
Smallmouth Bass	Young of year	603390	9404	Esselingen Park	150		180		130		200		360	
Smallmouth Bass	Young of year	603390	9405	Esselingen Park	210		240		180		310		470	
Smallmouth Bass	Young of year	603390	9406	Esselingen Park	230		210		170		280		520	
Smallmouth Bass	Adult	603391	9401	Between Kohler Dams	390		250		330		730		990	
Smallmouth Bass	Adult	603391	9402	Between Kohler Dams	260		200		200		440		620	
Smallmouth Bass	Adult	603391	9403	Between Kohler Dams	590		460		490		890		1200	
Smallmouth Bass	Young of year	603391	9404	Between Kohler Dams	330		410		320		540		750	
Smallmouth Bass	Young of year	603391	9405	Between Kohler Dams	270		330		270		460		590	
Smallmouth Bass	Young of year	603391	9406	Between Kohler Dams	560		560		500		840		1200	
White Sucker	Adult	603388	9407	Control	2.7		1.4		2		3.9		5.9	
White Sucker	Adult	603388	9408	Control	1	U	1	U	0.8	U	0.91		1.2	
White Sucker	Adult	603388	9409	Control	1	U	1	U	0.8	U	0.6	U	0.72	
White Sucker	Young of year	603388	9410	Control	1	U	1	U	0.8	U	0.67		0.93	
White Sucker	Young of year	603388	9411	Control	1	U	1	U	0.8	U	0.88		1.4	
White Sucker	Young of year	603388	9412	Control	4		2.6		3.2		5.7		8.2	
White Sucker	Adult	603389	9407	Rochester Park	130		100		120		200		230	

Table A3-4. Continued

Species	Age Class	Station	Sample	Location	PCB087 (µg/kg) Conc	Q	PCB091 (µg/kg) Conc	Q	PCB097 (µg/kg) Conc	Q	PCB099 (µg/kg) Conc	Q	PCB101 (µg/kg) Conc	Q
White Sucker	Adult	603389	9408	Rochester Park	190		130		170		270		350	
White Sucker	Adult	603389	9409	Rochester Park	300		260		270		450		620	
White Sucker	Young of year	603389	9410	Rochester Park	190		170		160		230		330	
White Sucker	Young of year	603389	9411	Rochester Park	190		180		160		240		370	
White Sucker	Young of year	603389	9412	Rochester Park	150		150		140		220		290	
White Sucker	Adult	603390	9407	Esselingen Park	63		52		54		96		140	
White Sucker	Adult	603390	9408	Esselingen Park	270		240		220		420		600	
White Sucker	Adult	603390	9409	Esselingen Park	110		100		93		150		210	
White Sucker	Young of year	603390	9410	Esselingen Park	68		72		56		100		140	
White Sucker	Young of year	603390	9411	Esselingen Park	66		77		59		98		140	
White Sucker	Young of year	603390	9412	Esselingen Park	88		93		78		130		190	
White Sucker	Adult	603391	9407	Between Kohler Dams	120		140		120		230		310	
White Sucker	Adult	603391	9408	Between Kohler Dams	180		180		170		290		390	
White Sucker	Adult	603391	9409	Between Kohler Dams	210		220		200		350		470	
White Sucker	Young of year	603391	9410	Between Kohler Dams	110		160		110		190		280	
White Sucker	Young of year	603391	9411	Between Kohler Dams	210		330		200		340		480	
White Sucker	Young of year	603391	9412	Between Kohler Dams	120		140		110		180		290	

Table A3-4. Continued

Species	Age Class	Station	Sample	Location	PCB105 (µg/kg) Conc	Q	PCB118 (µg/kg) Conc	Q	PCB123 (µg/kg) Conc	Q	PCB126 (µg/kg) Conc	Q	PCB128 (µg/kg) Conc	Q
Crayfish		603384	9409	Control	1	U	0.8	U	1	U	1	U	1.4	U
Crayfish		603384	9410	Control	1	U	0.8	U	1	U	1	U	1.4	U
Crayfish		603384	9411	Control			1.5						1.4	U
Crayfish		603385	9409	Rochester Park	29		98		8	U*I	1	U	10	
Crayfish		603385	9410	Rochester Park	22		83		2.1	U*I	1	U	7.9	
Crayfish		603385	9411	Rochester Park			79						10	
Crayfish		603386	9409	Between Kohler Dams	26		130		7.1	U*I	1	U	12	
Crayfish		603386	9410	Between Kohler Dams	21		95		8.7	U*I	1	U	11	
Crayfish		603386	9411	Between Kohler Dams			88						12	
Crayfish		603387	9409	Esselingen Park	19		80		4	U*I	1	U	9.4	
Crayfish		603387	9410	Esselingen Park	23		87		4	U*I	1	U	11	
Crayfish		603387	9411	Esselingen Park			83						12	
Emergent Insects		603384	9401	Control	2.8		9.3		1	U	1	U	1.5	
Emergent Insects		603384	9402	Control	1.6		6		1	U	1	U	1.4	U
Emergent Insects		603384	9403	Control	1	U	3.6		1	U	1	U	1.4	U
Emergent Insects		603384	9404	Control	1.4		4.9		1	U	1	U	1.4	U
Emergent Insects		603385	9401	Rochester Park	290		710		19	U*I	1	U	73	
Emergent Insects		603385	9402	Rochester Park	260		820		15	U*I	1	U	79	
Emergent Insects		603385	9403	Rochester Park	170		450		12	U*I	1	U	54	
Emergent Insects		603385	9404	Rochester Park	170		480		19	U*I	1	U	62	
Emergent Insects		603386	9401	Between Kohler Dams	160		600		28	U*I	1	U	72	
Emergent Insects		603386	9402	Between Kohler Dams	100		480		21	U*I	1	U	53	
Emergent Insects		603386	9403	Between Kohler Dams	87		260		17	U*I	1	U	31	
Emergent Insects		603386	9404	Between Kohler Dams	71		260		20	U*I	1	U	32	
Emergent Insects		603387	9401	Esselingen Park	81		270		15	U*I	1	U	31	
Emergent Insects		603387	9402	Esselingen Park	80		310		16	U*I	1	U	35	
Emergent Insects		603387	9403	Esselingen Park	97		340		19	U*I	1	U	40	
Emergent Insects		603387	9404	Esselingen Park	130		390		13	U*I	1	U	46	
Larval Insects		603384	9405	Control	1	U	1.6		1	U	1	U	1.4	U
Larval Insects		603384	9406	Control			2.6						1.4	U
Larval Insects		603384	9407	Control	1	U	1.2		1	U	1	U	1.4	U
Larval Insects		603384	9408	Control	1	U	1.7		1	U	1	U	1.4	U
Larval Insects		603385	9405	Rochester Park	100		290		9.3	U*I	1	U	34	
Larval Insects		603385	9406	Rochester Park			210						26	
Larval Insects		603385	9407	Rochester Park	110		290		9	U*I	1	U	36	
Larval Insects		603385	9408	Rochester Park	88		250		7.6	U*I	1	U	28	
Larval Insects		603386	9405	Between Kohler Dams	81		230		17	U*I	1	U	27	
Larval Insects		603386	9406	Between Kohler Dams			230						27	
Larval Insects		603386	9407	Between Kohler Dams	62		180		11	U*I	1	U	21	
Larval Insects		603386	9408	Between Kohler Dams	63		180		13	U*I	1	U	20	
Larval Insects		603387	9406	Esselingen Park	51		170		5.8	U*I	1	U	19	
Larval Insects		603387	9407	Esselingen Park	50		170		7	U*I	1	U	21	
Larval Insects		603387	9408	Esselingen Park	43		180		7.4	U*I	1	U	21	

Table A3-4. Continued

Species	Age Class	Station	Sample	Location	PCB105 (µg/kg) Conc	Q	PCB118 (µg/kg) Conc	Q	PCB123 (µg/kg) Conc	Q	PCB126 (µg/kg) Conc	Q	PCB128 (µg/kg) Conc	Q
Longnose Dace	Young of year	603388	9413	Control	9.9		25		1	U	1	U	3.5	
Longnose Dace	Young of year	603388	9414	Control			6.8						1.6	
Longnose Dace	Young of year	603388	9415	Control			3.3						1.4	U
Longnose Dace	Young of year	603389	9413	Rochester Park			300						34	
Longnose Dace	Young of year	603389	9414	Rochester Park			320						36	
Longnose Dace	Young of year	603389	9415	Rochester Park	240		740		17	U*I	2	U*I	71	
Longnose Dace	Young of year	603390	9413	Esselingen Park	260		760		20	U*I	1	U	87	
Longnose Dace	Young of year	603390	9414	Esselingen Park			700						78	
Longnose Dace	Young of year	603390	9415	Esselingen Park			460						53	
Longnose Dace	Young of year	603391	9413	Between Kohler Dams			460						54	
Longnose Dace	Young of year	603391	9414	Between Kohler Dams			560						63	
Longnose Dace	Young of year	603391	9415	Between Kohler Dams	170		560		16	U*I	1	U	65	
Smallmouth Bass	Adult	603388	9401	Control	8.6		39		1.2	U*I	1	U	5.5	
Smallmouth Bass	Adult	603388	9402	Control	4.5		13		1	U	1	U	2.5	
Smallmouth Bass	Adult	603388	9403	Control	3.1		8.1		1	U	1	U	1.7	
Smallmouth Bass	Young of year	603388	9404	Control			3.9						1.4	U
Smallmouth Bass	Young of year	603388	9405	Control			4.4						1.4	U
Smallmouth Bass	Young of year	603388	9406	Control	1.4		7.6		1	U	1	U	1.4	U
Smallmouth Bass	Adult	603389	9401	Rochester Park	770		2000		110	U*I	5.4		260	
Smallmouth Bass	Adult	603389	9402	Rochester Park	920		1900		120	U*I	4		240	
Smallmouth Bass	Adult	603389	9403	Rochester Park	460		1100		75	U*I	1.8		130	
Smallmouth Bass	Young of year	603389	9404	Rochester Park			920						90	
Smallmouth Bass	Young of year	603389	9405	Rochester Park			720						110	
Smallmouth Bass	Young of year	603389	9406	Rochester Park	340		920		23	U*I	2.4	U*I	93	
Smallmouth Bass	Adult	603390	9401	Esselingen Park	210		720		16	U*I	1.2	U*I	73	
Smallmouth Bass	Adult	603390	9402	Esselingen Park	250		820		18	U*I	1.4	U*I	93	
Smallmouth Bass	Adult	603390	9403	Esselingen Park	240		820		17	U*I	1.5	U*I	92	
Smallmouth Bass	Young of year	603390	9404	Esselingen Park			250						32	
Smallmouth Bass	Young of year	603390	9405	Esselingen Park			360						45	
Smallmouth Bass	Young of year	603390	9406	Esselingen Park	170		480		12	U*I	1	U	49	
Smallmouth Bass	Adult	603391	9401	Between Kohler Dams	340		1200		25	U*I	2.2		140	
Smallmouth Bass	Adult	603391	9402	Between Kohler Dams	210		680		18	U*I	1.2		88	
Smallmouth Bass	Adult	603391	9403	Between Kohler Dams	460		1400		44	U*I	2.4		170	
Smallmouth Bass	Young of year	603391	9404	Between Kohler Dams			830						100	
Smallmouth Bass	Young of year	603391	9405	Between Kohler Dams			720						88	
Smallmouth Bass	Young of year	603391	9406	Between Kohler Dams	430		1200		37	U*I	2		160	
White Sucker	Adult	603388	9407	Control	2.8		7.8		1	U	1	U	1.4	U
White Sucker	Adult	603388	9408	Control			2.1						1.4	U
White Sucker	Adult	603388	9409	Control			1.2						1.4	U
White Sucker	Young of year	603388	9410	Control			1.3						1.4	U
White Sucker	Young of year	603388	9411	Control			1.6						1.4	U
White Sucker	Young of year	603388	9412	Control	3.2		11		1	U	1	U	1.6	
White Sucker	Adult	603389	9407	Rochester Park	130		320		8.8	U*I	1.2	U*I	48	

Table A3-4. Continued

Species	Age Class	Station	Sample	Location	PCB105 (µg/kg) Conc	Q	PCB118 (µg/kg) Conc	Q	PCB123 (µg/kg) Conc	Q	PCB126 (µg/kg) Conc	Q	PCB128 (µg/kg) Conc	Q
White Sucker	Adult	603389	9408	Rochester Park			470						57	
White Sucker	Adult	603389	9409	Rochester Park			730						82	
White Sucker	Young of year	603389	9410	Rochester Park			370						50	
White Sucker	Young of year	603389	9411	Rochester Park			400						50	
White Sucker	Young of year	603389	9412	Rochester Park	130		310		9	U*I	1.9	U*I	41	
White Sucker	Adult	603390	9407	Esselingen Park	40		140		4.2	U*I	1	U	17	
White Sucker	Adult	603390	9408	Esselingen Park			550						68	
White Sucker	Adult	603390	9409	Esselingen Park			200						28	
White Sucker	Young of year	603390	9410	Esselingen Park			140						22	
White Sucker	Young of year	603390	9411	Esselingen Park			140						20	
White Sucker	Young of year	603390	9412	Esselingen Park	61		200		5.6	U*I	1	U	25	
White Sucker	Adult	603391	9407	Between Kohler Dams	120		330		8.1	U*I	1	U	42	
White Sucker	Adult	603391	9408	Between Kohler Dams			470						59	
White Sucker	Adult	603391	9409	Between Kohler Dams			540						61	
White Sucker	Young of year	603391	9410	Between Kohler Dams			250						36	
White Sucker	Young of year	603391	9411	Between Kohler Dams			450						59	
White Sucker	Young of year	603391	9412	Between Kohler Dams	83		260		7.1	U*I	1	U	31	

Table A3-4. Continued

					PCB132/153 (µg/kg)		PCB136 (µg/kg)		PCB137/176 (µg/kg)		PCB138/163 (µg/kg)		PCB141 (µg/kg)	
Species	**Age Class**	**Station**	**Sample**	**Location**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**
Crayfish		603384	9409	Control	1.8	U	2	U	1	U	1.7	U	0.8	U
Crayfish		603384	9410	Control	1.8	U	2	U	1	U	1.7	U	0.8	U
Crayfish		603384	9411	Control	1.9		2	U	1	U	1.7	U	0.8	U
Crayfish		603385	9409	Rochester Park	63						65		12	U*I
Crayfish		603385	9410	Rochester Park	55						55		10	U*I
Crayfish		603385	9411	Rochester Park	58				1	U	64		9	U*I
Crayfish		603386	9409	Between Kohler Dams	78		10	U*I	1	U	84		14	U*I
Crayfish		603386	9410	Between Kohler Dams	75		2	U*I	1	U	81		13	U*I
Crayfish		603386	9411	Between Kohler Dams	69		2	U	1	U	76		9.9	U*I
Crayfish		603387	9409	Esselingen Park	58		2	U	5.2		66		9	U*I
Crayfish		603387	9410	Esselingen Park	65		2	U	1	U	73		10	U*I
Crayfish		603387	9411	Esselingen Park	70		2	U	1	U	82		11	U*I
Emergent Insects		603384	9401	Control	11		2	U	1	U	9.9		1.3	U*I
Emergent Insects		603384	9402	Control	8.2		2	U	1	U	8.4		1	U*I
Emergent Insects		603384	9403	Control	7		2	U	1	U	6.4		0.8	U
Emergent Insects		603384	9404	Control	7.8		2	U	1	U	7.4		0.8	U
Emergent Insects		603385	9401	Rochester Park	540		17	U*I	2.1	U*I	550		68	U*I
Emergent Insects		603385	9402	Rochester Park	590		21		2.3	U*I	610		83	U*I
Emergent Insects		603385	9403	Rochester Park	350		13		1.6	U*I	390		56	U*I
Emergent Insects		603385	9404	Rochester Park	390		15		2	U*I	430		63	U*I
Emergent Insects		603386	9401	Between Kohler Dams	530		19		2.8	U*I	530		69	U*I
Emergent Insects		603386	9402	Between Kohler Dams	420		14		2	U*I	420		51	U*I
Emergent Insects		603386	9403	Between Kohler Dams	240		14	U*I			240		35	U*I
Emergent Insects		603386	9404	Between Kohler Dams	250		17	U*I			240		36	U*I
Emergent Insects		603387	9401	Esselingen Park	230		10	U*I			230		31	U*I
Emergent Insects		603387	9402	Esselingen Park	240		12	U*I			260		35	U*I
Emergent Insects		603387	9403	Esselingen Park	260		15	U*I			290		42	U*I
Emergent Insects		603387	9404	Esselingen Park	290		18	U*I			320		40	U*I
Larval Insects		603384	9405	Control	2.7		2	U	1	U	2.5		0.8	U
Larval Insects		603384	9406	Control	3.6		2	U	1	U	3.2		0.8	U
Larval Insects		603384	9407	Control	2		2	U	1	U	1.9		0.8	U
Larval Insects		603384	9408	Control	2.7		2	U	1	U	2.6		0.8	U
Larval Insects		603385	9405	Rochester Park	190		9.3		1	U	210		34	U*I
Larval Insects		603385	9406	Rochester Park	140		5.6		1	U	160		22	U*I
Larval Insects		603385	9407	Rochester Park	190		9.4		1	U	220		36	U*I
Larval Insects		603385	9408	Rochester Park	140		5.8		1	U	180		28	U*I
Larval Insects		603386	9405	Between Kohler Dams	190		13	U*I			190		27	U*I
Larval Insects		603386	9406	Between Kohler Dams	190		12	U*I			190		22	U*I
Larval Insects		603386	9407	Between Kohler Dams	150		11	U*I			150		21	U*I
Larval Insects		603386	9408	Between Kohler Dams	150		9	U*I			150		30	U*I
Larval Insects		603387	9406	Esselingen Park	120		9	U*I			130		17	U*I
Larval Insects		603387	9407	Esselingen Park	120		9	U*I	1	U	130		20	U*I
Larval Insects		603387	9408	Esselingen Park	120		9	U*I	1	U	140		19	U*I

Table A3-4. Continued

Species	Age Class	Station	Sample	Location	PCB132/153 (µg/kg) Conc	Q	PCB136 (µg/kg) Conc	Q	PCB137/176 (µg/kg) Conc	Q	PCB138/163 (µg/kg) Conc	Q	PCB141 (µg/kg) Conc	Q
Longnose Dace	Young of year	603388	9413	Control	26		2	U	1	U	25		3	U*I
Longnose Dace	Young of year	603388	9414	Control	14		2	U	1	U	12		1.7	U*I
Longnose Dace	Young of year	603388	9415	Control	7.4		2	U	1	U	6.3		0.8	U
Longnose Dace	Young of year	603389	9413	Rochester Park	230		5.7		20	U*I	240		35	U*I
Longnose Dace	Young of year	603389	9414	Rochester Park	260		6.6		20	U*I	260		40	U*I
Longnose Dace	Young of year	603389	9415	Rochester Park	440		14				490		69	U*I
Longnose Dace	Young of year	603390	9413	Esselingen Park	760		15	U*I	2.5	U*I	690		81	U*I
Longnose Dace	Young of year	603390	9414	Esselingen Park	650		12	U*I			620		70	U*I
Longnose Dace	Young of year	603390	9415	Esselingen Park	470		9.5	U*I	1.3		420		50	U*I
Longnose Dace	Young of year	603391	9413	Between Kohler Dams	460		19	U*I			410		50	U*I
Longnose Dace	Young of year	603391	9414	Between Kohler Dams	560		24	U*I	1.6	U*I	500		60	U*I
Longnose Dace	Young of year	603391	9415	Between Kohler Dams	670		14	U*I	2.5	U*I	530		64	U*I
Smallmouth Bass	Adult	603388	9401	Control	31		2	U	1	U	34		4	U*I
Smallmouth Bass	Adult	603388	9402	Control	21		2	U	1	U	18		2	U*I
Smallmouth Bass	Adult	603388	9403	Control	13		2	U	1	U	11		1.3	U*I
Smallmouth Bass	Young of year	603388	9404	Control	6.7		2	U	1	U	5.6		0.8	U
Smallmouth Bass	Young of year	603388	9405	Control	8.3		2	U	1	U	6.8		0.8	U
Smallmouth Bass	Young of year	603388	9406	Control	10		2	U	1	U	9.5		1.2	U*I
Smallmouth Bass	Adult	603389	9401	Rochester Park	1400		44		5	U*I	1600		200	U*I
Smallmouth Bass	Adult	603389	9402	Rochester Park	1400		33		4	U*I	1600		190	U*I
Smallmouth Bass	Adult	603389	9403	Rochester Park	770		17		2	U*I	830		110	U*I
Smallmouth Bass	Young of year	603389	9404	Rochester Park	570		26	U*I	1.4		630		75	U*I
Smallmouth Bass	Young of year	603389	9405	Rochester Park	580		18		1.3		720		110	U*I
Smallmouth Bass	Young of year	603389	9406	Rochester Park	580		19				630		81	U*I
Smallmouth Bass	Adult	603390	9401	Esselingen Park	510		22	U*I			560		65	
Smallmouth Bass	Adult	603390	9402	Esselingen Park	620		26	U*I			680		78	U*I
Smallmouth Bass	Adult	603390	9403	Esselingen Park	660		21	U*I			690		82	U*I
Smallmouth Bass	Young of year	603390	9404	Esselingen Park	240		20	U*I	20	U*I	240		32	U*I
Smallmouth Bass	Young of year	603390	9405	Esselingen Park	380		11		25	U*I	360		45	U*I
Smallmouth Bass	Young of year	603390	9406	Esselingen Park	400		13				390		47	U*I
Smallmouth Bass	Adult	603391	9401	Between Kohler Dams	1100		28	U*I	3.5	U*I	1000		130	U*I
Smallmouth Bass	Adult	603391	9402	Between Kohler Dams	730		12	U*I	2.3	U*I	660		83	U*I
Smallmouth Bass	Adult	603391	9403	Between Kohler Dams	1300		24	U*I	3.7	U*I	1200		160	U*I
Smallmouth Bass	Young of year	603391	9404	Between Kohler Dams	690		26		2.1		690		75	U*I
Smallmouth Bass	Young of year	603391	9405	Between Kohler Dams	550		30	U*I	1.3		580		64	U*I
Smallmouth Bass	Young of year	603391	9406	Between Kohler Dams	1300		35	U*I	4.5	U*I	1200		150	U*I
White Sucker	Adult	603388	9407	Control	10		2	U	1	U	9.5		1	U*I
White Sucker	Adult	603388	9408	Control	4.8		2	U	1	U	4		0.8	U
White Sucker	Adult	603388	9409	Control	3.5		2	U	1	U	2.8		0.8	U
White Sucker	Young of year	603388	9410	Control	3.3		2	U	1	U	2.7		0.8	U
White Sucker	Young of year	603388	9411	Control	3.7		2	U	1	U	3.3		0.8	U
White Sucker	Young of year	603388	9412	Control	9.2		2	U	1	U	9.6		1.2	U*I
White Sucker	Adult	603389	9407	Rochester Park	280		7.3				300		31	U*I

Table A3-4. Continued

Species	Age Class	Station	Sample	Location	PCB132/153 (µg/kg) Conc	Q	PCB136 (µg/kg) Conc	Q	PCB137/176 (µg/kg) Conc	Q	PCB138/163 (µg/kg) Conc	Q	PCB141 (µg/kg) Conc	Q
White Sucker	Adult	603389	9408	Rochester Park	410		8.4		25		410		44	U*I
White Sucker	Adult	603389	9409	Rochester Park	530		14				600		70	U*I
White Sucker	Young of year	603389	9410	Rochester Park	260		11				290		40	U*I
White Sucker	Young of year	603389	9411	Rochester Park	340		12		22		310		41	U*I
White Sucker	Young of year	603389	9412	Rochester Park	250		10				270		33	U*I
White Sucker	Adult	603390	9407	Esselingen Park	130						130		15	U*I
White Sucker	Adult	603390	9408	Esselingen Park	520				35	U*I	540		65	U*I
White Sucker	Adult	603390	9409	Esselingen Park	200				15	U*I	200		24	U*I
White Sucker	Young of year	603390	9410	Esselingen Park	140		7.7	U*I			130		11	U*I
White Sucker	Young of year	603390	9411	Esselingen Park	140		17	U*I			130		12	
White Sucker	Young of year	603390	9412	Esselingen Park	170		18	U*I	12	U*I	170		19	U*I
White Sucker	Adult	603391	9407	Between Kohler Dams	350		6.5	U*I	1.9	U*I	270		31	U*I
White Sucker	Adult	603391	9408	Between Kohler Dams	400		87	U*I			400		36	U*I
White Sucker	Adult	603391	9409	Between Kohler Dams	460		90	U*I	1.2		460		45	U*I
White Sucker	Young of year	603391	9410	Between Kohler Dams	250		16	U*I			230		22	U*I
White Sucker	Young of year	603391	9411	Between Kohler Dams	420		31	U*I	1.7		390		40	U*I
White Sucker	Young of year	603391	9412	Between Kohler Dams	230		7.5	U*I	15	U*I	220		26	U*I

Table A3-4. Continued

Species	Age Class	Station	Sample	Location	PCB144/135 (µg/kg) Conc	Q	PCB146 (µg/kg) Conc	Q	PCB149 (µg/kg) Conc	Q	PCB151 (µg/kg) Conc	Q	PCB156 (µg/kg) Conc	Q
Crayfish		603384	9409	Control	0.8	U	1	U	1.1	U	1	U	1	U
Crayfish		603384	9410	Control	0.8	U	1	U	1.1	U	1	U	1	U
Crayfish		603384	9411	Control	0.8	U	1	U	1.1	U	1	U		
Crayfish		603385	9409	Rochester Park	2.9		17		24		5.1		6.3	
Crayfish		603385	9410	Rochester Park	2.4		15		20		4.5		5.1	
Crayfish		603385	9411	Rochester Park	3		17		23		5.6			
Crayfish		603386	9409	Between Kohler Dams	4.1		27		32		7.7		5.8	
Crayfish		603386	9410	Between Kohler Dams	4.3		25		33		8		6.3	
Crayfish		603386	9411	Between Kohler Dams	3.9		23		30		7.2			
Crayfish		603387	9409	Esselingen Park	3.9		19		26		6.9		3.9	
Crayfish		603387	9410	Esselingen Park	3.4		20		27		6.1		4.7	
Crayfish		603387	9411	Esselingen Park	3.9		23		32		7.1			
Emergent Insects		603384	9401	Control	0.8	U	1.7		4.1		1	U	1	U
Emergent Insects		603384	9402	Control	0.8	U	1.3		2.6		1	U	1	U
Emergent Insects		603384	9403	Control	0.8	U	1.1		2		1	U	1	U
Emergent Insects		603384	9404	Control	0.8	U	1.2		2.5		1	U	1	U
Emergent Insects		603385	9401	Rochester Park	48		86		280		18		55	
Emergent Insects		603385	9402	Rochester Park	59		100		300		27		57	
Emergent Insects		603385	9403	Rochester Park	38		70		160		18		38	
Emergent Insects		603385	9404	Rochester Park	45		80		210		15		44	
Emergent Insects		603386	9401	Between Kohler Dams	71		120		300		21		46	
Emergent Insects		603386	9402	Between Kohler Dams	52		90		240		21		34	
Emergent Insects		603386	9403	Between Kohler Dams	33		65		130		18		20	
Emergent Insects		603386	9404	Between Kohler Dams	34		60		130		15		20	
Emergent Insects		603387	9401	Esselingen Park	23		55		110		27		16	
Emergent Insects		603387	9402	Esselingen Park	29		61		130		17		18	
Emergent Insects		603387	9403	Esselingen Park	37		71		160		19		23	
Emergent Insects		603387	9404	Esselingen Park	44		75		180		12		18	
Larval Insects		603384	9405	Control	0.8	U	1	U	1.1	U	1	U	1	U
Larval Insects		603384	9406	Control	0.8	U	1	U	1.3		1	U		
Larval Insects		603384	9407	Control	0.8	U	1	U	1.1	U	1	U	1	U
Larval Insects		603384	9408	Control	0.8	U	1	U	1.1	U	1	U	1	U
Larval Insects		603385	9405	Rochester Park	21		38		90		20		22	
Larval Insects		603385	9406	Rochester Park	16		28		69		13			
Larval Insects		603385	9407	Rochester Park	22		39		92		18		21	
Larval Insects		603385	9408	Rochester Park	16		30		72		15		15	
Larval Insects		603386	9405	Between Kohler Dams	26		48		100		24		13	
Larval Insects		603386	9406	Between Kohler Dams	25		45		99		19			
Larval Insects		603386	9407	Between Kohler Dams	23		39		85		20		10	
Larval Insects		603386	9408	Between Kohler Dams	24		38		84		23		10	
Larval Insects		603387	9406	Esselingen Park	18		30		68		13		7.4	
Larval Insects		603387	9407	Esselingen Park	19		31		67		16		7.8	
Larval Insects		603387	9408	Esselingen Park	20		32		70		17		6.2	

Table A3-4. Continued

Species	Age Class	Station	Sample	Location	PCB144/135 (µg/kg) Conc	Q	PCB146 (µg/kg) Conc	Q	PCB149 (µg/kg) Conc	Q	PCB151 (µg/kg) Conc	Q	PCB156 (µg/kg) Conc	Q
Longnose Dace	Young of year	603388	9413	Control	1.6		4.8		9.4		2.3		2.4	
Longnose Dace	Young of year	603388	9414	Control	0.8	U	2.1		3.9		1	U		
Longnose Dace	Young of year	603388	9415	Control	0.8	U	1		1.8		1	U		
Longnose Dace	Young of year	603389	9413	Rochester Park	24		49		120		24			
Longnose Dace	Young of year	603389	9414	Rochester Park	26		54		140		28			
Longnose Dace	Young of year	603389	9415	Rochester Park	47		83		210		44		44	
Longnose Dace	Young of year	603390	9413	Esselingen Park	71		140		400		69		54	
Longnose Dace	Young of year	603390	9414	Esselingen Park	71		140		330		67			
Longnose Dace	Young of year	603390	9415	Esselingen Park	53		100		250		52			
Longnose Dace	Young of year	603391	9413	Between Kohler Dams	48		99		200		45			
Longnose Dace	Young of year	603391	9414	Between Kohler Dams	61		120		300		56			
Longnose Dace	Young of year	603391	9415	Between Kohler Dams	65		130		360		59		38	
Smallmouth Bass	Adult	603388	9401	Control	1.9		5.4		12		2.6		1.6	
Smallmouth Bass	Adult	603388	9402	Control	0.89		2.9		5.8		1.3		1.4	
Smallmouth Bass	Adult	603388	9403	Control	0.8	U	2		3.7		1	U	1.1	
Smallmouth Bass	Young of year	603388	9404	Control	0.8	U	1	U	1.6		1	U		
Smallmouth Bass	Young of year	603388	9405	Control	0.8	U	1.1		2		1	U		
Smallmouth Bass	Young of year	603388	9406	Control	0.8	U	1.6		3.2		1	U	1	U
Smallmouth Bass	Adult	603389	9401	Rochester Park	97		280		600		150		170	
Smallmouth Bass	Adult	603389	9402	Rochester Park	100		280		590		160		190	
Smallmouth Bass	Adult	603389	9403	Rochester Park	60		150		350		81		90	
Smallmouth Bass	Young of year	603389	9404	Rochester Park	57		100		240		67			
Smallmouth Bass	Young of year	603389	9405	Rochester Park	62		140		310		83			
Smallmouth Bass	Young of year	603389	9406	Rochester Park	41		100		200		58		54	
Smallmouth Bass	Adult	603390	9401	Esselingen Park	44		110		260		56		41	
Smallmouth Bass	Adult	603390	9402	Esselingen Park	53		130		310		71		53	
Smallmouth Bass	Adult	603390	9403	Esselingen Park	46		140		290		62		51	
Smallmouth Bass	Young of year	603390	9404	Esselingen Park	29		53		130		33			
Smallmouth Bass	Young of year	603390	9405	Esselingen Park	41		74		190		46			
Smallmouth Bass	Young of year	603390	9406	Esselingen Park	39		76		170		47		23	
Smallmouth Bass	Adult	603391	9401	Between Kohler Dams	64		240		490		95		88	
Smallmouth Bass	Adult	603391	9402	Between Kohler Dams	50		150		340		71		64	
Smallmouth Bass	Adult	603391	9403	Between Kohler Dams	85		240		600		120		120	
Smallmouth Bass	Young of year	603391	9404	Between Kohler Dams	85		150		380		91			
Smallmouth Bass	Young of year	603391	9405	Between Kohler Dams	63		130		270		69			
Smallmouth Bass	Young of year	603391	9406	Between Kohler Dams	100		230		660		130		99	
White Sucker	Adult	603388	9407	Control	0.8	U	1.6		2.8		1	U	1	U
White Sucker	Adult	603388	9408	Control	0.8	U	1	U	1.1	U	1	U		
White Sucker	Adult	603388	9409	Control	0.8	U	1	U	1.1	U	1	U		
White Sucker	Young of year	603388	9410	Control	0.8	U	1	U	1.1	U	1	U		
White Sucker	Young of year	603388	9411	Control	0.8	U	1	U	1.1	U	1	U		
White Sucker	Young of year	603388	9412	Control	0.8	U	1.7		3.2		1	U	1	U
White Sucker	Adult	603389	9407	Rochester Park	17		60		99		23		27	

Table A3-4. Continued

Species	Age Class	Station	Sample	Location	PCB144/135 (µg/kg) Conc	Q	PCB146 (µg/kg) Conc	Q	PCB149 (µg/kg) Conc	Q	PCB151 (µg/kg) Conc	Q	PCB156 (µg/kg) Conc	Q
White Sucker	Adult	603389	9408	Rochester Park	21		67		140		26			
White Sucker	Adult	603389	9409	Rochester Park	37		100		230		45			
White Sucker	Young of year	603389	9410	Rochester Park	25		55		120		31			
White Sucker	Young of year	603389	9411	Rochester Park	30		64		160		34			
White Sucker	Young of year	603389	9412	Rochester Park	25		58		110		29		22	
White Sucker	Adult	603390	9407	Esselingen Park	11		29		56		9.5		11	
White Sucker	Adult	603390	9408	Esselingen Park	44		100		230		44			
White Sucker	Adult	603390	9409	Esselingen Park	19		44		88		18			
White Sucker	Young of year	603390	9410	Esselingen Park	14		26		68		17			
White Sucker	Young of year	603390	9411	Esselingen Park	13		28		66		18			
White Sucker	Young of year	603390	9412	Esselingen Park	19		38		84		21		13	
White Sucker	Adult	603391	9407	Between Kohler Dams	24		67		120		27		22	
White Sucker	Adult	603391	9408	Between Kohler Dams	29		90		160		35			
White Sucker	Adult	603391	9409	Between Kohler Dams	40		110		220		46			
White Sucker	Young of year	603391	9410	Between Kohler Dams	28		53		130		34			
White Sucker	Young of year	603391	9411	Between Kohler Dams	55		96		230		65			
White Sucker	Young of year	603391	9412	Between Kohler Dams	27		56		110		29		19	

Table A3-4. Continued

Species	Age Class	Station	Sample	Location	PCB157 (µg/kg) Conc	Q	PCB167 (µg/kg) Conc	Q	PCB169 (µg/kg) Conc	Q	PCB170/190 (µg/kg) Conc	Q	PCB171/202 (µg/kg) Conc	Q
Crayfish		603384	9409	Control	1	U	1.8	U	1	U	2.5	U	0.8	U
Crayfish		603384	9410	Control	1	U	1.8	U	1	U	2.5	U	0.8	U
Crayfish		603384	9411	Control			1.8	U			2.5	U	0.8	U
Crayfish		603385	9409	Rochester Park	2.1		3.5		1	U	10			
Crayfish		603385	9410	Rochester Park	1.7		2.7		1	U	8.1			
Crayfish		603385	9411	Rochester Park			3.3				10		1.6	U*I
Crayfish		603386	9409	Between Kohler Dams	1.4		3.9		1	U	14		3	U*I
Crayfish		603386	9410	Between Kohler Dams	1.4		3.6		1	U	12		3	U*I
Crayfish		603386	9411	Between Kohler Dams			3.4				11		1.9	U*I
Crayfish		603387	9409	Esselingen Park	2.1		3.3		1	U	11		2.5	U*I
Crayfish		603387	9410	Esselingen Park	2.3		3.8		1	U	12		2.5	U*I
Crayfish		603387	9411	Esselingen Park			3.6				12		2.2	U*I
Emergent Insects		603384	9401	Control	1	U	1.8	U	1	U	2.8		0.8	U
Emergent Insects		603384	9402	Control	1	U	1.8	U	1	U	2.5	U	0.8	U
Emergent Insects		603384	9403	Control	1	U	1.8	U	1	U	2.5	U	0.8	U
Emergent Insects		603384	9404	Control	1	U	1.8	U	1	U	2.5	U	0.8	U
Emergent Insects		603385	9401	Rochester Park	23		21		1	U	100		17	U*I
Emergent Insects		603385	9402	Rochester Park	19		25		1	U	110		19	U*I
Emergent Insects		603385	9403	Rochester Park	12		17		1	U	77		13	U*I
Emergent Insects		603385	9404	Rochester Park	15		19		1	U	85		15	U*I
Emergent Insects		603386	9401	Between Kohler Dams	11		22		1	U	110		9.4	
Emergent Insects		603386	9402	Between Kohler Dams	8.6		16		1	U	80		7.7	U*I
Emergent Insects		603386	9403	Between Kohler Dams	5.2		10		1	U	52		9	U*I
Emergent Insects		603386	9404	Between Kohler Dams	5.2		10		1	U	49		9	U*I
Emergent Insects		603387	9401	Esselingen Park	4.4		8.8		1	U	40		7	U*I
Emergent Insects		603387	9402	Esselingen Park	5.1		10		1	U	55		9	U*I
Emergent Insects		603387	9403	Esselingen Park	6.2		12		1	U	62		7	U*I
Emergent Insects		603387	9404	Esselingen Park	9.4		16		1	U	68		10	U*I
Larval Insects		603384	9405	Control	1	U	1.8	U	1	U	2.5	U	0.8	U
Larval Insects		603384	9406	Control			1.8	U			2.5	U	0.8	U
Larval Insects		603384	9407	Control	1	U	1.8	U	1	U	2.5	U	0.8	U
Larval Insects		603384	9408	Control	1	U	1.8	U	1	U	2.5	U	0.8	U
Larval Insects		603385	9405	Rochester Park	8.7		9.4		1	U	42		4.5	U*I
Larval Insects		603385	9406	Rochester Park			6.6				31		4.9	U*I
Larval Insects		603385	9407	Rochester Park	8.7		9.7		1	U	43		7.5	U*I
Larval Insects		603385	9408	Rochester Park	6.2		7.7		1	U	33		6	U*I
Larval Insects		603386	9405	Between Kohler Dams	3.9		7.2		1	U	36		7	U*I
Larval Insects		603386	9406	Between Kohler Dams			7.4				37		5.9	U*I
Larval Insects		603386	9407	Between Kohler Dams	3		5.4		1	U	28		5	U*I
Larval Insects		603386	9408	Between Kohler Dams	3.1		5		1	U	26		5	U*I
Larval Insects		603387	9406	Esselingen Park	4		5.7		1	U	25		4.5	U*I
Larval Insects		603387	9407	Esselingen Park	4.4		6.4		1	U	27		4.5	U*I
Larval Insects		603387	9408	Esselingen Park	3.4		6.6		1	U	28		4.5	U*I

Table A3-4. Continued

Species	Age Class	Station	Sample	Location	PCB157 (µg/kg) Conc	Q	PCB167 (µg/kg) Conc	Q	PCB169 (µg/kg) Conc	Q	PCB170/190 (µg/kg) Conc	Q	PCB171/202 (µg/kg) Conc	Q
Longnose Dace	Young of year	603388	9413	Control	1	U	1.8	U	1	U	4.5		0.8	U
Longnose Dace	Young of year	603388	9414	Control			1.8	U			2.5	U	0.8	U
Longnose Dace	Young of year	603388	9415	Control			1.8	U			2.5	U	0.8	U
Longnose Dace	Young of year	603389	9413	Rochester Park			11				53		10	U*I
Longnose Dace	Young of year	603389	9414	Rochester Park			12				56		10	U*I
Longnose Dace	Young of year	603389	9415	Rochester Park	11		19		1	U	82		13	U*I
Longnose Dace	Young of year	603390	9413	Esselingen Park	26		28		1	U	110		13	U*I
Longnose Dace	Young of year	603390	9414	Esselingen Park			22				110		9.8	U*I
Longnose Dace	Young of year	603390	9415	Esselingen Park			14				71		6.6	U*I
Longnose Dace	Young of year	603391	9413	Between Kohler Dams			16				80		12	U*I
Longnose Dace	Young of year	603391	9414	Between Kohler Dams			19				93		14	U*I
Longnose Dace	Young of year	603391	9415	Between Kohler Dams	19		22		1	U	94		10	U*I
Smallmouth Bass	Adult	603388	9401	Control	1	U	1.8	U	1	U	6.5		0.81	
Smallmouth Bass	Adult	603388	9402	Control	1	U	1.8	U	1	U	3.3		0.8	U
Smallmouth Bass	Adult	603388	9403	Control	1	U	1.8	U	1	U	2.5	U	0.8	U
Smallmouth Bass	Young of year	603388	9404	Control			1.8	U			2.5	U	0.8	U
Smallmouth Bass	Young of year	603388	9405	Control			1.8	U			2.5	U	0.8	U
Smallmouth Bass	Young of year	603388	9406	Control	1	U	1.8	U	1	U	2.5	U	0.8	U
Smallmouth Bass	Adult	603389	9401	Rochester Park	52		70		3	U*D	310		60	U*I
Smallmouth Bass	Adult	603389	9402	Rochester Park	54		71		1.5	U*D	290		55	U*I
Smallmouth Bass	Adult	603389	9403	Rochester Park	27		39		1.7	U*D	140		30	U*I
Smallmouth Bass	Young of year	603389	9404	Rochester Park			32				110		10	U*I
Smallmouth Bass	Young of year	603389	9405	Rochester Park			38				130		20	U*I
Smallmouth Bass	Young of year	603389	9406	Rochester Park	16		24		1	U	110		17	U*I
Smallmouth Bass	Adult	603390	9401	Esselingen Park	10		20		1	U	84		14	U*I
Smallmouth Bass	Adult	603390	9402	Esselingen Park	11		25		1	U	110		14	U*I
Smallmouth Bass	Adult	603390	9403	Esselingen Park	11		27		1	U	110		14	U*I
Smallmouth Bass	Young of year	603390	9404	Esselingen Park			9.3				45		10	U*I
Smallmouth Bass	Young of year	603390	9405	Esselingen Park			13				64		11	U*I
Smallmouth Bass	Young of year	603390	9406	Esselingen Park	6.8		13		1	U	58		9.2	U*I
Smallmouth Bass	Adult	603391	9401	Between Kohler Dams	49		56		1	U	170		19	U*I
Smallmouth Bass	Adult	603391	9402	Between Kohler Dams	30		34		1	U	130		15	U*I
Smallmouth Bass	Adult	603391	9403	Between Kohler Dams	36		66		1	U	220		24	U*I
Smallmouth Bass	Young of year	603391	9404	Between Kohler Dams			27				140		13	U*I
Smallmouth Bass	Young of year	603391	9405	Between Kohler Dams			24				110		11	U*I
Smallmouth Bass	Young of year	603391	9406	Between Kohler Dams	36		58		1	U	220		25	U*I
White Sucker	Adult	603388	9407	Control	1	U	1.8	U	1	U	2.5	U	0.8	U
White Sucker	Adult	603388	9408	Control			1.8	U			2.5	U	0.8	U
White Sucker	Adult	603388	9409	Control			1.8	U			2.5	U	0.8	U
White Sucker	Young of year	603388	9410	Control			1.8	U			5.5	U*I	0.8	U
White Sucker	Young of year	603388	9411	Control			1.8	U			2.5	U	0.8	U
White Sucker	Young of year	603388	9412	Control	1	U	1.8	U	1	U	2.5	U	0.8	U
White Sucker	Adult	603389	9407	Rochester Park	6.4		13		1	U	63		11	U*I

Table A3-4. Continued

Species	Age Class	Station	Sample	Location	PCB157 (µg/kg) Conc	Q	PCB167 (µg/kg) Conc	Q	PCB169 (µg/kg) Conc	Q	PCB170/190 (µg/kg) Conc	Q	PCB171/202 (µg/kg) Conc	Q
White Sucker	Adult	603389	9408	Rochester Park			16				81		15	U*I
White Sucker	Adult	603389	9409	Rochester Park			24				120		20	U*I
White Sucker	Young of year	603389	9410	Rochester Park			13				69		12	U*I
White Sucker	Young of year	603389	9411	Rochester Park			13				70		11	U*I
White Sucker	Young of year	603389	9412	Rochester Park	6		10		1	U	52		9.3	U*I
White Sucker	Adult	603390	9407	Esselingen Park	2.6		4.7		1	U	24			
White Sucker	Adult	603390	9408	Esselingen Park			20				110		20	U*I
White Sucker	Adult	603390	9409	Esselingen Park			8.1				45		10	U*I
White Sucker	Young of year	603390	9410	Esselingen Park			5.4				42		2.8	U*I
White Sucker	Young of year	603390	9411	Esselingen Park			4.3				41		3.3	U*I
White Sucker	Young of year	603390	9412	Esselingen Park	5.5		6.2		1	U	29		4	U*I
White Sucker	Adult	603391	9407	Between Kohler Dams	10		12		1	U	55		7.5	U*I
White Sucker	Adult	603391	9408	Between Kohler Dams			15				73		7.8	U*I
White Sucker	Adult	603391	9409	Between Kohler Dams			17				86		8.5	U*I
White Sucker	Young of year	603391	9410	Between Kohler Dams			7.5				50		5.4	U*I
White Sucker	Young of year	603391	9411	Between Kohler Dams			12				72		8.4	U*I
White Sucker	Young of year	603391	9412	Between Kohler Dams	7.2		8.5		1	U	42		6	U*I

Table A3-4. Continued

Species	Age Class	Station	Sample	Location	PCB172/197 (µg/kg) Conc	Q	PCB174 (µg/kg) Conc	Q	PCB177 (µg/kg) Conc	Q	PCB178 (µg/kg) Conc	Q	PCB180 (µg/kg) Conc	Q
Crayfish		603384	9409	Control	1.8	U	1.1	U	1.1	U	1.3	U	2.2	U
Crayfish		603384	9410	Control	1.8	U	1.1	U	1.1	U	1.3	U	2.2	U
Crayfish		603384	9411	Control	1.8	U	1.1	U	1.1	U	1.3	U	2.2	U
Crayfish		603385	9409	Rochester Park			4.2		4.8		2		17	
Crayfish		603385	9410	Rochester Park			2.9		3.7				13	
Crayfish		603385	9411	Rochester Park	2.1		3.4		4.5		2		14	
Crayfish		603386	9409	Between Kohler Dams	2.9		5.1		7.1		3.6		20	
Crayfish		603386	9410	Between Kohler Dams	2.6		4.7		6.5		3.4		18	
Crayfish		603386	9411	Between Kohler Dams	2.4		4.1		5.7		2.9		16	
Crayfish		603387	9409	Esselingen Park	2.3		4.2		5.7		3.5		16	
Crayfish		603387	9410	Esselingen Park	2.6		4.3		5.8		3.3		18	
Crayfish		603387	9411	Esselingen Park	2.7		4.4		6.1		3.1		18	
Emergent Insects		603384	9401	Control	1.8	U	1.1	U	1.1	U	1.3	U	4	
Emergent Insects		603384	9402	Control	1.8	U	1.1	U	1.5	U*I	1.3	U	2.4	
Emergent Insects		603384	9403	Control	1.8	U	1.1	U	1.1	U	1.3	U	2.3	
Emergent Insects		603384	9404	Control	1.8	U	1.1	U	1.1	U	1.3	U	2.3	
Emergent Insects		603385	9401	Rochester Park	14		27		28		12		95	
Emergent Insects		603385	9402	Rochester Park	15		30		30		12		110	
Emergent Insects		603385	9403	Rochester Park	11		21		23		8.9		76	
Emergent Insects		603385	9404	Rochester Park	12		24		26		10		80	
Emergent Insects		603386	9401	Between Kohler Dams	16		30		38		18		100	
Emergent Insects		603386	9402	Between Kohler Dams	12		21		28		13		76	
Emergent Insects		603386	9403	Between Kohler Dams	7.9		15		19		8.7		52	
Emergent Insects		603386	9404	Between Kohler Dams	7.4		13		17		7.8		49	
Emergent Insects		603387	9401	Esselingen Park	5.6		9.5		13		5.3		40	
Emergent Insects		603387	9402	Esselingen Park	8.2		14		19		8.7		54	
Emergent Insects		603387	9403	Esselingen Park	9.6		18		23		11		63	
Emergent Insects		603387	9404	Esselingen Park	11		19		24		11		67	
Larval Insects		603384	9405	Control	1.8	U	1.1	U	1.1	U	1.3	U	2.2	U
Larval Insects		603384	9406	Control	1.8	U	1.1	U	1.1	U	1.3	U	2.2	U
Larval Insects		603384	9407	Control	1.8	U	1.1	U	1.1	U	1.3	U	2.2	U
Larval Insects		603384	9408	Control	1.8	U	1.1	U	1.1	U	1.3	U	2.2	U
Larval Insects		603385	9405	Rochester Park	5.4		12		11		4.1		41	
Larval Insects		603385	9406	Rochester Park	4		8.9		8.2		3.1		28	
Larval Insects		603385	9407	Rochester Park	5.6		13		12		4.2		41	
Larval Insects		603385	9408	Rochester Park	4.4		10		8.6		3.3		31	
Larval Insects		603386	9405	Between Kohler Dams	5.1		10		13		5.4		36	
Larval Insects		603386	9406	Between Kohler Dams	5.3		9.7		13		5.8		35	
Larval Insects		603386	9407	Between Kohler Dams	4.1		8.3		10		4.6		27	
Larval Insects		603386	9408	Between Kohler Dams	3.8		8.3		9.6		4.7		25	
Larval Insects		603387	9406	Esselingen Park	3.7		7.4		8.8		4		25	
Larval Insects		603387	9407	Esselingen Park	3.9		7.9		8.7		4.3		25	
Larval Insects		603387	9408	Esselingen Park	4.1		8.2		9.5		4.6		26	

Table A3-4. Continued

Species	Age Class	Station	Sample	Location	PCB172/197 (µg/kg) Conc	Q	PCB174 (µg/kg) Conc	Q	PCB177 (µg/kg) Conc	Q	PCB178 (µg/kg) Conc	Q	PCB180 (µg/kg) Conc	Q
Longnose Dace	Young of year	603388	9413	Control	1.8	U	1.5		1.4		1.3	U	5.8	
Longnose Dace	Young of year	603388	9414	Control	1.8	U	1.1	U	1.1	U	1.3	U	2.9	
Longnose Dace	Young of year	603388	9415	Control	1.8	U	1.1	U	1.1	U	1.3	U	2.2	U
Longnose Dace	Young of year	603389	9413	Rochester Park	6.9		13		12		17		53	
Longnose Dace	Young of year	603389	9414	Rochester Park	7.5		14		13		4.5		57	
Longnose Dace	Young of year	603389	9415	Rochester Park	11		22		20		7.1		77	
Longnose Dace	Young of year	603390	9413	Esselingen Park	18		31		36		16		120	
Longnose Dace	Young of year	603390	9414	Esselingen Park	16		28		33		14		100	
Longnose Dace	Young of year	603390	9415	Esselingen Park	12		20		23		10		76	
Longnose Dace	Young of year	603391	9413	Between Kohler Dams	12		20		25		11		82	
Longnose Dace	Young of year	603391	9414	Between Kohler Dams	15		24		31		14		95	
Longnose Dace	Young of year	603391	9415	Between Kohler Dams	15		25		33		15		99	
Smallmouth Bass	Adult	603388	9401	Control	1.8	U	2		1.7		1.3	U	7.8	
Smallmouth Bass	Adult	603388	9402	Control	1.8	U	1.2		1.1	U	1.3	U	4.8	
Smallmouth Bass	Adult	603388	9403	Control	1.8	U	1.1	U	1.1	U	1.3	U	3.2	
Smallmouth Bass	Young of year	603388	9404	Control	1.8	U	1.1	U	1.1	U	1.3	U	2.2	U
Smallmouth Bass	Young of year	603388	9405	Control	1.8	U	1.1	U	1.1	U	1.3	U	2.2	U
Smallmouth Bass	Young of year	603388	9406	Control	1.8	U	1.1	U	1.1	U			2.4	
Smallmouth Bass	Adult	603389	9401	Rochester Park	47		75		86		35		300	
Smallmouth Bass	Adult	603389	9402	Rochester Park	48		77		85		36		290	
Smallmouth Bass	Adult	603389	9403	Rochester Park	24		43		46		19		160	
Smallmouth Bass	Young of year	603389	9404	Rochester Park	14		27		29		11		100	
Smallmouth Bass	Young of year	603389	9405	Rochester Park	18		32		34		13		120	
Smallmouth Bass	Young of year	603389	9406	Rochester Park	15		27		27		11		100	
Smallmouth Bass	Adult	603390	9401	Esselingen Park	13		22		27		12		86	
Smallmouth Bass	Adult	603390	9402	Esselingen Park	18		29		36		18		110	
Smallmouth Bass	Adult	603390	9403	Esselingen Park	20		30		39		19		120	
Smallmouth Bass	Young of year	603390	9404	Esselingen Park	6.2		12		14		5.9		48	
Smallmouth Bass	Young of year	603390	9405	Esselingen Park	9.3		17		21		8.3		68	
Smallmouth Bass	Young of year	603390	9406	Esselingen Park	8.8		15		19		8.4		60	
Smallmouth Bass	Adult	603391	9401	Between Kohler Dams	33		51		66		33		210	
Smallmouth Bass	Adult	603391	9402	Between Kohler Dams	22		33		43		21		140	
Smallmouth Bass	Adult	603391	9403	Between Kohler Dams	36		56		66		31		220	
Smallmouth Bass	Young of year	603391	9404	Between Kohler Dams	18		33		39		17		110	
Smallmouth Bass	Young of year	603391	9405	Between Kohler Dams	15		27		33		15		100	
Smallmouth Bass	Young of year	603391	9406	Between Kohler Dams	32		56		61		28		200	
White Sucker	Adult	603388	9407	Control	1.8	U	1.1	U	1.1	U	1.3	U	2.5	
White Sucker	Adult	603388	9408	Control	1.8	U	1.1	U	1.1	U	1.3	U	2.2	U
White Sucker	Adult	603388	9409	Control	1.8	U	1.1	U	1.1	U	1.3	U	2.2	U
White Sucker	Young of year	603388	9410	Control	1.8	U	1.1	U	1.1	U	1.3	U	2.2	U
White Sucker	Young of year	603388	9411	Control	1.8	U	1.1	U	1.1	U	1.3	U	2.2	U
White Sucker	Young of year	603388	9412	Control	1.8	U	1.1	U	1.1	U	1.3	U	2.2	U
White Sucker	Adult	603389	9407	Rochester Park	8.6		8.5		15		5.8		57	

Table A3-4. Continued

Species	Age Class	Station	Sample	Location	PCB172/197 (µg/kg) Conc	Q	PCB174 (µg/kg) Conc	Q	PCB177 (µg/kg) Conc	Q	PCB178 (µg/kg) Conc	Q	PCB180 (µg/kg) Conc	Q
White Sucker	Adult	603389	9408	Rochester Park	11		13		20		6.8		75	
White Sucker	Adult	603389	9409	Rochester Park	15		18		29		10		110	
White Sucker	Young of year	603389	9410	Rochester Park	8.7		14		17		6.5		65	
White Sucker	Young of year	603389	9411	Rochester Park	9		14		18		6.9		63	
White Sucker	Young of year	603389	9412	Rochester Park	7.2		11		14		6.3		48	
White Sucker	Adult	603390	9407	Esselingen Park	3.7		4.3		7.2		3.3		23	
White Sucker	Adult	603390	9408	Esselingen Park	16		21		31		13		100	
White Sucker	Adult	603390	9409	Esselingen Park	6.4		9		13		5.7		43	
White Sucker	Young of year	603390	9410	Esselingen Park	4.1		5.6		8.3		4.4		21	
White Sucker	Young of year	603390	9411	Esselingen Park	3.9		5.3		8		3.8		22	
White Sucker	Young of year	603390	9412	Esselingen Park	4.3		7.1		10		4.8		29	
White Sucker	Adult	603391	9407	Between Kohler Dams	8.1		8.8		17		7.7		54	
White Sucker	Adult	603391	9408	Between Kohler Dams	9.6		10		21		8.8		65	
White Sucker	Adult	603391	9409	Between Kohler Dams	13		17		27		11		80	
White Sucker	Young of year	603391	9410	Between Kohler Dams	5.7		9.7		14		6.4		39	
White Sucker	Young of year	603391	9411	Between Kohler Dams	9.2		16		24		11		62	
White Sucker	Young of year	603391	9412	Between Kohler Dams	6.2		9.1		15		7.1		41	

Table A3-4. Continued

Species	Age Class	Station	Sample	Location	PCB183 (µg/kg) Conc	Q	PCB185 (µg/kg) Conc	Q	PCB187/182 (µg/kg) Conc	Q	PCB194 (µg/kg) Conc	Q	PCB195/208 (µg/kg) Conc	Q
Crayfish		603384	9409	Control	1.8	U	1	U	1.5	U	1	U	2	U
Crayfish		603384	9410	Control	1.8	U	1	U	1.5	U	1	U	2	U
Crayfish		603384	9411	Control	1.8	U	1	U	1.5	U	1	U	2	U
Crayfish		603385	9409	Rochester Park	3.2				8.8		2.4			
Crayfish		603385	9410	Rochester Park	2.3				6.9		1.4			
Crayfish		603385	9411	Rochester Park	2.8				7.9		1.6			
Crayfish		603386	9409	Between Kohler Dams	4				13		2.4		2.3	
Crayfish		603386	9410	Between Kohler Dams	3.7				12		2		2	U
Crayfish		603386	9411	Between Kohler Dams	3.1				11		1.8			
Crayfish		603387	9409	Esselingen Park	3.2		1	U	11		2.3		2.4	
Crayfish		603387	9410	Esselingen Park	3.4		1	U	11		2.5		2.3	
Crayfish		603387	9411	Esselingen Park	3.4		1	U	11		1.9		2	U
Emergent Insects		603384	9401	Control	1.8	U	1	U	1.8		1	U	2	U
Emergent Insects		603384	9402	Control	1.8	U	1	U	1.5	U	1	U	2	U
Emergent Insects		603384	9403	Control	1.8	U	1	U	1.5	U	1	U	2	U
Emergent Insects		603384	9404	Control	1.8	U	1	U	1.5	U	1	U	2	U
Emergent Insects		603385	9401	Rochester Park	28		2.5		45		16		14	
Emergent Insects		603385	9402	Rochester Park	33		3		50		15		14	
Emergent Insects		603385	9403	Rochester Park	21		2.1		35		12		11	
Emergent Insects		603385	9404	Rochester Park	24		2.2		39		12		11	
Emergent Insects		603386	9401	Between Kohler Dams	31		2.6		61		18		16	
Emergent Insects		603386	9402	Between Kohler Dams	23		2		44		13		11	
Emergent Insects		603386	9403	Between Kohler Dams	15				31		8.8		7.7	
Emergent Insects		603386	9404	Between Kohler Dams	15				28		7.9		6.8	
Emergent Insects		603387	9401	Esselingen Park	13				23		4.7		4.5	
Emergent Insects		603387	9402	Esselingen Park	16				31		8		7.1	
Emergent Insects		603387	9403	Esselingen Park	19		1.7		37		8.8		8.2	
Emergent Insects		603387	9404	Esselingen Park	20				39		11		9.5	
Larval Insects		603384	9405	Control	1.8	U	1	U	1.5	U	1	U	2	U
Larval Insects		603384	9406	Control	1.8	U	1	U	1.5	U	1	U	2	U
Larval Insects		603384	9407	Control	1.8	U	1	U	1.5	U	1	U	2	U
Larval Insects		603384	9408	Control	1.8	U	1	U	1.5	U	1	U	2	U
Larval Insects		603385	9405	Rochester Park	12				18		5.9		5	
Larval Insects		603385	9406	Rochester Park	8.4		1	U	12		3.8		3.5	
Larval Insects		603385	9407	Rochester Park	12				18		5.2		4.6	
Larval Insects		603385	9408	Rochester Park	9.1				13		4.1		3.9	
Larval Insects		603386	9405	Between Kohler Dams	11				21		4.8		4.2	
Larval Insects		603386	9406	Between Kohler Dams	10				20		5.4		4.3	
Larval Insects		603386	9407	Between Kohler Dams	8.7				17		3.7		3.4	
Larval Insects		603386	9408	Between Kohler Dams	7.8				16		3.3		3.2	
Larval Insects		603387	9406	Esselingen Park	7.3				14		3.7		3.1	
Larval Insects		603387	9407	Esselingen Park	7.4		1	U	14		3.9		3.4	
Larval Insects		603387	9408	Esselingen Park	7.7		1	U	15		3.9		3.4	

Table A3-4. Continued

Species	Age Class	Station	Sample	Location	PCB183 (µg/kg) Conc	Q	PCB185 (µg/kg) Conc	Q	PCB187/182 (µg/kg) Conc	Q	PCB194 (µg/kg) Conc	Q	PCB195/208 (µg/kg) Conc	Q
Longnose Dace	Young of year	603388	9413	Control	1.8	U	1	U	2.7		1	U	2	U
Longnose Dace	Young of year	603388	9414	Control	1.8	U	1	U	1.5	U	1	U	2	U
Longnose Dace	Young of year	603388	9415	Control	1.8	U	1	U	1.5	U	1	U	2	U
Longnose Dace	Young of year	603389	9413	Rochester Park	14				21		6.9		5.6	
Longnose Dace	Young of year	603389	9414	Rochester Park	15				23		7			
Longnose Dace	Young of year	603389	9415	Rochester Park	23		3		32		8.9		7.9	
Longnose Dace	Young of year	603390	9413	Esselingen Park	37		4.3		65		14		12	
Longnose Dace	Young of year	603390	9414	Esselingen Park	31		3.9		60		13		11	
Longnose Dace	Young of year	603390	9415	Esselingen Park	22		3.1		44		8.5		8.3	
Longnose Dace	Young of year	603391	9413	Between Kohler Dams	24		2.7		44		11		9.4	
Longnose Dace	Young of year	603391	9414	Between Kohler Dams	29		3.3		53		12		11	
Longnose Dace	Young of year	603391	9415	Between Kohler Dams	29		3.3		56		13		11	
Smallmouth Bass	Adult	603388	9401	Control	2.2		1	U	3.5		1.2		2	U
Smallmouth Bass	Adult	603388	9402	Control	1.8	U	1	U	2.3		1	U	2	U
Smallmouth Bass	Adult	603388	9403	Control	1.8	U			1.6		1	U	2	U
Smallmouth Bass	Young of year	603388	9404	Control	1.8	U	1	U	1.5	U	1	U	2	U
Smallmouth Bass	Young of year	603388	9405	Control	1.8	U	1	U	1.5	U	1	U	2	U
Smallmouth Bass	Young of year	603388	9406	Control	1.8	U	1	U	1.5	U	1	U	2	U
Smallmouth Bass	Adult	603389	9401	Rochester Park	90		12		140		45		43	
Smallmouth Bass	Adult	603389	9402	Rochester Park	90		12		140		48		43	
Smallmouth Bass	Adult	603389	9403	Rochester Park	44		5.7		77		22		20	
Smallmouth Bass	Young of year	603389	9404	Rochester Park	28		3.9		45		12		11	
Smallmouth Bass	Young of year	603389	9405	Rochester Park	37		4.9		69		16		15	
Smallmouth Bass	Young of year	603389	9406	Rochester Park	30		4		45		14		13	
Smallmouth Bass	Adult	603390	9401	Esselingen Park	25		3.2		50		9.7		9.6	
Smallmouth Bass	Adult	603390	9402	Esselingen Park	33		4.3		71		14		15	
Smallmouth Bass	Adult	603390	9403	Esselingen Park	35		4.2		74		16		16	
Smallmouth Bass	Young of year	603390	9404	Esselingen Park	13				25		5.8		4.9	
Smallmouth Bass	Young of year	603390	9405	Esselingen Park	19				37		8.3		7.4	
Smallmouth Bass	Young of year	603390	9406	Esselingen Park	18		2.5		35		6.5		6.2	
Smallmouth Bass	Adult	603391	9401	Between Kohler Dams	53		6.5		120		26		24	
Smallmouth Bass	Adult	603391	9402	Between Kohler Dams	39		4.7		81		19		18	
Smallmouth Bass	Adult	603391	9403	Between Kohler Dams	65		8.3		120		30		26	
Smallmouth Bass	Young of year	603391	9404	Between Kohler Dams	34		4.5		65		14		13	
Smallmouth Bass	Young of year	603391	9405	Between Kohler Dams	31		2.8		54		15		9.9	
Smallmouth Bass	Young of year	603391	9406	Between Kohler Dams	67		8		110		23		23	
White Sucker	Adult	603388	9407	Control	1.8	U	1	U	1.5	U	1	U	2	U
White Sucker	Adult	603388	9408	Control	1.8	U	1	U	1.5	U	1	U	2	U
White Sucker	Adult	603388	9409	Control	1.8	U	1	U	1.5	U	1	U	2	U
White Sucker	Young of year	603388	9410	Control	1.8	U	1	U	1.5	U	1	U	2	U
White Sucker	Young of year	603388	9411	Control	1.8	U	1	U	1.5	U	1	U	2	U
White Sucker	Young of year	603388	9412	Control	1.8	U	1	U	1.5	U	1	U		
White Sucker	Adult	603389	9407	Rochester Park	17				26		8.4		8.8	

Table A3-4. Continued

Species	Age Class	Station	Sample	Location	PCB183 (µg/kg) Conc	Q	PCB185 (µg/kg) Conc	Q	PCB187/182 (µg/kg) Conc	Q	PCB194 (µg/kg) Conc	Q	PCB195/208 (µg/kg) Conc	Q
White Sucker	Adult	603389	9408	Rochester Park	22				30		11		11	
White Sucker	Adult	603389	9409	Rochester Park	30		3.6		48		16		15	
White Sucker	Young of year	603389	9410	Rochester Park	19		2.5		27		10		11	
White Sucker	Young of year	603389	9411	Rochester Park	19				30		8.8		9.2	
White Sucker	Young of year	603389	9412	Rochester Park	15				25		6.8		7.4	
White Sucker	Adult	603390	9407	Esselingen Park	7				13		3.3			
White Sucker	Adult	603390	9408	Esselingen Park	29		3.5		55		15		15	
White Sucker	Adult	603390	9409	Esselingen Park	12				23		6.5		6.4	
White Sucker	Young of year	603390	9410	Esselingen Park	7.3		1.2		14		3.2		3.8	
White Sucker	Young of year	603390	9411	Esselingen Park	7.2		1.1		15		3		3.8	
White Sucker	Young of year	603390	9412	Esselingen Park	9				18		3.7			
White Sucker	Adult	603391	9407	Between Kohler Dams	17				31		7.7		7.8	
White Sucker	Adult	603391	9408	Between Kohler Dams	21		2.2		40		9.2		9.3	
White Sucker	Adult	603391	9409	Between Kohler Dams	24		2.8		53		11		11	
White Sucker	Young of year	603391	9410	Between Kohler Dams	13		1.6		25		4.7		5.4	
White Sucker	Young of year	603391	9411	Between Kohler Dams	21		2.5		42		8.3		9.1	
White Sucker	Young of year	603391	9412	Between Kohler Dams	13				25		5.4		5.8	

Table A3-4. Continued

Species	Age Class	Station	Sample	Location	PCB196/203 (µg/kg) Conc	Q	PCB199 (µg/kg) Conc	Q	PCB201 (µg/kg) Conc	Q	PCB206 (µg/kg) Conc	Q
Crayfish		603384	9409	Control	3	U	0.6	U	1.8	U	1.5	U
Crayfish		603384	9410	Control	3	U	0.6	U	1.8	U	1.5	U
Crayfish		603384	9411	Control	3	U	0.6	U	1.8	U	1.5	U
Crayfish		603385	9409	Rochester Park					3.8			
Crayfish		603385	9410	Rochester Park					2.4			
Crayfish		603385	9411	Rochester Park					2.6			
Crayfish		603386	9409	Between Kohler Dams	3	U			4.6		1.5	U
Crayfish		603386	9410	Between Kohler Dams	3	U			3.7		1.5	U
Crayfish		603386	9411	Between Kohler Dams			0.6	U	3.3		1.5	U
Crayfish		603387	9409	Esselingen Park	3	U	0.6	U	4		1.5	U
Crayfish		603387	9410	Esselingen Park	3	U	0.6	U	4		1.5	U
Crayfish		603387	9411	Esselingen Park	3	U			3.6		1.5	U
Emergent Insects		603384	9401	Control	3	U	0.6	U	1.8	U	1.5	U
Emergent Insects		603384	9402	Control	3	U	0.6	U	1.8	U	1.5	U
Emergent Insects		603384	9403	Control	3	U	0.6	U	1.8	U	1.5	U
Emergent Insects		603384	9404	Control	3	U	0.6	U	1.8	U	1.5	U
Emergent Insects		603385	9401	Rochester Park	23				19		6.1	
Emergent Insects		603385	9402	Rochester Park	26				19		5.6	
Emergent Insects		603385	9403	Rochester Park	18				15		4.4	
Emergent Insects		603385	9404	Rochester Park	19				15		4.3	
Emergent Insects		603386	9401	Between Kohler Dams	28				22		6.5	
Emergent Insects		603386	9402	Between Kohler Dams	21				16		5.1	
Emergent Insects		603386	9403	Between Kohler Dams	15				12		3.5	
Emergent Insects		603386	9404	Between Kohler Dams	13				10		3	
Emergent Insects		603387	9401	Esselingen Park	9.2				6.3			
Emergent Insects		603387	9402	Esselingen Park	15				11		3.1	
Emergent Insects		603387	9403	Esselingen Park	18				13		3.4	
Emergent Insects		603387	9404	Esselingen Park	17				14		3.6	
Larval Insects		603384	9405	Control	3	U	0.6	U	1.8	U	1.5	U
Larval Insects		603384	9406	Control	3	U	0.6	U	1.8	U	1.5	U
Larval Insects		603384	9407	Control	3	U	0.6	U	1.8	U	1.5	U
Larval Insects		603384	9408	Control	3	U	0.6	U	1.8	U	1.5	U
Larval Insects		603385	9405	Rochester Park	9.5				7.1			
Larval Insects		603385	9406	Rochester Park	6.2		0.6	U	5.1			
Larval Insects		603385	9407	Rochester Park	8.6				6.5		1.6	
Larval Insects		603385	9408	Rochester Park	6.4				5.3			
Larval Insects		603386	9405	Between Kohler Dams	8.9				6.2		1.5	
Larval Insects		603386	9406	Between Kohler Dams	8.2				6.7			
Larval Insects		603386	9407	Between Kohler Dams	6.9				5.2			
Larval Insects		603386	9408	Between Kohler Dams	6.1				5.1			
Larval Insects		603387	9406	Esselingen Park	5.9				4.7			
Larval Insects		603387	9407	Esselingen Park	5.9		0.6	U	5		1.5	U
Larval Insects		603387	9408	Esselingen Park	6.1		0.6	U	5.2		1.5	U

Table A3-4. Continued

Species	Age Class	Station	Sample	Location	PCB196/203 (µg/kg) Conc	Q	PCB199 (µg/kg) Conc	Q	PCB201 (µg/kg) Conc	Q	PCB206 (µg/kg) Conc	Q
Longnose Dace	Young of year	603388	9413	Control	3	U	0.6	U	1.8	U	1.5	U
Longnose Dace	Young of year	603388	9414	Control	3	U	0.6	U	1.8	U	1.5	U
Longnose Dace	Young of year	603388	9415	Control	3	U	0.6	U	1.8	U	1.5	U
Longnose Dace	Young of year	603389	9413	Rochester Park	11				7.2			
Longnose Dace	Young of year	603389	9414	Rochester Park	11				7.6			
Longnose Dace	Young of year	603389	9415	Rochester Park	15				10		3.3	
Longnose Dace	Young of year	603390	9413	Esselingen Park	25				19		4	
Longnose Dace	Young of year	603390	9414	Esselingen Park	22				17		3.7	
Longnose Dace	Young of year	603390	9415	Esselingen Park	17				12		2.6	
Longnose Dace	Young of year	603391	9413	Between Kohler Dams	18				13			
Longnose Dace	Young of year	603391	9414	Between Kohler Dams	22		0.6	U	16		4.3	
Longnose Dace	Young of year	603391	9415	Between Kohler Dams	23				17		3.9	
Smallmouth Bass	Adult	603388	9401	Control	3	U	0.6	U	1.9		1.6	U*I
Smallmouth Bass	Adult	603388	9402	Control	3	U			1.8	U	1.5	U
Smallmouth Bass	Adult	603388	9403	Control					1.8	U	1.5	U
Smallmouth Bass	Young of year	603388	9404	Control	3	U	0.6	U	1.8	U	1.5	U
Smallmouth Bass	Young of year	603388	9405	Control	3	U	0.6	U	1.8	U	1.5	U
Smallmouth Bass	Young of year	603388	9406	Control	3	U			1.8	U	1.5	U
Smallmouth Bass	Adult	603389	9401	Rochester Park	70		1.9		54		16	
Smallmouth Bass	Adult	603389	9402	Rochester Park	72		1.9		57		16	
Smallmouth Bass	Adult	603389	9403	Rochester Park	33		0.95		28		6.8	
Smallmouth Bass	Young of year	603389	9404	Rochester Park	20				16		3.9	
Smallmouth Bass	Young of year	603389	9405	Rochester Park	26		0.6	U	20		5	
Smallmouth Bass	Young of year	603389	9406	Rochester Park	22				17			
Smallmouth Bass	Adult	603390	9401	Esselingen Park	17				13		3.2	
Smallmouth Bass	Adult	603390	9402	Esselingen Park	25				22		5.8	
Smallmouth Bass	Adult	603390	9403	Esselingen Park	26				24		5.4	
Smallmouth Bass	Young of year	603390	9404	Esselingen Park	10				7.1			
Smallmouth Bass	Young of year	603390	9405	Esselingen Park	15				9.9			
Smallmouth Bass	Young of year	603390	9406	Esselingen Park	13				8.7		2	
Smallmouth Bass	Adult	603391	9401	Between Kohler Dams	37				39		7.2	
Smallmouth Bass	Adult	603391	9402	Between Kohler Dams	30				27		6	
Smallmouth Bass	Adult	603391	9403	Between Kohler Dams	47				40		9.3	
Smallmouth Bass	Young of year	603391	9404	Between Kohler Dams	24		0.63		20		4.5	
Smallmouth Bass	Young of year	603391	9405	Between Kohler Dams	23				19		3.7	
Smallmouth Bass	Young of year	603391	9406	Between Kohler Dams	40				33		8	
White Sucker	Adult	603388	9407	Control	3	U			1.8	U	1.5	U
White Sucker	Adult	603388	9408	Control	3	U	0.6	U	1.8	U	1.5	U
White Sucker	Adult	603388	9409	Control	3	U	0.6	U	1.8	U	1.5	U
White Sucker	Young of year	603388	9410	Control	3	U	0.6	U	1.8	U	1.5	U
White Sucker	Young of year	603388	9411	Control	3	U	0.6	U	1.8	U	1.5	U
White Sucker	Young of year	603388	9412	Control	3	U			1.8	U	1.5	U
White Sucker	Adult	603389	9407	Rochester Park	14				9.7		3.9	

Table A3-4. Continued

Species	Age Class	Station	Sample	Location	PCB196/203 (µg/kg) Conc	Q	PCB199 (µg/kg) Conc	Q	PCB201 (µg/kg) Conc	Q	PCB206 (µg/kg) Conc	Q
White Sucker	Adult	603389	9408	Rochester Park	17				13		4.2	
White Sucker	Adult	603389	9409	Rochester Park	25				19		5.7	
White Sucker	Young of year	603389	9410	Rochester Park	17				13		4.5	
White Sucker	Young of year	603389	9411	Rochester Park	14				12		3.5	
White Sucker	Young of year	603389	9412	Rochester Park	12				8.8		2.8	
White Sucker	Adult	603390	9407	Esselingen Park	5.7				4.2			
White Sucker	Adult	603390	9408	Esselingen Park	25				20		5.8	
White Sucker	Adult	603390	9409	Esselingen Park	11				8.6			
White Sucker	Young of year	603390	9410	Esselingen Park	6.4				6			
White Sucker	Young of year	603390	9411	Esselingen Park	6.2				5.1			
White Sucker	Young of year	603390	9412	Esselingen Park	7.1				5.8			
White Sucker	Adult	603391	9407	Between Kohler Dams	14				10			
White Sucker	Adult	603391	9408	Between Kohler Dams	16				12		3.4	
White Sucker	Adult	603391	9409	Between Kohler Dams	20				15		3.9	
White Sucker	Young of year	603391	9410	Between Kohler Dams	9.2				7.2		1.8	
White Sucker	Young of year	603391	9411	Between Kohler Dams	15				12		3	
White Sucker	Young of year	603391	9412	Between Kohler Dams					7.8			

Table A3-3. Results of the metals analyses of sediment samples collected for the WDNR food chain study

Station ID	603363		603364		603365		603365		603366		603367	
Sample ID	6A		6B		6C		6DUP		6D		6E	
Chemical	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
Arsenic	1.35		1.15		1.86		1.86		1.75		0.65	
Cadmium	0.4	U	0.4	U	0.4	U	0.4	U	1.3		0.4	U
Chromium	22		18		28		26		25		19	
Copper	37		25		39		45		36		24	
Lead	38		63		58		55		59		48	
Mercury	0.068		0.054		0.11		0.13		0.14		0.033	
Selenium	0.32		0.19		0.44		0.31		0.62		0.2	
Silver	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U

NOTE: All concentrations are in mg/kg

Table A3-3. Results of the metals analyses of sediment samples collected for the WDNR food chain study

Station ID	603368		603368		603369		603370		603371		603372	
Sample ID	5A		5DUP		5B		5C		5D		3A	
Chemical	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
Arsenic	1.77		1.51		0.84		0.61		0.77		1.03	
Cadmium	0.4	U	1.1		2.2		0.7		0.4	U	0.4	U
Chromium	26		24		16		14		16		14	
Copper	39		39		23		20		28		15	
Lead	59		56		37		30		34		12	
Mercury	0.08		0.083		0.036		0.024		0.031		0.064	
Selenium	0.64		0.4		0.25		0.12		0.23		0.17	
Silver	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U

NOTE: All concentrations are in mg/kg

Table A3-3. Results of the metals analyses of sediment samples collected for the WDNR food chain study

Station ID	603373		603374		603375		603375		603376		603377	
Sample ID	3B		3C		3D		3DUP		3E		2A	
Chemical	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
Arsenic	0.81		0.53		0.96		1.15		0.94		0.77	
Cadmium	0.9		0.7		0.4	U	1.2		0.4	U	0.4	U
Chromium	12		8.4		17		14		14		11	
Copper	11		7.8		23		18		14		13	
Lead	10		11		16		17		12		11	
Mercury	0.051		0.022		0.076		0.075		0.06		0.051	
Selenium	0.37		0.08		0.33		0.32		0.3		0.16	
Silver	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U

NOTE: All concentrations are in mg/kg

Table A3-3. Results of the metals analyses of sediment samples collected for the WDNR food chain study

Station ID	603378		603379		603380		603381		603392		603393	
Sample ID	2B		2C		2D		2E		1A		1B	
Chemical	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q	Conc	Q
Arsenic	0.98		0.91		1.02		0.72		1.16		1.17	
Cadmium	2.2		1		0.4	U	0.4	U	0.4	U	0.4	U
Chromium	14		12		22		7.3		10		16	
Copper	44		16		87		7.2		10		14	
Lead	13		12		53		8		5		11	
Mercury	0.05		0.056		0.27		0.044		0.036		0.06	
Selenium	0.36		0.22		0.41		0.15		0.36		0.41	
Silver	2.5	U	2.5	U	6		2.5	U	2.5	U	2.5	U

NOTE: All concentrations are in mg/kg

Table A3-3. Results of the metals analyses of sediment samples collected for the WDNR food chain study

Station ID	603394		603395		603396	
Sample ID	1C		1D		1E	
Chemical	Conc	Q	Conc	Q	Conc	Q
Arsenic	0.84		1.27		1.35	
Cadmium	0.4	U	0.4	U	0.4	U
Chromium	12		19		16	
Copper	9.6		19		16	
Lead	7		13		12	
Mercury	0.05		0.12		0.081	
Selenium	0.44		0.73		0.46	
Silver	2.5	U	2.5	U	2.5	U

NOTE: All concentrations are in mg/kg

Table A3-5. Results of the PAH analyses of tissue samples collected for the WDNR food chain study

	Crayfish			
PAH	**Control mg/kg ww**	**Rochester Park mg/kg ww**	**Between Kohler Dams mg/kg ww**	**Esselingen Park mg/kg ww**
Acenaphthylene	0.0035	0.0035	0.0035	0.0035
Acenapthene	0.0035	0.0035	0.0035	0.0035
Fluorene	0.0035	0.0035	0.0035	0.0035
Phenanthrene	0.0035	0.0035	0.0035	0.0035
Anthracene	0.0035	0.0035	0.0035	0.0035
Fluoranthene	0.0035	0.0035	0.0035	0.0035
Pyrene	0.0035	0.0035	0.0035	0.0035
Benzo(a)anthracene	0.0035	0.0035	0.0035	0.0035
Chrysene	0.0035	0.0035	0.0035	0.0035
Benzo(b)fluoranthene	0.0035	0.0035	0.0035	0.0035
Benzo(k)fluoranthene	0.0035	0.0035	0.0035	0.0035
Benzo(e)pyrene	0.0035	0.0035	0.0035	0.0035
Benzo(a)pyrene	0.0035	0.0035	0.0035	0.0035
Perylene	0.0035	0.0035	0.0035	0.0035
Ideno(1,2,3-cd)pyrene	0.0035	0.0035	0.0035	0.0035
Dibenzo(a,h)anthracene	0.0035	0.0035	0.0035	0.0035
Benzo(g,h,i)perylene	0.0035	0.0035	0.0035	0.0035

Note: 0.0035 is 1/2 the detection limit

Table A3-5. Results of the PAH analyses of tissue samples collected for the WDNR food chain study

	Larval Insects			
PAH	Control mg/kg ww	Rochester Park mg/kg ww	Between Kohler Dams mg/kg ww	Esselingen Park mg/kg ww
Acenaphthylene	0.0035	0.0035	0.0035	0.0035
Acenapthene	0.0035	0.0035	0.0035	0.0035
Fluorene	0.0097	0.0112	0.0106	0.0157
Phenanthrene	0.0035	0.0145	0.0172	0.0382
Anthracene	0.0035	0.0035	0.0035	0.0035
Fluoranthene	0.0035	0.016	0.007	0.0335
Pyrene	0.0035	0.0126	0.0127	0.0281
Benzo(a)anthracene	0.0035	0.0035	0.0035	0.0035
Chrysene	0.0035	0.0035	0.0035	0.0035
Benzo(b)fluoranthene	0.0035	0.0072	0.0035	0.0096
Benzo(k)fluoranthene	0.0035	0.0035	0.0035	0.0035
Benzo(e)pyrene	0.0035	0.0035	0.0035	0.0035
Benzo(a)pyrene	0.0035	0.0035	0.0035	0.0035
Perylene	0.0035	0.0035	0.0035	0.0035
Ideno(1,2,3-cd)pyrene	0.0035	0.0035	0.0035	0.0035
Dibenzo(a,h)anthracene	0.0035	0.0035	0.0035	0.0035
Benzo(g,h,i)perylene	0.0035	0.0035	0.0035	0.0099

Note: 0.0035 is 1/2 the detection limit

Table A3-5. Results of the PAH analyses of tissue samples collected for the WDNR food chain study

	Emergent Insects			
PAH	Control mg/kg ww	Rochester Park mg/kg ww	Between Kohler Dams mg/kg ww	Esselingen Park mg/kg ww
Acenaphthylene	0.0035	0.0035	0.0035	0.0035
Acenapthene	0.0035	0.0035	0.0035	0.0035
Fluorene	0.014	0.0435	0.010	0.0091
Phenanthrene	0.0159	0.0171	0.025	0.0351
Anthracene	0.0035	0.0035	0.000	0.0000
Fluoranthene	0.0035	0.010	0.015	0.0241
Pyrene	0.0035	0.007	0.009	0.0230
Benzo(a)anthracene	0.0035	0.012	0.004	0.0035
Chrysene	0.0035	0.009	0.009	0.0217
Benzo(b)fluoranthene	0.0035	0.0035	0.0035	0.0035
Benzo(k)fluoranthene	0.0035	0.0035	0.0035	0.0035
Benzo(e)pyrene	0.0035	0.0035	0.0035	0.0035
Benzo(a)pyrene	0.0035	0.0035	0.0035	0.0035
Perylene	0.0035	0.0035	0.0035	0.0035
Ideno(1,2,3-cd)pyrene	0.0035	0.0035	0.0035	0.0035
Dibenzo(a,h)anthracene	0.0035	0.0035	0.0035	0.0080
Benzo(g,h,i)perylene	0.0035	0.0035	0.0035	0.0083

Note: 0.0035 is 1/2 the detection limit

Table A3-6. Results of metals analyses of crayfish and emergent and larval insect tissue samples collected for the WDNR food chain study

Segment 1, Control

	Emergent Insects							
Station ID	**603384**		**603384**		**603384**		**603384**	
Sample ID	**9401**		**9402**		**9403**		**9404**	
Chemical	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**
Arsenic	0.1	U	0.1		0.1	U	0.1	U
Cadmium	0.01		0.015		0.009		0.012	
Chromium	0.2		0.1		0.1		0.1	
Copper	7.7		11		9		9.5	
Lead	2.8		0.04		0.11		0.08	
Mercury	0.048		0.076		0.064		0.056	
Selenium	0.64		0.48		0.968		1.33	
Silver	0.019		0.024		0.018		0.007	

Segment 1, Control

	Larval Insects							
Station ID	**603384**		**603384**		**603384**		**603384**	
Sample ID	**9405**		**9406**		**9407**		**9408**	
Chemical	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**
Arsenic	0.2		0.2		0.2		0.1	
Cadmium	0.019		0.024		0.016		0.014	
Chromium	0.7		0.8		0.6		0.6	
Copper	3.2		3.4		3.2		3.7	
Lead	0.57		0.55		0.36		0.35	
Mercury	0.03		0.028		0.018		0.022	
Selenium	0.48		0.567		0.39		0.511	
Silver	0.004				0.01	U	0.011	

Segment 1, Control

	Crayfish					
Station ID	**603384**		**603384**		**603384**	
Sample ID	**9409**		**9410**		**9411**	
Chemical	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**
Arsenic	0.7		0.6		0.5	
Cadmium	0.01		0.013		0.011	
Chromium	0.3		0.5		0.3	
Copper	18		15		17	
Lead	0.14		0.17		0.12	
Mercury	0.042		0.038		0.049	
Selenium	0.35		0.25		0.27	
Silver	0.066		0.08		0.073	

NOTE: All concentrations are in mg/kg dry weight

Table A3-6. Continued

Segment 2, Rochester Park

	Emergent Insects							
Station ID	**603385**		**603385**		**603385**		**603385**	
Sample ID	**9401**		**9402**		**9403**		**9404**	
Chemical	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**
Arsenic	0.1	U	0.1		0.1	U	0.2	
Cadmium	0.015		0.016		0.008		0.011	
Chromium	0.1		0.1		0.1		0.1	
Copper	8.2		7.6		7.9		7.6	
Lead	0.14		0.05		0.17		0.16	
Mercury	0.048		0.053		0.044		0.049	
Selenium	1.058		0.899		1.11		1.139	
Silver	0.019		0.021		0.017		0.02	

Segment 2, Rochester Park

	Larval Insects							
Station ID	**603385**		**603385**		**603385**		**603385**	
Sample ID	**9405**		**9406**		**9407**		**9408**	
Chemical	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**
Arsenic	0.1		0.2		0.2		0.2	
Cadmium	0.016		0.017		0.018		0.013	
Chromium	0.8		0.7		0.9		0.6	
Copper	2.8		3.9		3.7		5.2	
Lead	0.84		0.73		0.79		0.59	
Mercury	0.026				0.026		0.01	
Selenium	0.426		0.581		0.448		0.358	
Silver	0.009		0.011		0.011		0.002	

Segment 2, Rochester Park

	Crayfish					
Station ID	**603385**		**603385**		**603385**	
Sample ID	**9409**		**9410**		**9411**	
Chemical	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**
Arsenic	0.5		0.6		0.4	
Cadmium	0.01		0.007		0.007	
Chromium	0.3		0.3		0.3	
Copper	24		24		23	
Lead	0.18		0.23		0.25	
Mercury	0.017		0.024		0.02	
Selenium	0.253		0.61		0.311	
Silver	0.065		0.07		0.065	

NOTE: All concentrations are in mg/kg dry weight

Table A3-6. Continued

Segment 3, Between Kohler Dams

	Emergent Insects							
Station ID	**603386**		**603386**		**603386**		**603386**	
Sample ID	**9401**		**9402**		**9403**		**9404**	
Chemical	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**
Arsenic	0.1	U	0.1	U	0.1	U	0.1	U
Cadmium	0.006		0.014		0.012		0.011	
Chromium	0.2		0.1		0.1		0.1	
Copper	8.3		7.8		6.7		6.4	
Lead	0.2		0.43		0.45		0.19	
Mercury	0.031		0.035		0.031		0.034	
Selenium	1.039		0.965		0.964		1.314	
Silver	0.01	U	0.01	U	0.01	U	0.01	U

Segment 3, Between Kohler Dams

	Larval Insects							
Station ID	**603386**		**603386**		**603386**		**603386**	
Sample ID	**9405**		**9406**		**9407**		**9408**	
Chemical	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**
Arsenic	0.2		0.1		0.1		0.1	
Cadmium	0.015		0.014		0.015		0.01	
Chromium	0.7		0.7		0.9		0.7	
Copper	4		4.1		3.9		3.9	
Lead	0.65		0.63		0.49		0.42	
Mercury	0.02		0.025		0.018		0.017	
Selenium	0.332		0.399		0.332		0.191	
Silver	0.01	U	0.01	U	0.01	U	0.01	U

Segment 3, Between Kohler Dams

	Crayfish					
Station ID	**603386**		**603386**		**603386**	
Sample ID	**9409**		**9410**		**9411**	
Chemical	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**
Arsenic	0.5		0.5		0.6	
Cadmium	0.007		0.008		0.009	
Chromium	0.7		0.4		0.4	
Copper	23		22		23	
Lead	0.26		0.26		0.3	
Mercury	0.022		0.028		0.023	
Selenium	0.355		0.333		0.41	
Silver	0.05		0.06		0.05	

NOTE: All concentrations are in mg/kg dry weight

Table A3-6. Continued

Segment 5, Esslingen Park

	Emergent Insects							
Station ID	**603387**		**603387**		**603387**		**603387**	
Sample ID	**9401**		**9402**		**9403**		**9404**	
Chemical	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**
Arsenic	0.1	U	0.1	U	0.1		0.1	U
Cadmium	0.027		0.014		0.013		0.012	
Chromium	0.1		0.1		0.2		0.2	
Copper	7.7		8.9		9		9.5	
Lead	0.3		0.31		0.31		0.33	
Mercury	0.048		0.039		0.035		0.027	
Selenium	0.909		1.067		1.283		1.177	
Silver	0.01		0.01	U	0.01	U	0.01	U

Segment 5, Esslingen Park

	Larval Insects							
Station ID	**603387**		**603387**		**603387**		**603387**	
Sample ID	**9405**		**9406**		**9407**		**9408**	
Chemical	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**
Arsenic	0.1	U	0.1	U	0.1		0.1	
Cadmium	0.016		0.017		0.013		0.14	
Chromium	0.8		1.3		0.9		0.8	
Copper	4		4.8		5.2		5.4	
Lead	1		1.5		0.88		0.9	
Mercury	0.019		0.018		0.03		0.015	
Selenium	0.32		0.482		0.347		0.49	
Silver	0.01	U	0.01	U	0.01	U	0.01	U

Segment 5, Esslingen Park

	Crayfish					
Station ID	**603387**		**603387**		**603387**	
Sample ID	**9409**		**9410**		**9411**	
Chemical	**Conc**	**Q**	**Conc**	**Q**	**Conc**	**Q**
Arsenic	0.6		0.5		0.6	
Cadmium	0.011		0.01		0.01	
Chromium	0.4		0.3		0.3	
Copper	29		28		29	
Lead	0.48		0.41		0.46	
Mercury	0.028		0.028		0.03	
Selenium	0.43		0.215		0.388	
Silver	0.03		0.03		0.03	

NOTE: All concentrations are in mg/kg dry weight

Table A3-7. Results of the PCB congener analyses of small mammal tissue samples collected for the WDNR food chain study

Genus	WDNR ID	Weight (g)	Sex	Lipids (%)	PCB026		PCB028		PCB052		PCB049		PCB047		PCB044		PCB041		PCB074	
Clethrinomys	94088	22	F	1.3	2.5	U	5.6		1	U	0.6	U	2.6		1.1	U	2	U	17	
Clethrinomys	94086	46	F	2.5	2.5	U	2.5	U	1	U	0.6	U	1.2	U	1.1	U	2	U	1	U
Clethrinomys	94087	46	F	2.5	2.5	U	2.5	U	1	U	0.6	U	1.2	U	1.1	U	2	U	1	U
Microtus	94090	28	M	2.3	2.5	U	14		1.4		0.87		10		1.1	U	2	U	12	
Microtus	94091	13		1.8	2.5	U	2.5	U	1	U	0.6	U	1.2	U	1.1	U	2	U	1	U
Microtus	94100	22	M	2.8	2.5	U	2.5	U	1	U	0.6	U	1.2	U	1.1	U	2	U	1	U
Microtus	94101	43	F	4.7	0.96		110		8.1		5		50		1.4		11		53	
Microtus	94089	51	F	2.1	2.5	U	2.5	U	1	U	0.6	U	1.2	U	1.1	U	2	U	1	U
Peromyscus	94092	27	F	4.2	2.5	U	12		4.9		2.1		34		1.1	U	3.4		12	
Peromyscus	94093	26	M	4.1	2.5	U	24		2.8		0.78		33		1.1	U	2.7		29	
Peromyscus	94094	18	M	2.4	2.5	U	13		1.5		0.6	U	17		1.1	U	2	U	16	
Peromyscus	94095	22	M	3.1	2.5	U	2.5	U	1	U	0.6	U	4.8		1.1	U	2	U	3.4	
Peromyscus	94104	20	M	2.2	2.5	U	2.5	U	1	U	0.6	U	1.2	U	1.1	U	2	U	1	U
Peromyscus	94103	18	M	3.5	2.5	U	2.5	U	1	U	0.6	U	1.5		1.1	U	2	U	3.1	
Peromyscus	94102	22	M	0.8	2.5	U	2.5	U	1	U	0.6	U	6.3		1.1	U	2	U	1.4	
Tamias	94099	94	F	1.7	2.5	U	2.5	U	1	U	0.6	U	2		1.1	U	2	U	1.7	
Tamias	94098	88	M	1.3	2.5	U	2.5	U	1	U	0.6	U	1.2	U	1.1	U	2	U	1	U
Tamias	94106	106	F	2.5	2.5	U	18		2		1.3		27		1.1	U	2	U	30	
Tamias	94105	51	M	1	2.5	U	5.4		1	U	0.6	U	8.7		1.1	U	2	U	36	
Zapus	94096	13	M	1.6	2.5	U	2.5	U	1	U	0.6	U	2		1.1	U	2	U	1	U
Zapus	94097	23	F	3.1	2.5	U	2.5	U	1	U	0.6	U	1.2	U	1.1	U	2	U	1	U

NOTE: All PCB concentrations are in µg/kg.

Table A3-7. Results of the PCB congener analyses of small mammal tissue samples collected for the WDNR food chain study

Genus	WDNR ID	PCB070		PCB066		PCB056		PCB084		PCB101		PCB099		PCB097		PCB087		PCB085	
Clethrinomys	94088	2.4	U	13		3.6		1.3	U	0.91		2.1		0.8	U	1	U	1	U
Clethrinomys	94086	2.4	U	2.8	U	1.8	U	1.3	U	0.6	U			0.8	U	1	U	1	U
Clethrinomys	94087	2.4	U	2.8	U	1.8	U	1.3	U	0.6	U			0.8	U	1	U	1	U
Microtus	94090	6.2		34		8.7		1.3	U	6.1		21		1		1.5		1	U
Microtus	94091	2.4	U	2.8	U	1.8	U	1.3	U	0.6	U			0.8	U	1	U	1	U
Microtus	94100	2.4	U	2.8	U	1.8	U	1.3	U	0.6	U			0.8	U	1	U	1	U
Microtus	94101	48		140		47		1.3	U	15		32		2.7		7		13	
Microtus	94089	2.4	U	2.8	U	1.8	U	1.3	U	0.6	U			0.8	U	1	U	1	U
Peromyscus	94092	2.4	U	20		6.2		4.2		5.7		63		0.8	U	2.5		8.8	
Peromyscus	94093	2.4	U	24		11		1.3	U	6.8		45		0.8	U	2.3		7.1	
Peromyscus	94094	2.4	U	13		5.7		1.3	U	3.6		24		0.8	U	1.2		3.8	
Peromyscus	94095	2.4	U	2.8		1.8	U	1.3	U	1.3		9.7		0.8	U	1	U	1	U
Peromyscus	94104	2.4	U	2.8	U	1.8	U	1.3	U	0.6	U			0.8	U	1	U	1	U
Peromyscus	94103	2.4	U	3.2		1.8	U	1.3	U	1.3		4.8		0.8	U	1	U	1	U
Peromyscus	94102	2.4	U	2.8	U	1.8	U	1.3	U	1.1		19		0.8	U	1	U	2.4	
Tamias	94099	2.4	U	4.5		1.8	U	1.3	U	0.6	U	6.9		0.8	U	1	U	1	U
Tamias	94098	2.4	U	2.8	U	1.8	U	1.3	U	0.6	U			0.8	U	1	U	1	U
Tamias	94106	3.5		35		16		1.3	U	2.5		25		0.8	U	2.1		8.7	
Tamias	94105	2.4	U	6.1		11		1.3	U	0.6	U	27		0.8	U	1.9		4	
Zapus	94096	2.4	U	2.8	U	1.8	U	1.3	U	0.7		2.3		0.8	U	1	U	1	U
Zapus	94097	2.4	U	2.8	U	1.8	U	1.3	U	0.6	U			0.8	U	1	U	1	U

NOTE: All PCB concentrations are in µg/kg.

Table A3-7. Results of the PCB congener analyses of small mammal tissue samples collected for the WDNR food chain study

Genus	WDNR ID	PCB077		PCB149		PCB118		PCB146		PCB132		PCB138		PCB178		PCB182		PCB183	
Clethrinomys	94088	1.3	U	1.1	U	51		5.2		1.9		17		1.3		4.1		1.8	U
Clethrinomys	94086	1.3	U	1.1	U			1	U					1.3	U	1.5	U	1.8	U
Clethrinomys	94087	1.3	U	1.1	U			1	U					1.3	U	1.5	U	1.8	U
Microtus	94090	4.5		1.6		52		6.7		27		35		1.3	U	3.8		1.8	U
Microtus	94091	1.3	U	1.1	U			1	U					1.3	U	1.5	U	1.8	U
Microtus	94100	1.3	U	1.1	U			1	U					1.3	U	1.5	U	1.8	U
Microtus	94101	13		1.1	U	97		8.3		16		38		1.3	U	4.4		1.8	U
Microtus	94089	1.3	U	1.1	U			1	U					1.3	U	1.5	U	1.8	U
Peromyscus	94092	2.7		1.6		33		19		180		140		3.2		23		4.7	
Peromyscus	94093	1.9		1.2		120		22		180		140		4.8		32		5.5	
Peromyscus	94094	1.3	U	1.1	U	61		11		92		72		2.5		16		2.8	
Peromyscus	94095	1.3	U	1.1	U	20		6.3		110		71		1.5		26		3.7	
Peromyscus	94104	1.3	U	1.1	U			1	U					1.3	U	1.5	U	1.8	U
Peromyscus	94103	1.3	U	1.1	U	28		7.7		43		34		1.8		14		1.8	U
Peromyscus	94102	1.3	U	1.1	U	19		14		160		120		3.6		33		5.1	
Tamias	94099	1.3	U	1.1	U	10		2.6		28		20		1.3	U	2.4		1.8	U
Tamias	94098	1.3	U	1.1	U			1	U					1.3	U	1.5	U	1.8	U
Tamias	94106	2.4		1.1	U	37		1	U	27		21		1.3	U	1.5	U	1.8	U
Tamias	94105	1.3	U	1.1	U	59		2.3		42		33		1.3	U	1.9		1.8	U
Zapus	94096	1.3	U	1.1	U	18		9.9		110		67		1.4		23		3.1	
Zapus	94097	1.3	U	1.1	U			1	U					1.3	U	1.5	U	1.8	U

NOTE: All PCB concentrations are in µg/kg.

Table A3-7. Results of the PCB congener analyses of small mammal tissue samples collected for the WDNR food chain study

Genus	WDNR ID	PCB177		PCB172		PCB180		PCB170		PCB201		PCB196		PCB194		PCB206	
Clethrinomys	94088	1.8		1.8	U	7.8		8.1		2.3		3	U	1.3		1.5	U
Clethrinomys	94086	1.1	U	1.8	U	2.2	U	2.5	U	1.8	U	3	U	1	U	1.5	U
Clethrinomys	94087	1.1	U	1.8	U	2.2	U	2.5	U	1.8	U	3	U	1	U	1.5	U
Microtus	94090	2.4		1.8	U	6.5		9.1		1.8	U	3	U	1	U	1.5	U
Microtus	94091	1.1	U	1.8	U	2.2	U	2.5	U	1.8	U	3	U	1	U	1.5	U
Microtus	94100	1.1	U	1.8	U	2.2	U	2.5	U	1.8	U	3	U	1	U	1.5	U
Microtus	94101	2.2		1.8	U	8		9.5		2.1		3	U	1.1		1.5	U
Microtus	94089	1.1	U	1.8	U	2.2	U	2.5	U	1.8	U	3	U	1	U	1.5	U
Peromyscus	94092	1.2		5		46		46		9.2		17		7.8		4.5	
Peromyscus	94093	2.6		5.1		59		45		9.7		17		9.2		4.4	
Peromyscus	94094	1.3		2.7		31		23		4.9		8.3		4.7		2.3	
Peromyscus	94095	1.1	U	3.4		63		42		12		23		9.3		4.7	
Peromyscus	94104	1.1	U	1.8	U	2.2	U	2.5	U	1.8	U	3	U	1	U	1.5	U
Peromyscus	94103	1.1	U	2.1		12		9.2		3.3		3.1		1.9		1.5	U
Peromyscus	94102	1.1		5		68		51		14		22		11		5.4	
Tamias	94099	1.1	U	1.8	U	10		10		1.8	U	3.3		2.4		1.7	
Tamias	94098	1.1	U	1.8	U	2.2	U	2.5	U	1.8	U	3	U	1	U	1.5	U
Tamias	94106	1.1	U	1.8	U	5.7		6.5		1.8	U	3	U	1	U	1.5	U
Tamias	94105	1.1	U	1.8	U	7		7.6		1.8	U	3	U	1.1		1.5	U
Zapus	94096	1.1	U	1.8	U	59		36		3.8		15		6.9		2.5	
Zapus	94097	1.1	U	1.8	U	2.2	U	2.5	U	1.8	U	3	U	1	U	1.5	U

NOTE: All PCB concentrations are in µg/kg.

Table A3-7. Results of the PCB congener analyses of small mammal tissue samples collected for the WDNR food chain study

Genus	WDNR ID	SUM (detected values only)	Total of first 17 Congeners	Total of next 17 Congeners	Total of all 34 congeners**
Clethrinomys	94088	170.81	51.66	107.05	158.71
Clethrinomys	94086	46.5	11.8	11.45	23.25
Clethrinomys	94087	46.5	11.8	11.45	23.25
Microtus	94090	285.47	120.72	154.7	275.42
Microtus	94091	46.5	11.8	11.45	23.25
Microtus	94100	46.5	11.8	11.45	23.25
Microtus	94101	755.56	544.81	204.85	749.66
Microtus	94089	46.5	11.8	11.45	23.25
Peromyscus	94092	729.5	182.2	543.9	726.1
Peromyscus	94093	855.98	192.53	659.4	851.93
Peromyscus	94094	447.4	104.15	336.7	440.85
Peromyscus	94095	439.4	31	397.65	428.65
Peromyscus	94104	46.5	11.8	11.45	23.25
Peromyscus	94103	198.8	22.9	163.5	186.4
Peromyscus	94102	584.6	40.1	533.4	573.5
Tamias	94099	134.3	24.4	95.5	119.9
Tamias	94098	46.5	11.8	11.45	23.25
Tamias	94106	295.3	174.95	108.05	283
Tamias	94105	281	106.25	161.25	267.5
Zapus	94096	387.7	15.9	358.25	374.15
Zapus	94097		11.8	11.45	23.25
		note this simply	** Detected conc.+ 1/2 undetected only if congener detected in another sample.		
		adds the columns			
		NOTE: All PCB concentrations are in µg/kg.			

APPENDIX B

Toxic Equivalent Calculations

APPENDIX B-1

Toxic Equivalent Concentrations for Fish

LIST OF TABLES

APPENDIX B-1
DEFINITION OF TERMS

Definition of qualifiers

> - sample over linear range of method
D - diluted sample
L - labeled compound
U - undetected
U*I - significant interference present; value represents operator's best judgement of reporting limit

1997 ERA sample identification

F1-1

fish tissue sample   river segment   sample number

Table B1-1. Fish TEQs using 1997 ERA fish data

Station Chemical	Fish TEFs	F1-1 TEQ	Q	Percent of Total TEQ	F1-2 TEQ	Q	Percent of Total TEQ	F1-3 TEQ	Q	Percent of Total TEQ
PCB077	0.00016	1.71E-05		13.88%	1.84E-05		13.33%	1.60E-05		10.23%
PCB105	0.00000172	4.13E-06		3.35%	4.30E-06		3.11%	3.96E-06		2.53%
PCB114	0.000005	9.30E-07	L	0.75%	8.15E-07	L	0.59%	1.39E-06		0.89%
PCB118	0.00000302	2.36E-05		19.10%	2.39E-05		17.28%	2.27E-05		14.48%
PCB123	0.000005	4.44E-07		0.36%	3.61E-07		0.26%	7.60E-07		0.49%
PCB126	0.005	7.20E-05		58.37%	8.45E-05		61.21%	1.06E-04		67.77%
PCB156	0.00000167	1.60E-06		1.30%	1.69E-06		1.22%	1.46E-06		0.93%
PCB157	0.000005	8.35E-07		0.68%	9.30E-07		0.67%	1.09E-06		0.69%
PCB167	0.000005	2.48E-06		2.01%	2.87E-06		2.08%	2.77E-06		1.77%
PCB189	0.000005	2.62E-07		0.21%	3.29E-07		0.24%	3.44E-07		0.22%
Total TEQ		1.23E-04			1.38E-04			1.56E-04		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congeners 114, 189, and 81 were not analyzed in any samples.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.

Table B1-1. Continued

Station Chemical	F2-1 TEQ	Q	Percent of Total TEQ	F2-2 TEQ	Q	Percent of Total TEQ	F2-3 TEQ	Q	Percent of Total TEQ
PCB077	6.30E-03	D	43.97%	8.48E-03	D	42.89%	4.06E-03		39.91%
PCB105	5.16E-04	>D	3.60%	5.68E-04	D	2.87%	3.61E-04	>D	3.55%
PCB114	1.44E-04		1.00%	1.64E-04		0.83%	1.20E-04		1.18%
PCB118	1.72E-03	>D	12.01%	2.69E-03	>D	13.59%	1.45E-03	>D	14.24%
PCB123	5.85E-05		0.41%	5.50E-05		0.28%	5.45E-05		0.54%
PCB126	5.35E-03		37.31%	7.55E-03		38.18%	3.93E-03		38.59%
PCB156	8.58E-05		0.60%	1.05E-04		0.53%	7.53E-05		0.74%
PCB157	5.45E-05		0.38%	5.25E-05		0.27%	4.08E-05		0.40%
PCB167	9.35E-05		0.65%	9.95E-05		0.50%	7.85E-05		0.77%
PCB189	1.08E-05		0.08%	1.18E-05		0.06%	9.00E-06		0.09%
Total TEQ	1.43E-02			1.98E-02			1.02E-02		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congeners 114, 189, and 81 were not analyzed in any samples.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.

Table B1-1. Continued

Station Chemical	F3-1 TEQ	Q	Percent of Total TEQ	F3-2 TEQ	Q	Percent of Total TEQ	F3-3 TEQ	Q	Percent of Total TEQ
PCB077	5.63E-03	D	30.98%	3.90E-03		27.05%	4.26E-03	D	27.41%
PCB105	6.71E-04		3.69%	6.02E-04		4.17%	5.68E-04		3.66%
PCB114	1.73E-04		0.95%	1.67E-04		1.15%	1.45E-04		0.93%
PCB118	3.32E-03		18.27%	2.93E-03		20.30%	2.93E-03		18.86%
PCB123	6.60E-05		0.36%	6.95E-05		0.48%	5.75E-05		0.37%
PCB126	7.95E-03		43.72%	6.45E-03		44.69%	7.25E-03		46.69%
PCB156	1.30E-04		0.71%	1.13E-04		0.78%	1.26E-04		0.81%
PCB157	7.00E-05		0.38%	7.25E-05		0.50%	6.85E-05		0.44%
PCB167	1.54E-04		0.85%	1.11E-04		0.77%	1.14E-04		0.73%
PCB189	1.50E-05		0.08%	1.42E-05		0.10%	1.59E-05		0.10%
Total TEQ	1.82E-02			1.44E-02			1.55E-02		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congeners 114, 189, and 81 were not analyzed in any samples.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.

Table B1-1. Continued

Station Chemical	F5-1 TEQ	Q	Percent of Total TEQ	F5-2 TEQ	Q	Percent of Total TEQ	F5-3 TEQ	Q	Percent of Total TEQ
PCB077	1.65E-03		30.70%	1.65E-03		26.50%	1.68E-03		25.34%
PCB105	2.41E-04		4.49%	2.75E-04		4.43%	3.10E-04		4.67%
PCB114	6.95E-05		1.29%	8.70E-05		1.40%	9.90E-05		1.49%
PCB118	1.27E-03		23.63%	1.39E-03		22.34%	1.57E-03		23.68%
PCB123	3.09E-05		0.57%	4.04E-05		0.65%	3.26E-05		0.49%
PCB126	1.97E-03		36.70%	2.61E-03		41.97%	2.77E-03		41.77%
PCB156	5.63E-05		1.05%	5.95E-05		0.96%	6.21E-05		0.94%
PCB157	2.59E-05		0.48%	3.15E-05		0.51%	3.32E-05		0.50%
PCB167	5.25E-05		0.98%	7.00E-05		1.13%	6.65E-05		1.00%
PCB189	5.85E-06		0.11%	8.35E-06		0.13%	7.65E-06		0.12%
Total TEQ	5.37E-03			6.22E-03			6.63E-03		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congeners 114, 189, and 81 were not analyzed in any samples.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.

Table B1-2. Fish TEQs using fish tissue samples collected for the WDNR food chain study

Station		603388			603388			603388		
Sample		9413			9414			9415		
Species		longnose dace			longnose dace			longnose dace		
Age class										
Location		control			control			control		
Chemical	Fish TEFs	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ
PCB077	0.00016	0.00008	U	2.98%			na			na
PCB105	0.00000172	1.7E-05		0.63%			na			na
PCB118	0.00000302	7.55E-05		2.81%	2.05E-05		na	9.97E-06		na
PCB126	0.005	0.0025	U	93.16%			na			na
PCB156	0.00000167	4.01E-06		0.15%			na			na
PCB157	0.000005	2.5E-06	U	0.09%			na			na
PCB167	0.000005	4.5E-06	U	0.17%	4.5E-06	U	na	4.5E-06	U	na
Total TEQ		0.002684			na			na		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congeners 114, 189, and 81 were not analyzed in any samples.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 77, 105, 126, and 156 were only analyzed in some samples.
5) na - not applicable when all TEF congeners are not measured.

Table B1-2. Continued

Station	603389			603389			603389		
Sample	9413			9414			9415		
Species	longnose dace			longnose dace			longnose dace		
Age class									
Location	rochester park			rochester park			rochester park		
Chemical	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ
PCB077			na			na	0.00256		24.54%
PCB105			na			na	0.000413		3.96%
PCB118	0.000906		na	0.000966		na	0.002235		21.42%
PCB126			na			na	0.005	U*I	47.93%
PCB156			na			na	7.35E-05		0.70%
PCB157			na			na	0.000055		0.53%
PCB167	0.000055		na	0.00006		na	0.000095		0.91%
Total TEQ	na			na			0.010431		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congeners 114, 189, and 81 were not analyzed in any samples.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 77, 105, 126, and 156 were only analyzed in some samples.
5) na - not applicable when all TEF congeners are not measured.

Table B1-2. Continued

Station	603390			603390			603390		
Sample	9413			9414			9415		
Species	longnose dace			longnose dace			longnose dace		
Age class									
Location	esselingen park			esselingen park			esselingen park		
Chemical	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ
PCB077	0.0032		36.35%			na			na
PCB105	0.000447		5.08%			na			na
PCB118	0.002295		26.07%	0.002114		na	0.001389		na
PCB126	0.0025	U	28.40%			na			na
PCB156	9.02E-05		1.02%			na			na
PCB157	0.00013		1.48%			na			na
PCB167	0.00014		1.59%	0.00011		na	0.00007		na
Total TEQ	0.008803			na			na		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congeners 114, 189, and 81 were not analyzed in any samples.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 77, 105, 126, and 156 were only analyzed in some samples.
5) na - not applicable when all TEF congeners are not measured.

Table B1-2. Continued

Station	603391			603391			603391		
Sample	9413			9414			9415		
Species	longnose dace			longnose dace			longnose dace		
Age class									
Location	between kohler dams			between kohler dams			between kohler dams		
Chemical	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ
PCB077			na			na	0.00272		36.40%
PCB105			na			na	0.0002924		3.91%
PCB118	0.0013892		na	0.0016912		na	0.0016912		22.63%
PCB126			na			na	0.0025	U	33.46%
PCB156			na			na	0.00006346		0.85%
PCB157			na			na	0.000095		1.27%
PCB167	0.00008		na	0.000095		na	0.00011		1.47%
Total TEQ	na			na			0.00747206		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congeners 114, 189, and 81 were not analyzed in any samples.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 77, 105, 126, and 156 were only analyzed in some samples.
5) na - not applicable when all TEF congeners are not measured.

Table B1-2. Continued

Station	603388			603388			603388		
Sample	9401			9402			9403		
Species	smallmouth bass			smallmouth bass			smallmouth bass		
Age class	adult			adult			adult		
Location	control			control			control		
Chemical	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ
PCB077	0.000192		6.77%	0.00008	U	3.03%	0.00008	U	3.06%
PCB105	1.48E-05		0.52%	7.74E-06		0.29%	5.33E-06		0.20%
PCB118	0.000118		4.16%	3.93E-05		1.49%	2.45E-05		0.93%
PCB126	0.0025	U	88.21%	0.0025	U	94.83%	0.0025	U	95.47%
PCB156	2.67E-06		0.09%	2.34E-06		0.09%	1.84E-06		0.07%
PCB157	2.5E-06	U	0.09%	2.5E-06	U	0.09%	2.5E-06	U	0.10%
PCB167	4.5E-06	U	0.16%	4.5E-06	U	0.17%	4.5E-06	U	0.17%
Total TEQ	0.002834			0.002636			0.002619		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congeners 114, 189, and 81 were not analyzed in any samples.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 77, 105, 126, and 156 were only analyzed in some samples.
5) na - not applicable when all TEF congeners are not measured.

Table B1-2. Continued

Station	603388			603388			603388		
Sample	9404			9405			9406		
Species	smallmouth bass			smallmouth bass			smallmouth bass		
Age class	young of year			young of year			young of year		
Location	control			control			control		
Chemical	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ
PCB077			na			na	0.00008	U	3.06%
PCB105			na			na	2.41E-06		0.09%
PCB118	1.18E-05		na	1.33E-05		na	2.3E-05		0.88%
PCB126			na			na	0.0025	U	95.67%
PCB156			na			na	8.35E-07	U	0.03%
PCB157			na			na	2.5E-06	U	0.10%
PCB167	4.5E-06	U	na	4.5E-06	U	na	4.5E-06	U	0.17%
Total TEQ	na			na			0.002613		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congeners 114, 189, and 81 were not analyzed in any samples.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 77, 105, 126, and 156 were only analyzed in some samples.
5) na - not applicable when all TEF congeners are not measured.

Table B1-2. Continued

Station	603389			603389			603389		
Sample	9401			9402			9403		
Species	smallmouth bass			smallmouth bass			smallmouth bass		
Age class	adult			adult			adult		
Location	rochester park			rochester park			rochester park		
Chemical	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ
PCB077	0.01568		30.78%	0.01376		32.74%	0.00768		36.10%
PCB105	0.001324		2.60%	0.001582		3.77%	0.000791		3.72%
PCB118	0.00604		11.86%	0.005738		13.65%	0.003322		15.62%
PCB126	0.027		53.01%	0.02		47.59%	0.009		42.31%
PCB156	0.000284		0.56%	0.000317		0.76%	0.00015		0.71%
PCB157	0.00026		0.51%	0.00027		0.64%	0.000135		0.63%
PCB167	0.00035		0.69%	0.000355		0.84%	0.000195		0.92%
Total TEQ	0.050938			0.042023			0.021274		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congeners 114, 189, and 81 were not analyzed in any samples.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 77, 105, 126, and 156 were only analyzed in some samples.
5) na - not applicable when all TEF congeners are not measured.

Table B1-2. Continued

Station	603389			603389			603389		
Sample	9404			9405			9406		
Species	smallmouth bass			smallmouth bass			smallmouth bass		
Age class	young of year			young of year			young of year		
Location	rochester park			rochester park			rochester park		
Chemical	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ
PCB077			na			na	0.00464		32.46%
PCB105			na			na	0.000585		4.09%
PCB118	0.002778		na	0.002174		na	0.002778		19.44%
PCB126			na			na	0.006	U*I	41.98%
PCB156			na			na	9.02E-05		0.63%
PCB157			na			na	0.00008		0.56%
PCB167	0.00016		na	0.00019		na	0.00012		0.84%
Total TEQ	na			na			0.014293		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congeners 114, 189, and 81 were not analyzed in any samples.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 77, 105, 126, and 156 were only analyzed in some samples.
5) na - not applicable when all TEF congeners are not measured.

Table B1-2. Continued

Station	603390			603390			603390		
Sample	9401			9402			9403		
Species	smallmouth bass			smallmouth bass			smallmouth bass		
Age class	adult			adult			adult		
Location	esselingen park			esselingen park			esselingen park		
Chemical	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ
PCB077	0.00272		32.10%	0.00256		27.72%	0.00208		23.13%
PCB105	0.000361		4.26%	0.00043		4.66%	0.000413		4.59%
PCB118	0.002174		25.66%	0.002476		26.82%	0.002476		27.53%
PCB126	0.003	U*I	35.40%	0.0035	U*I	37.90%	0.00375	U*I	41.69%
PCB156	6.85E-05		0.81%	8.85E-05		0.96%	8.52E-05		0.95%
PCB157	0.00005		0.59%	0.000055		0.60%	0.000055		0.61%
PCB167	0.0001		1.18%	0.000125		1.35%	0.000135		1.50%
Total TEQ	0.008474			0.009235			0.008994		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congeners 114, 189, and 81 were not analyzed in any samples.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 77, 105, 126, and 156 were only analyzed in some samples.
5) na - not applicable when all TEF congeners are not measured.

Table B1-2. Continued

Station	603390			603390			603390		
Sample	9404			9405			9406		
Species	smallmouth bass			smallmouth bass			smallmouth bass		
Age class	young of year			young of year			young of year		
Location	esselingen park			esselingen park			esselingen park		
Chemical	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ
PCB077			na			na	2.24E-03		33.84%
PCB105			na			na	2.92E-04		4.42%
PCB118	0.000755		na	1.09E-03		na	1.45E-03		21.90%
PCB126			na			na	2.50E-03	U	37.77%
PCB156			na			na	3.84E-05		0.58%
PCB157			na			na	3.40E-05		0.51%
PCB167	4.65E-05		na	6.50E-05		na	6.50E-05		0.98%
Total TEQ	na			na			6.62E-03		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congeners 114, 189, and 81 were not analyzed in any samples.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 77, 105, 126, and 156 were only analyzed in some samples.
5) na - not applicable when all TEF congeners are not measured.

Table B1-2. Continued

Station	603391			603391			603391		
Sample	9401			9402			9403		
Species	smallmouth bass			smallmouth bass			smallmouth bass		
Age class	adult			adult			adult		
Location	between kohler dams			between kohler dams			between kohler dams		
Chemical	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ
PCB077	5.76E-03		26.62%	0.00416		32.00%	0.00672		27.49%
PCB105	5.85E-04		2.70%	0.0003612		2.78%	0.0007912		3.24%
PCB118	3.62E-03		16.75%	0.0020536		15.79%	0.004228		17.29%
PCB126	1.10E-02		50.83%	0.006		46.15%	0.012		49.08%
PCB156	1.47E-04		0.68%	0.00010688		0.82%	0.0002004		0.82%
PCB157	2.45E-04		1.13%	0.00015		1.15%	0.00018		0.74%
PCB167	2.80E-04		1.29%	0.00017		1.31%	0.00033		1.35%
Total TEQ	2.16E-02			0.01300168			0.0244496		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congeners 114, 189, and 81 were not analyzed in any samples.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 77, 105, 126, and 156 were only analyzed in some samples.
5) na - not applicable when all TEF congeners are not measured.

Table B1-2. Continued

Station	603391			603391			603391		
Sample	9404			9405			9406		
Species	smallmouth bass			smallmouth bass			smallmouth bass		
Age class	young of year			young of year			young of year		
Location	between kohler dams			between kohler dams			between kohler dams		
Chemical	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ
PCB077			na			na	0.00656		30.43%
PCB105			na			na	0.0007396		3.43%
PCB118	0.0025066		na	0.0021744		na	0.003624		16.81%
PCB126			na			na	0.01		46.38%
PCB156			na			na	0.00016533		0.77%
PCB157			na			na	0.00018		0.83%
PCB167	0.000135		na	0.00012		na	0.00029		1.35%
Total TEQ	na			na			0.02155893		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congeners 114, 189, and 81 were not analyzed in any samples.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 77, 105, 126, and 156 were only analyzed in some samples.
5) na - not applicable when all TEF congeners are not measured.

Table B1-2. Continued

Station	603388			603388			603388		
Sample	9407			9408			9409		
Species	white sucker			white sucker			white sucker		
Age class	adult			adult			adult		
Location	control			control			control		
Chemical	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ
PCB077	0.00008	U	3.06%			na			na
PCB105	4.82E-06		0.18%			na			na
PCB118	2.36E-05		0.90%	6.34E-06		na	3.62E-06		na
PCB126	0.0025	U	95.56%			na			na
PCB156	8.35E-07	U	0.03%			na			na
PCB157	2.5E-06	U	0.10%			na			na
PCB167	4.5E-06	U	0.17%	4.5E-06	U	na	4.5E-06	U	na
Total TEQ	0.002616			na			na		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congeners 114, 189, and 81 were not analyzed in any samples.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 77, 105, 126, and 156 were only analyzed in some samples.
5) na - not applicable when all TEF congeners are not measured.

Table B1-2. Continued

Station	603388			603388			603388		
Sample	9410			9411			9412		
Species	white sucker			white sucker			white sucker		
Age class	young of year			young of year			young of year		
Location	control			control			control		
Chemical	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ
PCB077			na			na	0.00008	U	3.05%
PCB105			na			na	5.5E-06		0.21%
PCB118	3.93E-06		na	4.83E-06		na	3.32E-05		1.26%
PCB126			na			na	0.0025	U	95.18%
PCB156			na			na	8.35E-07	U	0.03%
PCB157			na			na	2.5E-06	U	0.10%
PCB167	4.5E-06	U	na	4.5E-06	U	na	4.5E-06	U	0.17%
Total TEQ	na			na			0.002627		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congeners 114, 189, and 81 were not analyzed in any samples.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 77, 105, 126, and 156 were only analyzed in some samples.
5) na - not applicable when all TEF congeners are not measured.

Table B1-2. Continued

Station	603389			603389			603389		
Sample	9407			9408			9409		
Species	white sucker			white sucker			white sucker		
Age class	adult			adult			adult		
Location	rochester park			rochester park			rochester park		
Chemical	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ
PCB077	0.00064		12.87%			na			na
PCB105	0.000224		4.50%			na			na
PCB118	0.000966		19.44%	0.001419		na	0.002205		na
PCB126	0.003	U*I	60.34%			na			na
PCB156	4.51E-05		0.91%			na			na
PCB157	0.000032		0.64%			na			na
PCB167	0.000065		1.31%	0.00008		na	0.00012		na
Total TEQ	0.004972			na			na		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congeners 114, 189, and 81 were not analyzed in any samples.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 77, 105, 126, and 156 were only analyzed in some samples.
5) na - not applicable when all TEF congeners are not measured.

Table B1-2. Continued

Station	603389			603389			603389		
Sample	9410			9411			9412		
Species	white sucker			white sucker			white sucker		
Age class	young of year			young of year			young of year		
Location	rochester park			rochester park			rochester park		
Chemical	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ
PCB077			na			na	0.00176		22.60%
PCB105			na			na	0.000224		2.87%
PCB118	0.001117		na	0.001208		na	0.000936		12.02%
PCB126			na			na	0.00475	U*I	61.00%
PCB156			na			na	3.67E-05		0.47%
PCB157			na			na	0.00003		0.39%
PCB167	0.000065		na	0.000065		na	0.00005		0.64%
Total TEQ	na			na			0.007787		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congeners 114, 189, and 81 were not analyzed in any samples.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 77, 105, 126, and 156 were only analyzed in some samples.
5) na - not applicable when all TEF congeners are not measured.

Table B1-2. Continued

Station	603390			603390			603390		
Sample	9407			9408			9409		
Species	white sucker			white sucker			white sucker		
Age class	adult			adult			adult		
Location	esselingen park			esselingen park			esselingen park		
Chemical	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ
PCB077	0.000368		10.78%			na			na
PCB105	6.88E-05		2.01%			na			na
PCB118	0.000423		12.38%	0.001661		na	0.000604		na
PCB126	0.0025	U	73.22%			na			na
PCB156	1.84E-05		0.54%			na			na
PCB157	0.000013		0.38%			na			na
PCB167	2.35E-05		0.69%	0.0001		na	4.05E-05		na
Total TEQ	0.003414			na			na		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congeners 114, 189, and 81 were not analyzed in any samples.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 77, 105, 126, and 156 were only analyzed in some samples.
5) na - not applicable when all TEF congeners are not measured.

Table B1-2. Continued

Station	603390			603390			603390		
Sample	9410			9411			9412		
Species	white sucker			white sucker			white sucker		
Age class	young of year			young of year			young of year		
Location	esselingen park			esselingen park			esselingen park		
Chemical	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ
PCB077			na			na	0.001024		23.74%
PCB105			na			na	0.000105		2.43%
PCB118	0.000423		na	0.000423		na	0.000604		14.00%
PCB126			na			na	0.0025	U	57.96%
PCB156			na			na	2.17E-05		0.50%
PCB157			na			na	2.75E-05		0.64%
PCB167	0.000027		na	2.15E-05		na	0.000031		0.72%
Total TEQ	na			na			0.004313		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congeners 114, 189, and 81 were not analyzed in any samples.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 77, 105, 126, and 156 were only analyzed in some samples.
5) na - not applicable when all TEF congeners are not measured.

Table B1-2. Continued

Station	603391			603391			603391		
Sample	9407			9408			9409		
Species	white sucker			white sucker			white sucker		
Age class	adult			adult			adult		
Location	between kohler dams			between kohler dams			between kohler dams		
Chemical	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ
PCB077	0.000896		18.88%			na			na
PCB105	0.0002064		4.35%			na			na
PCB118	0.0009966		21.00%	0.0014194		na	0.0016308		na
PCB126	0.0025	U	52.68%			na			na
PCB156	0.00003674		0.77%			na			na
PCB157	0.00005		1.05%			na			na
PCB167	0.00006		1.26%	0.000075		na	0.000085		na
Total TEQ	0.00474574			na			na		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congeners 114, 189, and 81 were not analyzed in any samples.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 77, 105, 126, and 156 were only analyzed in some samples.
5) na - not applicable when all TEF congeners are not measured.

Table B1-2. Continued

Station	603391			603391			603391		
Sample	9410			9411			9412		
Species	white sucker			white sucker			white sucker		
Age class	young of year			young of year			young of year		
Location	between kohler dams			between kohler dams			between kohler dams		
Chemical	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ
PCB077			na			na	0.001248		26.08%
PCB105			na			na	0.00014276		2.98%
PCB118	0.000755		na	0.001359		na	0.0007852		16.41%
PCB126			na			na	0.0025	U	52.23%
PCB156			na			na	0.00003173		0.66%
PCB157			na			na	0.000036		0.75%
PCB167	0.0000375		na	0.00006		na	0.0000425		0.89%
Total TEQ	na			na			0.00478619		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congeners 114, 189, and 81 were not analyzed in any samples.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 77, 105, 126, and 156 were only analyzed in some samples.
5) na - not applicable when all TEF congeners are not measured.

APPENDIX B-2

Toxic Equivalent Concentrations for Birds

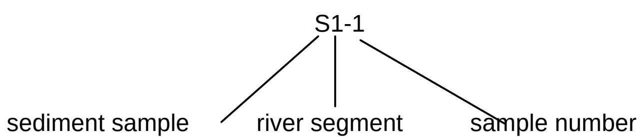
LIST OF TABLES

APPENDIX B-2
DEFINITION OF TERMS

Definition of qualifiers

> - sample over linear range of method
D - diluted sample
L - labeled compound
*Q - unexplainable result
R - peak detected but did not meet quantification criteria
U - undetected
U*I - significant interference present; value represents operator's best judgement of reporting limit

1997 ERA sample identification



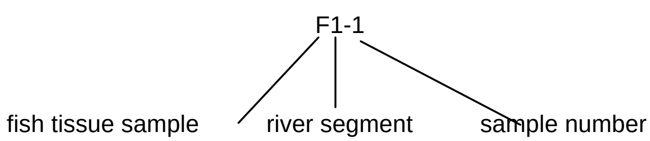


Table B2-1. Bird TEQs using 1997 ERA fish data

Station Chemical	Bird TEFs	F1-1 TEQ	Q	Percent of Total TEQ	F1-2 TEQ	Q	Percent of Total TEQ	F1-3 TEQ	Q	Percent of Total TEQ	F2-1 TEQ	Q	Percent of Total TEQ
PCB066	0.002	3.00E-03		8.24%	2.80E-03		7.35%	2.80E-03		7.52%	9.80E-01	>D	19.76%
PCB077	0.03	3.21E-03		8.82%	3.45E-03		9.05%	3.00E-03		8.06%	1.18E+00	D	23.83%
PCB105	0.005	1.20E-02		32.96%	1.25E-02		32.80%	1.15E-02		30.89%	1.50E+00	>D	30.24%
PCB110	0.00005	5.00E-04		1.37%	4.35E-04		1.14%	4.75E-04		1.28%	1.40E-01	>D	2.82%
PCB118	0.001	7.80E-03		21.42%	7.90E-03		20.73%	7.50E-03		20.15%	5.70E-01	>D	11.49%
PCB126	0.3	4.32E-03		11.86%	5.07E-03		13.30%	6.36E-03		17.09%	3.21E-01		6.47%
PCB128	0.001	2.60E-03		7.14%	2.60E-03		6.82%	2.50E-03		6.72%	1.30E-01	D	2.62%
PCB156	0.001	9.58E-04		2.63%	1.01E-03		2.65%	8.74E-04		2.35%	5.14E-02		1.04%
PCB157	0.002	3.34E-04		0.92%	3.72E-04		0.98%	4.34E-04		1.17%	2.18E-02		0.44%
PCB167	0.002	9.90E-04		2.72%	1.15E-03		3.01%	1.11E-03		2.97%	3.74E-02		0.75%
PCB170	0.0002	1.81E-04		0.50%	2.50E-04		0.66%	1.84E-04		0.49%	9.64E-03		0.19%
PCB180	0.0002	5.04E-04		1.38%	5.64E-04		1.48%	4.76E-04		1.28%	1.65E-02		0.33%
PCB194	0.00005	1.25E-05	R	0.03%	1.65E-05		0.04%	1.55E-05		0.04%	7.00E-04	D	0.01%
Total TEQ		3.64E-02			3.81E-02			3.72E-02			4.96E+00		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congener 138 was measured as 138/163/164, so this value was not included in total TEQ sum.
3) PCB congener 169 was not detected in any samples, so was not included in the TEQ sum.
4) PCB congeners 2, 12, 35, 37, 66, 78, 79, 80, 81, 110, 122, 127, and 139 were not analyzed in any samples.

Table B2-1. Continued

Station / Chemical	F2-2 TEQ	Q	Percent of Total TEQ	F2-3 TEQ	Q	Percent of Total TEQ	F3-1 TEQ	Q	Percent of Total TEQ	F3-2 TEQ	Q	Percent of Total TEQ	F3-3 TEQ	Q	Percent of Total TEQ
PCB066	1.56E+00	>D	23.64%	8.40E-01	>D	22.79%	1.74E+00		25.75%	1.50E+00		26.06%	1.48E+00		25.73%
PCB077	1.59E+00	D	24.09%	7.62E-01		20.67%	1.06E+00	D	15.63%	7.32E-01		12.72%	7.98E-01	D	13.87%
PCB105	1.65E+00	D	25.00%	1.05E+00	>D	28.49%	1.95E+00		28.86%	1.75E+00		30.40%	1.65E+00		28.69%
PCB110	2.10E-01	>D	3.18%	1.15E-01	>D	3.12%	8.50E-02		1.26%	7.50E-02		1.30%	7.00E-02		1.22%
PCB118	8.90E-01	>D	13.49%	4.80E-01	>D	13.02%	1.10E+00		16.28%	9.70E-01		16.85%	9.70E-01		16.86%
PCB126	4.53E-01		6.86%	2.36E-01		6.40%	4.77E-01		7.06%	3.87E-01		6.72%	4.35E-01		7.56%
PCB128	9.80E-02	D	1.48%	8.80E-02	D	2.39%	1.50E-01		2.22%	1.70E-01		2.95%	1.70E-01		2.96%
PCB156	6.30E-02		0.95%	4.51E-02		1.22%	7.78E-02		1.15%	6.78E-02		1.18%	7.55E-02		1.31%
PCB157	2.10E-02		0.32%	1.63E-02		0.44%	2.80E-02		0.41%	2.90E-02		0.50%	2.74E-02		0.48%
PCB167	3.98E-02		0.60%	3.14E-02		0.85%	6.16E-02		0.91%	4.42E-02		0.77%	4.54E-02		0.79%
PCB170	9.08E-03		0.14%	7.44E-03		0.20%	1.11E-02		0.16%	1.13E-02		0.20%	1.03E-02		0.18%
PCB180	1.51E-02		0.23%	1.44E-02		0.39%	1.96E-02		0.29%	1.95E-02		0.34%	1.90E-02		0.33%
PCB194	8.00E-04	D	0.01%	4.95E-04	D	0.01%	1.10E-03		0.02%	9.50E-04		0.02%	1.00E-03		0.02%
Total TEQ	6.60E+00			3.69E+00			6.76E+00			5.76E+00			5.75E+00		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congener 138 was measured as 138/163/164, so this value was not included in total TEQ sum.
3) PCB congener 169 was not detected in any samples, so was not included in the TEQ sum.
4) PCB congeners 2, 12, 35, 37, 66, 78, 79, 80, 81, 110, 122, 127, and 139 were not analyzed in any samples.

Table B2-1. Continued

Station / Chemical	F5-1 TEQ	Q	Percent of Total TEQ	F5-2 TEQ	Q	Percent of Total TEQ	F5-3 TEQ	Q	Percent of Total TEQ
PCB066	6.40E-01		27.06%	6.40E-01		24.82%	7.20E-01		25.23%
PCB077	3.09E-01		13.06%	3.09E-01		11.98%	3.15E-01		11.04%
PCB105	7.00E-01		29.60%	8.00E-01		31.02%	9.00E-01		31.54%
PCB110	3.65E-02		1.54%	4.10E-02		1.59%	4.70E-02		1.65%
PCB118	4.20E-01		17.76%	4.60E-01		17.84%	5.20E-01		18.22%
PCB126	1.18E-01		5.00%	1.57E-01		6.07%	1.66E-01		5.82%
PCB128	6.40E-02		2.71%	8.10E-02		3.14%	9.00E-02		3.15%
PCB156	3.37E-02		1.42%	3.56E-02		1.38%	3.72E-02		1.30%
PCB157	1.03E-02		0.44%	1.26E-02		0.49%	1.33E-02		0.46%
PCB167	2.10E-02		0.89%	2.80E-02		1.09%	2.66E-02		0.93%
PCB170	4.08E-03		0.17%	5.02E-03		0.19%	5.66E-03		0.20%
PCB180	7.96E-03		0.34%	9.60E-03		0.37%	1.19E-02		0.42%
PCB194	3.60E-04		0.02%	3.75E-04		0.01%	6.00E-04		0.02%
Total TEQ	2.37E+00			2.58E+00			2.85E+00		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congener 138 was measured as 138/163/164, so this value was not included in total TEQ sum.
3) PCB congener 169 was not detected in any samples, so was not included in the TEQ sum.
4) PCB congeners 2, 12, 35, 37, 66, 78, 79, 80, 81, 110, 122, 127, and 139 were not analyzed in any samples.

Table B2-2. Bird TEQs using 1997 ERA sediment data

Station Chemical	Bird TEFs	S1-1 TEQ	Q	Percent of Total TEQ	S1-2 TEQ	Q	Percent of Total TEQ	S1-3 TEQ	Q	Percent of Total TEQ
PCB066	0.002	3.00E-04		20.05%	7.20E-04		7.92%	1.20E-04	R	8.82%
PCB077	0.03	1.19E-04		7.98%	1.09E-03		11.98%	2.61E-04		19.20%
PCB105	0.005	6.50E-04		43.43%	2.75E-03		30.24%	5.00E-04		36.73%
PCB110	0.00005	2.00E-05		1.34%	1.05E-04		1.15%	1.90E-05		1.40%
PCB118	0.001	2.40E-04		16.04%	1.30E-03		14.30%	2.40E-04		17.63%
PCB126	0.3	7.65E-05	U	5.11%	2.14E-03	L	23.56%	7.50E-05	U	5.51%
PCB128	0.001	5.00E-05	U	3.34%	5.40E-04		5.94%	6.00E-05	R	4.41%
PCB156	0.001	1.15E-05	L	0.77%	1.34E-04		1.47%	2.60E-05		1.91%
PCB157	0.002	4.74E-06	L	0.32%	5.78E-05		0.64%	1.19E-05	L	0.87%
PCB167	0.002	1.20E-05	L	0.80%	1.18E-04		1.30%	2.18E-05	L	1.60%
PCB170	0.0002	3.60E-06	L	0.24%	5.76E-05		0.63%	9.66E-06		0.71%
PCB180	0.0002	6.32E-06		0.42%	7.34E-05		0.81%	1.41E-05		1.04%
PCB194	0.00005	2.50E-06	U	0.17%	6.00E-06	R	0.07%	2.50E-06	U	0.18%
Total TEQ		1.50E-03			9.09E-03			1.36E-03		

All concentrations in ug/kg dry weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congener 138 was measured as 138/163/164, so this value was not included in total TEQ sum.
3) PCB congener 169 was not detected in any samples, so was not included in the TEQ sum.
4) PCB congeners 2, 12, 35, 37, 66, 78, 79, 80, 81, 110, 122, 127, and 139 were not analyzed in any samples.

Table B2-2. Continued

Station Chemical	S2-1 TEQ	Q	Percent of Total TEQ	S2-2 TEQ	Q	Percent of Total TEQ	S2-3 TEQ	Q	Percent of Total TEQ
PCB066	2.20E-01		30.41%	1.44E+00		20.95%	2.00E-01		22.98%
PCB077	2.05E-01		28.37%	2.05E+00		29.77%	2.74E-01		31.43%
PCB105	1.60E-01		22.12%	1.85E+00		26.92%	1.90E-01		21.83%
PCB110	9.00E-03		1.24%	6.50E-02		0.95%	1.20E-02		1.38%
PCB118	7.60E-02		10.51%	7.10E-01		10.33%	9.90E-02		11.37%
PCB126	3.45E-02		4.77%	5.28E-01		7.68%	6.09E-02		7.00%
PCB128	9.30E-03		1.29%	1.30E-01		1.89%	1.70E-02		1.95%
PCB156	3.36E-03		0.46%	3.92E-02		0.57%	6.42E-03		0.74%
PCB157	1.33E-03		0.18%	1.58E-02		0.23%	2.62E-03		0.30%
PCB167	2.54E-03		0.35%	2.60E-02		0.38%	4.76E-03		0.55%
PCB170	8.20E-04		0.11%	8.60E-03		0.13%	1.68E-03		0.19%
PCB180	1.26E-03		0.17%	1.24E-02		0.18%	2.38E-03		0.27%
PCB194	8.50E-05		0.01%	1.00E-03		0.01%	1.20E-04		0.01%
Total TEQ	7.23E-01			6.87E+00			8.70E-01		

All concentrations in ug/kg dry weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congener 138 was measured as 138/163/164, so this value was not included in total TEQ sum.
3) PCB congener 169 was not detected in any samples, so was not included in the TEQ sum.
4) PCB congeners 2, 12, 35, 37, 66, 78, 79, 80, 81, 110, 122, 127, and 139 were not analyzed in any samples.

Table B2-2. Continued

Station Chemical	S3-1 TEQ	Q	Percent of Total TEQ	S3-2 TEQ	Q	Percent of Total TEQ	S3-3 TEQ	Q	Percent of Total TEQ
PCB066	1.08E-01		18.40%	2.80E-01		21.88%	1.50E-01		20.03%
PCB077	2.26E-01		38.50%	3.39E-01		26.49%	2.50E-01		33.37%
PCB105	1.10E-01		18.75%	3.35E-01		26.18%	1.65E-01		22.04%
PCB110	9.00E-03		1.53%	3.30E-02		2.58%	8.50E-03		1.14%
PCB118	5.60E-02		9.54%	1.20E-01		9.38%	7.30E-02		9.75%
PCB126	5.31E-02		9.05%	1.02E-01		7.97%	6.87E-02		9.17%
PCB128	9.80E-03		1.67%	2.50E-02	R	1.95%	1.20E-02		1.60%
PCB156	5.04E-03		0.86%	1.38E-02		1.08%	8.18E-03		1.09%
PCB157	2.22E-03		0.38%	4.96E-03		0.39%	3.62E-03		0.48%
PCB167	3.64E-03		0.62%	9.36E-03		0.73%	5.40E-03		0.72%
PCB170	1.54E-03		0.26%	6.26E-03		0.49%	1.73E-03		0.23%
PCB180	2.44E-03		0.42%	1.02E-02		0.80%	2.64E-03		0.35%
PCB194	1.30E-04		0.02%	9.00E-04	U	0.07%	1.20E-04	U	0.02%
Total TEQ	5.87E-01			1.28E+00			7.49E-01		

All concentrations in ug/kg dry weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congener 138 was measured as 138/163/164, so this value was not included in total TEQ sum.
3) PCB congener 169 was not detected in any samples, so was not included in the TEQ sum.
4) PCB congeners 2, 12, 35, 37, 66, 78, 79, 80, 81, 110, 122, 127, and 139 were not analyzed in any samples.

Table B2-2. Continued

Station Chemical	S5-1 TEQ	Q	Percent of Total TEQ	S5-2 TEQ	Q	Percent of Total TEQ	S5-3 TEQ	Q	Percent of Total TEQ	S5-4 TEQ	Q	Percent of Total TEQ	S5-5 TEQ	Q	Percent of Total TEQ
PCB066	1.80E-01		18.85%	3.40E-02		18.80%	1.74E-01		21.21%	7.80E-02		16.82%	3.40E-02		21.09%
PCB077	3.27E-01		34.25%	6.30E-02		34.84%	2.59E-01		31.52%	1.90E-01		40.89%	5.46E-02	D	33.87%
PCB105	2.30E-01		24.09%	4.40E-02		24.33%	2.00E-01		24.38%	8.50E-02		18.33%	3.60E-02		22.33%
PCB110	9.00E-03		0.94%	1.70E-03		0.94%	6.50E-03		0.79%	3.10E-03		0.67%	1.65E-03		1.02%
PCB118	8.10E-02		8.48%	1.50E-02		8.30%	7.30E-02		8.90%	3.40E-02		7.33%	1.50E-02		9.30%
PCB126	8.97E-02		9.40%	1.86E-02		10.27%	8.28E-02		10.09%	5.82E-02		12.55%	1.44E-02		8.91%
PCB128	1.90E-02		1.99%	1.05E-03	U	0.58%	7.60E-03		0.93%	4.20E-03		0.91%	2.50E-03		1.55%
PCB156	7.53E-03		0.79%	1.43E-03		0.79%	6.95E-03		0.85%	4.71E-03		1.02%	1.12E-03		0.69%
PCB157	3.08E-03		0.32%	5.98E-04		0.33%	3.10E-03		0.38%	1.91E-03		0.41%	4.72E-04		0.29%
PCB167	4.68E-03		0.49%	9.20E-04		0.51%	4.58E-03		0.56%	2.80E-03		0.60%	8.40E-04		0.52%
PCB170	1.33E-03		0.14%	2.04E-04		0.11%	1.30E-03		0.16%	8.20E-04		0.18%	2.56E-04		0.16%
PCB180	2.12E-03		0.22%	3.26E-04		0.18%	1.93E-03		0.24%	1.28E-03		0.28%	3.76E-04		0.23%
PCB194	2.75E-04	U	0.03%	1.70E-05	U	0.01%	9.00E-05		0.01%	5.50E-05		0.01%	2.15E-05		0.01%
Total TEQ	9.55E-01			1.81E-01			8.20E-01			4.64E-01			1.61E-01		

All concentrations in ug/kg dry weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congener 138 was measured as 138/163/164, so this value was not included in total TEQ sum.
3) PCB congener 169 was not detected in any samples, so was not included in the TEQ sum.
4) PCB congeners 2, 12, 35, 37, 66, 78, 79, 80, 81, 110, 122, 127, and 139 were not analyzed in any samples.

Table B2-3. Bird TEQs using young-of-year fish tissue samples collected for the WDNR food chain study

Station		603388			603388			603388		
Sample		9413			9414			9415		
Species		longnose dace			longnose dace			longnose dace		
Location		control			control			control		
Chemical	Bird TEFs	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ
PCB077	0.03	0.015	U	6.01%			na			na
PCB105	0.005	0.0495		19.85%			na			na
PCB118	0.001	0.025		10.02%	0.0068		na	0.0033		na
PCB126	0.3	0.15	U	60.15%			na			na
PCB128	0.001	0.0035		1.40%	0.0016		na	0.0007	U	na
PCB156	0.001	0.0024		0.96%			na			na
PCB157	0.002	0.001	U	0.40%			na			na
PCB167	0.002	0.0018	U	0.72%	0.0018	U	na	0.0018	U	na
PCB180	0.0002	0.00116		0.47%	0.00058		na	0.00022	U	na
PCB194	0.00005	0.000025	U	0.01%	0.000025	U	na	0.000025	U	na
Total TEQ		0.249385			na			na		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the Percent of Total TEQ sum.
2) PCB congener 138 was measured as 138/163 and PCB congener 170 as 170/190, so these were not included in Percent of Total TEQ sum.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 2, 12, 35, 37, 66, 78, 79, 80, 81, 110, 122, 127, and 139 were not analyzed in any samples.
5) PCB congeners 77, 105, 126, 156, and 157 were only analyzed in some samples.
6) na - not applicable when all TEF congeners are not measured.

Table B2-3. Continued

Station	603389			603389			603389			603390		
Sample	9413			9414			9415			9413		
Species	longnose dace			longnose dace			longnose dace			longnose dace		
Location	rochester park			rochester park			rochester park			esselingen park		
Chemical	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ
PCB077			na			na	0.48		16.49%	0.6		19.46%
PCB105			na			na	1.2		41.23%	1.3		42.16%
PCB118	0.3		na	0.32		na	0.74		25.42%	0.76		24.65%
PCB126			na			na	0.3	U*I	10.31%	0.15	U	4.86%
PCB128	0.034		na	0.036		na	0.071		2.44%	0.087		2.82%
PCB156			na			na	0.044		1.51%	0.054		1.75%
PCB157			na			na	0.022		0.76%	0.052		1.69%
PCB167	0.022		na	0.024		na	0.038		1.31%	0.056		1.82%
PCB180	0.0106		na	0.0114		na	0.0154		0.53%	0.024		0.78%
PCB194	0.000345		na	0.00035		na	0.000445		0.02%	0.0007		0.02%
Total TEQ	na			na			2.910845			3.0837		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the Percent of Total TEQ sum.
2) PCB congener 138 was measured as 138/163 and PCB congener 170 as 170/190, so these were not included in Percent of Total TEQ sum.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 2, 12, 35, 37, 66, 78, 79, 80, 81, 110, 122, 127, and 139 were not analyzed in any samples.
5) PCB congeners 77, 105, 126, 156, and 157 were only analyzed in some samples.
6) na - not applicable when all TEF congeners are not measured.

Table B2-3. Continued

Station	603390			603390			603391			603391		
Sample	9414			9415			9413			9414		
Species	longnose dace			longnose dace			longnose dace			longnose dace		
Location	esselingen park			esselingen park			between kohler dams			between kohler dams		
Chemical	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ
PCB077			na			na			na			na
PCB105			na			na			na			na
PCB118	0.7		na	0.46		na	0.46		na	0.56		na
PCB126			na			na			na			na
PCB128	0.078		na	0.053		na	0.054		na	0.063		na
PCB156			na			na			na			na
PCB157			na			na			na			na
PCB167	0.044		na	0.028		na	0.032		na	0.038		na
PCB180	0.02		na	0.0152		na	0.0164		na	0.019		na
PCB194	0.00065		na	0.000425		na	0.00055		na	0.0006		na
Total TEQ	na			na			na			na		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the Percent of Total TEQ sum.
2) PCB congener 138 was measured as 138/163 and PCB congener 170 as 170/190, so these were not included in Percent of Total TEQ sum.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 2, 12, 35, 37, 66, 78, 79, 80, 81, 110, 122, 127, and 139 were not analyzed in any samples.
5) PCB congeners 77, 105, 126, 156, and 157 were only analyzed in some samples.
6) na - not applicable when all TEF congeners are not measured.

Table B2-3. Continued

Station	603391			603388			603388			603388		
Sample	9415			9404			9405			9406		
Species	longnose dace			smallmouth bass			smallmouth bass			smallmouth bass		
Location	between kohler dams			control			control			control		
Chemical	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ
PCB077	0.51		22.41%			na			na	0.015	U	8.15%
PCB105	0.85		37.36%			na			na	0.007		3.80%
PCB118	0.56		24.61%	0.0039		na	0.0044		na	0.0076		4.13%
PCB126	0.15	U	6.59%			na			na	0.15	U	81.48%
PCB128	0.065		2.86%	0.0007	U	na	0.0007	U	na	0.0007	U	0.38%
PCB156	0.038		1.67%			na			na	0.0005	U	0.27%
PCB157	0.038		1.67%			na			na	0.001	U	0.54%
PCB167	0.044		1.93%	0.0018	U	na	0.0018	U	na	0.0018	U	0.98%
PCB180	0.0198		0.87%	0.00022	U	na	0.00022	U	na	0.00048		0.26%
PCB194	0.00065		0.03%	0.000025	U	na	0.000025	U	na	0.000025	U	0.01%
Total TEQ	2.27545			na			na			0.184105		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample.
This value contributes to the Percent of Total TEQ sum.
2) PCB congener 138 was measured as 138/163 and PCB congener 170 as 170/190, so these were not included in Percent of Total TEQ sum.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 2, 12, 35, 37, 66, 78, 79, 80, 81, 110, 122, 127, and 139 were not analyzed in any samples.
5) PCB congeners 77, 105, 126, 156, and 157 were only analyzed in some samples.
6) na - not applicable when all TEF congeners are not measured.

Table B2-3. Continued

Station	603389			603389			603389			603390		
Sample	9404			9405			9406			9404		
Species	smallmouth bass			smallmouth bass			smallmouth bass			smallmouth bass		
Location	rochester park			rochester park			rochester park			esselingen park		
Chemical	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ
PCB077			na			na	0.87		21.23%			na
PCB105			na			na	1.7		41.49%			na
PCB118	0.92		na	0.72		na	0.92		22.45%	0.25		na
PCB126			na			na	0.36	U*I	8.79%			na
PCB128	0.09		na	0.11		na	0.093		2.27%	0.032		na
PCB156			na			na	0.054		1.32%			na
PCB157			na			na	0.032		0.78%			na
PCB167	0.064		na	0.076		na	0.048		1.17%	0.0186		na
PCB180	0.02		na	0.024		na	0.02		0.49%	0.0096		na
PCB194	0.0006		na	0.0008		na	0.0007		0.02%	0.00029		na
Total TEQ	na			na			4.0977			na		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the Percent of Total TEQ sum.
2) PCB congener 138 was measured as 138/163 and PCB congener 170 as 170/190, so these were not included in Percent of Total TEQ sum.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 2, 12, 35, 37, 66, 78, 79, 80, 81, 110, 122, 127, and 139 were not analyzed in any samples.
5) PCB congeners 77, 105, 126, 156, and 157 were only analyzed in some samples.
6) na - not applicable when all TEF congeners are not measured.

Table B2-3. Continued

Station	603390			603390			603391			603391		
Sample	9405			9406			9404			9405		
Species	smallmouth bass			smallmouth bass			smallmouth bass			smallmouth bass		
Location	esselingen park			esselingen park			between kohler dams			between kohler dams		
Chemical	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ
PCB077			na	0.42		20.75%			na			na
PCB105			na	0.85		42.00%			na			na
PCB118	0.36		na	0.48		23.72%	0.83		na	0.72		na
PCB126			na	0.15	U	7.41%			na			na
PCB128	0.045		na	0.049		2.42%	0.1		na	0.088		na
PCB156			na	0.023		1.14%			na			na
PCB157			na	0.0136		0.67%			na			na
PCB167	0.026		na	0.026		1.28%	0.054		na	0.048		na
PCB180	0.0136		na	0.012		0.59%	0.022		na	0.02		na
PCB194	0.000415		na	0.000325		0.02%	0.0007		na	0.00075		na
Total TEQ	na			2.023925			na			na		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample.
This value contributes to the Percent of Total TEQ sum.
2) PCB congener 138 was measured as 138/163 and PCB congener 170 as 170/190, so these were not included in Percent of Total TEQ sum.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 2, 12, 35, 37, 66, 78, 79, 80, 81, 110, 122, 127, and 139 were not analyzed in any samples.
5) PCB congeners 77, 105, 126, 156, and 157 were only analyzed in some samples.
6) na - not applicable when all TEF congeners are not measured.

Table B2-3. Continued

Station	603391			603388			603388			603388		
Sample	9406			9410			9411			9412		
Species	smallmouth bass			white sucker			white sucker			white sucker		
Location	between kohler dams			control			control			control		
Chemical	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ
PCB077	1.23		21.70%			na			na	0.015	U	7.61%
PCB105	2.15		37.93%			na			na	0.016		8.12%
PCB118	1.2		21.17%	0.0013		na	0.0016		na	0.011		5.58%
PCB126	0.6		10.59%			na			na	0.15	U	76.09%
PCB128	0.16		2.82%	0.0007	U	na	0.0007	U	na	0.0016		0.81%
PCB156	0.099		1.75%			na			na	0.0005	U	0.25%
PCB157	0.072		1.27%			na			na	0.001	U	0.51%
PCB167	0.116		2.05%	0.0018	U	na	0.0018	U	na	0.0018	U	0.91%
PCB180	0.04		0.71%	0.00022	U	na	0.00022	U	na	0.00022	U	0.11%
PCB194	0.00115		0.02%	0.000025	U	na	0.000025	U	na	0.000025	U	0.01%
Total TEQ	5.66815			na			na			0.197145		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the Percent of Total TEQ sum.
2) PCB congener 138 was measured as 138/163 and PCB congener 170 as 170/190, so these were not included in Percent of Total TEQ sum.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 2, 12, 35, 37, 66, 78, 79, 80, 81, 110, 122, 127, and 139 were not analyzed in any samples.
5) PCB congeners 77, 105, 126, 156, and 157 were only analyzed in some samples.
6) na - not applicable when all TEF congeners are not measured.

Table B2-3. Continued

Station	603389			603389			603389			603390		
Sample	9410			9411			9412			9410		
Species	white sucker			white sucker			white sucker			white sucker		
Location	rochester park			rochester park			rochester park			esselingen park		
Chemical	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ
PCB077			na			na	0.33		19.64%			na
PCB105			na			na	0.65		38.69%			na
PCB118	0.37		na	0.4		na	0.31		18.45%	0.14		na
PCB126			na			na	0.285	U*I	16.96%			na
PCB128	0.05		na	0.05		na	0.041		2.44%	0.022		na
PCB156			na			na	0.022		1.31%			na
PCB157			na			na	0.012		0.71%			na
PCB167	0.026		na	0.026		na	0.02		1.19%	0.0108		na
PCB180	0.013		na	0.0126		na	0.0096		0.57%	0.0042		na
PCB194	0.0005		na	0.00044		na	0.00034		0.02%	0.00016		na
Total TEQ	na			na			1.67994			na		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the Percent of Total TEQ sum.
2) PCB congener 138 was measured as 138/163 and PCB congener 170 as 170/190, so these were not included in Percent of Total TEQ sum.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 2, 12, 35, 37, 66, 78, 79, 80, 81, 110, 122, 127, and 139 were not analyzed in any samples.
5) PCB congeners 77, 105, 126, 156, and 157 were only analyzed in some samples.
6) na - not applicable when all TEF congeners are not measured.

Table B2-3. Continued

Station	603390			603390			603391			603391		
Sample	9411			9412			9410			9411		
Species	white sucker			white sucker			white sucker			white sucker		
Location	esselingen park			esselingen park			between kohler dams			between kohler dams		
Chemical	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ
PCB077			na	0.192		21.00%			na			na
PCB105			na	0.305		33.36%			na			na
PCB118	0.14		na	0.2		21.87%	0.25		na	0.45		na
PCB126			na	0.15	U	16.40%			na			na
PCB128	0.02		na	0.025		2.73%	0.036		na	0.059		na
PCB156			na	0.013		1.42%			na			na
PCB157			na	0.011		1.20%			na			na
PCB167	0.0086		na	0.0124		1.36%	0.015		na	0.024		na
PCB180	0.0044		na	0.0058		0.63%	0.0078		na	0.0124		na
PCB194	0.00015		na	0.000185		0.02%	0.000235		na	0.000415		na
Total TEQ	na			0.914385			na			na		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the Percent of Total TEQ sum.
2) PCB congener 138 was measured as 138/163 and PCB congener 170 as 170/190, so these were not included in Percent of Total TEQ sum.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 2, 12, 35, 37, 66, 78, 79, 80, 81, 110, 122, 127, and 139 were not analyzed in any samples.
5) PCB congeners 77, 105, 126, 156, and 157 were only analyzed in some samples.
6) na - not applicable when all TEF congeners are not measured.

Table B2-3. Continued

Station	**603391**		
Sample	**9412**		
Species	**white sucker**		
Location	**between kohler dams**		
Chemical	**TEQ**	**Q**	**Percent of Total TEQ**
PCB077	0.234		20.37%
PCB105	0.415		36.12%
PCB118	0.26		22.63%
PCB126	0.15	U	13.06%
PCB128	0.031		2.70%
PCB156	0.019		1.65%
PCB157	0.0144		1.25%
PCB167	0.017		1.48%
PCB180	0.0082		0.71%
PCB194	0.00027		0.02%
Total TEQ	1.14887		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the Percent of Total TEQ sum.
2) PCB congener 138 was measured as 138/163 and PCB congener 170 as 170/190, so these were not included in Percent of Total TEQ sum.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 2, 12, 35, 37, 66, 78, 79, 80, 81, 110, 122, 127, and 139 were not analyzed in any samples.
5) PCB congeners 77, 105, 126, 156, and 157 were only analyzed in some samples.
6) na - not applicable when all TEF congeners are not measured.

Table B2-4. Bird TEQs using crayfish samples collected for the WDNR food chain study

Station		**603384**			**603384**			**603384**		
Sample		**9409**			**9410**			**9411**		
Species		**crayfish**			**crayfish**			**crayfish**		
Location		**control**			**control**			**control**		
Chemical	**Bird TEFs**	**TEQ**	**Q**	**Percent of Total TEQ**	**TEQ**	**Q**	**Percent of Total TEQ**	**TEQ**	**Q**	**Percent of Total TEQ**
PCB077	0.03	0.015	U	8.71%	0.015	U	8.71%			na
PCB105	0.005	0.0025	U	1.45%	0.0025	U	1.45%			na
PCB118	0.001	0.0004	U	0.23%	0.0004	U	0.23%	0.0015		na
PCB126	0.3	0.15	U	87.14%	0.15	U	87.14%			na
PCB128	0.001	0.0007	U	0.41%	0.0007	U	0.41%	0.0007	U	na
PCB156	0.001	0.0005	U	0.29%	0.0005	U	0.29%			na
PCB157	0.002	0.001	U	0.58%	0.001	U	0.58%			na
PCB167	0.002	0.0018	U	1.05%	0.0018	U	1.05%	0.0018	U	na
PCB180	0.0002	0.00022	U	0.13%	0.00022	U	0.13%	0.00022	U	na
PCB194	0.00005	0.000025	U	0.01%	0.000025	U	0.01%	0.000025	U	na
Total TEQ		0.172145			0.172145			na		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congener 138 was measured as 138/163 and PCB congener 170 as 170/190, so these were not included in total TEQ sum.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 2, 12, 35, 37, 66, 78, 79, 80, 81, 110, 122, 127, and 139 were not analyzed in any samples.
5) PCB congeners 77, 105, 126, 156, and 157 were only analyzed in some samples.
6) na - not applicable when all TEF congeners are not measured.

Table B2-4. Continued

Station	603385			603385			603385		
Sample	9409			9410			9411		
Species	crayfish			crayfish			crayfish		
Location	rochester park			rochester park			rochester park		
Chemical	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ
PCB077	0.156		26.90%	0.132		26.43%			na
PCB105	0.145		25.00%	0.11		22.02%			na
PCB118	0.098		16.90%	0.083		16.62%	0.079		na
PCB126	0.15	U	25.86%	0.15	U	30.03%			na
PCB128	0.01		1.72%	0.0079		1.58%	0.01		na
PCB156	0.0063		1.09%	0.0051		1.02%			na
PCB157	0.0042		0.72%	0.0034		0.68%			na
PCB167	0.007		1.21%	0.0054		1.08%	0.0066		na
PCB180	0.0034		0.59%	0.0026		0.52%	0.0028		na
PCB194	0.00012		0.02%	0.00007		0.01%	0.00008		na
Total TEQ	0.58002			0.49947			na		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congener 138 was measured as 138/163 and PCB congener 170 as 170/190, so these were not included in total TEQ sum.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 2, 12, 35, 37, 66, 78, 79, 80, 81, 110, 122, 127, and 139 were not analyzed in any samples.
5) PCB congeners 77, 105, 126, 156, and 157 were only analyzed in some samples.
6) na - not applicable when all TEF congeners are not measured.

Table B2-4. Continued

Station	603386			603386			603386		
Sample	9409			9410			9411		
Species	crayfish			crayfish			crayfish		
Location	between kohler dams			between kohler dams			between kohler dams		
Chemical	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ
PCB077	0.075	*Q	14.49%	0.057	*Q	13.01%			na
PCB105	0.13		25.12%	0.105		23.97%			na
PCB118	0.13		25.12%	0.095		21.69%	0.088		na
PCB126	0.15	U	28.98%	0.15	U	34.25%			na
PCB128	0.012		2.32%	0.011		2.51%	0.012		na
PCB156	0.0058		1.12%	0.0063		1.44%			na
PCB157	0.0028		0.54%	0.0028		0.64%			na
PCB167	0.0078		1.51%	0.0072		1.64%	0.0068		na
PCB180	0.004		0.77%	0.0036		0.82%	0.0032		na
PCB194	0.00012		0.02%	0.0001		0.02%	0.00009		na
Total TEQ	0.51752			0.438			na		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congener 138 was measured as 138/163 and PCB congener 170 as 170/190, so these were not included in total TEQ sum.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 2, 12, 35, 37, 66, 78, 79, 80, 81, 110, 122, 127, and 139 were not analyzed in any samples.
5) PCB congeners 77, 105, 126, 156, and 157 were only analyzed in some samples.
6) na - not applicable when all TEF congeners are not measured.

Table B2-4. Continued

Station	603387			603387			603387		
Sample	9409			9410			9411		
Species	crayfish			crayfish			crayfish		
Location	esselingen park			esselingen park			esselingen park		
Chemical	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ
PCB077	0.069		16.37%	0.084		17.96%			na
PCB105	0.095		22.54%	0.115		24.59%			na
PCB118	0.08		18.98%	0.087		18.60%	0.083		na
PCB126	0.15	U	35.59%	0.15	U	32.08%			na
PCB128	0.0094		2.23%	0.011		2.35%	0.012		na
PCB156	0.0039		0.93%	0.0047		1.01%			na
PCB157	0.0042		1.00%	0.0046		0.98%			na
PCB167	0.0066		1.57%	0.0076		1.63%	0.0072		na
PCB180	0.0032		0.76%	0.0036		0.77%	0.0036		na
PCB194	0.000115		0.03%	0.000125		0.03%	0.000095		na
Total TEQ	0.421415			0.467625			na		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congener 138 was measured as 138/163 and PCB congener 170 as 170/190, so these were not included in total TEQ sum.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 2, 12, 35, 37, 66, 78, 79, 80, 81, 110, 122, 127, and 139 were not analyzed in any samples.
5) PCB congeners 77, 105, 126, 156, and 157 were only analyzed in some samples.
6) na - not applicable when all TEF congeners are not measured.

Table B2-5. Bird TEQs using sediment samples collected for the WDNR food chain study

Station		603363			603364			603365		
Sample		6A			6B			6C		
Location		camp marina			camp marina			camp marina		
Chemical	Bird TEFs	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ
PCB077	0.03	0.174		40.09%	0.168		48.31%	0.24		45.54%
PCB105	0.005	0.12		27.65%	0.095		27.32%	0.15		28.46%
PCB118	0.001	0.045		10.37%	0.039		11.22%	0.055		10.44%
PCB126	0.3	0.078		17.97%	0.03	U	8.63%	0.0615	U*I	11.67%
PCB128	0.001	0.0063		1.45%	0.0056		1.61%	0.008		1.52%
PCB156	0.001	0.0041		0.94%	0.0032		0.92%	0.0046		0.87%
PCB157	0.002	0.0022		0.51%	0.00186		0.53%	0.0028		0.53%
PCB167	0.002	0.0028		0.65%	0.0024		0.69%	0.0034		0.65%
PCB180	0.0002	0.0015		0.35%	0.0024		0.69%	0.00164		0.31%
PCB194	0.00005	0.000075		0.02%	0.00026		0.07%	0.000075		0.01%
Total TEQ		0.433975			0.34772			0.527015		

All concentrations in ug/kg dry weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congener 138 was measured as 138/163 and PCB congener 170 as 170/190, so these were not included in total TEQ sum.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 2, 12, 35, 37, 66, 78, 79, 80, 81, 110, 122, 127, and 139 were not analyzed in any samples.

Table B2-5. Continued

Station	603366			603367			603368		
Sample	6D			6E			5A		
Location	camp marina		Percent of	camp marina		Percent of	kiwanis park		Percent of
Chemical	TEQ	Q	Total TEQ	TEQ	Q	Total TEQ	TEQ	Q	Total TEQ
PCB077	0.237		47.38%	0.12		45.97%	0.219		43.76%
PCB105	0.145		28.99%	0.075		28.73%	0.17		33.97%
PCB118	0.053		10.60%	0.026		9.96%	0.059		11.79%
PCB126	0.045	U*I	9.00%	0.03	U	11.49%	0.03	U	5.99%
PCB128	0.008		1.60%	0.0037		1.42%	0.0087		1.74%
PCB156	0.0045		0.90%	0.0023		0.88%	0.0053		1.06%
PCB157	0.0026		0.52%	0.00138		0.53%	0.0028		0.56%
PCB167	0.0034		0.68%	0.0017		0.65%	0.0038		0.76%
PCB180	0.00162		0.32%	0.00092		0.35%	0.0018		0.36%
PCB194	0.00007		0.01%	4.75E-05		0.02%	0.00008		0.02%
Total TEQ	0.50019			0.261048			0.50048		

All concentrations in ug/kg dry weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congener 138 was measured as 138/163 and PCB congener 170 as 170/190, so these were not included in total TEQ sum.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 2, 12, 35, 37, 66, 78, 79, 80, 81, 110, 122, 127, and 139 were not analyzed in any samples.

Table B2-5. Continued

Station	603369			603370			603371		
Sample	5B			5C			5D		
Location	kiwanis park		Percent of	kiwanis park		Percent of	kiwanis park		Percent of
Chemical	TEQ	Q	Total TEQ	TEQ	Q	Total TEQ	TEQ	Q	Total TEQ
PCB077	0.225		46.26%	0.138		43.69%	0.186		43.63%
PCB105	0.15		30.84%	0.1		31.66%	0.145		34.02%
PCB118	0.055		11.31%	0.035		11.08%	0.048		11.26%
PCB126	0.0345	U*I	7.09%	0.03	U	9.50%	0.03	U	7.04%
PCB128	0.0086		1.77%	0.0051		1.61%	0.0068		1.60%
PCB156	0.0049		1.01%	0.003		0.95%	0.0039		0.91%
PCB157	0.003		0.62%	0.00184		0.58%	0.0024		0.56%
PCB167	0.0036		0.74%	0.002		0.63%	0.0028		0.66%
PCB180	0.00174		0.36%	0.00092		0.29%	0.00132		0.31%
PCB194	0.00007		0.01%	3.45E-05		0.01%	0.00005		0.01%
Total TEQ	0.48641			0.315895			0.42627		

All concentrations in ug/kg dry weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congener 138 was measured as 138/163 and PCB congener 170 as 170/190, so these were not included in total TEQ sum.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 2, 12, 35, 37, 66, 78, 79, 80, 81, 110, 122, 127, and 139 were not analyzed in any samples.

Table B2-5. Continued

Station	603372			603373			603374		
Sample	3A			3B			3C		
Location	between kohler dams		Percent of	between kohler dams		Percent of	between kohler dams		Percent of
Chemical	TEQ	Q	Total TEQ	TEQ	Q	Total TEQ	TEQ	Q	Total TEQ
PCB077	0.3		40.59%	0.258		44.56%	0.156		45.70%
PCB105	0.235		31.80%	0.17		29.36%	0.095		27.83%
PCB118	0.089		12.04%	0.068		11.74%	0.04		11.72%
PCB126	0.081		10.96%	0.054	U*I	9.33%	0.0345	U*I	10.11%
PCB128	0.013		1.76%	0.011		1.90%	0.0059		1.73%
PCB156	0.0079		1.07%	0.0067		1.16%	0.0035		1.03%
PCB157	0.0046		0.62%	0.004		0.69%	0.0022		0.64%
PCB167	0.0056		0.76%	0.0048		0.83%	0.0026		0.76%
PCB180	0.0028		0.38%	0.0024		0.41%	0.0016		0.47%
PCB194	0.00014		0.02%	0.00011		0.02%	0.00008		0.02%
Total TEQ	0.73904			0.57901			0.34138		

All concentrations in ug/kg dry weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congener 138 was measured as 138/163 and PCB congener 170 as 170/190, so these were not included in total TEQ sum.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 2, 12, 35, 37, 66, 78, 79, 80, 81, 110, 122, 127, and 139 were not analyzed in any samples.

Table B2-5. Continued

Station	603375			603376			603377		
Sample	3D			3E			2A		
Location	between kohler dams		Percent of	between kohler dams		Percent of	rochester park		Percent of
Chemical	TEQ	Q	Total TEQ	TEQ	Q	Total TEQ	TEQ	Q	Total TEQ
PCB077	0.27		46.87%	0.294		44.89%	0.21		44.14%
PCB105	0.165		28.64%	0.185		28.25%	0.145		30.48%
PCB118	0.079		13.71%	0.088		13.44%	0.059		12.40%
PCB126	0.03	U	5.21%	0.0525	U*I	8.02%	0.039	U*I	8.20%
PCB128	0.012		2.08%	0.014		2.14%	0.0087		1.83%
PCB156	0.0071		1.23%	0.0079		1.21%	0.005		1.05%
PCB157	0.0044		0.76%	0.0046		0.70%	0.0032		0.67%
PCB167	0.0054		0.94%	0.0056		0.86%	0.0038		0.80%
PCB180	0.003		0.52%	0.0032		0.49%	0.002		0.42%
PCB194	0.000165		0.03%	0.000145		0.02%	0.000095		0.02%
Total TEQ	0.576065			0.654945			0.475795		

All concentrations in ug/kg dry weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congener 138 was measured as 138/163 and PCB congener 170 as 170/190, so these were not included in total TEQ sum.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 2, 12, 35, 37, 66, 78, 79, 80, 81, 110, 122, 127, and 139 were not analyzed in any samples.

Table B2-5. Continued

Station	603378			603379			603380		
Sample	2B			2C			2D		
Location	rochester park		Percent of	rochester park		Percent of	rochester park		Percent of
Chemical	TEQ	Q	Total TEQ	TEQ	Q	Total TEQ	TEQ	Q	Total TEQ
PCB077	0.45		43.54%	0.219		47.82%	0.81		42.68%
PCB105	0.33		31.93%	0.125		27.29%	0.5		26.34%
PCB118	0.12		11.61%	0.06		13.10%	0.29		15.28%
PCB126	0.09	U*I	8.71%	0.033	U*I	7.21%	0.18	U*I	9.48%
PCB128	0.017		1.64%	0.0084		1.83%	0.047		2.48%
PCB156	0.01		0.97%	0.0045		0.98%	0.026		1.37%
PCB157	0.006		0.58%	0.0026		0.57%	0.016		0.84%
PCB167	0.007		0.68%	0.0036		0.79%	0.0196		1.03%
PCB180	0.0034		0.33%	0.00182		0.40%	0.009		0.47%
PCB194	0.00015		0.01%	0.00008		0.02%	0.00032		0.02%
Total TEQ	1.03355			0.458			1.89792		

All concentrations in ug/kg dry weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congener 138 was measured as 138/163 and PCB congener 170 as 170/190, so these were not included in total TEQ sum.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 2, 12, 35, 37, 66, 78, 79, 80, 81, 110, 122, 127, and 139 were not analyzed in any samples.

Table B2-5. Continued

Station	603381			603392			603393		
Sample	2E			1A			1B		
Location	rochester park		Percent of	control		Percent of	control		Percent of
Chemical	TEQ	Q	Total TEQ	TEQ	Q	Total TEQ	TEQ	Q	Total TEQ
PCB077	0.9		40.83%	0.003	U	7.93%	0.003	U	8.38%
PCB105	0.8		36.30%	0.0005	U	1.32%	0.00115		3.21%
PCB118	0.29		13.16%	0.000225	U	0.59%	0.00054		1.51%
PCB126	0.0975	U*I	4.42%	0.033	U	87.25%	0.03	U	83.83%
PCB128	0.047		2.13%	0.00025	U	0.66%	0.00025	U	0.70%
PCB156	0.027		1.22%	0.0001	U	0.26%	0.0001	U	0.28%
PCB157	0.0162		0.73%	0.0002	U	0.53%	0.0002	U	0.56%
PCB167	0.0186		0.84%	0.0005	U	1.32%	0.0005	U	1.40%
PCB180	0.0076		0.34%	0.000035	U	0.09%	0.000035	U	0.10%
PCB194	0.00022		0.01%	1.25E-05	U	0.03%	1.25E-05	U	0.03%
Total TEQ	2.20412			0.037823			0.035788		

All concentrations in ug/kg dry weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congener 138 was measured as 138/163 and PCB congener 170 as 170/190, so these were not included in total TEQ sum.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 2, 12, 35, 37, 66, 78, 79, 80, 81, 110, 122, 127, and 139 were not analyzed in any samples.

Table B2-5. Continued

Station	603394			603395			603396		
Sample	1C			1D			1E		
Location	control		Percent of	control		Percent of	control		Percent of
Chemical	TEQ	Q	Total TEQ	TEQ	Q	Total TEQ	TEQ	Q	Total TEQ
PCB077	0.003	U	8.56%	0.003	U	8.19%	0.003	U	8.27%
PCB105	0.0005	U	1.43%	0.0017		4.64%	0.0014		3.86%
PCB118	0.00046		1.31%	0.00082		2.24%	0.00076		2.10%
PCB126	0.03	U	85.57%	0.03	U	81.93%	0.03	U	82.74%
PCB128	0.00025	U	0.71%	0.00025	U	0.68%	0.00025	U	0.69%
PCB156	0.0001	U	0.29%	0.0001	U	0.27%	0.0001	U	0.28%
PCB157	0.0002	U	0.57%	0.0002	U	0.55%	0.0002	U	0.55%
PCB167	0.0005	U	1.43%	0.0005	U	1.37%	0.0005	U	1.38%
PCB180	0.000035	U	0.10%	0.000035	U	0.10%	0.000035	U	0.10%
PCB194	1.25E-05	U	0.04%	1.25E-05	U	0.03%	1.25E-05	U	0.03%
Total TEQ	0.035058			0.036618			0.036258		

All concentrations in ug/kg dry weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congener 138 was measured as 138/163 and PCB congener 170 as 170/190, so these were not included in total TEQ sum.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 2, 12, 35, 37, 66, 78, 79, 80, 81, 110, 122, 127, and 139 were not analyzed in any samples.

APPENDIX B-3

Toxic Equivalent Concentrations for Mammals

LIST OF TABLES

APPENDIX B-3
DEFINITION OF TERMS

Definition of qualifiers

> - sample over linear range of method
D - diluted sample
L - labeled compound
U - undetected
U*I - significant interference present; value represents operator's best judgement of reporting limit

1997 ERA sample identification

S1-1

sediment sample   river segment   sample number

F1-1

fish tissue sample   river segment   sample number

Table B3-1. TEQs for mammals by chemical and station using 1997 ERA tissue data

Station Chemical	Mammal TEFs	F1-1 TEQ	Q	Percent of Total TEQ	F1-2 TEQ	Q	Percent of Total TEQ	F1-3 TEQ	Q	Percent of Total TEQ	F2-1 TEQ	Q	Percent of Total TEQ
PCB077	0.0001	1.07E-05		0.34%	1.15E-05		0.33%	1.00E-05		0.26%	3.94E-03	D	1.61%
PCB105	0.0001	2.40E-04		7.64%	2.50E-04		7.28%	2.30E-04		6.03%	3.00E-02	>D	12.25%
PCB114	0.0005	9.30E-05	L	2.96%	8.15E-05	L	2.37%	1.39E-04		3.63%	1.44E-02		5.86%
PCB118	0.0001	7.80E-04		24.84%	7.90E-04		23.00%	7.50E-04		19.65%	5.70E-02	>D	23.28%
PCB123	0.0001	8.88E-06		0.28%	7.22E-06		0.21%	1.52E-05		0.40%	1.17E-03		0.48%
PCB126	0.1	1.44E-03		45.86%	1.69E-03		49.20%	2.12E-03		55.55%	1.07E-01		43.70%
PCB156	0.0005	4.79E-04		15.25%	5.05E-04		14.70%	4.37E-04		11.45%	2.57E-02		10.50%
PCB157	0.0005	8.35E-05		2.66%	9.30E-05		2.71%	1.09E-04		2.84%	5.45E-03		2.23%
PCB189	0.0001	5.24E-06		0.17%	6.58E-06		0.19%	6.87E-06		0.18%	2.16E-04		0.09%
Total TEQ		3.14E-03			3.43E-03			3.82E-03			2.45E-01		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congener 81 was not analyzed in any samples.
3) PCB congener 169 was not detected in any samples, so was not included in the TEQ sum.

Table B3-1. Continued

Station Chemical	F2-2 TEQ	Q	Percent of Total TEQ	F2-3 TEQ	Q	Percent of Total TEQ	F3-1 TEQ	Q	Percent of Total TEQ	F3-2 TEQ	Q	Percent of Total TEQ
PCB077	5.30E-03	D	1.59%	2.54E-03		1.34%	3.52E-03	D	0.94%	0.00244		0.76%
PCB105	3.30E-02	D	9.92%	2.10E-02	>D	11.05%	3.90E-02		10.36%	0.035		10.84%
PCB114	1.64E-02		4.91%	1.20E-02		6.31%	1.73E-02		4.58%	0.01665		5.16%
PCB118	8.90E-02	>D	26.75%	4.80E-02	>D	25.26%	1.10E-01		29.23%	0.097		30.04%
PCB123	1.10E-03		0.33%	1.09E-03		0.57%	1.32E-03		0.35%	0.00139		0.43%
PCB126	1.51E-01		45.38%	7.86E-02		41.36%	1.59E-01		42.25%	0.129		39.95%
PCB156	3.15E-02		9.47%	2.26E-02		11.87%	3.89E-02		10.34%	0.0339		10.50%
PCB157	5.25E-03		1.58%	4.08E-03		2.15%	7.00E-03		1.86%	0.00725		2.25%
PCB189	2.35E-04		0.07%	1.80E-04		0.09%	2.99E-04		0.08%	0.000284		0.09%
Total TEQ	3.33E-01			1.90E-01			3.76E-01			3.23E-01		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congener 81 was not analyzed in any samples.
3) PCB congener 169 was not detected in any samples, so was not included in the TEQ sum.

Table B3-1. Continued

Station Chemical	F3-3 TEQ	Q	Percent of Total TEQ	F5-1 TEQ	Q	Percent of Total TEQ	F5-2 TEQ	Q	Percent of Total TEQ	F5-3 TEQ	Q	Percent of Total TEQ
PCB077	0.00266	D	0.79%	0.00103		0.83%	0.00103		0.71%	0.00105		0.66%
PCB105	0.033		9.76%	0.014		11.33%	0.016		10.97%	0.018		11.32%
PCB114	0.01445		4.27%	0.00695		5.63%	0.0087		5.97%	0.0099		6.22%
PCB118	0.097		28.68%	0.042		33.99%	0.046		31.54%	0.052		32.69%
PCB123	0.00115		0.34%	0.000617		0.50%	0.000808		0.55%	0.000651		0.41%
PCB126	0.145		42.88%	0.0394		31.89%	0.0522		35.79%	0.0554		34.83%
PCB156	0.03775		11.16%	0.01685		13.64%	0.0178		12.20%	0.0186		11.69%
PCB157	0.00685		2.03%	0.002585		2.09%	0.003145		2.16%	0.003315		2.08%
PCB189	0.000318		0.09%	0.000117		0.09%	0.000167		0.11%	0.000153		0.10%
Total TEQ	3.38E-01			1.24E-01			1.46E-01			1.59E-01		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congener 81 was not analyzed in any samples.
3) PCB congener 169 was not detected in any samples, so was not included in the TEQ sum.

Table B3-2. TEQs for mammals by chemical and station using 1997 ERA sediment data

Station Chemical	Mammal TEFs	S1-1 TEQ	Q	Percent of Total TEQ	S1-2 TEQ	Q	Percent of Total TEQ	S1-3 TEQ	Q	Percent of Total TEQ	S2-1 TEQ	Q	Percent of Total TEQ
PCB077	0.0001	3.98E-07		0.56%	3.63E-06		0.36%	8.71E-07		1.11%	6.84E-04		2.60%
PCB105	0.0001	1.30E-05		18.26%	5.50E-05		5.52%	1.00E-05		12.71%	3.20E-03		12.16%
PCB114	0.0005	1.22E-06	L	1.71%	1.04E-05	L	1.04%	2.31E-06	L	2.94%	1.20E-03		4.56%
PCB118	0.0001	2.40E-05		33.70%	1.30E-04		13.06%	2.40E-05		30.50%	7.60E-03		28.89%
PCB123	0.0001	1.09E-07	L	0.15%	1.10E-06		0.11%	4.96E-07	L	0.63%	9.66E-05		0.37%
PCB126	0.1	2.55E-05	U	35.81%	7.14E-04	L	71.71%	2.50E-05	U	31.77%	1.15E-02		43.71%
PCB156	0.0005	5.75E-06	L	8.07%	6.70E-05		6.73%	1.30E-05		16.52%	1.68E-03		6.39%
PCB157	0.0005	1.19E-06	L	1.66%	1.45E-05		1.45%	2.97E-06	L	3.77%	3.32E-04		1.26%
PCB189	0.0001	5.00E-08	U	0.07%	5.00E-08	U	0.01%	5.00E-08	U	0.06%	1.82E-05		0.07%
Total TEQ		7.12E-05			9.96E-04			7.87E-05			2.63E-02		

All concentrations in ug/kg dry weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congener 81 was not analyzed in any samples.
3) PCB congener 169 was not detected in any samples, so was not included in the TEQ sum.

Table B3-2. Continued

Station Chemical	S2-2 TEQ	Q	Percent of Total TEQ	S2-3 TEQ	Q	Percent of Total TEQ	S3-1 TEQ	Q	Percent of Total TEQ	S3-2 TEQ	Q	Percent of Total TEQ
PCB077	6.82E-03		2.08%	9.12E-04		2.25%	7.53E-04		2.43%	1.13E-03		1.73%
PCB105	3.70E-02		11.31%	3.80E-03		9.37%	2.20E-03		7.11%	6.70E-03		10.26%
PCB114	1.15E-02		3.52%	1.59E-03		3.91%	1.47E-03		4.73%	2.94E-03		4.49%
PCB118	7.10E-02		21.70%	9.90E-03		24.42%	5.60E-03		18.09%	1.20E-02		18.37%
PCB123	1.07E-03		0.33%	1.42E-04		0.35%	1.20E-04		0.39%	1.71E-04		0.26%
PCB126	1.76E-01		53.80%	2.03E-02		50.06%	1.77E-02		57.19%	3.40E-02		52.05%
PCB156	1.96E-02		5.99%	3.21E-03		7.92%	2.52E-03		8.14%	6.90E-03		10.56%
PCB157	3.95E-03		1.21%	6.55E-04		1.62%	5.55E-04		1.79%	1.24E-03		1.90%
PCB189	1.90E-04		0.06%	4.46E-05		0.11%	3.64E-05		0.12%	2.49E-04		0.38%
Total TEQ	3.27E-01			4.05E-02			3.09E-02			6.53E-02		

All concentrations in ug/kg dry weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congener 81 was not analyzed in any samples.
3) PCB congener 169 was not detected in any samples, so was not included in the TEQ sum.

Table B3-2. Continued

Station Chemical	S3-3 TEQ	Q	Percent of Total TEQ	S5-1 TEQ	Q	Percent of Total TEQ	S5-2 TEQ	Q	Percent of Total TEQ	S5-3 TEQ	Q	Percent of Total TEQ
PCB077	8.33E-04		2.01%	1.09E-03		2.14%	2.10E-04		2.07%	8.62E-04		1.86%
PCB105	3.30E-03		7.97%	4.60E-03		9.02%	8.80E-04		8.66%	4.00E-03		8.64%
PCB114	1.87E-03		4.51%	2.50E-03		4.90%	4.77E-04		4.69%	2.08E-03		4.49%
PCB118	7.30E-03		17.64%	8.10E-03		15.89%	1.50E-03		14.76%	7.30E-03		15.76%
PCB123	1.54E-04		0.37%	2.18E-04		0.43%	3.44E-05		0.34%	1.81E-04		0.39%
PCB126	2.29E-02		55.33%	2.99E-02		58.66%	6.19E-03		60.92%	2.76E-02		59.60%
PCB156	4.09E-03		9.88%	3.77E-03		7.39%	7.15E-04		7.04%	3.48E-03		7.50%
PCB157	9.05E-04		2.19%	7.70E-04		1.51%	1.50E-04		1.47%	7.75E-04		1.67%
PCB189	4.36E-05		0.11%	3.16E-05		0.06%	4.58E-06		0.05%	3.24E-05		0.07%
Total TEQ	4.14E-02			5.10E-02			1.02E-02			4.63E-02		

All concentrations in ug/kg dry weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congener 81 was not analyzed in any samples.
3) PCB congener 169 was not detected in any samples, so was not included in the TEQ sum.

Table B3-2. Continued

Station Chemical	S5-4 TEQ	Q	Percent of Total TEQ	S5-5 TEQ	Q	Percent of Total TEQ
PCB077	6.32E-04		2.15%	1.82E-04	D	2.22%
PCB105	1.70E-03		5.78%	7.20E-04		8.78%
PCB114	1.33E-03		4.50%	3.04E-04		3.70%
PCB118	3.40E-03		11.56%	1.50E-03		18.28%
PCB123	1.12E-04		0.38%	2.39E-05		0.29%
PCB126	1.94E-02		65.93%	4.79E-03		58.39%
PCB156	2.36E-03		8.00%	5.60E-04		6.83%
PCB157	4.77E-04		1.62%	1.18E-04		1.44%
PCB189	2.32E-05		0.08%	6.48E-06		0.08%
Total TEQ	2.94E-02			8.20E-03		

All concentrations in ug/kg dry weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congener 81 was not analyzed in any samples.
3) PCB congener 169 was not detected in any samples, so was not included in the TEQ sum.

Table B3-3. Mammals TEQs using fish tissue samples collected for the WDNR food chain study

Station		603388			603388			603388		
Sample		9413			9414			9415		
Species		longnose dace			longnose dace			longnose dace		
Location		control			control			control		
Chemical	Mammal TEFs	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ
PCB077	0.0001	0.00005	U	0.09%			na			na
PCB105	0.0001	0.00099		1.80%			na			na
PCB118	0.0001	0.0025		4.55%	0.00068		na	0.00033		na
PCB126	0.1	0.05	U	90.93%			na			na
PCB156	0.0005	0.0012		2.18%			na			na
PCB157	0.0005	0.00025	U	0.45%			na			na
Total TEQ		0.05499			na			na		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the Percent of Total TEQ sum.
2) PCB congener 81 was not analyzed in any samples.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 77, 105, 126, 156 and 157 were only analyzed in some samples.
5) na - not applicable when all TEF congeners are not measured.

Table B3-3. Continued

Station	603389			603389			603389		
Sample	9413			9414			9415		
Species	longnose dace			longnose dace			longnose dace		
Location	rochester park			rochester park			rochester park		
Chemical	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ
PCB077			na			na	0.0016		0.70%
PCB105			na			na	0.024		10.57%
PCB118	0.03		na	0.032		na	0.074		32.58%
PCB126			na			na	0.1	U*I	44.03%
PCB156			na			na	0.022		9.69%
PCB157			na			na	0.0055		2.42%
Total TEQ	na			na			0.2271		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample.
   This value contributes to the Percent of Total TEQ sum.
2) PCB congener 81 was not analyzed in any samples.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 77, 105, 126, 156 and 157 were only analyzed in some samples.
5) na - not applicable when all TEF congeners are not measured.

Table B3-3. Continued

Station	603390			603390			603390		
Sample	9413			9414			9415		
Species	longnose dace			longnose dace			longnose dace		
Location	esselingen park			esselingen park			esselingen park		
Chemical	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ
PCB077	0.002		1.03%			na			na
PCB105	0.026		13.40%			na			na
PCB118	0.076		39.18%	0.07		na	0.046		na
PCB126	0.05	U	25.77%			na			na
PCB156	0.027		13.92%			na			na
PCB157	0.013		6.70%			na			na
Total TEQ	0.194			na			na		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the Percent of Total TEQ sum.
2) PCB congener 81 was not analyzed in any samples.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 77, 105, 126, 156 and 157 were only analyzed in some samples.
5) na - not applicable when all TEF congeners are not measured.

Table B3-3. Continued

Station	603391			603391			603391		
Sample	9413			9414			9415		
Species	longnose dace			longnose dace			longnose dace		
Location	between kohler dams			between kohler dams			between kohler dams		
Chemical	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ
PCB077			na			na	0.0017		1.11%
PCB105			na			na	0.017		11.10%
PCB118	0.046		na	0.056		na	0.056		36.55%
PCB126			na			na	0.05	U	32.64%
PCB156			na			na	0.019		12.40%
PCB157			na			na	0.0095		6.20%
Total TEQ	na			na			0.1532		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the Percent of Total TEQ sum.
2) PCB congener 81 was not analyzed in any samples.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 77, 105, 126, 156 and 157 were only analyzed in some samples.
5) na - not applicable when all TEF congeners are not measured.

Table B3-3. Continued

Station	603388			603388			603388		
Sample	9404			9405			9406		
Species	smallmouth bass			smallmouth bass			smallmouth bass		
Location	control			control			control		
Chemical	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ
PCB077			na			na	0.00005	U	0.10%
PCB105			na			na	0.00014		0.27%
PCB118	0.00039		na	0.00044		na	0.00076		1.48%
PCB126			na			na	0.05	U	97.18%
PCB156			na			na	0.00025	U	0.49%
PCB157			na			na	0.00025	U	0.49%
Total TEQ	na			na			0.05145		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the Percent of Total TEQ sum.
2) PCB congener 81 was not analyzed in any samples.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 77, 105, 126, 156 and 157 were only analyzed in some samples.
5) na - not applicable when all TEF congeners are not measured.

Table B3-3. Continued

Station	603389			603389			603389		
Sample	9404			9405			9406		
Species	smallmouth bass			smallmouth bass			smallmouth bass		
Location	rochester park			rochester park			rochester park		
Chemical	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ
PCB077			na			na	0.0029		1.02%
PCB105			na			na	0.034		11.98%
PCB118	0.092		na	0.072		na	0.092		32.41%
PCB126			na			na	0.12	U*I	42.27%
PCB156			na			na	0.027		9.51%
PCB157			na			na	0.008		2.82%
Total TEQ	na			na			0.2839		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the Percent of Total TEQ sum.
2) PCB congener 81 was not analyzed in any samples.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 77, 105, 126, 156 and 157 were only analyzed in some samples.
5) na - not applicable when all TEF congeners are not measured.

Table B3-3. Continued

Station	603390			603390			603390		
Sample	9404			9405			9406		
Species	smallmouth bass			smallmouth bass			smallmouth bass		
Location	esselingen park			esselingen park			esselingen park		
Chemical	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ
PCB077			na			na	0.0014		1.07%
PCB105			na			na	0.017		12.95%
PCB118	0.025		na	0.036		na	0.048		36.56%
PCB126			na			na	0.05	U	38.08%
PCB156			na			na	0.0115		8.76%
PCB157			na			na	0.0034		2.59%
Total TEQ	na			na			0.1313		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the Percent of Total TEQ sum.
2) PCB congener 81 was not analyzed in any samples.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 77, 105, 126, 156 and 157 were only analyzed in some samples.
5) na - not applicable when all TEF congeners are not measured.

Table B3-3. Continued

Station	603391			603391			603391		
Sample	9404			9405			9406		
Species	smallmouth bass			smallmouth bass			smallmouth bass		
Location	between kohler dams			between kohler dams			between kohler dams		
Chemical	**TEQ**	**Q**	**Percent of Total TEQ**	**TEQ**	**Q**	**Percent of Total TEQ**	**TEQ**	**Q**	**Percent of Total TEQ**
PCB077			na			na	0.0041		0.94%
PCB105			na			na	0.043		9.89%
PCB118	0.083		na	0.072		na	0.12		27.61%
PCB126			na			na	0.2		46.02%
PCB156			na			na	0.0495		11.39%
PCB157			na			na	0.018		4.14%
Total TEQ	na			na			0.4346		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the Percent of Total TEQ sum.
2) PCB congener 81 was not analyzed in any samples.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 77, 105, 126, 156 and 157 were only analyzed in some samples.
5) na - not applicable when all TEF congeners are not measured.

Table B3-3. Continued

Station	603388			603388			603388		
Sample	9410			9411			9412		
Species	white sucker			white sucker			white sucker		
Location	control			control			control		
Chemical	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ
PCB077			na			na	0.00005	U	0.10%
PCB105			na			na	0.00032		0.62%
PCB118	0.00013		na	0.00016		na	0.0011		2.12%
PCB126			na			na	0.05	U	96.21%
PCB156			na			na	0.00025	U	0.48%
PCB157			na			na	0.00025	U	0.48%
Total TEQ	na			na			0.05197		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the Percent of Total TEQ sum.
2) PCB congener 81 was not analyzed in any samples.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 77, 105, 126, 156 and 157 were only analyzed in some samples.
5) na - not applicable when all TEF congeners are not measured.

Table B3-3. Continued

Station	603389			603389			603389		
Sample	9410			9411			9412		
Species	white sucker			white sucker			white sucker		
Location	rochester park			rochester park			rochester park		
Chemical	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ
PCB077			na			na	0.0011		0.71%
PCB105			na			na	0.013		8.44%
PCB118	0.037		na	0.04		na	0.031		20.12%
PCB126			na			na	0.095	U*I	61.65%
PCB156			na			na	0.011		7.14%
PCB157			na			na	0.003		1.95%
Total TEQ	na			na			0.1541		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the Percent of Total TEQ sum.
2) PCB congener 81 was not analyzed in any samples.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 77, 105, 126, 156 and 157 were only analyzed in some samples.
5) na - not applicable when all TEF congeners are not measured.

Table B3-3. Continued

Station	603390			603390			603390		
Sample	9410			9411			9412		
Species	white sucker			white sucker			white sucker		
Location	esselingen park			esselingen park			esselingen park		
Chemical	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ
PCB077			na			na	0.00064		0.74%
PCB105			na			na	0.0061		7.09%
PCB118	0.014		na	0.014		na	0.02		23.26%
PCB126			na			na	0.05	U	58.15%
PCB156			na			na	0.0065		7.56%
PCB157			na			na	0.00275		3.20%
Total TEQ	na			na			0.08599		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the Percent of Total TEQ sum.
2) PCB congener 81 was not analyzed in any samples.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 77, 105, 126, 156 and 157 were only analyzed in some samples.
5) na - not applicable when all TEF congeners are not measured.

Table B3-3. Continued

Station	603391			603391			603391		
Sample	9410			9411			9412		
Species	white sucker			white sucker			white sucker		
Location	between kohler dams			between kohler dams			between kohler dams		
Chemical	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ	TEQ	Q	Percent of Total TEQ
PCB077			na			na	0.00078		0.79%
PCB105			na			na	0.0083		8.45%
PCB118	0.025		na	0.045		na	0.026		26.48%
PCB126			na			na	0.05	U	50.93%
PCB156			na			na	0.0095		9.68%
PCB157			na			na	0.0036		3.67%
Total TEQ	na			na			0.09818		

All concentrations in ug/kg wet weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the Percent of Total TEQ sum.
2) PCB congener 81 was not analyzed in any samples.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 77, 105, 126, 156 and 157 were only analyzed in some samples.
5) na - not applicable when all TEF congeners are not measured.

Table B3-4. Mammal TEQs using sediment data collected for the WDNR food chain study

Station	603366			603367			603368		
Sample	6D			6E			5A		
Species	sediment			sediment			sediment		
Location	camp marina		Percent of	camp marina		Percent of	kiwanis park		Percent of
Chemical	TEQ	Q	Total TEQ	TEQ	Q	Total TEQ	TEQ	Q	Total TEQ
PCB077	0.00079		2.94%	0.0004		2.50%	0.00073		3.12%
PCB105	0.0029		10.78%	0.0015		9.38%	0.0034		14.54%
PCB118	0.0053		19.71%	0.0026		16.26%	0.0059		25.24%
PCB126	0.015	U*I	55.78%	0.01	U	62.52%	0.01	U	42.77%
PCB156	0.00225		8.37%	0.00115		7.19%	0.00265		11.33%
PCB157	0.00065		2.42%	0.000345		2.16%	0.0007		2.99%
Total TEQ	0.02689			0.015995			0.02338		

All concentrations in ug/kg dry weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congener 81 was not analyzed in any samples.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 77, 105, 126, 156 and 157 were only analyzed in some samples.

Table B3-4. Continued

Station	603369			603370			603371		
Sample	5B			5C			5D		
Species	sediment			sediment			sediment		
Location	kiwanis park		Percent of	kiwanis park		Percent of	kiwanis park		Percent of
Chemical	TEQ	Q	Total TEQ	TEQ	Q	Total TEQ	TEQ	Q	Total TEQ
PCB077	0.00075		3.13%	0.00046		2.57%	0.00062		2.97%
PCB105	0.003		12.53%	0.002		11.16%	0.0029		13.90%
PCB118	0.0055		22.96%	0.0035		19.53%	0.0048		23.00%
PCB126	0.0115	U*I	48.02%	0.01	U	55.80%	0.01	U	47.92%
PCB156	0.00245		10.23%	0.0015		8.37%	0.00195		9.34%
PCB157	0.00075		3.13%	0.00046		2.57%	0.0006		2.87%
Total TEQ	**0.02395**			**0.01792**			**0.02087**		

All concentrations in ug/kg dry weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample.
   This value contributes to the total TEQ sum.
2) PCB congener 81 was not analyzed in any samples.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 77, 105, 126, 156 and 157 were only analyzed in some samples.

Table B3-4. Continued

Station	603372			603373			603374		
Sample	3A			3B			3C		
Species	sediment			sediment			sediment		
Location	between kohler dams		Percent of	between kohler dams		Percent of	between kohler dams		Percent of
Chemical	TEQ	Q	Total TEQ	TEQ	Q	Total TEQ	TEQ	Q	Total TEQ
PCB077	0.001		2.14%	0.00086		2.57%	0.00052		2.57%
PCB105	0.0047		10.06%	0.0034		10.18%	0.0019		9.40%
PCB118	0.0089		19.06%	0.0068		20.35%	0.004		19.78%
PCB126	0.027		57.82%	0.018	U*I	53.88%	0.0115	U*I	56.87%
PCB156	0.00395		8.46%	0.00335		10.03%	0.00175		8.65%
PCB157	0.00115		2.46%	0.001		2.99%	0.00055		2.72%
Total TEQ	**0.0467**			**0.03341**			**0.02022**		

All concentrations in ug/kg dry weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congener 81 was not analyzed in any samples.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 77, 105, 126, 156 and 157 were only analyzed in some samples.

Table B3-4. Continued

Station	603375			603376			603377		
Sample	3D			3E			2A		
Species	sediment			sediment			sediment		
Location	between kohler dams		Percent of	between kohler dams		Percent of	rochester park		Percent of
Chemical	TEQ	Q	Total TEQ	TEQ	Q	Total TEQ	TEQ	Q	Total TEQ
PCB077	0.0009		3.36%	0.00098		2.72%	0.0007		2.71%
PCB105	0.0033		12.34%	0.0037		10.25%	0.0029		11.24%
PCB118	0.0079		29.53%	0.0088		24.39%	0.0059		22.87%
PCB126	0.01	U	37.38%	0.0175	U*I	48.50%	0.013	U*I	50.39%
PCB156	0.00355		13.27%	0.00395		10.95%	0.0025		9.69%
PCB157	0.0011		4.11%	0.00115		3.19%	0.0008		3.10%
Total TEQ	0.02675			0.03608			0.0258		

All concentrations in ug/kg dry weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congener 81 was not analyzed in any samples.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 77, 105, 126, 156 and 157 were only analyzed in some samples.

Table B3-4. Continued

Station	603378			603379			603380		
Sample	2B			2C			2D		
Species	sediment			sediment			sediment		
Location	rochester park		Percent of	rochester park		Percent of	rochester park		Percent of
Chemical	TEQ	Q	Total TEQ	TEQ	Q	Total TEQ	TEQ	Q	Total TEQ
PCB077	0.0015		2.65%	0.00073		3.16%	0.0027		2.27%
PCB105	0.0066		11.66%	0.0025		10.81%	0.01		8.42%
PCB118	0.012		21.20%	0.006		25.94%	0.029		24.43%
PCB126	0.03	U*I	53.00%	0.011	U*I	47.56%	0.06	U*I	50.55%
PCB156	0.005		8.83%	0.00225		9.73%	0.013		10.95%
PCB157	0.0015		2.65%	0.00065		2.81%	0.004		3.37%
Total TEQ	**0.0566**			**0.02313**			**0.1187**		

All concentrations in ug/kg dry weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congener 81 was not analyzed in any samples.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 77, 105, 126, 156 and 157 were only analyzed in some samples.

Table B3-4. Continued

Station	603381			603392			603393		
Sample	2E			1A			1B		
Species	sediment			sediment			sediment		
Location	rochester park		Percent of	control		Percent of	control		Percent of
Chemical	TEQ	Q	Total TEQ	TEQ	Q	Total TEQ	TEQ	Q	Total TEQ
PCB077	0.003		3.06%	0.00001	U	0.09%	0.00001	U	0.10%
PCB105	0.016		16.32%	0.00001	U	0.09%	0.000023		0.23%
PCB118	0.029		29.58%	0.0000225	U	0.20%	0.000054		0.53%
PCB126	0.0325	U*I	33.15%	0.011	U	98.72%	0.01	U	98.16%
PCB156	0.0135		13.77%	0.00005	U	0.45%	0.00005	U	0.49%
PCB157	0.00405		4.13%	0.00005	U	0.45%	0.00005	U	0.49%
Total TEQ	**0.09805**			**0.0111425**			**0.010187**		

All concentrations in ug/kg dry weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congener 81 was not analyzed in any samples.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 77, 105, 126, 156 and 157 were only analyzed in some samples.

Table B3-4. Continued

Station	603394			603395			603396		
Sample	1C			1D			1E		
Species	sediment			sediment			sediment		
Location	control		Percent of	control		Percent of	control		Percent of
Chemical	TEQ	Q	Total TEQ	TEQ	Q	Total TEQ	TEQ	Q	Total TEQ
PCB077	0.00001	U	0.10%	0.00001	U	0.10%	0.00001	U	0.10%
PCB105	0.00001	U	0.10%	0.000034		0.33%	0.000028		0.27%
PCB118	0.000046		0.45%	0.000082		0.80%	0.000076		0.74%
PCB126	0.01	U	98.37%	0.01	U	97.79%	0.01	U	97.90%
PCB156	0.00005	U	0.49%	0.00005	U	0.49%	0.00005	U	0.49%
PCB157	0.00005	U	0.49%	0.00005	U	0.49%	0.00005	U	0.49%
Total TEQ	**0.010166**			**0.010226**			**0.010214**		

All concentrations in ug/kg dry weight.

1) For PCB congeners that were not detected, 1/2 the detection limit was used if that congener was detected in another sample. This value contributes to the total TEQ sum.
2) PCB congener 81 was not analyzed in any samples.
3) PCB congeners 123 and 169 were not detected in any samples, so were not included in the TEQ sum.
4) PCB congeners 77, 105, 126, 156 and 157 were only analyzed in some samples.

APPENDIX C

Laboratory Report
Freshwater Sediment Toxicity Testing Program

October 1997

LABORATORY REPORT

NOAA - Sheboygan, WI

Freshwater Sediment Toxicity Testing Program

PREPARED FOR:

EVS Environment Consultants
Seattle, WA

PREPARED BY:

EVS ENVIRONMENT CONSULTANTS
North Vancouver, BC

FRESHWATER SEDIMENT TOXICITY TESTING PROGRAM

NOAA - SHEBOYGAN, WI

LABORATORY REPORT

Prepared for

EVS Environment Consultants
200 West Mercer Street
Suite 403
Seattle WA 98119

Prepared by

EVS Environment Consultants
195 Pemberton Avenue
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V7P 2R4

EVS Project No.
9/575-37.10

October 1997

Environmental Services for
Industry and Government

Vancouver, Canada
Seattle, U.S.A.

ENVIRONMENT
CONSULTANTS

Our File #: 9/575-37.10
Work Order # 9700658 and 9700659

October 16, 1997

Ms. Kim Magruder
EVS Environment Consultants
200 West Mercer Street
Suite 403
Seattle, WA 98119
USA

Dear Ms. Magruder:

Re: Report of the Freshwater Sediment Toxicity Testing for NOAA - Sheboygan, WI

We are pleased to provide the results of toxicity testing on freshwater samples received on behalf of NOAA in Sheboygan, WI.

We have completed toxicity testing on eighteen (18) freshwater sediment samples, collected between August 12 and 13, 1997

This report includes data and results for tests using the freshwater midge (*Chironomus tentans*) and the amphipod (*Hyalella azteca*). The test methods, results and raw data including statistical printouts are provided in the following report. If you have any questions or comments, please do not hesitate to contact the undersigned.

Yours truly,

EVS ENVIRONMENT CONSULTANTS

Jennifer V. Stewart, B.Sc.
Manager, Laboratory Services

PAH/jag

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Freshwater sediment toxicity testing was conducted by George Yang, Lori Suffredine, May Lee, Betty Yung, Patricia Haynes, Stefan Santos, Elizabeth Thys, Bushra Jamil, Amanda Ward, Andy Diewald, Edmund Canaria, Alice Yang, Kevin Bahr, Camille Merchant, Micaele Madison, Jan Widmer and Julianna Galfi Kalocai. The statistical analyses and report preparation were conducted by Patricia Haynes. Quality assurance/quality control (QA/QC) review of the data was conducted by Cathy McPherson. The report was reviewed by Jennifer Stewart. Kristen Ramsden and Jackie Gelling were responsible for word processing.

1.0
INTRODUCTION

Eighteen sediment samples were received by the EVS Laboratory on August 20 and 22, 1997. These samples were collected between August 12 and 18, 1997. Toxicity tests were conducted on all samples using the freshwater midge, *Chironomus tentans* and the juvenile amphipod, *Hyalella azteca*. This report describes the results of these tests. Chain-of-Custody forms submitted with the samples are provided in Appendix A. Test data and statistical printouts are provided in Appendices B and C, respectively.

The samples were each shipped in one 2-L glass containers which were then homogenized thoroughly. Prior to test initiation the sediments were stored at 4☜C in the dark.

Both the midge test and the amphipod test were initiated with cultured organisms obtained from a commercial supplier. The exposure duration was 10 days for both tests, the endpoints were survival and growth.

1.1 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

This study was conducted under our comprehensive QA/QC Program to ensure full documentation and minimize possible errors in computation and reporting of results. The details of our QA/QC Program are documented in our Laboratory QA/QC Manual which describes all aspects of our program, including information on general laboratory procedures, sample handling, toxicity test procedures, data interpretation and management, and documentation of results. The following general QA/QC guidelines apply to all toxicity tests: use of negative controls, use of positive controls, replication, instrument calibration, water quality maintenance and record-keeping, and use of standard operating procedures (SOP). To ensure the highest quality of data and reporting, all data and statistical analyses for each toxicity test are reviewed by a member of our QA/QC Committee prior to the report being released.

2.0
10-d MIDGE (*Chironomus tentans*) SEDIMENT TOXICITY TEST

2.1 METHODS

Ten-day water-renewal toxicity tests using the freshwater midge, *Chironomus tentans*, were conducted according to methods described in ASTM (1996). Test organisms were obtained from a commercial supplier in Wisconsin and were third instar at test initiation. The chironomids were cultured in moderately hard water (80 - 100 mg/L as $CaCO_3$) at 23 ✂ 1☜C under a 16:8 h light:dark photoperiod.

Tests were conducted in 300 mL glass beakers. Six replicates, plus one sacrificial replicate for Day 0 ammonia analysis were prepared for each sample, including the negative control. One of the six replicates was used for monitoring daily water quality and Day 10 ammonia analysis. Moderately hard reconstituted water was used for testing. Reagent-grade chemicals were added to dechlorinated water to achieve a final hardness of 80 - 100 mg/L as $CaCO_{3.}$ The toxicity tests were conducted at 23 ✂ 1☜C, under a 16:8 h light:dark photoperiod, in a constant environment chamber.

Sediments were distributed to the test containers the day prior to test initiation (Day -1). A 100-mL volume of test sediment was added to each beaker. Approximately 175 mL of moderately hard water (80 - 100 mg/L $CaCO_3$) was added gently to each beaker using a turbulence reducer to minimize disturbing the sediments. Water renewal by volume was initiated the same day, the beakers were then covered with clean plexiglass and left to settle overnight. On Day 0, each beaker was seeded with 10 randomly selected chironomids of similar size (approximately 7 mm in length). Prior to seeding, the head capsule widths were measured on 20 additional larvae to ensure that 50% of the midges were in third instar. The test was not aerated until Day 3, when the dissolved oxygen dropped below 3.4 mg/L (40% saturation). The test organisms were fed a diet of 1.5 mL of Tetra-Min fish food mixture daily.

Two additional sets of 10 larvae were set aside for determination of initial dry weight (biomass). Water quality parameters (temperature, pH, dissolved oxygen, and conductivity) were measured daily for each treatment, in a replicate designated for measuring water quality parameters. Two overlying water renewals (by volume) were completed daily. Hardness and alkalinity were measured in composite samples of overlying water from each treatment on Days 0 and 10, using methods described in APHA (1995). Ammonia concentrations in interstitial water and sulfide concentrations in overlying water were measured on Days 0 and 10.

Total ammonia concentrations were measured in the interstitial water from each sample, using the Salicylate Method (Hach Company, 1992). Interstitial water was collected by centrifugation of a small portion of sediment from the sacrificial replicate. Appropriate reagents were added and the absorbance was measured for each sample using a spectrophotometer. The absorbance reading was compared to a standard curve to determine the total ammonia concentration (mg/L N) in each sample. Composite subsamples of overlying water were collected from each sample and analyzed for total sulfides using an ion specific electrode.

The test was terminated after 10 d when the sediments were sieved and the live and dead larvae were removed and counted. For the test to be considered valid, mean negative control survival had to be at least 70% and average size of *C. tentans* in the negative control be at least 0.6 mg at the end of test (ASTM, 1996). Surviving larvae (excluding pupae and flies) from each replicate were transferred to pre-weighed aluminum pans and dried at 60 °C for 24 hours for determination of total dry weight. The larvae were weighed to an accuracy of 0.1 mg to obtain final dry weights. Mean individual dry weights were obtained by dividing the final dry weight of each replicate by the number of larvae weighed.

Statistical analyses were performed using the TOXCALC computer program (Tidepool Scientific Software, 1994). Survival and dry weight data were analysed separately. The survival and dry weight data were tested for normality and homogeneity of variance. If the survival data did not pass the tests for normality and homogeneity of variance, then the data were transformed. If transformation did not allow the data to pass these tests, untransformed data were used. Dry weight data were not transformed. Homoscedastic *t*-tests or the non-parametric Heteroscedastic *t*-tests were then performed to determine if any of the test sediments were significantly different ($p \leq 0.05$) from the negative control with respect to survival or dry weight. Samples significantly different with respect to survival were omitted from dry weight analyses.

A concurrent 96-h LC50 positive (toxic) control test was conducted with the reference toxicant potassium chloride (KCl) to assess the health and sensitivity of the chironomids. Potassium chloride solutions were prepared from reagent grade KCl and diluted with moderately hard reconstituted water to obtain the specified concentrations. The test consisted of five concentrations (1.25, 2.5, 5, 10 and 20 g/L KCl) with three replicates each. Ten randomly selected larvae of third instar testing size were exposed to each treatment. Test containers were 300-mL beakers, each containing 150 mL of test solution and a monolayer of control sediment for burrowing. Water quality measurements were recorded at the beginning and end of the test, and temperature and survival were recorded daily. The chironomids were fed 1.25 mL of Tetra-Min mixture on Day 0 and 2. Beakers were not aerated during testing.

2.2 RESULTS

Results of the sediment toxicity test is summarized in Table 2-1. Raw data and statistical printouts are provided in Appendix B.

Mean survival in the negative control was 96.7%. Mean survival in the samples ranged from 0 to 95.0%. Mean dry weight in the negative control was 0.81 mg/larva. Mean dry weight in the samples ranged from 1.44 to 2.16 mg/larva.

With respect to survival, Heteroscedastic *t*-tests indicated there were significant differences ($p \le 0.05$).

With respect to dry weight, Homoscedastic *t*-tests indicated there were no significant differences ($p \le 0.05$) between samples and the negative control.

2.3 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

Mean survival responses in the negative control met the criterion for test acceptability as outlined in ASTM (1996).

Seven replicates were initially requested for testing, however at the time of seeding only six replicates were seeded due to a shortage of animals received from the supplier. Client was previously notified of this deviation.

Water quality parameters measured during the 10-d exposure period were in the following ranges: temperature, 22.0 - 23.0°C; pH 7.0 - 8.3; dissolved oxygen, 3.0 - 8.6 mg/L and conductivity 280 - 500 µmhos/cm. Hardness measurements ranged from 106 - 166 mg/L as $CaCO_3$ on Day 0 and from 104 - 152 mg/L as $CaCO_3$ on Day 10. Alkalinity measurements ranged from 67 - 136 mg/L as $CaCO_3$ on Day 0 and 86 - 124 mg/L as $CaCO_3$ on Day 10. Dissolved Oxygen measurements were generally ≥40% saturation (3.4 mg/L) during the 10-d exposure, however there were some exceptions. Aeration was checked daily and adjusted as needed. These low oxygen measurements do not appear to have affected the test results. Sulfide levels in overlying water and interstitial ammonia concentrations measured during the 10-d exposure are summarized in Table 2-2.

The 96-h LC50 value for the KCl reference toxicant (initiated September 5, 1997) was determined using the TOXCALC computer program. The 96-h LC50 value for KCl was 5.4 g/L KCl (95% confidence limits: 4.2 and 6.8 g/L KCl) which is within the laboratory range of 4.5 ± 3.0 g/L KCl (mean ± 2SD). Water quality parameters measured during the 96-h exposure period were within the following ranges: temperature, 22.0 - 23.0°C; pH, 7.4 - 8.0; dissolved oxygen, 4.8 - 8.6 mg/L; and conductivity, 200 - 47,000 µmhos/cm.

Table 2-1. Summary of *Chironomus tentans* sediment toxicity test results

Sample ID	Mean ✂ SD	
	SURVIVAL (%)[1]	DRY WEIGHT (mg)[2]
Negative Control	96.7 ✂ 5.2	0.81 ✂ 0.19
SR-1-SS-B	95.0 ✂ 5.5	1.90 ✂ 0.18
SR-2-SS-B	68.3 ✂ 18.4*	1.71 ✂ 0.25
SR-3-SS-B	81.7 ✂ 17.2*	2.16 ✂ 0.25
SR-4-SS-B	88.3 ✂ 7.5*	1.62 ✂ 0.18
SR-7-SS-F	0.0 ✂ 0.0*	-
SR-8-SS-F	91.7 ✂ 7.5	2.01 ✂ 0.18
SR-9-SS-F	77.5 ✂ 9.6*	1.96 ✂ 0.18
SR-10-SS-F	88.3 ✂ 7.5*	2.04 ✂ 0.22
SR-11-SS-F	78.3 ✂ 18.4*	2.14 ✂ 0.41
SR-12-SS-F	91.7 ✂ 9.8	1.54 ✂ 0.19
SR-13-SS-F	85.0 ✂ 13.8	1.58 ✂ 0.14
SR-14-SS-F	76.7 ✂ 22.5*	1.62 ✂ 0.17
SR-15-SS-F	83.3 ✂ 31.4	1.68 ✂ 0.31
SR-16-SS-F	86.7 ✂ 17.5	1.44 ✂ 0.30
SR-17-SS-F	73.3 ✂ 26.6*	1.70 ✂ 0.34
SR-18-SS-F	93.3 ✂ 8.2	1.49 ✂ 0.15
SR-19-SS-F	81.7 ✂ 17.2*	1.60 ✂ 0.27
SR-20-SS-F	83.3 ✂ 21.6	1.59 ✂ 0.43

1 Asterisks (*) indicate samples significantly different (*p*✁0.05) from the negative control.
2 Samples significantly different with respect to survival were omitted from dry weight statistical analyses.

Table 2-2. Summary of *Chironomus tentans* interstitial ammonia and overlying sulfide results

Sample ID	Total Interstitial Ammonia (mg/L N)		Total Sulfides (mg/L S)	
	Day 0	Day 10	Day 0	Day 10
Negative Control	< 0.1	1.1	0.000	0.000
SR-1-SS-B	7.0	0.3	0.000	0.000
SR-2-SS-B	17.3	0.2	0.000	0.000
SR-3-SS-B	11.6	1.9	0.000	0.000
SR-4-SS-B	26.9	7.1	0.000	0.000
SR-7-SS-F	5.9	2.7	0.000	0.000
SR-8-SS-F	16.4	2.1	0.000	0.000
SR-9-SS-F	9.6	4.2	0.000	0.000
SR-10-SS-F	27.8	0.9	0.000	0.000
SR-11-SS-F	22.8	<0.1	0.000	0.001
SR-12-SS-F	16.4	1.8	0.000	0.000
SR-13-SS-F	25.1	7.1	0.000	0.000
SR-14-SS-F	31.0	5.5	0.000	0.000
SR-15-SS-F	20.5	6.7	0.000	0.000
SR-16-SS-F	16.8	3.8	0.000	0.000
SR-17-SS-F	12.3	8.4	0.000	0.000
SR-18-SS-F	24.6	7.1	0.000	0.000
SR-19-SS-F	25.5	4.7	0.000	0.000
SR-20-SS-F	19.1	3.8	0.000	0.000

3.0
10-d AMPHIPOD (*Hyalella azteca*) SEDIMENT TOXICITY TEST

3.1 METHODS

Ten-day water-renewal toxicity tests using the freshwater amphipod *Hyalella azteca* were conducted according to methods described in ASTM (1996). Test organisms were obtained from a commercial supplier in New Hampshire and were 14 d old at test initiation. The amphipods were cultured in moderately hard water (80 - 100 mg/L as $CaCO_3$) at 23 ✂ 1☜C under a 16:8 h light:dark photoperiod. The amphipods were fed a combination of algae (*Selenastrum capricornutum*), d-YCT (yeast/cereal flakes/digested trout food), and Tetra-Min mixture every second day during the holding period.

Tests were conducted in 300 mL glass beakers. Eight replicates were prepared for each sample, including the negative control. Of the 8 replicates, one sacrificial replicate was used for Day 0 interstitial ammonia analysis and one for monitoring daily water quality and Day 10 interstitial ammonia. Moderately hard reconstituted water was used for testing. Reagent-grade chemicals were added to dechlorinated water to achieve a final hardness of 80 - 100 mg/L as $CaCO_3$. The toxicity tests were conducted at 23 ✂ 1☜C, under a 16:8 h light:dark photoperiod, in a constant environment chamber.

Sediments were distributed to the test containers the day prior to test initiation (Day -1). A 100-mL volume of test sediment was added to each beaker. Approximately 175 mL of moderately hard water (80 - 100 mg/L $CaCO_3$) was added gently to each beaker using a turbulence reducer to minimize disturbing the sediments. Water renewal by volume was initiated the same day, the beakers were then covered with clean plexiglass and left to settle overnight. On Day 0, each beaker was seeded with 10 randomly selected amphipods of similar size (approximately 2 - 3 mm in length). The test was not aerated until Day 8 when the dissolved oxygen dropped below 3.4 mg/L (40% saturation). Test organisms were fed a diet of 1.5 mL of d-YCT daily.

Two additional sets of 10 amphipods were set aside for determination of initial dry weight (biomass). Water quality parameters (temperature, pH, dissolved oxygen, and conductivity) were measured daily for each treatment, in a replicate designated for measuring water quality parameters. Two overlying water renewals (by volume) were completed daily. Hardness and alkalinity were measured in composite samples of overlying water from each treatment on Days 0 and 10, using methods described in APHA (1995). Ammonia concentrations in interstitial water and sulfide concentrations in overlying water were measured on Days 0 and 10.

Total ammonia concentrations were measured in the interstitial water from each sample, using the Salicylate Method (Hach Company, 1992). Interstitial water was collected by centrifugation of a small portion of sediment from the sacrificial replicate. Appropriate reagents were added and the absorbance was measured for each sample using a spectrophotometer. The absorbance reading was compared to a standard curve to determine the total ammonia concentration (mg/L N) in each sample. Composite subsamples of overlying water were collected from each sample and analyzed for total sulfides using an ion specific electrode.

The test was terminated after 10 d when the sediments were sieved and the live and dead amphipods were removed and counted. Amphipods were considered dead when there was no response to physical stimulation. Missing amphipods were assumed to have died and decomposed prior to the termination of the test. For the test to be considered valid, mean negative control survival had to be at least 80% (ASTM, 1996). Surviving amphipods from each replicate were transferred to pre-weighed aluminum pans and dried at 60 °C for 24 hours for determination of total dry weight. The amphipods were weighed to an accuracy of 0.1 mg to obtain final dry weights. Mean individual dry weights were obtained by dividing the final dry weight of each replicate by the number of amphipods weighed.

Statistical analyses were performed using the TOXCALC computer program (Tidepool Scientific Software, 1994). Survival and dry weight data were analysed separately. The survival and dry weight data were tested for normality and homogeneity of variance. If the survival data did not pass the tests for normality and homogeneity of variance, then the data were transformed. If transformation did not allow the data to pass these tests, untransformed data were used. Dry weight data were not transformed. Homoscedastic *t*-tests or non-parametric Heteroscedastic *t*-tests were then performed to determine if any of the test sediments were significantly different ($p \leq 0.05$) from then negative control with respect to survival or dry weight. Samples significantly different with respect to survival were omitted from the dry weight analysis.

A concurrent 96-h LC50 positive (toxic) control test was conducted with the reference toxicant, zinc (prepared from zinc sulphate, $ZnSO_4 \cdot 7H_2O$) to assess the health and sensitivity of the amphipods. Zinc stock solution was prepared from reagent grade zinc sulphate and diluted with moderately hard reconstituted water to obtain the specified concentrations. The test consisted of five concentrations (32, 56, 100, 180 and 320 µg/L as Zn) with three replicates each. Ten randomly selected amphipods (2 - 3 mm in length) were exposed to each treatment. The test containers were 300-mL beakers each containing 200 mL of test solution and a small 110 µg piece of nylon mesh as substrate. Water quality measurements were recorded at the beginning and end of the test, and temperature and survival were recorded daily. The amphipods were fed 0.5 mL of d-YCT on Days 0 and 2. Beakers were not aerated during testing.

3.2 RESULTS

Results of the sediment toxicity test is summarized in Table 3-1. Raw data and statistical printouts are provided in Appendix C.

Mean survival in the negative control was 96.7%. Mean survival in the samples ranged from 0 to 95.0%. Mean dry weight in the negative control was 0.12 mg/amphipod. Mean dry weight in the samples ranged from 0.09 to 0.19 mg/amphipod.

With respect to survival, Heteroscedastic *t*-tests indicated there were significant differences ($p \leq 0.05$).

With respect to dry weight, Homoscedastic *t*-tests indicated no significant differences between the samples and the negative control.

3.3 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

Mean survival responses in the negative control met the criterion for test acceptability as outlined in ASTM (1996).

Please note that Samples SR-9-SS-F, SR-13-SS-F, and SR-15-SS-F, had one replicate where the survival varied from the other replicates. Therefore statistical analysis was performed including and excluding this replicate of each sample. The results from comparing both statistical analysis, demonstrated that there was no statistical difference in each sample analysis regardless of whether the replicate was included or not.

Water quality parameters measured during the 10-d exposure period were within the following ranges: temperature, 22.0 - 24.0°C; pH, 7.1 - 8.3; dissolved oxygen, 2.4 - 8.7 mg/L; and conductivity, 300 - 600 µmhos/cm. Hardness measurements ranged from 94 - 136 mg/L as $CaCO_3$ on Day 0 and 112 - 156 mg/L as $CaCO_3$ on Day 10. Alkalinity measurements ranged from 64 - 112 mg/L as $CaCO_3$ on Day 0 and 76 - 118 mg/L as $CaCO_3$ on Day 10. Dissolved oxygen measurements were generally ≥40% saturation (3.4 mg/L) during the 10-d exposure, however there were some exceptions. Aeration was checked daily and adjusted as needed. These low oxygen measurements do not appear to affect the test results. Sulfide levels in overlying water and interstitial ammonia concentrations measured during the 10-d exposure for each batch of testing are summarized in Table 3-2.

The 96-h LC50 for the zinc reference toxicant (initiated August 26, 1997) was determined using the TOXCALC computer program. The 96-h LC50 value for zinc was 145 µg/L Zn (95% confidence limits: 130 and 162 µg/L Zn). A laboratory mean has not yet been generated due to insufficient data points for this method. However, this value is consistent with values obtained for our in-house cultures. Water quality parameters measured during the 96-h exposure period were within the following ranges: temperature, 22.5 - 24.0°C; pH, 7.7 - 8.0; dissolved oxygen, 7.4 - 8.5 mg/L; and conductivity, 310 - 320 µmhos/cm.

Table 3-1. Summary of *Hyalella azteca* sediment toxicity test results

Sample ID	Mean ± SD	
	SURVIVAL (%)[1]	DRY WEIGHT (mg)[2]
Negative Control	96.7 ± 5.2	0.12 ± 0.03
SR-1-SS-B	95.0 ± 8.4	0.16 ± 0.02
SR-2-SS-B	86.7 ± 10.3*	0.14 ± 0.02
SR-3-SS-B	68.3 ± 21.4*	0.17 ± 0.04
SR-4-SS-B	46.7 ± 12.1*	0.18 ± 0.09
SR-7-SS-F	0.0 ± 0.0*	-
SR-8-SS-F	91.7 ± 7.5	0.19 ± 0.08
SR-9-SS-F	75.0 ± 41.8 (90.0 ± 22.4)	0.17 ± 0.04
SR-10-SS-F	66.7 ± 25.0*	0.17 ± 0.06
SR-11-SS-F	85.0 ± 8.4*	0.13 ± 0.04
SR-12-SS-F	88.3 ± 11.7	0.12 ± 0.03
SR-13-SS-F	66.1 ± 28.0* (60.0 ± 26.5*)	0.09 ± 0.02
SR-14-SS-F	78.3 ± 14.7*	0.10 ± 0.03
SR-15-SS-F	65.0 ± 38.9 (78.0 ± 24.9)	0.15 ± 0.03
SR-16-SS-F	61.7 ± 28.6*	0.15 ± 0.03
SR-17-SS-F	86.7 ± 12.1	0.16 ± 0.05
SR-18-SS-F	78.3 ± 13.3*	0.13 ± 0.02
SR-19-SS-F	60.0 ± 37.4*	0.19 ± 0.06
SR-20-SS-F	63.3 ± 25.8*	0.14 ± 0.04

[1] Asterisks (*) indicate samples significantly different ($p \leq 0.05$) from the negative control (Bracketed survival values indicate anomalous replicate removed from statistical analysis. See text for details).

[2] Samples significantly different with respect to survival were omitted from dry weight statistical analyses.

Table 3-2. Summary of *Hyalella azteca* interstitial ammonia and overlying sulfide results

SAMPLE ID	TOTAL INTERSTITIAL AMMONIA (mg/L N)		TOTAL SULFIDES (mg/L S)	
	DAY 0	DAY 10	DAY 0	DAY 10
Negative Control	<0.1	1.5	0.000	0.000
SR-1-SS-B	10.7	8.2	0.000	0.000
SR-2-SS-B	16.3	10.9	0.000	0.000
SR-3-SS-B	11.1	10.4	0.000	0.000
SR-4-SS-B	29.5	17.2	0.000	0.000
SR-7-SS-F	7.5	5.0	0.000	0.000
SR-8-SS-F	17.8	10.4	0.015	0.000
SR-9-SS-F	13.3	5.9	0.000	0.000
SR-10-SS-F	23.6	19.1	0.000	0.000
SR-11-SS-F	21.0	15.4	0.015	0.001
SR-12-SS-F	16.0	10.4	0.000	0.000
SR-13-SS-F	25.4	16.3	0.000	0.000
SR-14-SS-F	27.7	14.5	0.000	0.000
SR-15-SS-F	28.6	20.0	0.000	0.000
SR-16-SS-F	20.1	15.4	0.000	0.000
SR-17-SS-F	14.2	9.1	0.000	0.000
SR-18-SS-F	17.2	10.4	0.000	0.000
SR-19-SS-F	21.0	15.4	0.000	0.000
SR-20-SS-F	18.5	15.0	0.000	0.000

4.0
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APPENDIX A

Chain-of-Custody Forms

CHAIN-OF-CUSTODY/TEST REQUEST FORM FOR SEDIMENT SAMPLE(S)*

Client Name: NOAA

Contact Name: Kim Magruder (EVS)

Sampled By: Gary Rosenthal

Ship to: EVS Laboratory
195 Pemberton Ave, N. Vancouver B.C. V7P 2R4

Attn: Jennifer Stewart

Shipper: Fed EX

Shipping Date: 8/18/97

Waybill #: 400-5448 5955

Sample Collection Date (d/m/y)	Time (am/pm)	Sample Identification	Volume of Sample/# of Containers	Test(s) Requested (check test(s) required): 10-d Rhepoxynius	10-d Hyalella	10-d Chironomid	48-h/120-h Echinoderm Larval	48-h Bivalve Larval	20-d Neanthes	Microtox	Benthic	Other (Please Specify)	Comments/Instructions
		Sediment											tag #
8/13/97	1115	SR-17-SS-F	1/64 oz			✓							6007 21°C
8/13/97	1115	SR-17-SS-F	1/64 oz		✓								6008 21°C
8/13/97	1315	SR-16-SS-F	1/64 oz			✓							6009 21°C
8/13/97	1315	SR-16-SS-F	1/64 oz		✓								6010 21°C
8/13/97	1510	SR-15-SS-F	1/64 oz			✓							6012 22°C
~~8/13/97~~	~~1510~~	~~SR-15-SS-F~~	~~1/64 oz~~		✓								~~6011~~ MM

1) Released by: Alex M. Mun Date/Time: 8/18/97 0800	2) Released by: Date/Time:	3) Released by: Date/Time:	To be completed by EVS Laboratory upon sample receipt: EVS Project #: 9/575-37.11 EVS W.O #: 9700659
1) Rec'd by: AMC 0942 Date/Time: 20 Aug 97	2) Rec'd by: Date/Time:	3) Rec'd by: Date/Time:	Date of Receipt: 20 Aug 97 Time of receipt: 0942 Condition Upon Receipt: Received by:

*Instructions for completion of Chain-of-Custody/Test Request Form on back.
*Distribution: White and yellow copies accompany shipment; pink-consignor's copy; white-consignee return with results; yellow-consignee's copy

☐ 195 Pemberton Avenue
North Vancouver, B.C.
Canada, V7P 2R4
Tel: (604) 986-4331
Fax: (604) 662-8548

☐ 200 West Mercer Street
Suite 403
Seattle, WA 98119
Tel: (206) 217-9337
Fax: (206) 217-9343

EVS ENVIRONMENT CONSULTANTS

CHAIN-OF-CUSTODY/TEST REQUEST FORM FOR SEDIMENT SAMPLE(S)*

Client Name: NOAA
Contact Name: Kim Magruder
Sampled By: Gary Rosenthal

Ship to: EVS Laboratory
195 Pemberton Ave N Vancouver BC V7P2R4
Attn: Jennifer Stewart
Shipping Date: 8/18/97
Shipper: Fed Ex
Waybill #: 400-4417 4824

Sample Collection Date (d/m/y)	Time (am/pm)	Sample Identification	Volume of Sample/# of Containers	10-d Rhepoxynius	10-d Hyalella	10-d Chironomid	48-h/120-h Echinoderm Larval	48-h Bivalve Larval	20-d Neanthes	Microtox	Benthic	Other (Please Specify)	Comments/Instructions
		Sediment											Tag #
8/12/97	1615	SR-20-55-F	1 64oz			✓							6001 20°C
8/12/97	1615	SR-20-55-F	1 64oz		✓								6002 21°C
8/12/97	1817	SR-19-55-F	1 64oz			✓							6003 21°C
8/12/97	1817	SR-19-55-F	1 64oz		✓								6004 20°C
8/13/97	0950	SR-18-55-F	1 64oz			✓							6005 21°C
8/13/97	0950	SR-18-55-F	1 64oz		✓								6006 21°C

1) Released by: Lisa M. Mill[illegible] Date/Time: 8/18/97 0800	2) Released by: Date/Time:	3) Released by: Date/Time:	To be completed by EVS Laboratory upon sample receipt: EVS Project #: 91575-37.10 EVS W.O #: 9700659 Date of Receipt: 20 Aug 97 Time of receipt: 0942 Condition Upon Receipt: ______ Received by: ______
1) Rec'd by: AMC 0942 Date/Time: 20 Aug 97	2) Rec'd by: Date/Time:	3) Rec'd by: Date/Time:	

*Instructions for completion of Chain-of-Custody/Test Request Form on back.
*Distribution: White and yellow copies accompany shipment; pink-consignor's copy; white-consignee return with results; yellow-consignee's copy

EVS ENVIRONMENT CONSULTANTS

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Tel: (206) 217-9337
Fax: (206) 217-9342

CHAIN-OF-CUSTODY/TEST REQUEST FORM FOR SEDIMENT SAMPLE(S)*

Client Name: NOAA

Contact Name: Kim Magruder (EVS)

Sampled By: Gary Rosenthal

Ship to: EVS Laboratory
195 Pemberton Ave. N. Vancouver B.C. Canada V7P 2R4

Attn: Jennifer Stewart

Shipping Date: 8/20/97

Shipper: FedEx

Waybill #: 400-5448-5970

Sample Collection Date (d/m/y)	Time (am/pm)	Sample Identification	Volume of Sample/# of Containers	Test(s) Requested (check test(s) required): 10-d Rhepoxynius	10-d Hyalella	10-d Chironomid	48-h/120-h Echinoderm Larval	48-h Bivalve Larval	20-d Neanthes	Microtox	Benthic	Other (Please Specify)	Comments/Instructions
		Sediment											Tag#:
8/14/97	1130	SR-12-55-F	1 / 64oz		✓								6164
8/14/97	1130	SR-12-55-F	1 / 64oz			✓							6163
8/14/97	1302	SR-11-55-F	1 / 64oz		✓								6187
8/14/97	1302	SR-11-55-F	1 / 64oz			✓							6188
8/15/97	0945	SR-10-55-F	1 / 64oz		✓								6203
~~8/15/97~~	~~0945~~	~~SR-10-55-F~~	~~1 / 64oz~~			~~✓~~							~~6204~~ [initials]
						Temperatures = 13°C							

1) Released by: Ava M. Mill Date/Time: 8/20/97 0830	2) Released by: Date/Time:	3) Released by: Date/Time:
1) Rec'd by: AJW 1000 Date/Time: 22 Aug 97	2) Rec'd by: Date/Time:	3) Rec'd by: Date/Time:

To be completed by EVS Laboratory upon sample receipt:

EVS Project #: 9/575-37.10 EVS W.O #: 9700659

Date of Receipt: 22 Aug 97 Time of receipt: 1000

Condition Upon Receipt: ______ Received by: ______

*Instructions for completion of Chain-of-Custody/Test Request Form on back.

*Distribution: White and yellow copies accompany shipment; pink/consignor's copy; white-consignee return with results; yellow-consignee's copy

EVS ENVIRONMENT CONSULTANTS

☐ 195 Pemberton Avenue
North Vancouver, B.C.
Canada, V7P 2R4
Tel: (604) 986-4331
Fax: (604) 662-8548

☐ 200 West Mercer Street
Suite 403
Seattle, WA 98119
Tel: (206) 217-9337
Fax: (206) 217-9342

CHAIN-OF-CUSTODY/TEST REQUEST FORM FOR SEDIMENT SAMPLE(S)*

Client Name: NOAA
Contact Name: Kim Magruder (EVS)
Sampled By: Gary Rosenthal

Ship to: EVS Laboratory
195 Pemberton Ave., N. Vancouver BC Canada V7P2R4
Attn: Jennifer Stewart
Shipper: Fed Ex
Shipping Date: 8/20/97
Waybill #: 400-4054-7866

Sample Collection Date (d/m/y)	Time (am/pm)	Sample Identification	Volume of Sample/# of Containers	10-d Rhepoxynius	10-d Hyalella	10-d Chironomid	48-h/120-h Echinoderm Larval	48-h Bivalve Larval	20-d Neanthes	Microtox	Benthic	Other (Please Specify)	Comments/Instructions
		Sediment											Tag#:
8/14/97	1800	SR-9-SS-F	1 / 64oz			✓							6196
8/14/97	1800	SR-9-SS-F	1 / 64oz		✓								6195
8/15/97	0945	SR-10-SS-F	1 / 64oz			✓							6204
8/15/97	1740	SR-7-SS-F	1 / 64oz		✓								6216
8/15/97	1740	SR-7-SS-F	1 / 64oz			✓							6215
						Temperatures = 14°C							

1) Released by: Lisa M. Mill Date/Time: 8/20/97 0830	2) Released by: Date/Time:	3) Released by: Date/Time:	To be completed by EVS Laboratory upon sample receipt: EVS Project #: 91675-37.10 EVS W.O #: 9700659
1) Rec'd by: AJW 1000 Date/Time: 22 Aug 97	2) Rec'd by: Date/Time:	3) Rec'd by: Date/Time:	Date of Receipt: 22 Aug 97 Time of receipt: 1000 Condition Upon Receipt: ______ Received by: ______

*Instructions for completion of Chain-of-Custody/Test Request Form on back.
*Distribution: White and yellow copies accompany shipment; pink-consignor's copy; white-consignee return with results; yellow-consignee's copy

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Tel: (604) 986-4331
Fax: (604) 662-8548

200 West Mercer Street
Suite 403
Seattle, WA 98119
Tel: (206) 217-9337
Fax: (206) 217-9342

CHAIN-OF-CUSTODY/TEST REQUEST FORM FOR SEDIMENT SAMPLE(S)*

Client Name: NOAA

Contact Name: Kim Magruder (EVS)

Sampled By: Gary Rosenthal

Ship to: EVS Laboratory

195 Pemberton Ave N Vancouver BC V7P2R4

Attn: Jennifer Stewart

Shipper Fed. EX

Shipping Date: 8/20/97

Waybill # 400-5448 5946

Sample Collection Date (d/m/y)	Time (am/pm)	Sample Identification	Volume of Sample/# of Containers	10-d Rhepoxynius	10-d Hyalella	10-d Chironomid	48-h/120-h Echinoderm Larval	48-h Bivalve Larval	20-d Neanthes	Microtox	Benthic	Other (Please Specify)	Comments/Instructions
m/d/y													Tag #
Aug 8/13/97	1510	SR-15-SS-F	1 64oz		✓								6011
Aug 8/13/97	1608	SR-14-SS-F	1 64oz		✓								6057
Aug 8/13/97	1608	SR-14-SS-F	1 64oz			✓							6056
Aug 8/13/97	1718	SR-13-SS-F	1 64oz		✓								~~6064~~ 6063
Aug 8/13/97	1718	SR-13-SS-F	1 64oz			✓							6064
													See Email to confirm code change.
					Temperatures = 13°C								

1) Released by: Lisa M. Mu... Date/Time: 8/20/97 0900	2) Released by: Date/Time:	3) Released by: Date/Time:	To be completed by EVS Laboratory upon sample receipt: EVS Project #: 91575-37.10 EVS W.O #: 9700657
1) Rec'd by: AJW 1000 Date/Time: 22 Aug 97	2) Rec'd by: Date/Time:	3) Rec'd by: Date/Time:	Date of Receipt: 22 Aug 97 Time of receipt: 1000 Condition Upon Receipt: Received by:

*Instructions for completion of Chain-of-Custody/Test Request Form on back.

**Distribution: White and yellow copies accompany shipment; pink-consignor's copy; white-consignee return with results; yellow-consignee's copy

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200 West Mercer Street
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Seattle, WA 98119
Tel: (206) 217-9337
Fax: (206) 217-9342

CHAIN-OF-CUSTODY/TEST REQUEST FORM FOR SEDIMENT SAMPLE(S)*

Client Name: NOAA

Contact Name: Kim Magruder (EVS)

Sampled By: Gary Rosenthal

Ship to: EVS Laboratory
195 Pemberton Ave. N. Vancouver B.C. Canada V7P 2R4

Attn: Jennifer Stewart

Shipper: Fed Ex

Shipping Date: 8/20/97

Waybill #: 400-4056-7870

Sample Collection Date (d/m/y)	Time (am/pm)	Sample Identification	Volume of Sample/# of Containers	10-d Rhepoxynius	10-d Hyalella	10-d Chironomid	48-h/120-h Echinoderm Larval	48-h Bivalve Larval	20-d Neanthes	Microtox	Benthic	Other (Please Specify)	Comments/Instructions
		Sediment											Tag #:
8/17/97	1100	SR-1-SS-~~F~~B ajw	1/64oz		✓								6274
8/17/97	1100	SR-1-SS-~~F~~B ajw	1/64oz			✓							6276
8/17/97	1705	SR-2-SS-~~F~~B ajw	1/64oz			✓							6280
8/18/97	1720	SR-4-SS-~~F~~B ajw	1/64oz		✓								6275
8/18/97	1720	SR-4-SS-~~F~~B ajw	1/64oz			✓							6281

B = background confirmed by Gary Rosenthal

Temperature = 15°C

1) Released by: Kim M. Mill[illegible] Date/Time: 8/20/97 0830	2) Released by: Date/Time:	3) Released by: Date/Time:
1) Rec'd by: AJW 1000 Date/Time: 22 Aug 97	2) Rec'd by: Date/Time:	3) Rec'd by: Date/Time:

To be completed by EVS Laboratory upon sample receipt:

EVS Project #: 91575-37.10 EVS W.O #: 97 00657

Date of Receipt: 22 Aug 97 Time of receipt: 1000

Condition Upon Receipt: ______ Received by: ______

*Instructions for completion of Chain-of-Custody/Test Request Form on back.
*Distribution: White and yellow copies accompany shipment; pink-consignor's copy; white-consignee return with results; yellow-consignee's copy

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☐ 200 West Mercer Street
Suite 403
Seattle, WA 98119
Tel: (206) 217-9337
Fax: (206) 217-9343

CHAIN-OF-CUSTODY/TEST REQUEST FORM FOR SEDIMENT SAMPLE(S)*

Client Name: NOAA

Contact Name: Kim Magruder (EVS)

Sampled By: Gary Rosenthal / Garrett Gray

Ship to: EVS Laboratory
195 Pemberton Ave N. Vancouver B.C. Canada V7P2R4

Attn: Jennifer Stewart

Shipping Date: 8/20/97

Shipper: Fed Ex

Waybill #: 400-4056-7881

Sample Collection Date (d/m/y)	Time (am/pm)	Sample Identification	Volume of Sample/# of Containers	10-d Rhepoxynius	10-d Hyalella	10-d Chironomid	48-h/120-h Echinoderm Larval	48-h Bivalve Larval	20-d Neanthes	Microtox	Benthic	Other (Please Specify)	Comments/Instructions
		Sediment											Tag #:
8/17/97	1705	SR-2-SS-F B 9pm	1 / 64oz		✓								6279
8/17/97	1245	SR-3-SS-F B 4pm	1 / 64oz		✓								6277
8/17/97	1245	SR-3-SS-F-B 4pm	1 / 64oz			✓							6278
8/16/97	1522	SR-8-SS-P	1 / 64oz		✓								6217
8/16/97	1522	SR-8-SS-P	1 / 64oz			✓							6218
		B = background				Temperatures = 13°C							
		Confirmed by Gary Rosenthal											

1) Released by: Alex M. Mill	2) Released by:	3) Released by:	To be completed by EVS Laboratory upon sample receipt:
Date/Time: 8/20/97 0830	Date/Time:	Date/Time:	EVS Project #: 9/575-27.10 EVS W.O #: 9709659
1) Rec'd by: AJW 1000	2) Rec'd by:	3) Rec'd by:	Date of Receipt: 22 Aug 97 Time of receipt: 1000
Date/Time: 22 Aug 97	Date/Time:	Date/Time:	Condition Upon Receipt: ______ Received by: ______

*Instructions for completion of Chain-of-Custody/Test Request Form on back.

*Distribution: White and yellow copies accompany shipment; pink-consignor's copy; white-consignee return with results; yellow-consignee's copy

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Fax: (206) 217-9343

APPENDIX B

10-d *C. tentans* Sediment Toxicity Test
Raw Data

EVS CONSULTANTS
FRESHWATER SEDIMENT TOXICITY TEST DATA SUMMARY

Client: NOAA
EVS Project No.: 9/575-37.10
EVS Work Order No.: 9700658

EVS Analysts: PAH, AIW, BSI, JGK, ETT, MKC, SYS, TWW, AFY, MJM, KTI
Test Type: 10-d Freshwater Sediment Toxicity Test
Test Initiation Date: September 5, 1997

SAMPLE

Identification: Various
Amount Received: 2L
Date Collected: August 12-18 1997
Date Received: August 20-22, 1997

TEST SPECIES INFORMATION

Organism: C. tentans
Source/Date Received: ECT / Sept. 4/97
Age/Dry Weight on Day 0 (mg/ind): 11d / 0.30mg/ind.
Reference Toxicant: KCl
Current Reference Toxicant Result (LC50 and 95% CL):
5.4 g/L KCl (95% CLs 4.2 and 6.8) g/L KCl
Reference Toxicant Warning Limits (mean ± 2SD):
(4.5 ± 2.0) g/L KCl

DILUTION AND CONTROL MEDIUM

Water Type: Moderately Hard Water
Temperature (°C): 22-23
pH: 7.9-8.1
Dissolved Oxygen (mg/L): 8.5-8.8
Conductivity (µmhos/cm): 300-335
Hardness (mg/L as $CaCO_3$): 90-100
Alkalinity (mg/L as $CaCO_3$): 64-72
Other:

TEST CONDITIONS

Temperature Range (°C): 22-23
pH Range: 7.0-8.3
Dissolved Oxygen Range (mg/L): 3.8 - 8.6 (aeration added on Day 3 due to low DO)
Conductivity (µmhos/cm): 280-500
Hardness (mg/L as $CaCO_3$): Day 0: 100-166; Day 10: 104-152
Alkalinity (mg/L as $CaCO_3$): 67-136; Day 10: 84-124
Photoperiod (L:D h): 16:8
Other: Interstitial NH_3 (mg/L N): Day 0 (\[illegible\]); Day 10 (\[illegible\])
Overlying S (mg/L S): Day 0 (0.0-0.0); Day 10 (0.0-0.003)

Sample ID	Mean ± SD Survival (%)	Mean ± SD Individual Dry Weight (mg)
SR-15-SS-F	83.3 ± 31.4	1.68 ± 0.31
SR-12-SS-F	91.7 ± 9.8	1.54 ± 0.19
SR-2-SS-B	* 68.3 ± 18.4	1.71 ± 0.25
SR-13-SS-F	85.0 ± 13.8	1.58 ± 0.14
SR-20-SS-F	83.3 ± 21.6	1.59 ± 0.43
SR-10-SS-F	* 88.3 ± 7.5	2.04 ± 0.22
SR-17-SS-F	* 73.3 ± 20.6	1.70 ± 0.34
SR-1-SS-B	95.0 ± 5.5	1.91 ± 0.18
SR-11-SS-F	* 78.3 ± 18.4	2.14 ± 0.41
Control	96.7 ± 5.2	0.81 ± 0.19

Data Verified By: C. McPherson   Date Verified: Oct 9/97

EVS CONSULTANTS
FRESHWATER SEDIMENT TOXICITY TEST DATA SUMMARY

Client: NOAA
EVS Project No.: 9/575-37.10
EVS Work Order No.: 9700658

EVS Analysis: RH, ALW, BSJ, JGK, ETT, MCL, SS, TW, AFY, MJM, KTB
Test Type: 10-d Freshwater Sediment Toxicity Test
Test Initiation Date: September 5, 1997

SAMPLE

Identification: Various
Amount Received: 2 L
Date Collected: August 12-18 1997
Date Received: August 20+22, 1997

TEST SPECIES INFORMATION

Organism: C. tentans
Source/Date Received: ECT / Sept. 4/97
Age/Dry Weight on Day 0 (mg/ind): 11d / 0.30mg/ind.
Reference Toxicant: KCl
Current Reference Toxicant Result (LC50 and 95% CL):
5.4 g/L KCl (95% CL: 4.2 and 6.8) g/L KCl
Reference Toxicant Warning Limits (mean ± 2SD):
(4.5 ± 2.0) g/L KCl

DILUTION AND CONTROL MEDIUM

Water Type: Moderately Hard Water
Temperature (°C): 22-23
pH: 7.9-8.1
Dissolved Oxygen (mg/L): 8.5-8.8
Conductivity (µmhos/cm): 300-335
Hardness (mg/L as $CaCO_3$): 90-100
Alkalinity (mg/L as $CaCO_3$): 64-86 72
Other:

TEST CONDITIONS

Temperature Range (°C): 22-23
pH Range: 7.0-8.3
Dissolved Oxygen Range (mg/L): 3.8 -8.6 (Aeration added on Day 3 due to low DO)
Conductivity (µmhos/cm): 280-500
Hardness (mg/L as $CaCO_3$): Day 0: 100-160; Day 10: 100-152
Alkalinity (mg/L as $CaCO_3$): 67-136; 78-124
Photoperiod (L:D h): 16:8
Other: Day 0 / Day 10
Interstitial NH_3 (mg/L N): (10.1-27.5) / (10.1-84)
Overlying S (mg/L S): (0.0-0.0) / (0.0-0.001)

Sample ID	Mean ± SD: Survival (%)	Individual Dry Weight (mg)
SR-3-SS-B	* 81.7 ± 17.2	— 2.16 ± 0.25
SR-8-SS-F	91.7 ± 7.5	2.01 ± 0.18
SR-4-SS-B	* 88.3 ± 7.5	— 1.62 ± 0.18
SR-14-SS-F	* 76.7 ± 22.5	— 1.62 ± 0.17
SR-7-SS-F	* 0.0 ± 0.0	—
SR-16-SS-F	86.7 ± 17.5	1.44 ± 0.30
SR-18-SS-F	93.3 ± 8.2	1.49 ± 0.15
SR-9-SS-F	* 77.5 ± 9.6	— 1.96 ± 0.18
SR-15-SS-F	* 91.7 ± 17.2	— 1.60 ± 0.27

Data Verified By: Oct 9/97
Date Verified: C. McPherson

EVS CONSULTANTS

10-d FRESHWATER SEDIMENT TOXICITY TEST - DAILY WATER QUALITY MONITORING

Client NOAA

EVS Project No. 9/5TS - 37.10

EVS Work Order No. 9710658

Test Initiation Date (Day 0) September 5, 1997

Test Termination Date (Day 10) September 15, 1997

Test Species C. tentans

Source/Batch SCI / Hatched Aug. 25/97

Sample ID	Temperature (°C) 0	1	2	3	4	5	6	7	8	9	10
SR-3-SS-MB (8)	23.0	23.0	22.5	22.5	22.5	22.0	22.0	22.5	22.0	22.0	22.0
SR-8-SS-F (A)	23.0	23.0	22.5	22.5	22.5	22.0	22.0	22.5	22.0	22.0	22.0
SR-4-SS-MB (A)	23.0	23.0	22.5	22.5	22.5	22.0	22.0	22.5	22.0	22.0	22.0
SR-19-SS-F (B)	23.0	23.0	23.0	22.5	22.5	22.5	22.5	22.0	22.0	22.0	22.0
SR-7-SS-D (E)	23.0	23.0	22.5	22.5	22.5	22.0	22.0	22.5	22.0	22.0	22.0
SR-16-SS-F (F)	23.0	23.0	23.0	22.5	22.5	22.5	22.5	22.0	22.0	22.0	22.0
SR-18-SS-D (E)	23.0	23.0	23.0	22.5	22.5	22.5	22.5	22.0	22.0	22.5	22.0
SR-9-SS-D (C)	23.0	23.0	22.5	22.5	22.5	22.0	22.0	22.5	22.0	22.0	22.0
SR-17-SS-F (B)	23.0	23.0	23.0	22.5	22.5	22.5	22.5	22.0	22.0	23.0	22.0
SR-15-SS-F (E)	23.0	23.0	23.0	22.5	22.5	22.5	22.5	22.0	22.0	22.0	22.0
CTRL -- (F)	23.0	23.0	22.5	22.5	22.5	22.0	22.0	22.5	22.0	22.0	22.0
Technician's Initials	JDA	AJW	BST	BST	BST/JGL	BST	JGL	BST/JGL	Em	[illegible]	AJW

Sample ID	pH 0	1	2	3	4 (1)	5 (1)	6	7	8	9	10
SR-3-SS-MB (8)	7.4	7.6	7.4	7.4	8.1	8.3	8.1	8.1	8.3	8.1	7.8
SR-8-SS-F (A)	7.3	7.5	7.3	7.3	8.1	8.1	8.1	8.1	8.3	8.0	8.1
SR-4-SS-MB (A)	7.1	7.4	7.1	7.2	8.1	8.2	8.2	8.0	8.0	7.9	7.7
SR-19-SS-F (B)	7.4	7.6	7.2	7.2	8.2	7.3 (2)	8.2	8.0	8.2	8.0	7.6
SR-7-SS-D (E)	7.8	7.6	7.3	7.4	8.1	8.1	8.1	8.1	8.2	8.1	7.7
SR-16-SS-F (F)	7.4	7.6	7.2	7.3	7.5	8.1	8.1	8.1	8.2	7.9	7.6
SR-18-SS-D (E)	7.3	7.5	7.2	7.2	8.2	8.2	7.9	8.2	8.3	8.1	7.4
SR-9-SS-D (C)	7.5	7.7	7.4	7.4	8.0	8.2	8.2	8.1	8.2	8.2	7.8
SR-17-SS-F (B)	7.4	7.4	7.2	7.5	8.2	8.1	7.9	8.1	8.3	8.4	7.5
SR-15-SS-F (E)	7.3	7.5	7.3	7.2	8.2	8.2	8.1	8.0	8.3	8.1	7.7
CTRL -- (F)	7.8	7.5	7.2	7.3	8.0	8.0	8.0	7.9	8.2	8.1	7.9
Technician's Initials	DAH	AJW	BST	BST	BST/JGL	BST	JGL	BST/JGL	Em	[illegible]	AJW

WQ Instruments Used: Temp. Cal. Hg therm. pH II-A-26

Comments (1) used pH meter (II-A-26). (2) aeration stopped on WQ. beaker.

Data Verified By [illegible] Date Verified Oct 8/97

EVS CONSULTANTS

10-d FRESHWATER SEDIMENT TOXICITY TEST - DAILY WATER QUALITY MONITORING

Client: NOAA
EVS Project No. 9/575 - 37.10
EVS Work Order No. 9700658

Test Initiation Date (Day 0): September 5, 1997
Test Termination Date (Day 10): September 15, 1997
Test Species: C. tentans
Source/Batch: SCT / hatched Aug. 25/97

Sample ID	Temperature (°C)											pH										
	0	1	2	3	4	5	6	7	8	9	10	0	1	2	3	4 ①	5	6	7	8	9	10
SE-13-SS-F* (f)	23.0	23.0	23.0	23.0	22.5	22.5	22.0	22.0	22.0	22.5	22.0	7.9	7.6	7.3	7.4	8.1	8.1	8.0	8.0	8.0	8.1	7.
SE-2-SS-FR (c)	23.0	23.0	22.5	22.5	22.5	22.0	22.0	22.5	22.0	22.5	22.0	7.4	7.6	7.3	7.3	7.7	8.2	8.1	8.1	8.3	7.9	7.
SE-13-SS-F (b)	23.0	23.0	23.0	22.5	22.5	22.5	22.5	22.0	22.0	22.0	22.0	7.4	7.6	7.3	7.3	8.2	8.2	8.1	8.0	8.2	8.0	7.
SE-20-SS-F (a)	23.0	23.0	23.0	22.5	22.5	22.5	22.5	22.0	22.0	23.0	22.0	7.3	7.4	7.1	7.5	8.2	8.2	8.0	8.0	8.2	7.7	7.
SE-10-SS-F (a)	23.0	23.0	22.5	22.5	22.5	22.0	22.0	22.5	22.0	22.0	22.0	7.2	7.7	7.3	7.4	8.1	8.3	8.1	7.9	8.1	8.1	8.
SE-17-SS-F (c)	23.0	23.0	23.0	22.5	22.5	22.5	22.5	22.0	22.0	22.5	22.0	7.8	7.5	7.2	7.3	8.1	8.2	8.0	8.1	8.3	8.1	7.
SE-1-SS-FR (b)	23.0	23.0	22.5	22.5	22.5	22.0	22.0	22.5	22.0	22.0	22.0	7.9	7.6	7.4	7.5	8.1	8.2	8.1	8.1	8.2	8.2	8.
SE-11-SS-F (c)	23.0	23.0	22.5	22.5	22.5	22.0	22.0	22.0	22.0	22.5	22.0	7.4	7.5	7.2	7.3	8.1	8.1	8.2	8.0	8.3	8.0	7.
	[illegible]	[illegible]																				
Technician's Initials	ROH	AJW	BST	BST	BST/JGH	BST	JGH	BST/JGH	[illegible]	[illegible]	AJW	ROH	AJW	BST	BST	BST/JGH	BST	JGH	BST/JGH	[illegible]	[illegible]	[illegible]

WQ Instruments Used: Temp. Cal. thermometer pH II-A-26

Comments ① used pH meter II-A-21
* At time of testing no replicate was discarded due to shortage of animals therefore WQ was done on a randomly selected replicate

Data Verified By C. [illegible] Date Verified Oct 8/97

[illegible]

EVS CONSULTANTS

10-d FRESHWATER SEDIMENT TOXICITY TEST - DAILY WATER QUALITY MONITORING

Client: NOAA
EVS Project No. 9/575-37.10
EVS Work Order No. 9700 458

Test Initiation Date (Day 0): September 5, 1997
Test Termination Date (Day 10): September 15, 1997
Test Species: C. tentans
Source/Batch: ECT / Hatched Aug. 25/97

Sample ID	Dissolved Oxygen (mg/L)										
	0	1	2	3 ①	4 ②	5	6	7	8	9	10
SR-3-SS-F(D)	[illegible]	5.1	3.6	3.2	8.4	7.9	7.7	8.1	7.5	8.6	6.9
SR-8-SS-F(A)	[illegible]	5.3	3.7	3.6	8.1	7.6	7.9	8.1	7.8	8.3	7.3
SR-4-SS-F(E)	[illegible]	5.2	4.6	3.9	8.0	8.0	8.0	8.1	7.1	7.9	7.1
SR-14-SS-F(B)	[illegible]	5.2	4.1	3.4	7.7	5.3 ③	8.0	8.0	7.4	8.1	7.4
SR-7-SS-F(E)	[illegible]	5.2	5.5	4.4	8.2	8.0	8.1	8.0	7.6	8.3	7.2
SR-16-SS-F(F)	[illegible]	5.4	4.6	3.8	6.7	7.2	7.7	8.1	8.0	7.7	7.3
SR-18-SS-F(G)	6.6	5.0	3.8	3.2	8.1	7.4	7.2	8.3	7.7	8.2	7.4
SR-9-SS-F(C)	[illegible]	5.1	3.6	3.5	8.0	7.4	8.1	8.2	7.8	8.3	7.2
SR-17-SS-F(H)	[illegible]	5.2	4.7	3.6	8.0	7.6	7.2	8.2	7.6	8.2	7.7
SR-15-SS-F(E)	[illegible]	5.2	4.4	3.3	8.1	7.5	7.9	7.9	7.4	8.0	7.5
CTL-(E)	[illegible]	5.1	5.1	4.6	8.2	8.1	8.4	8.4	8.3	8.4	7.7
Technician's Initials	[illegible]	MJW	BSJ	BST	BST/JGL	BSJ	JGL	BST/JGL	EM	[illegible]	MJW

Sample ID	Conductivity (µmhos/cm)										
	0	1	2	3	4 ④	5	6	7	8	9	10
SR-3-SS-F(D)	[illegible]	430	390	360	[illegible]	400	400	360	370	375	380
SR-8-SS-F(A)	[illegible]	440	410	360	370	370	390	370	370	380	400
SR-4-SS-F(E)	[illegible]	500	410	370	[illegible]	380	390	375	390	380	380
SR-14-SS-F(B)	[illegible]	500	425	375	440	390	390	380	390	385	385
SR-7-SS-F(E)	[illegible]	400	365	350	365	370	360	340	355	345	350
SR-16-SS-F(F)	[illegible]	470	420	370	385	390	390	370	390	380	380
SR-18-SS-F(G)	[illegible]	500	400	370	390	370	400	380	390	380	385
SR-9-SS-F(C)	[illegible]	420	390	360	370	360	370	350	360	370	360
SR-17-SS-F(H)	[illegible]	460	420	370	385	370	395	385	390	385	375
SR-15-SS-F(E)	[illegible]	490	440	380	410	390	400	390	405	380	375
CTL-(E)	360	280	310	310	320	320	320	310	305	310	320
Technician's Initials	[illegible]	MJW	BSJ	BST	BST	BST	JGL	[illegible]	EM	[illegible]	MJW

WQ Instruments Used: DO II-A-19 Conductivity II-A-10CC

Comments: ① Due to the low D.O. level, aeration started after the second water change. ② used DO meter II-A-20, aeration stopped

Data Verified By: [illegible signature]

Date Verified: Oct 8/97

EVS CONSULTANTS

10-d FRESHWATER SEDIMENT TOXICITY TEST - DAILY WATER QUALITY MONITORING

Client: NOAA

EVS Project No. 7/575-37.10

EVS Work Order No. 9700678

Test Initiation Date (Day 0): September 5, 1997

Test Termination Date (Day 10): September 15, 1997

Test Species: C. tentans

Source/Batch: ECT / Hatched Aug. 23/97

Sample ID	Dissolved Oxygen (mg/L)										
	0	1	2	3	4	5	6	7	8	9	10
SR-12-SS-F (F)	6.7	5.3	4.7	3.0	8.1	7.8	7.5	8.0	8.1	[illegible]	7.4
SR-2-SS-B (C)	6.5	5.4	4.1	3.6	8.5	7.8	7.8	8.2	7.8	[illegible]	7.0
SR-13-SS-D (D)	6.4	5.2	4.1	3.6	8.4	7.7	7.8	7.9	7.6	[illegible]	7.4
SR-20-SS-D (A)	[illegible]	5.2	4.6	3.2	8.2	7.6	7.5	7.8	7.6	6.5 ©	7.7
SR-10-SS-F (D)	6.3	5.3	3.6	3.5	8.3	7.6	7.8	7.3	7.8	7.8	7.0
SR-17-SS-E (C)	[illegible]	5.1	3.6	3.0	8.1	7.6	7.4	8.1	7.6	8.1	7.4
SR-1-SS-B (D)	[illegible]	5.0	4.1	3.8	8.2	8.0	7.9	8.2	7.7	8.4	7.3
SR-11-SS-F (C)	[illegible]	5.2	4.0	[illegible]	8.3	7.5	8.0	8.0	7.7	7.8	7.5
Technician's Initials	[illegible]	AJW	BST	BST	[illegible]	BST	JGL	[illegible]	CM	[illegible]	AJW

Sample ID	Conductivity (µmhos/cm)										
	0	1	2	3	4	5	6	7	8	9	10
SR-12-SS-F (F)	[illegible]	410	370	350	360	345	380	350	380	370	370
SR-2-SS-B (C)	[illegible]	410	390	360	370	370	380	350	350	365	365
SR-13-SS-D (D)	[illegible]	450	410	370	400	500 ©	440	380	390	390	375
SR-20-SS-D (A)	[illegible]	450	400	356	390	370	370	370	390	380	380
SR-10-SS-F (D)	[illegible]	500	450	410	425	405	420	400	410	390	395
SR-17-SS-E (C)	[illegible]	430	380	355	390	360	385	365	380	370	375
SR-1-SS-B (D)	[illegible]	410	380	350	400	390	380	360	360	365	365
SR-11-SS-F (C)	[illegible]	470	400	390	375	370	385	370	390	390	390
Technician's Initials	[illegible]	AJW	BST	BST	BST	BST	JGL	[illegible]	CM	[illegible]	AJW

WQ Instrument Used: DO II-2-19 Conductivity II-2-100C

Comments: B checked another rep. (B); Cond. = 405 µmhos/cm. © aeration stopped; re-started

Data Verified By: C McPherson

Date Verified: Oct 8/97

Forms\Lab\Consultant\Sediment\Fresh10DWQ.WPD (p. 2 of 2) June 13, 1997

EVS CONSULTANTS
SEDIMENT TOXICITY TESTS - SURVIVAL AND FINAL WATER QUALITY DATA

Client: NOAA
EVS Project No. 9/575-3710
EVS Work Order No. 9700658

Test Type: 10-d Freshwater Sediment Toxicity Test
Test Species: C. tentans
Test Initiation Date (Day 0): 1997
Test Termination Date: Sept. 15/97

Sample ID	Rep.	Pan No.	No. Alive	No. Dead	Total Recovered	No. Missing	Tech. Init.	Temp. (°C)	pH	Cond. (µmhos/cm) ☑ Salinity (ppt) ☐	DO (mg/L)
SE-3-SS-7B	A	1	9	0	9	1	JGL	22.0	7.8	380	7.0
	B	2	5	0	5	5	JGL	22.0	7.8	380	7.2
	C	3	9	0	9	1	JGL	22.0	7.8	380	7.0
	D	4	10	0	10	0	JGL	22.0	7.8	380	6.9
	E	5	8	0	8	2	JGL	22.0	7.8	380	7.1
	F	6*	8	0	8	2	JGL	22.0	7.8	380	7.1
SR-4-SS-F	A	7	8	0	8	2	SVS	22.0	8.1	400	7.3
	B	8	9	0	9	1	SVS	22.0	8.0	380	7.1
	C	9	10	0	10	0	SVS	22.0	8.1	380	7.4
	D	10	10	0	10	0	SVS	22.0	7.8	375	7.4
	E	11	9	0	9	1	SVS	22.0	7.8	375	7.2
	F	12	9	0	9	1	SVS	22.0	7.8	380	7.0
							Technician's Initials	AJW	AJW	AJW	AJW

* used blue pan
① One pan was used from another batch of weighed pans and was taken into account in final weights.

WQ Instruments Used: Temp. Cal. Hg Thermo. pH II-A-26 Cond./Sal. II-A-100C DO II-A-19

Data Verified By: C. Wilson Date Verified: Oct 8/97

FormII.A\Data\Sediment\SURVIVAL.WPD February 21, 1997

EVS CONSULTANTS
SEDIMENT TOXICITY TESTS - SURVIVAL AND FINAL WATER QUALITY DATA

Client NOAA
EVS Project No. 9/5T5-3710
EVS Work Order No. 9700658

Test Type Freshwater Sediment Toxicity Test
Test Species C. tentans
Test Initiation Date (Day 0) August 26 1997
Test Termination Date Sept. 15/97

Sample ID	Rep.	Pan No.	No. Alive	No. Dead	Total Recovered	No. Missing	Tech. Init.	Temp. (°C)	pH	Cond. (µmhos/cm) ☑ Salinity (ppt) ☐	DO (mg/L)
SR-4-SS-F8	A	13	8	0	8	2	BSJ	22.0	7.9	380	7.2
	B	14	10	0	10	0	BSJ	22.0	7.4	380	7.2
	C	15	9	0	9	1	BSJ	22.0	7.6	390	7.1
	D	16	9	0	9	1	BSJ	22.0	7.6	380	7.0
	E	17	8	0	8	2	BSJ	22.0	7.7	380	7.1
	F	18	9	0	9	1	BSJ	22.0	7.8	380	7.1
SR-4-SS-F	A	19	4	0	4	6	JRW	22.0	7.6	385	7.4
	B	20	9①	0	8	1	JRW	22.0	7.6	385	7.4
	C	21	9	0	9	1	JRW	22.0	7.6	390	7.2
	D	22	10	0	10	0	JRW	22.0	7.6	380	7.4
	E	23	8	0	8	2	JRW	22.0	7.5	380	7.2
	F	24	6	0	6	4	JRW	22.0	7.6	380	7.4
							Technician's Initials	AJW	AJW	AJW	AJW

① 1 lost in transfer

WQ Instruments Used: Temp. Cl. Hg Therm. pH II-A-26 Cond./Sal. II-A-100C DO II-A-19

Data Verified By C. McPherson Date Verified Oct 8/97

EVS CONSULTANTS
SEDIMENT TOXICITY TESTS - SURVIVAL AND FINAL WATER QUALITY DATA

Client NOAA
EVS Project No. 9/5TS-3710
EVS Work Order No. 9700458

Test Type 10-d freshwater sediment Toxicity Test
Test Species C. tentans
Test Initiation Date (Day 0) Aug 26 1997
Test Termination Date Sept 5/97

Sample ID	Rep.	Pan No.	No. Alive	No. Dead	Total Recovered	No. Missing	Tech. Init.	Temp. (°C)	pH	Cond. (µmhos/cm) ☑ Salinity (ppt) ☐	DO (mg/L)
SR-7-SS-F	A	25	0	0	0	10	BSJ	22.0	8.1	385	7.4
	B	26	0	0	0	10	AFY	22.0	7.7	370	7.3
	C	27	0	0	0	10	AFY	22.0	7.7	370	7.3
	D	28	0	0	0	10	AFY	22.0	7.7	370	7.4
	E	29	0	0	0	10	AFY	22.0	7.7	350	7.2
	F	30	0	0	0	10	AFY	22.0	7.7	360	7.3
SR-16-SS-F	A	31	9	0	9	1	BSJ	22.0	7.6	380	7.2
	B	32	6	0	6	4	BSJ	22.0	7.7	380	7.4
	C	33	10	0	10	0	BSJ	22.0	7.0	380	7.4
	D	34	10	0	10	0	BSJ	22.0	7.7	380	4.1 ①
	E	35	7	0	7	3	BSJ	22.0	7.7	375	7.3
	F	36	10	0	10	0	BSJ	22.0	7.6	380	7.3
							Technician's Initials	AJW	AJW	AJW	AJW

① when removing airlines noticed airline was not completely submerged in H_2O.

WQ Instruments Used: Temp. Cal. Hg Therm. pH II-A-26 Cond./Sal. II-A-100C DO II-A-19
Data Verified By Oct 8/97 C. McPherson Date Verified Oct 8/97

Forms/Lab/Datasht/Sediment/SURVIVAL.WPD February 21, 1997

EVS CONSULTANTS

SEDIMENT TOXICITY TESTS - SURVIVAL AND FINAL WATER QUALITY DATA

Client: NOAA
EVS Project No. 9/575-3710
EVS Work Order No. 9700658

Test Type: 10-d Freshwater Sediment Toxicity Test
Test Species: C. tentans
Test Initiation Date (Day 0): ~~August~~ Sept. 5 ~~21~~, 1997
Test Termination Date: Sept. 15/97

Sample ID	Rep.	Pan No.	No. Alive	No. Dead	Total Recovered	No. Missing	Tech. Init.	Temp. (°C)	pH	Cond. (µmhos/cm) ☑ Salinity (ppt) ☐	DO (mg/L)
SE-19-SS-F	A	37	8 ~~9~~ JRW	0 ~~0~~ JRW	8 ~~9~~ JRW	2 ~~1~~ JRW	JRW	22.0	7.8 ~~8.1~~ gjw	380	7.4
	B	38	9	0	9	1	JRW	22.0	7.9 ~~8.1~~ gjw	380	7.4
	C	39	10	0	10	0	JRW	22.0	7.9 ~~7.7~~ gjw	380	7.4
	D	40	10	0	10	0	JRW	22.0	7.4 ~~7.7~~ gjw	385	7.5
	E	41	10	0	10	0	JRW	22.0	7.9 ~~7.7~~ gjw	385	7.4
	F	42	9	0	9	1	JRW	22.0	7.4 ~~7.7~~ gjw	380	7.4
SR-9-SS-F	A	43	8	0	8	2	JGL	22.0	8.1	360	7.4
	B	44	7	0	7	3	JGL	22.0	7.8	360	7.4
	C	45	7	0	7	3	JGL	22.0	7.8	360	7.2
	D	46	—	—	—	—		22.0	7.8	360	7.3
	E	47	9	0	9	1	JGL				
	F	48	—	—	—	—					
Technician's Initials								gjw	gjw	gjw	gjw

WQ Instruments Used: Temp. Cal. Hg Therm. pH II-A-26 Cond./Sal. II-A-100C DO II-A-19

Data Verified By: C. McPherson Date Verified: Oct 8/97

Form/Lab/Datasht/Sediment/SURVIVAL.WPD February 21, 1997

EVS CONSULTANTS

SEDIMENT TOXICITY TESTS - SURVIVAL AND FINAL WATER QUALITY DATA

Client NOAA
EVS Project No. 9/575-3710
EVS Work Order No. 9700 65R

Test Type 10-d Freshwater Sediment Toxicity Test
Test Species C. tentans
Test Initiation Date (Day 0) August 26 1997
Test Termination Date Sept. 15/97

Sample ID	Rep.	Pan No.	No. Alive	No. Dead	Total Recovered	No. Missing	Tech. Init.	Temp. (°C)	pH	Cond. (µmhos/cm) ☑ Salinity (ppt) ☐	DO (mg/L)
SR-19-SS-F	A	49	6	0	6	4	mjm	22.0	7.5	390	7.5
	B	50	10	0	10	0	mjm	22.0	7.5	385	7.7
	C	51	7	0	7	3	mjm	22.0	7.5	385	7.3
	D	52	9	0	9	1	BST	22.0	7.5	395	7.3
	E	53	10	0	10	0	BST	22.0	7.5	390	7.3
	F	54	7	0	7	3	BST	22.0	7.5	390	7.4
SR-15-SS-F	A	55	10	0	10	0	mjm	22.0	7.5	375	7.3
*Hve pans were used	B	56	10	0	10	0	mjm	22.0	7.6	385	7.4
	C	57	9	0	mjm 9	1	mjm	22.0	7.6	380	7.4
	D	58	2	0	2	8	mjm	22.0	7.6	380	7.4
	E	59	10	0	10	0	mjm	22.0	7.7	375	7.5
	F	60	9	0	9	1	mjm	22.0	7.6	380	7.4
							Technician's Initials	ajw	ajw	ajw	ajw

[illegible margin note]

WQ Instruments Used: Temp. cal. Hg therm. pH II-A-26 Cond./Sal. II-A-100C DO II-A-19

Data Verified By C. McPherson Date Verified Oct 8/97

Form/Lab/Datasht/Sediment/SURVIVAL.WPD February 21, 1997

EVS CONSULTANTS
SEDIMENT TOXICITY TESTS - SURVIVAL AND FINAL WATER QUALITY DATA

Client: NOAA
EVS Project No. 9/575-3710
EVS Work Order No. 9700658

Test Type: 10-d Freshwater Sediment Toxicity Test
Test Species: C. tentans
Test Initiation Date (Day 0): Sept. 5th 1997
Test Termination Date: Sept. 15 /97

Sample ID	Rep.	Pan No.	No. Alive	No. Dead	Total Recovered	No. Missing	Tech. Init.	Temp. (°C)	pH	Cond. (µmhos/cm) ☐ Salinity (ppt) ☐	DO (mg/L)
Control	A	61	9	0	9	1	ajw	22.0	7.9	310	7.8
	B	62	10	0	10	0	ajw	22.0	7.9	320	7.7
	C	63	10	0	10	0	ajw	22.0	7.9	320	7.7
	D	64	10	0	10	0	ajw	22.0	7.9	320	7.8
	E	65	9	1	10	0	ajw	22.0	7.9	320	7.7
	F	66	10	0	10	0	ajw	22.0	7.9	320	7.7
SR-12-33-F	A	67	8	0	8	2	ajw	22.0	7.6	365 ~~7.6~~ ajw	7.5
	B	68	9	0	9	1	ajw	22.0	7.6	365 ~~7.6~~ ajw	7.7
	C	69	10	0	10	0	ajw	22.0	7.5	370 ~~7.5~~ ajw	7.4
	D	70	8	0	8	2	ajw	22.0	7.4	370 ~~7.4~~ ajw	7.5
	E	71	ajw ~~9~~ 10	ajw ~~1~~ 0	10	0	ajw	22.0	7.3	370 ~~7.3~~ ajw	6.5
	F	72	10	0	10	0	ajw	22.0	7.4	370 ~~7.4~~ ajw	7.4
							Technician's Initials	ajw	ajw	ajw	ajw

WQ Instruments Used: Temp. Cal. Hg therm. pH II-A-26 Cond./Sal. II-A-100C DO II-A-19
Data Verified By: C. Wetterson Date Verified: Oct 8/97

Form:/LAB/Data/lab/Sediment/SURVIVAL.WPD February 21, 1997

EVS CONSULTANTS

SEDIMENT TOXICITY TESTS - SURVIVAL AND FINAL WATER QUALITY DATA

Client NOAA
EVS Project No. 9/5TS-3710
EVS Work Order No. 9700658

Test Type 10-d Freshwater Sediment Toxicity Test
Test Species C. tentans
Test Initiation Date (Day 0) August 5th 1997
Test Termination Date Sept. 15/97

Sample ID	Rep.	Pan No.	No. Alive	No. Dead	Total Recovered	No. Missing	Tech. Init.	Temp. (°C)	pH	Cond. (µmhos/cm) ☑ Salinity (ppt) ☐	DO (mg/L)
SR-2-SS-7A	A	73	5	0	5	5	AJW	22.0	8.1	370	7.2
	B	74	6	0	6	4	Abh	22.0	7.7	370	7.0
	C	75	7	0	7	3	AFY	22.0	7.7	365	7.0
	D	76	9	0	9	1	AFY	22.0	7.7	360	7.1
	E	77	9	0	9	1	AFY	22.0	7.8	365	6.9
	F	78	5	0	5	5	AFY	22.0	7.8	365	6.9
SR-3-SS-F	A	79	7	0	7	3	KFS	22.0	7.5	400	7.3
	B	80	10	0	10	0	KFS	22.0	7.6	395	7.3
	C	81	7	0	7	3	KFS	22.0	7.6	395	7.5
	D	82	8	0	8	2	KFS	22.0	7.4	395	7.4
	E	83	9	0	~~8~~ 9	1	KFS	22.0	7.5	395	7.3
	F	84	10	0	10	0	KFS	22.0	7.6	400	7.5
							Technician's Initials	AJW	AJW	AJW	AJW

WQ Instruments Used: Temp. Cal-thermometer pH II-A-26 Cond./Sal. II-A-100C DO II-A-19

Data Verified By C McPherson Date Verified Oct 8/97

EVS CONSULTANTS

SEDIMENT TOXICITY TESTS - SURVIVAL AND FINAL WATER QUALITY DATA

Client NOAA
EVS Project No. 9/575-3710
EVS Work Order No. 9700658

Test Type 10-d Freshwater Sediment Toxicity Test
Test Species C. tentans
Test Initiation Date (Day 0) August 26 1997
Test Termination Date Sept. 15 1997

Sample ID	Rep.	Pan No.	No. Alive	No. Dead	Total Recovered	No. Missing	Tech. Init.	Temp. (°C)	pH	Cond. (µmhos/cm) ☑ Salinity (ppt) ☐	DO (mg/L)
SR-20-SS-F	A	85	9	0	9	1	mjm	22.0	7.7	380	7.7
	B	86	9	0	9	1	mjm	22.0	7.5	380	7.5
	C	87	10	0	10	0	mjm	22.0	7.5	380	7.7
	D	88	9	0	9	1	mjm	22.0	7.5	380	7.6
	E	89	4	0	4	6	mjm	22.0	7.6	380	7.6
	F	90	9	0	9	1	mjm	22.0	7.5	380	7.4
SR-10-SS-F	A	91	9	0	9	1	SVS	22.0	8.1	385	7.8
	B	92	8	0	8	2	SVS	22.0	8.0	390	7.2
	C	93	9	0	9	1	SVS	22.0	8.0	390	7.3
	D	94	10	0	10	0	SVS	22.0	8.1	395	7.0
	E	95	8	0	8	2	SVS	22.0	7.7	400	6.5
	F	96	9	0	9	1	SVS	22.0	8.1	390	7.1
							Technician's Initials	ajw	ajw	ajw	ajw

WQ Instruments Used: Temp. Cal. Hg therm. pH II-A-26 Cond./Sal. II-A-100C DO II-A-19

Data Verified By C McPherson Date Verified Oct 8/97

EVS CONSULTANTS
SEDIMENT TOXICITY TESTS - SURVIVAL AND FINAL WATER QUALITY DATA

Client: NOAA
EVS Project No.: 9/575-37.10
EVS Work Order No.: 9700658

Test Type: 10-d Freshwater Sediment Toxicity Test
Test Species: [illegible] C. tentans
Test Initiation Date (Day 0): [illegible] 1997
Test Termination Date: Sept. 15 /97

Sample ID	Rep.	Pan No.	No. Alive	No. Dead	Total Recovered	No. Missing	Tech. Init.	Temp. (°C)	pH	Cond. (µmhos/cm) ☑ Salinity (ppt) ☐	DO (mg/L)
SR-17-SS-C	A	97	4	0	4	6	AFY	22.0	7.7	370	7.5
	B	98	4	1	5	5	AFY	22.0	7.7	370	7.4
	C	99	9	0	9	1	AFY	22.0	7.7	375	7.4
	D	100	8	1	9	1	AFY	22.0	7.7	375	7.4
	E	101	9	0	9	1	AFY	22.0	7.7	375	7.5
	F	102	10	0	10	0	AFY	22.0	7.7	370	7.5
SR-1-SS-7D	A	103	10	0	10	0	BSS	22.0	7.8	370	7.4
	B	104	9	0	9	1	BSS	22.0	8.1	370	7.4
	C	105	9	0	9	1	BSS	22.0	8.1	365	7.4
	D	106	10	0	10	0	BSS	22.0	8.0	365	7.3
	E	107	10	0	10	0	BSS	22.0	8.1	365	7.3
	F	108	9	0	9	1	BSS	22.0	8.1	360	7.4
							Technician's Initials	AJW	AJW	AJW	AJW

WQ Instruments Used: Temp. Cal. Hg Therm. pH II-A-26 Cond./Sal. II-A-100C DO II-A-19

Data Verified By: C. McPherson Date Verified: Oct 8/97

EVS CONSULTANTS

SEDIMENT TOXICITY TESTS - SURVIVAL AND FINAL WATER QUALITY DATA

Client NOAA
EVS Project No. 9/575 - 37.10
EVS Work Order No. 9700658

Test Type 10-d Freshwater - Sediment Toxicity Test
Test Species [illegible] C. tentans
Test Initiation Date (Day 0) [illegible] 1997
Test Termination Date Sept. 15 1997

Sample ID	Rep.	Pan No.	No. Alive	No. Dead	Total Recovered	No. Missing	Tech. Init.	Temp. (°C)	pH	Cond. (µmhos/cm) ☑ Salinity (ppt) ☐	DO (mg/L)
SR-11-SS-F	A	109	7	0	7	3	BST	22.0	7.5	395	7.6
	B	110	7	0	7	3	BST	22.0	7.5	400	7.5
	C	111	5	0	5	5	BST	22.0	7.5	390	7.5
	D	112	9	0	9	1	BST	22.0	7.5	395	7.4
	E	113	9	0	9	1	BST	22.0	7.4	395	7.5
	F	114	10	0	10	0	BST	22.0	7.4	395	7.5
							Technician's Initials	AJW	AJW	AJW	AJW

WQ Instruments Used: Temp. [illegible] pH II-A-26 Cond./Sal. II-A-100 DO II-A-14

Data Verified By [illegible] Date Verified Oct 8/97

Form/Lab/Data/Sediment/SURVIVAL.WPD February 21, 1997

Test: CH-Chironomid Survival and Growth Test								Test ID: EVS5442
Species: CT-Chironomus tentans								Protocol: ASTM 96
Sample ID: VARIOUS								Sample Type: SEDIMENT2-Freshwater
Start Date: 05/09/97				End Date: 15/09/97				Lab ID: EVS-Environment Consultants

Pos	ID	Rep	Group	Survival Start	Survival Day 10	# of Chironomids Weighed	Pan Weight (mg)	Pan + Chironomids (mg)
	1	1	D-Control	10	9	9	1002	1011.5
	2	2	D-Control	10	10	10	1002.5	1012.1
	3	3	D-Control	10	10	10	994.1	999.1
	4	4	D-Control	10	10	10	991.9	999.1
	5	5	D-Control	10	9	9	990.2	997.5
	6	6	D-Control	10	10	10	985.7	993.6
	7	1	SR-3-SS-F	8 pan 10	9	9	978.5	996.2
	8	2	SR-3-SS-F	8 10	5	5	981.8	994.8
	9	3	SR-3-SS-F	8 10	9	9	980.4	998.5
	10	4	SR-3-SS-F	8 10	10	10	983.4	1002.9
	11	5	SR-3-SS-F	8 10	8	8	975.1	992.5
	12	6	SR-3-SS-F	8 10	8	8	970.6	988.7
	13	1	SR-8-SS-F	10	8	8	972.7	990.2
	14	2	SR-8-SS-F	10	9	9	972.9	990.9
	15	3	SR-8-SS-F	10	10	10	976.6	995.8
	16	4	SR-8-SS-F	10	10	10	983.3	1005
	17	5	SR-8-SS-F	10	9	9	981.4	998.5
	18	6	SR-8-SS-F	10	9	9	977.2	995.8
	19	1	SR-4-SS-F	8 pan 10	8	8	980	992.9
	20	2	SR-4-SS-F	8 10	10	10	980.4	997.9
	21	3	SR-4-SS-F	8 10	9	9	980.4	993.3
	22	4	SR-4-SS-F	8 10	9	9	983.1	999.3
	23	5	SR-4-SS-F	8 10	8	8	977.7	988.8
	24	6	SR-4-SS-F	8 10	9	9	985.8	1001.6
	25	1	SR-14-SS-F	10	4	4	978.7	984.8
	26	2	SR-14-SS-F	10	9	8	983.5	995.6
	27	3	SR-14-SS-F	10	9	9	981.8	997
	28	4	SR-14-SS-F	10	10	10	987.9	1001.9
	29	5	SR-14-SS-F	10	8	8	988.8	1003.6
	30	6	SR-14-SS-F	10	6	6	984.5	995.1
	31	1	SR-7-SS-F	10	0	0	990.5	990.5
	32	2	SR-7-SS-F	10	0	0	987.7	987.7
	33	3	SR-7-SS-F	10	0	0	988.4	988.4
	34	4	SR-7-SS-F	10	0	0	986.8	986.8
	35	5	SR-7-SS-F	10	0	0	986	986
	36	6	SR-7-SS-F	10	0	0	990.7	990.7
	37	1	SR-16-SS-F	10	9	9	987.1	997.6
	38	2	SR-16-SS-F	10	6	6	987.5	997
	39	3	SR-16-SS-F	10	10	10	991.2	1008.1
	40	4	SR-16-SS-F	10	10	10	985.6	1003.3
	41	5	SR-16-SS-F	10	7	7	981.7	988.8
	42	6	SR-16-SS-F	10	10	10	982.7	996.9
	43	1	SR-18-SS-F	10	8	8	985.3	997.9
	44	2	SR-18-SS-F	10	9	9	984.2	997.9
	45	3	SR-18-SS-F	10	10	10	985.1	1002
	46	4	SR-18-SS-F	10	10	10	985.3	998
	47	5	SR-18-SS-F	10	10	9	989.2	1001.7
	48	6	SR-18-SS-F	10	9	9	984.8	998.4
	49	1	SR-9-SS-F	10	8	8	991.1	1004.8
	50	2	SR-9-SS-F	10	7	7	995.3	1009
	51	3	SR-9-SS-F	10	7	7	997.4	1012.4
	52	4	SR-9-SS-F	10	9	9	994	1012.3

 ToxCalc 5.0 Reviewed by:

Test: CH-Chironomid Survival and Growth Test | Test ID: EVS5442
Species: CT-Chironomus tentans | Protocol: ASTM 95
Sample ID: VARIOUS | Sample Type: SEDIMENT2-Freshwater
Start Date: 05/09/97 | End Date: 15/09/97 | Lab ID: EVS-Environment Consultants

	53	1	SR-19-SS-F	10	6	6	996.6	1009
	54	2	SR-19-SS-F	10	10	10	989.9	1003.9
	55	3	SR-19-SS-F	10	7	7	995.2	1005.8
	56	4	SR-19-SS-F	10	9	9	994.6	1007.5
	57	5	SR-19-SS-F	10	10	10	1009.3	1023.5
	58	6	SR-19-SS-F	10	7	7	1005.7	1018.2
	59	1	SR-15-SS-F	10	10	10	983.3	999.7
	60	2	SR-15-SS-F	10	10	10	990.7	1009.5
	61	3	SR-15-SS-F	10	9	9	996	1009
	62	4	SR-15-SS-F	10	2	2	998.8	1003.2
	63	5	SR-15-SS-F	10	10	10	1002.2	1016.4
	64	6	SR-15-SS-F	10	9	9	1014	1027.2
	65	1	SR-12-SS-F	10	8	8	980.4	998.1
	66	2	SR-12-SS-F	10	9	9	987.5	999.2
	67	3	SR-12-SS-F	10	10	10	985.5	999.5
	68	4	SR-12-SS-F	10	8	8	986.7	1001
	69	5	SR-12-SS-F	10	10	10	984.4	1000.7
	70	6	SR-12-SS-F	10	10	10	1006.5	1023.3
	71	1	SR-2-SS-F	10	5	5	1020.7	1027.8
	72	2	SR-2-SS-F	10	6	6	1016.1	1028.6
	73	3	SR-2-SS-F	10	7	7	993	1006.2
	74	4	SR-2-SS-F	10	9	9	999.6	1014.5
	75	5	SR-2-SS-F	10	9	9	1001.2	1016.6
	76	6	SR-2-SS-F	10	5	5	1017.9	1025.3
	77	1	SR-13-SS-F	10	7	7	1007.5	1019.8
	78	2	SR-13-SS-F	10	10	10	1004.4	1021.7
	79	3	SR-13-SS-F	10	7	7	1000.2	1011
	80	4	SR-13-SS-F	10	8	8	975.4	987.8
	81	5	SR-13-SS-F	10	9	9	978.7	992.1
	82	6	SR-13-SS-F	10	10	10	981.9	995.8
	83	1	SR-20-SS-F	10	9	9	978.8	988.9
	84	2	SR-20-SS-F	10	9	9	994.7	1008.3
	85	3	SR-20-SS-F	10	10	10	990.8	1004.3
	86	4	SR-20-SS-F	10	9	9	990.2	1003.8
	87	5	SR-20-SS-F	10	4	4	982.5	992
	88	6	SR-20-SS-F	10	9	9	979.6	994.5
	89	1	SR-10-SS-F	10	9	9	972.8	989.3
	90	2	SR-10-SS-F	10	8	8	965.5	979.3
	91	3	SR-10-SS-F	10	9	9	962	980.5
	92	4	SR-10-SS-F	10	10	10	962.4	983.8
	93	5	SR-10-SS-F	10	8	8	962.8	981.1
	94	6	SR-10-SS-F	10	9	9	965.4	985.3
	95	1	SR-17-SS-F	10	4	4	968.1	976.2
	96	2	SR-17-SS-F	10	4	4	974.9	982.6
	97	3	SR-17-SS-F	10	9	9	976.2	986.5
	98	4	SR-17-SS-F	10	8	8	979.5	991.9
	99	5	SR-17-SS-F	10	9	9	970.1	987.8
	100	6	SR-17-SS-F	10	10	10	1012.8	1028.8
	101	1	SR-1-SS-F	10	10	10	980.4	998.7
	102	2	SR-1-SS-F	10	9	9	988.8	1005.7
	103	3	SR-1-SS-F	10	9	9	997.5	1014.7
	104	4	SR-1-SS-F	10	10	10	995	1011.4
	105	5	SR-1-SS-F	10	10	10	997.6	1017.1
	106	6	SR-1-SS-F	10	9	9	1001.8	1021.6

Test: CH-Chironomid Survival and Growth Test					Test ID: EVS5442			
Species: CT-Chironomus tentans					Protocol: ASTM 96			
Sample ID: VARIOUS					Sample Type: SEDIMENT2-Freshwater			
Start Date: 05/09/97			End Date: 15/09/97		Lab ID: EVS-Environment Consultants			
	107	1	SR-11-SS-F	10	7	7	1004.7	1017
	108	2	SR-11-SS-F	10	7	7	1008.7	1029.2
	109	3	SR-11-SS-F	10	5	5	1013.4	1023.5
	110	4	SR-11-SS-F	10	9	9	1020.7	1039.4
	111	5	SR-11-SS-F	10	9	9	1024.8	1042.2
	112	6	SR-11-SS-F	10	10	10	1024.4	1045.8

Comments: NOAA; 9/575-37.10; 9700658; Chironomus tentans

Chironomid Survival and Growth Test-Survival

Start Date:	9/5/97	Test ID:	EVS5442	Sample ID:	VARIOUS
End Date:	9/15/97	Lab ID:	EVS-Environment Consultan	Sample Type:	SEDIMENT2-Freshwater
Sample Date:	8/12/97	Protocol:	ASTM 96	Test Species:	CT-Chironomus tentans

Comments: NOAA; 9/575-37.10; 9700658; Chironomus tentans

Conc-%	1	2	3	4	5	6
D-Control	0.9000	1.0000	1.0000	1.0000	0.9000	1.0000
SR-3-SS-F	0.9000	0.5000	0.9000	1.0000	0.8000	0.8000
SR-8-SS-F	0.8000	0.9000	1.0000	1.0000	0.9000	0.9000
SR-4-SS-F	0.8000	1.0000	0.9000	0.9000	0.8000	0.9000
SR-14-SS-F	0.4000	0.9000	0.9000	1.0000	0.8000	0.6000
SR-7-SS-F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SR-16-SS-F	0.9000	0.6000	1.0000	1.0000	0.7000	1.0000
SR-18-SS-F	0.8000	0.9000	1.0000	1.0000	1.0000	0.9000
SR-9-SS-F	0.8000	0.7000	0.7000	0.9000		
SR-19-SS-F	0.6000	1.0000	0.7000	0.9000	1.0000	0.7000
SR-15-SS-F	1.0000	1.0000	0.9000	0.2000	1.0000	0.9000
SR-12-SS-F	0.8000	0.9000	1.0000	0.8000	1.0000	1.0000
SR-2-SS-F	0.5000	0.6000	0.7000	0.9000	0.9000	0.5000
SR-13-SS-F	0.7000	1.0000	0.7000	0.8000	0.9000	1.0000
SR-20-SS-F	0.9000	0.9000	1.0000	0.9000	0.4000	0.9000
SR-10-SS-F	0.9000	0.8000	0.9000	1.0000	0.8000	0.9000
SR-17-SS-F	0.4000	0.4000	0.9000	0.8000	0.9000	1.0000
SR-1-SS-F	1.0000	0.9000	0.9000	1.0000	1.0000	0.9000
SR-11-SS-F	0.7000	0.7000	0.5000	0.9000	0.9000	1.0000

			Transform: Untransformed						1-Tailed	
Conc-%	Mean	SD	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
D-Control	0.9667	0.0516	0.9667	0.9000	1.0000	5.342	6			
*SR-3-SS-F	0.8167	0.1722	0.8167	0.5000	1.0000	21.091	6	2.043	2.015	0.0109
SR-8-SS-F	0.9167	0.0753	0.9167	0.8000	1.0000	8.212	6	1.342	2.015	0.0028
*SR-4-SS-F	0.8833	0.0753	0.8833	0.8000	1.0000	8.522	6	2.236	2.015	0.0028
*SR-14-SS-F	0.7667	0.2251	0.7667	0.4000	1.0000	29.360	6	2.121	2.015	0.0179
SR-7-SS-F	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	6			
SR-16-SS-F	0.8667	0.1751	0.8667	0.6000	1.0000	20.206	6	1.342	2.015	0.0112
SR-18-SS-F	0.9333	0.0816	0.9333	0.8000	1.0000	8.748	6	0.845	2.015	0.0031
*SR-9-SS-F	0.7750	0.0957	0.7750	0.7000	0.9000	12.354	4	3.664	2.298	0.0063
*SR-19-SS-F	0.8167	0.1722	0.8167	0.6000	1.0000	21.091	6	2.043	2.015	0.0109
SR-15-SS-F	0.8333	0.3141	0.8333	0.2000	1.0000	37.694	6	1.026	2.015	0.0340
SR-12-SS-F	0.9167	0.0983	0.9167	0.8000	1.0000	10.726	6	1.103	2.015	0.0041
*SR-2-SS-F	0.6833	0.1835	0.6833	0.5000	0.9000	26.851	6	3.641	2.015	0.0122
SR-13-SS-F	0.8500	0.1378	0.8500	0.7000	1.0000	16.217	6	1.941	2.015	0.0073
SR-20-SS-F	0.8333	0.2160	0.8333	0.4000	1.0000	25.923	6	1.470	2.015	0.0166
*SR-10-SS-F	0.8833	0.0753	0.8833	0.8000	1.0000	8.522	6	2.236	2.015	0.0028
*SR-17-SS-F	0.7333	0.2658	0.7333	0.4000	1.0000	36.250	6	2.111	2.015	0.0246
SR-1-SS-F	0.9500	0.0548	0.9500	0.9000	1.0000	5.766	6	0.542	2.015	0.0019
*SR-11-SS-F	0.7833	0.1835	0.7833	0.5000	1.0000	23.424	6	2.356	2.015	0.0122

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates non-normal distribution (p <= 0.01)	1.33188	1.035	-1.217	2.45201
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)

Heteroscedastic t Test indicates significant differences

* Indicates a significant difference when compared to control.

ToxCalc v5.0

Reviewed by: ______

Chironomid Survival and Growth Test-Dry Weight

Start Date:	9/5/97	Test ID:	EVS5442	Sample ID:	VARIOUS
End Date:	9/15/97	Lab ID:	EVS-Environment Consultan	Sample Type:	SEDIMENT2-Freshwater
Sample Date:	8/12/97	Protocol:	ASTM 96	Test Species:	CT-Chironomus tentans

Comments: NOAA; 9/575-37.10; 9700658; Chironomus tentans

Conc-%	1	2	3	4	5	6
D-Control	1.0556	0.9000	0.5000	0.7200	0.6111	0.7900
SR-3-SS-F	1.9667	2.6000	2.0111	1.9500	2.1750	2.2625
SR-8-SS-F	2.1875	2.0000	1.7200	2.1700	1.9000	2.0667
SR-4-SS-F	1.6125	1.7500	1.4333	1.8000	1.3875	1.7556
SR-14-SS-F	1.5250	1.5125	1.6889	1.4000	1.8500	1.7667
SR-16-SS-F	1.1667	1.5833	1.6900	1.7700	1.0143	1.4200
SR-18-SS-F	1.5750	1.5222	1.6900	1.2700	1.3889	1.5111
SR-9-SS-F	1.7125	1.9571	2.1429	2.0333		
SR-19-SS-F	2.0667	1.4000	1.5143	1.4333	1.4200	1.7857
SR-15-SS-F	1.6400	1.8800	1.4444	2.2000	1.4200	1.4667
SR-12-SS-F	1.4625	1.3000	1.4000	1.7875	1.6300	1.6800
SR-2-SS-F	1.4200	2.0833	1.8857	1.6556	1.7111	1.4800
SR-13-SS-F	1.7571	1.7300	1.5429	1.5500	1.4889	1.3900
SR-20-SS-F	1.1222	1.5111	1.3500	1.5111	2.3750	1.6556
SR-10-SS-F	1.8333	1.7250	2.0556	2.1400	2.2875	2.2111
SR-17-SS-F	2.0250	1.9250	1.1444	1.5500	1.9667	1.6000
SR-1-SS-F	1.8300	1.8778	1.9111	1.6400	1.9500	2.2000
SR-11-SS-F	1.7571	2.9266	2.0200	2.0778	1.9333	2.1400

			Transform: Untransformed						1-Tailed	
Conc-%	Mean	SD	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
D-Control	0.8061	0.1936	0.8061	0.5000	1.0556	24.010	6			
SR-3-SS-F	2.1609	0.2462	2.1609	1.9500	2.6000	11.485	6			
SR-8-SS-F	2.0074	0.1770	2.0074	1.7200	2.1875	8.816	6	-11.220	1.812	0.0208
SR-4-SS-F	1.6231	0.1770	1.6231	1.3875	1.8000	10.902	6			
SR-14-SS-F	1.6238	0.1721	1.6238	1.4000	1.8500	10.597	6			
SR-16-SS-F	1.4407	0.2994	1.4407	1.0143	1.7700	20.783	6	-4.360	1.812	0.0364
SR-18-SS-F	1.4929	0.1465	1.4929	1.2700	1.6900	9.812	6	-6.930	1.812	0.0178
SR-9-SS-F	1.9615	0.1826	1.9615	1.7125	2.1429	9.311	4			
SR-19-SS-F	1.6033	0.2682	1.6033	1.4000	2.0667	16.729	6			
SR-15-SS-F	1.6752	0.3100	1.6752	1.4200	2.2000	18.505	6	-5.825	1.812	0.0403
SR-12-SS-F	1.5433	0.1855	1.5433	1.3000	1.7875	12.021	6	-6.735	1.812	0.0217
SR-2-SS-F	1.7060	0.2490	1.7060	1.4200	2.0833	14.599	6			
SR-13-SS-F	1.5765	0.1416	1.5765	1.3900	1.7571	8.992	6	-7.665	1.812	0.0174
SR-20-SS-F	1.5875	0.4265	1.5875	1.1222	2.3750	26.864	6	-4.087	1.812	0.0663
SR-10-SS-F	2.0421	0.2203	2.0421	1.7250	2.2875	10.789	6			
SR-17-SS-F	1.7019	0.3372	1.7019	1.1444	2.0250	19.813	6			
SR-1-SS-F	1.9015	0.1820	1.9015	1.6400	2.2000	9.571	6	-10.099	1.812	0.0213
SR-11-SS-F	2.1428	0.4073	2.1428	1.7571	2.9286	19.007	6			

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates normal distribution (p > 0.01)	0.45977	1.035	0.71615	1.81446
Bartlett's Test indicates equal variances (p = 0.63)	4.33979	20.0902		

Hypothesis Test (1-tail, 0.05)

Homoscedastic t Test indicates no significant differences

ToxCalc v5.0

Reviewed by: ________

EVS CONSULTANTS
FRESHWATER SEDIMENT TOXICITY TEST DATA SUMMARY

Client: NOAA

EVS Project No.: 9/575-37.10

EVS Work Order No.: 9700658

EVS Analysts: AJW, BSI, MKL, JGE, PAH

Test Type: 96-h KCl Reference Toxicant Test

Test Initiation Date: Sept. 5/97

SAMPLE

Identification: KCl RefTox prep'd Sept 5 '97

Amount Received: –

Date Collected: –

Date Received: –

TEST SPECIES INFORMATION

Organism: C. tentans

Source/Date Received: ECT/Sept. 4 '97

Age/Dry Weight on Day 0 (mg/ind): 11d / 0.30 mg/ind.

Reference Toxicant: KCl

Current Reference Toxicant Result (LC50 and 95% CL): 5.4 g/L KCl (95% CL: 4.2 and 6.8) g/L KCl

Reference Toxicant Warning Limits (mean ± 2SD): (4.5 ± 5.0) g/L KCl

DILUTION AND CONTROL MEDIUM

Water Type: Moderately Hard Water

Temperature (°C): 23

pH: 7.9

Dissolved Oxygen (mg/L): 8.7

Conductivity (µmhos/cm): 300

Hardness (mg/L as $CaCO_3$): 98

Alkalinity (mg/L as $CaCO_3$): 68

Other:

TEST CONDITIONS

Temperature Range (°C): 22-23

pH Range: 7.4 - 8.0

Dissolved Oxygen Range (mg/L): 4.8 - 8.6

Conductivity (µmhos/cm): 200 - 47 000

Hardness (mg/L as $CaCO_3$): 100 - 108

Alkalinity (mg/L as $CaCO_3$): 66 - 70

Photoperiod (L:D h): 16:8

Other:

Sample ID	Mean ± SD	
	Survival (%)	Individual Dry Weight (mg)
control	100.0	
1.25	93.3	
2.5	80.0	
5.0	66.7	
10.0	Ø	
20.0	Ø	

Data Verified By: C. McPherson

Date Verified: Oct 8/97

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EVS CONSULTANTS

FRESHWATER SEDIMENT - 96-h REFERENCE TOXICANT TEST DATA

Client NOAA
EVS Project No. 9/575 - 3210
EVS Work Order No. 9700 458
Test Initiation Date August 26 1997

Reference Toxicant KCl
EVS Stock ID/Preparation Date made Sept. 5/97
Test Species C. tentans
Source/Collection Date EC / Aug. 25/97
No. Organisms/Test Volume 10/150mL

Concentration g/L KCl		Number of Survivors (24 to 96 hours)				Dissolved Oxygen (mg/L)					Temperature (°C)					pH					Conductivity (µmhos/cm)	
		24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	96
20.0	A	0	0	0	0	8.6				6.4	22	23.0	23.0	23.0	22.5	7.9				7.6	47000	50000
	B	1	0	0	0	8.6				6.6	22	23.0	23.0	23.0	22.5	7.9				7.6	47000	50000
	C	0	0	0	0	8.6				6.4	22	23.0	23.0	23.0	22.5	7.9				7.5	47000	49000
10.0	A	5	3	3	0	8.4				5.0	22	23.0	23.0	23.0	22.5	8.0				7.4	29000	37000
	B	5	2	2	0	8.4				5.2	22	23.0	23.0	23.0	22.5	8.0				7.4	29000	36000
	C	4	2	2	0	8.4				5.6	22	23.0	23.0	23.0	22.5	8.0				7.4	29000	37000
Technician Init.		AJW	BSJ	BSJ	AJW	M				JGL	M	AJW	BSJ	BSJ	JGL	M				JGL	M	JGL

WQ Instruments Used: Temperature Cal. Hg thermo. pH II-A-26 DO II-A-19 Cond. II-A-100C

Comments

Test Set Up By MEL/AM   Data Verified By C. McPherson   Date Verified Oct 8/97

EVS CONSULTANTS

FRESHWATER SEDIMENT - 96-h REFERENCE TOXICANT TEST DATA

Client: NOAA
EVS Project No.: 9/575 - 37.10
EVS Work Order No.: 9700 658
Test Initiation Date: Sept 5 ~~August 26~~ 1997

Reference Toxicant: KCl
EVS Stock ID/Preparation Date: Modd. Sept 5/97
Test Species: C. tentans
Source/Collection Date: BLT / Aug 25/97
No. Organisms/Test Volume: 10 / 150 mL

Concentration g/L KCl	Number of Survivors (24 to 96 hours)				Dissolved Oxygen (mg/L)					Temperature (°C)					pH					Conductivity (µmhos/cm)	
	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	96
5.0 A	10 gw	6	6	5	8.4				4.9	22	23.0	23.0	23.0	22.5	8.0				7.4	18000	23000
B	9	8	7	8	8.4				4.8	22	23.0	23.0	23.0	22.5	8.0				7.4	18000	24000
C	8	8	8	7	8.4				5.2	22	23.0	23.0	23.0	22.5	8.0				7.4	18000	24000
2.5 A	10 gw	7	7	8	8.4				5.1	22	23.0	23.0	23.0	22.5	8.0				7.4	4500	4750
B	10	10	9	9	8.4				5.3	22	23.0	23.0	23.0	22.5	8.0				7.4	4500	4700
C	7	7	7	7	8.4				5.3	22	23.0	23.0	23.0	22.5	8.0				7.4	4500	4700
Technician Init.	AJW	BSS	BST	AJW	[illegible]				JGH	[illegible]	AJW	BJJ	BSS	JGH	[illegible]				JGH	[illegible]	JGH

WQ Instruments Used: Temperature: Cal. Hg therm. pH: II-A-26 DO: II-A-19 Cond.: II-A-100C

Comments:

Test Set Up By: MKL / PAH Data Verified By: C. McPherson Date Verified: Oct 1/97

EVS CONSULTANTS

FRESHWATER SEDIMENT - 96-h REFERENCE TOXICANT TEST DATA

Client: NOAA
EVS Project No. 9/575-3210
EVS Work Order No. 9700658
Test Initiation Date: ~~August~~ Sept 5 ~~26~~ 1997

Reference Toxicant: KCl
EVS Stock ID/Preparation Date: made Sept 5/97
Test Species: C. tentans
Source/Collection Date: ELT / Aug 25/97
No. Organisms/Test Volume: 10 / 150 mL

Concentration g/L KCl	Number of Survivors (24 to 96 hours)				Dissolved Oxygen (mg/L)					Temperature (°C)					pH					Conductivity (µmhos/cm)	
	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	96
1.25 A	~~10~~ 9	9	9	9	8.2				4.9	22	23.0	23.0	23.0	22.5	79				7.4	2310	2400
B	10	10	10	7	8.2				5.6	22	23.0	23.0	23.0	22.5	79				7.5	2300	2400
C	10	10	10	9	8.2				5.2	22	23.0	23.0	23.0	22.5	78				7.4	2300	2450
Control A	9	9	9	10	8.2				6.1	22	23.0	23.0	23.0	22.5	78				7.5	300	340
B	10	10	10	10	8.2				5.7	22	23.0	23.0	23.0	22.5	78				7.4	300	330
C	10	10	10	10	8.2				5.9	22	23.0	23.0	23.0	[illegible]	78				7.5	300	345
Technician Init.	AJW	BSJ	BSJ	AJW	[illegible]				JGL	[illegible]	AJW	BSJ	BSJ	JGL	[illegible]				JGL	[illegible]	JGL

WQ Instruments Used: Temperature: Cal. Hg Thermom. pH: II-A-26 DO: II-A-19 Cond: II-A-400C

Comments:

Test Set Up By: MKL / [illegible]
Data Verified By: C. McPherson
Date Verified: Oct 8/97

Test: HY-Freshwater Amphipod Survival and Growth Test	Test ID: RTCTKCL4
Species: CT-Chironomus tentans	Protocol: EPAFS 94-EPA Freshwater Sediment
Sample ID: REF-Ref Toxicant	Sample Type: KCL-Potassium chloride
Start Date: 9/5/97 End Date: 9/9/97	Lab ID: EVS-Environment Consultants

Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	D-Control	10				10	
	2	2	D-Control	10				10	
	3	3	D-Control	10				10	
	4	1	1.250	10				9	
	5	2	1.250	10				7	
	6	3	1.250	10				9	
	7	1	2.5	10				8	
	8	2	2.5	10				9	
	9	3	2.5	10				7	
	10	1	5.0	10				5	
	11	2	5.0	10				8	
	12	3	5.0	10				7	
	13	1	10.0	10				0	
	14	2	10.0	10				0	
	15	3	10.0	10				0	
	16	1	20.0	10				0	
	17	2	20.0	10				0	
	18	3	20.0	10				0	

Comments: NOAA; 6/575-37.1; 6700658; Chironomus tentans

Reviewed by GM Oct 9 97

Freshwater Amphipod Survival and Growth Test-96 Hr Survival

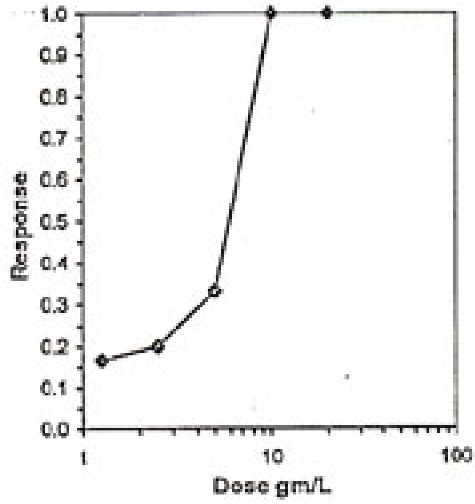
Start Date:	9/5/97	Test ID:	RTCTKCL4	Sample ID:	REF-Ref Toxicant
End Date:	9/9/97	Lab ID:	EVS-Environment Consultan	Sample Type:	KCL-Potassium chloride
Sample Date:		Protocol:	EPAFS 94-EPA Freshwater	Test Species:	CT-Chironomus tentans
Comments:	NOAA; 9/575-37.1; 9700658; Chironomus tentans				

Conc-gm/L	1	2	3
D-Control	1.0000	1.0000	1.0000
1.25	0.9000	0.7000	0.8000
2.5	0.8000	0.9000	0.7000
5	0.5000	0.8000	0.7000
10	0.0000	0.0000	0.0000
20	0.0000	0.0000	0.0000

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%			
5.0%			
10.0%			
20.0%	5.5907	4.5417	6.8820
Auto-16.7%	5.3621	4.2291	6.6495

g/L KCl



ToxCalc v5.0

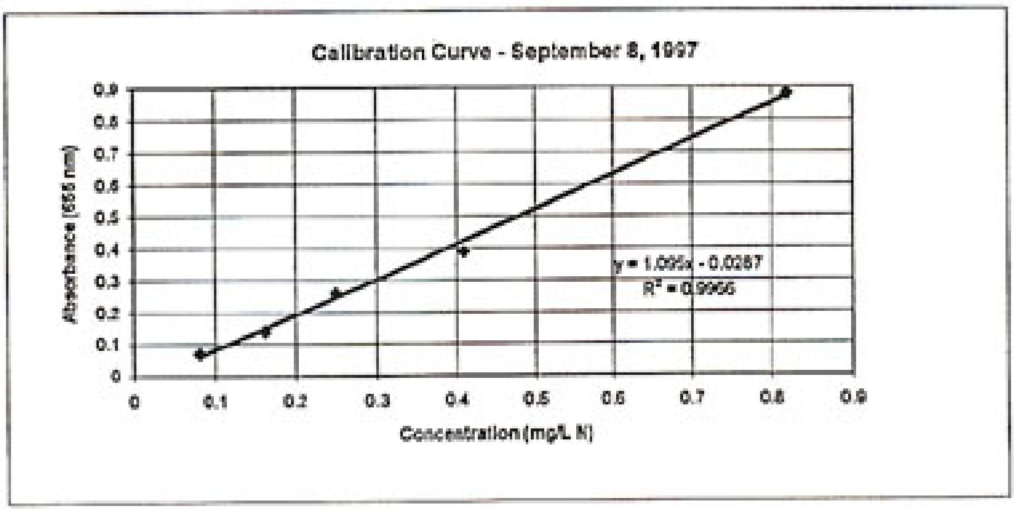
Reviewed by: [signature] 97

Total Ammonia Measurements (reported as ammonia nitrogen, mg/L N)

Client:	NOAA		Test Type:	10-d Freshwater Sediment Toxicity Test
Project No.:	9/575-37.1		Test Species:	*Chironomus tentans*
Work Order No.:	9700658		Date Initiated:	5-Sep-97
Date Sampled:	5-Sep-97	Day 0	Date Terminated	15-Sep-97
Date Measured:	8-Sep-97			

Standard Concentrations (mg/L N)	Absorbance of standards
0.08	0.07
0.16	0.14
0.25	0.26
0.41	0.39
0.82	0.88

Sample ID Interstitial water	Absorbance of samples	Dilution factor	Ammonia concentrations (mg/L N)
Control	0.02	16.67	<0.1
SR-1-SS-B	0.28	25.00	7.0
SR-2-SS-B	0.35	50.00	17.3
SR-2-SS-B rep	0.36	50.00	17.7
SR-3-SS-B	0.48	25.00	11.6
SR-4-SS-B	0.56	50.00	26.9
SR-7-SS-F	0.23	25.00	5.9
SR-8-SS-F	0.33	50.00	16.4
SR-9-SS-F	0.39	25.00	9.6
SR-10-SS-F	0.58	50.00	27.8
SR-11-SS-F	0.47	50.00	22.8
SR-12-SS-F	0.33	50.00	16.4
SR-12-SS-F rep	0.34	50.00	16.8
SR-13-SS-F	0.52	50.00	25.1
SR-14-SS-F	0.65	50.00	31.0
SR-15-SS-F	0.42	50.00	20.5
SR-16-SS-F	0.34	50.00	16.8
SR-17-SS-F	0.51	25.00	12.3
SR-18-SS-F	0.51	50.00	24.6
SR-19-SS-F	0.53	50.00	25.5
SR-20-SS-F	0.39	50.00	19.1



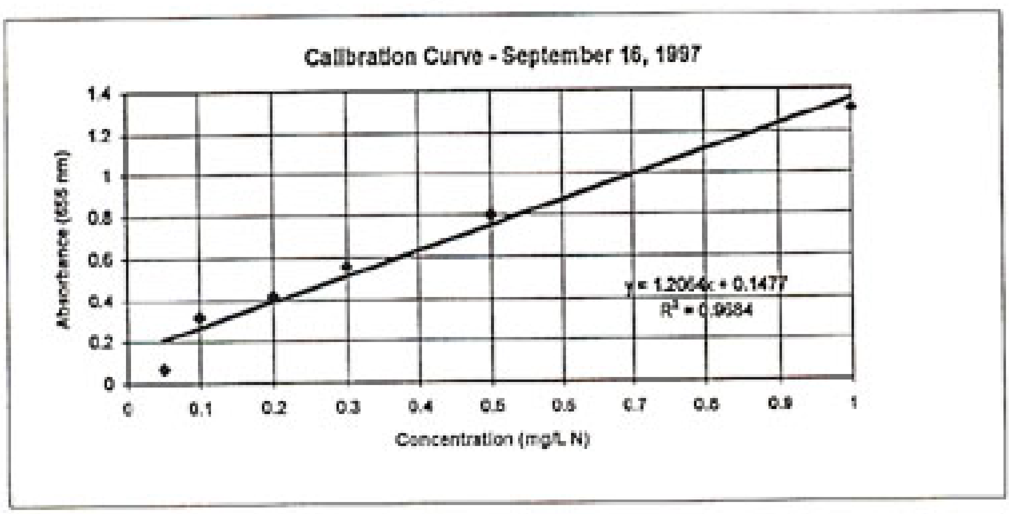
CAM
Oct 9/97

Total Ammonia Measurements (reported as ammonia nitrogen, mg/L N)

Client:	NOAA		Test Type:	10-d Freshwater Sediment Toxicity Test
Project No.:	9/575-37.1		Test Species:	*Chironomus tentans*
Work Order No.:	9700658		Date Initiated:	5-Sep-97
Date Sampled:	15-Sep-97	Day 10	Date Terminated	15-Sep-97
Date Measured:	16-Sep-97			

Standard Concentrations (mg/L N)	Absorbance of standards
0.05	0.07
0.1	0.32
0.2	0.42
0.3	0.56
0.5	0.80
1.0	1.31

Sample ID Interstitial water	Absorbance of samples	Dilution factor	Ammonia concentrations (mg/L N)
Control	0.25	12.50	1.1
SR-1-SS-B	0.18	12.50	0.3
SR-2-SS-B	0.17	12.50	0.2
SR-3-SS-B	0.33	12.50	1.9
SR-4-SS-B	0.32	50.00	7.1
SR-7-SS-F	0.28	25.00	2.7
SR-8-SS-F	0.25	25.00	2.1
SR-9-SS-F	0.25	50.00	4.2
SR-10-SS-F	0.17	50.00	0.9
SR-10-SS-F rep	0.16	50.00	0.5
SR-11-SS-F	0.13	50.00	<0.1
SR-12-SS-F	0.19	50.00	1.8
SR-13-SS-F	0.32	50.00	7.1
SR-14-SS-F	0.28	50.00	5.5
SR-15-SS-F	0.31	50.00	6.7
SR-16-SS-F	0.24	50.00	3.8
SR-17-SS-F	0.35	50.00	8.4
SR-18-SS-F	0.32	50.00	7.1
SR-18-SS-F rep	0.32	50.00	7.1
SR-19-SS-F	0.26	50.00	4.7
SR-20-SS-F	0.24	50.00	3.8



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Total Sulfide Measurements (reported as mg/L S)

Combination Silver/Sulfide Method

Client: NOAA
Project No.: 9/575-37.10
Work Order No.: 9700658
Notes: Days 0&10
Please note sulfides preserved on sampling date.

Test Type: 10-d Sediment Toxicity Test
Test Species: C.tentans
Date Initiated: 05-Sep-97
Date Terminated: 15-Sep-97

Sample ID	Date Sampled	Date Measured	Sulfide(mg/L)	Comments
SR-1-SS-B	05-Sep-97	23-Sep-97	0.000	Day 0
SR-2-SS-B	05-Sep-97	23-Sep-97	0.000	Day 0
SR-3-SS-B	05-Sep-97	23-Sep-97	0.000	Day 0
SR-4-SS-B	05-Sep-97	23-Sep-97	0.000	Day 0
SR-7-SS-F	05-Sep-97	22-Sep-97	0.000	Day 0
SR-8-SS-F	05-Sep-97	22-Sep-97	0.000	Day 0
SR-9-SS-F	05-Sep-97	23-Sep-97	0.000	Day 0
SR-10-SS-F	05-Sep-97	23-Sep-97	0.000	Day 0
SR-11-SS-F	05-Sep-97	22-Sep-97	0.000	Day 0
SR-12-SS-F	05-Sep-97	23-Sep-97	0.000	Day 0
SR-13-SS-F	05-Sep-97	23-Sep-97	0.000	Day 0
SR-14-SS-F	05-Sep-97	23-Sep-97	0.000	Day 0
SR-15-SS-F	05-Sep-97	23-Sep-97	0.000	Day 0
SR-16-SS-F	05-Sep-97	23-Sep-97	0.000	Day 0
SR-17-SS-F	05-Sep-97	23-Sep-97	0.000	Day 0
SR-18-SS-F	05-Sep-97	23-Sep-97	0.000	Day 0
SR-19-SS-F	05-Sep-97	23-Sep-97	0.000	Day 0
SR-20-SS-F	05-Sep-97	23-Sep-97	0.000	Day 0
SR-1-SS-B	15-Sep-97	22-Sep-97	0.000	Day 10
SR-2-SS-B	15-Sep-97	22-Sep-97	0.000	Day 10
SR-3-SS-B	15-Sep-97	22-Sep-97	0.000	Day 10
SR-4-SS-B	15-Sep-97	22-Sep-97	0.000	Day 10
SR-7-SS-F	15-Sep-97	22-Sep-97	0.000	Day 10
SR-8-SS-F	15-Sep-97	22-Sep-97	0.000	Day 10
SR-9-SS-F	15-Sep-97	22-Sep-97	0.000	Day 10
SR-10-SS-F	15-Sep-97	22-Sep-97	0.000	Day 10
SR-11-SS-F	15-Sep-97	22-Sep-97	0.001	Day 10
SR-12-SS-F	15-Sep-97	22-Sep-97	0.000	Day 10
SR-13-SS-F	15-Sep-97	22-Sep-97	0.000	Day 10
SR-14-SS-F	15-Sep-97	22-Sep-97	0.000	Day 10
SR-15-SS-F	15-Sep-97	22-Sep-97	0.000	Day 10
SR-16-SS-F	15-Sep-97	22-Sep-97	0.000	Day 10
SR-17-SS-F	15-Sep-97	22-Sep-97	0.000	Day 10
SR-18-SS-F	15-Sep-97	22-Sep-97	0.000	Day 10
SR-19-SS-F	15-Sep-97	22-Sep-97	0.000	Day 10
SR-20-SS-F	15-Sep-97	22-Sep-97	0.000	Day 10

GM Oct 10/97

EVS CONSULTANTS

Alkalinity/Hardness Measurements

Client	NOAA	Test Type	10-d Sediment Toxicity Test
EVS Project No	9/575-37.10	Test Species	*C.tentans*
EVS Work Order No.	9700658	Test Initiation Date	September 5,1997
		Test Termination Date	September 15,1997

Sample ID	Subsample Date	Alkalinity Measurement					Hardness Measurement			
		Subsample Volume (mL)	Initial H_2SO_4 Volume (mL)	Volume to pH 4.5 (mL)	Total Volume to pH 4.2 (mL)	Alkalinity (mg/L as $CaCO_3$)	Subsample Volume (mL)	Initial EDTA Volume (mL)	Final EDTA Volume (mL)	Hardness (mg/L as $CaCO_3$)
SR-1-SS-~~F~~ B PAH	Sept. 5/97	50	0.0	6.5	6.7	126	50	0.0	7.5	150
SR-2-SS-~~F~~ B	Sept. 5/97	50	0.0	6.1	6.3	118	50	0.0	7.6	152
SR-3-SS-~~F~~ B	Sept. 5/97	50	0.0	5.9	6.0	116	50	0.0	6.8	136
SR-4-SS-~~F~~ B	Sept. 5/97	50	0.0	6.5	6.6	128	50	15.8	23.1	146
SR-7-SS-F	Sept. 5/97	50	0.0	4.5	4.7	86	50	0.0	6.1	122
SR-8-SS-F	Sept. 5/97	50	0.0	6.2	6.4	120	50	0.0	7.2	144
SR-9-SS-F	Sept. 5/97	50	0.0	4.1	4.2	80	50	36.1	43.1	140
SR-10-SS-F	Sept. 5/97	50	0.0	6.6	6.7	130	50	0.0	7.7	154
SR-11-SS-F	Sept. 5/97	50	0.0	6.6	6.7	130	50	0.0	7.8	156
SR-12-SS-F	Sept. 5/97	50	0.0	5.6	5.8	108	50	0.0	7.1	142
SR-13-SS-F	Sept. 5/97	50	0.0	6.8	7.0	132	50	0.0	7.6	152
SR-14-SS-F	Sept. 5/97	50	0.0	7.0	7.2	136	50	0.0	7.5	150
SR-15-SS-F	Sept. 5/97	50	0.0	6.8	6.9	134	50	0.0	7.6	152
SR-16-SS-F	Sept. 5/97	50	0.0	5.4	5.6	104	50	0.0	6.9	138
SR-17-SS-F	Sept. 5/97	50	0.0	5.7	5.8	112	50	0.0	7.2	144
SR-18-SS-F	Sept. 5/97	50	6.6	13.3	13.5	131	50	23.1	30.8	154
SR-19-SS-F	Sept. 5/97	50	0.0	6.9	7.1	134	50	0.0	8.3	166
SR-20-SS-F	Sept. 5/97	50	0.0	6.7	6.9	130	50	0.0	7.7	154
CONTROL	Sept. 5/97	36	19.4	21.9	22.0	67	50	30.8	36.1	106

CM Oct 9/97

EVS CONSULTANTS

Alkalinity/Hardness Measurements

Client	NOAA	Test Type	10-d Sediment Toxicity Test
EVS Project No	9/575-37.10	Test Species	*C. tentans*
EVS Work Order No.	9700658	Test Initiation Date	September 5,1997
		Test Termination Date	September 15,1997

Sample ID	Subsample Date	Alkalinity Measurement					Hardness Measurement			
		Subsample Volume (mL)	Initial H_2SO_4 Volume (mL)	Volume to pH 4.5 (mL)	Total Volume to pH 4.2 (mL)	Alkalinity (mg/L as $CaCO_3$)	Subsample Volume (mL)	Initial EDTA Volume (mL)	Final EDTA Volume (mL)	Hardness (mg/L as $CaCO_3$)
SR-8-SS-F	Sept. 15/97	50	0.0	5.1	5.2	100	50	0.0	7.2	144
SR-4-SS-FB Pw	Sept. 15/97	50	0.0	5.8	6.0	112	50	0.0	7.5	150
SR-9-SS-F	Sept. 15/97	50	0.0	4.6	4.8	88	50	0.0	6.7	134
SR-7-SS-F	Sept. 15/97	50	0.0	4.5	4.7	86	50	0.0	6.4	128
SR-2-SS-FB Pw	Sept. 15/97	60	0.0	6.4	6.5	105	50	0.0	7.1	142
SR-1-SS-FB Pw	Sept. 15/97	50	0.0	4.9	5.0	96	50	0.0	6.7	134
CONTROL	Sept. 15/97	50	0.0	3.7	3.8	72	50	0.0	5.2	104
SR-3-SS-FB Pw	Sept. 15/97	50	0.0	5.1	5.3	98	50	0.0	7.3	146
SR-10-SS-F	Sept. 15/97	50	0.0	6.3	6.4	124	50	0.0	7.6	152
SR-13-SS-F	Sept. 15/97	50	0.0	5.1	5.3	98	50	0.0	7.3	146
SR-11-SS-F	Sept. 15/97	50	0.0	5.3	5.4	104	50	0.0	7.5	150
SR-14-SS-F	Sept. 15/97	50	0.0	5.3	5.4	104	50	0.0	7.5	150
SR-16-SS-F	Sept. 15/97	50	0.0	5.3	5.4	104	50	0.0	7.1	142
SR-15-SS-F	Sept. 15/97	50	0.0	5.3	5.4	104	50	0.0	7.5	150
SR-12-SS-F	Sept. 15/97	50	0.0	4.8	4.9	94	50	0.0	7.0	140
SR-18-SS-F	Sept. 15/97	50	0.0	5.3	5.4	104	50	0.0	7.1	142
SR-17-SS-F	Sept. 15/97	50	0.0	5.0	5.1	98	50	0.0	7.2	144
SR-20-SS-F	Sept. 15/97	50	0.0	5.4	5.5	106	50	0.0	7.2	144
SR-19-SS-F	Sept. 15/97	50	0.0	5.2	5.3	102	50	0.0	7.4	148

[illegible] Oct 9/97

EVS CONSULTANTS

Alkalinity/Hardness Measurements

Client	NOAA	Test Type	96hr KCl Reftox
EVS Project No	9/575-37.10	Test Species	*C.tentans*
EVS Work Order No.	97006.58	Test Initiation Date	5 September 1997
		Test Termination Date	9 September 1997

Sample ID	Subsample Date	Alkalinity Measurement					Hardness Measurement			
		Subsample Volume (mL)	Initial H_2SO_4 Volume (mL)	Volume to pH 4.5 (mL)	Total Volume to pH 4.2 (mL)	Alkalinity (mg/L as $CaCO_3$)	Subsample Volume (mL)	Initial EDTA Volume (mL)	Final EDTA Volume (mL)	Hardness (mg/L as $CaCO_3$)
5 g/L KCl	Sept5/97	50	0	3.6	3.7	70	50	31.3	36.3	100
2.5 g/L KCl	Sept5/97	50	3.7	7.3	7.4	70	50	36.3	41.5	104
Control	Sept5/97	50	7.4	11.0	11.1	70	50	41.5	46.5	100
1.25 g/L KCl	Sept5/97	50	11.0	14.6	14.7	70	50	0	5.1	102
10 g/L KCl	Sept5/97	50	14.7	18.2	18.4	66	50	5.1	10.4	106
20 g/L KCl	Sept5/97	50	18.4	21.9	22.0	68	50	10.4	15.8	108

GdM Oct 8/97

APPENDIX C

10-d *H. azteca* Sediment Toxicity Test
Raw Data

EVS CONSULTANTS
FRESHWATER SEDIMENT TOXICITY TEST DATA SUMMARY

Client NOAA
EVS Project No. 91575-37.10
EVS Work Order No. 9700659

EVS Analysts PAH, BSJ, GSY, MKL, JGK, GST, ETB, LTJ, ECC, AWD, LT
Test Type 10-d Freshwater Sediment Toxicity Test
Test Initiation Date August 26, 1997

SAMPLE

Identification Various
Amount Received 2 L
Date Collected August 17-18, 1997
Date Received August 20-22, 1997

TEST SPECIES INFORMATION

Organism H. azteca
Source/Date Received ARO / Aug. 22, 1997
Age/Dry Weight on Day 0 (mg/ind) 14 d / 0.04 mg/ind.
Reference Toxicant Zn
Current Reference Toxicant Result (LC50 and 95% CL)
145.0 µg/L Zn (95% CL: 129.8 and 162.0) µg/L Zn
Reference Toxicant Warning Limits (mean ± 2SD)
Due to insufficient data points a laboratory mean has yet to be determined.

DILUTION AND CONTROL MEDIUM

Water Type Moderately hard water
Temperature (°C) 22-23
pH 7.9 - 8.1
Dissolved Oxygen (mg/L) 8.5 - 8.8
Conductivity (µmhos/cm) 300 - 335
Hardness (mg/L as $CaCO_3$) 90 - 100
Alkalinity (mg/L as $CaCO_3$) 64 - 80 72
Other

TEST CONDITIONS

Temperature Range (°C) 22 - 24
pH Range 7.1 - 8.22
Dissolved Oxygen Range (mg/L) 2.4 - 8.7 (aeration initiated on Day 8 due to low D.O.)
Conductivity (µmhos/cm) 300 - 600
Hardness (mg/L as $CaCO_3$) Day 0 (94-136) Day 10 (112-150)
Alkalinity (mg/L as $CaCO_3$) (64-112) (76-118)
Photoperiod (L:D h) 16:8
Other Day 0 Day 10
interstitial NH_3 (mg/L N) (0.0 - 37.6) (1.5 - 20.4)
overlying S (mg/L S) (0.0 - 0.02) (76 - 118)

Sample ID	Mean ± SD	
	Survival (%)	Individual Dry Weight (mg)
Control	96.4 ± 5.7	0.12 ± 0.03
SR-19-SS-F	*60.0 ± 37.0	— 0.19 ± 0.06
SR-20-SS-F	*63.3 ± 25.9	— 0.14 ± 0.04
SR-15-SS-F	65.0 ± 38.9 (78.0 ± 25.0)	0.15 ± 0.02 (0.15 ± 0.02)
SR-17-SS-F	86.7 ± 12.1	0.16 ± 0.05
SR-13-SS-F	*66.1 ± 28.0 (60.0 ± 26.5)	— 0.09 ± 0.02
SR-12-SS-F	88.3 ± 11.7	0.12 ± 0.03
SR-1-SS-B	95.0 ± 8.4	0.16 ± 0.02
SR-7-SS-F	* 0 ± 0	— ~~0.17 ± 0.04~~
SR-3-SS-B	*68.3 ± 21.4	— 0.17 ± 0.04

* indicates significant difference compared to control.

Data Verified By C. McPherson Date Verified Oct 9/97

( ) Indicates values for those samples with one replicate removed from statistical analysis due to possible miscounting.

EVS CONSULTANTS
FRESHWATER SEDIMENT TOXICITY TEST DATA SUMMARY

Client NOAA

EVS Project No. 9/575-37.10

EVS Work Order No. 9700459

EVS Analysts PAH, BSJ, GSY, MKL, JGK, EJT, KTB, LTS, ECL, AWD, LJM

Test Type 10-d Freshwater Sediment Toxicity Test

Test Initiation Date August 26, 1997

SAMPLE

Identification Various

Amount Received 2 L

Date Collected August 17-18, 1997

Date Received August 20-22, 1997

TEST SPECIES INFORMATION

Organism H. azteca

Source/Date Received ARO / Aug. 22, 1997

Age/Dry Weight on Day 0 (mg/ind) 14 d / 0.04 mg/ind.

Reference Toxicant Zn

Current Reference Toxicant Result (LC50 and 95% CL)

145.0 μg/L Zn (95% CL: 129.8 and 162.0) μg/L Zn

Reference Toxicant Warning Limits (mean ± 2SD)

Due to insufficient data points a laboratory warn has yet to be determined.

DILUTION AND CONTROL MEDIUM

Water Type Moderately Hard Water

Temperature (°C) 22-23

pH 7.9 - 8.1

Dissolved Oxygen (mg/L) 8.5 - 8.8

Conductivity (μmhos/cm) 300-335

Hardness (mg/L as $CaCO_3$) 90-100

Alkalinity (mg/L as $CaCO_3$) 64-80 72

Other

TEST CONDITIONS

Temperature Range (°C) 22-24

pH Range 7.1-8.23

Dissolved Oxygen Range (mg/L) 2.4-8.7 (aeration initiated on Day 8 due to low D.O.)

Conductivity (μmhos/cm) 300-600

Hardness (mg/L as $CaCO_3$) Day 0 (94-136) Day 10 (112-126)

Alkalinity (mg/L as $CaCO_3$) (64-112) (76-118)

Photoperiod (L:D h) 16:8

Other | Day 0 | Day 10
interstitial NH_3 (mg/L N) (0.0-28.6) (1.5-20.0)
overlying S (mg/L S) (0.0-0.015) (76-118)

Sample ID	Mean ± SD	
	Survival (%)	Individual Dry Weight (mg)
SR-4-SS-B	* 46.7 ± 12.1	— 0.18 ± 0.09
SR-14-SS-F	* 78.3 ± 14.7	— 0.10 ± 0.03
SR-10-SS-F	* 66.7 ± 25.0	— 0.16 ± 0.06
SR-2-SS-B	* 86.7 ± 10.3	— 0.14 ± 0.02
SR-8-SS-F	91.7 ± 7.5	0.19 ± 0.08
SR-16-SS-F	* 61.7 ± 28.6	— 0.15 ± 0.03
SR-9-SS-F	75.0 ± 41.8 (90.0 ± 22.4)	0.17 ± 0.04 (0.17 ± 0.04)
SR-11-SS-F	* 85.0 ± 8.4	— 0.13 ± 0.04
SR-18-SS-F	* 78.3 ± 3.3	— 0.13 ± 0.02

Data Verified By C. McPherson

Date Verified Oct 9/97

EVS CONSULTANTS

10-d FRESHWATER SEDIMENT TOXICITY TEST - DAILY WATER QUALITY MONITORING

lient NOAA
VS Project No. 4/575-37.10
VS Work Order No. 9700 659

Test Initiation Date (Day 0) August 26, 1997
Test Termination Date (Day 10) September 5, 1997
Test Species H. azteca
Source/Batch ALO 1 0811-97 HA Aug. 11-12, 1997

Sample ID	Temperature (°C)											pH										
	0	1	2	3	4	5	6	7	8	9	10	0	1	2	3	4	5	6	7	8	9	10
SC-12-SS-F	23.0	23.0	24.0	23.0	23.0	23.0	23.0	22.0	22.5	22.5	22	7.4	7.5	7.6	7.4	7.5	7.5	7.3	7.2	7.8	8.0	7.7
SC-7-SS-F	23.0	23.0	24.0	23.0	23.0	23.0	23.0	22.0	22.5	22.0	22	7.4	7.3	7.6	7.4	7.3	7.2	7.2	7.2	8.0	8.1	8.1
SC-15-SS-F	23.0	23.0	24.0	23.0	23.0	23.0	23.0	22.0	22.5	22.0	22	7.3	7.4	7.1	7.2	7.2	7.1	7.1	7.1	7.9	8.1	7.3
SC-8-SS-F	23.0	23.0	24.0	23.0	23.0	23.0	23.0	22.0	22.5	22.5	22	7.4	7.3	7.2	7.2	7.3	7.2	7.2	7.2	7.9	8.0	8.0
SC-14-SS-F	23.0	23.0	24.0	23.0	23.0	23.0	23.0	22.0	22.5	22.5	22	7.4	7.4	7.1	7.3	7.2	7.1	7.1	7.1	8.0	8.1	8.1
SC-19-SS-F	23.0	23.0	24.0	23.0	23.0	23.0	23.0	22.0	22.5	22.0	22	7.4	7.5	7.2	7.2	7.5	7.2	7.2	7.1	8.0	8.0	8.1
CTRL	23.0	23.0	24.0	23.0	23.0	23.0	23.0	22.0	22.5	22.5	22	7.8	7.6	7.4	7.5	7.5	7.3	7.2	7.3	7.8	8.0	8.0
SC-11-SS-F	23.0	23.0	24.0	23.0	23.0	23.0	23.0	22.0	22.5	22.5	22	7.3	7.4	7.1	7.3	7.3	7.1	7.1	7.1	7.3	7.1	7.7
SC-20-SS-F	23.0	23.0	24.0	23.0	23.0	21.0	23.0	22.0	22.5	22.0	22	7.2	7.3	7.2	7.3	7.3	7.2	7.2	7.2	7.9	8.2	8.1
SC-4-SS-PB	23.0	23.0	24.0	23.0	23.0	23.0	23.0	22.0	22.5	22.5	22	7.1	7.1	7.4	7.4	7.4	7.1	7.1	7.2	7.8	7.9	8.1
SC-13-SS-[illegible]	23.0	23.0	24.0	23.0	23.0	23.0	23.0	22.5	22.5	22.5	22	7.3	7.5	7.1	7.3	7.2	7.1	7.2	7.1	8.2	8.1	7.9
Technician's Initials	RGA	CR	[illegible]	CR	JGL	JGL	JGL	MSF	BSS	BSS	RGA	RGA	CR	[illegible]	CR	JGL	JGL	[illegible]	BSS	BSS	JGL	RGA

WQ Instruments Used: Temp. Cal. Hg Therm. pH T-A-26

Comments

Data Verified By C. McPherson Date Verified Oct 8/97

EVS CONSULTANTS

10-d FRESHWATER SEDIMENT TOXICITY TEST - DAILY WATER QUALITY MONITORING

Client NOAA

EVS Project No. 4/575-37.10

EVS Work Order No. 9700459

Test Initiation Date (Day 0) August 26, 1997

Test Termination Date (Day 10) September 5, 1997

Test Species H. azteca

Source/Batch ALO / 970811-HA August 12, 1997

Sample ID	Temperature (°C)										
	0	1	2	3	4	5	6	7	8	9	10
SR-2-55-FD	23.0	23.0	24.0	23.0	23.0	23.0	23.0	22.5	22.5	22.5	22
SR-18-55-F	23.0	23.0	24.0	23.0	23.0	23.0	23.0	22.5	22.5	22.5	22
SR-13-55-F	23.0	23.0	24.0	23.0	23.0	23.0	23.0	22.5	22.5	22.5	22
SR-7-55-F	23.0	23.0	24.0	23.0	23.0	23.0	23.0	22.5	22.5	22.5	22
SR-3-55-FD	23.0	23.0	24.0	23.0	23.0	23.0	23.0	22.5	22.5	22.5	22
SR-16-55-F	23.0	23.0	24.0	23.0	23.0	23.0	23.0	22.5	22.5	22.5	22
SR-1-55-FD	23.0	23.0	24.0	23.0	23.0	23.0	23.0	22.5	22.5	22.5	22
SR-10-55-F	23.0	23.0	24.0	23.0	23.0	23.0	23.0	22.5	22.5	22.5	22
Technician's Initials	[illegible]	CH	[illegible]	CH	JGL	JGL	JGL	BSS	BSS	BSS	BW

Sample ID	pH										
	0	1	2	3	4	5	6	7	8	9	10
SR-2-55-FD	7.4	7.3	7.2	7.3	7.3	7.2	7.2	7.1	8.2	8.2	7.1
SR-18-55-F	7.4	7.1	7.1	7.1	7.2	7.1	7.2	7.1	8.3	8.1	7.2
SR-13-55-F	7.5	7.2	7.3	7.3	7.4	7.2	7.2	7.2	8.2	8.1	8.0
SR-7-55-F	7.6	7.4	7.1	7.3	7.6	7.3	7.4	7.3	8.1	8.1	8.0
SR-3-55-FD	7.4	7.4	7.3	7.2	7.2	7.1	7.2	7.1	8.2	8.1	8.0
SR-16-55-F	7.4	7.3	7.1	7.1	7.2	7.1	7.2	7.1	8.1	8.1	8.1
SR-1-55-FD	7.4	7.2	7.4	7.3	7.5	7.4	7.3	7.3	8.2	8.1	7.7
SR-10-55-F	7.4	7.3	7.2	7.2	7.3	7.2	7.3	7.2	8.3	8.2	7.1
Technician's Initials	[illegible]	CH	[illegible]	CH	JGL	JGL	JGL	BSS	BS	[illegible]	[illegible]

WQ Instruments Used: Temp. Cal. Hg Thermo. pH II-A-26

Comments

Data Verified By C. Watson Date Verified Oct 8/97

EVS CONSULTANTS
10-d FRESHWATER SEDIMENT TOXICITY TEST - DAILY WATER QUALITY MONITORING

Client: NOAA
EVS Project No. 9/575-37.10
EVS Work Order No. 9700459

Test Initiation Date (Day 0): August 26, 1997
Test Termination Date (Day 10): September 5, 1997
Test Species: H. azteca
Source/Batch: ABO / Aug. 11-12, 1997

Sample ID	Dissolved Oxygen (mg/L)											Conductivity (µmhos/cm)										
	0	1	2	3	4	5	6	7	8	9	10	0	1	2	3	4	5	6	7	8	9	10
SR. 12-SS-E	6.5	4.9	~~5.8~~ 6.0	5.1	5.4	4.7	4.1	3.6	8.5	8.3	7.5	350	390	370	380	360	340	345	350	310	360	320
SR. 9-SS-E (1)	6.5	4.4	~~5.6~~ 5.2	4.8	4.6	4.4	4.3	3.7	8.3	8.6	7.9	370	410	370	375	370	350	345	3650	415	390	320
SR. 15-SS-E (1)	6.2	4.6	5.0	4.7	4.7	4.2	4.1	3.6	8.3	8.5	7.4	375	440	400	420	410	370	370	370	390	385	390
SR. 8-SS-E	6.0	4.5	5.2	5.0	5.0	4.5	4.2	3.6	8.4	8.5	7.8	360	410	385	400	385	360	360	365	370	380	400
SR. 14-SS-E	6.3	4.4	4.6	4.7	4.0	3.5	3.5	3.1	8.5	8.7	7.9	360	430	390	390	400	385	370	370	500	475	550
SR. 19-SS-P (1)	6.5	4.1	5.4	4.2	5.3	4.7	3.8	3.1	8.6	8.4	7.8	360	440	400	420	390	360	360	365	420	400	500
SWC CTRL	8.1	(4) 2.64	7.0	4.8	5.0	5.6	5.2	5.0	8.5	8.7	8.1	300	300	310	320	320	310	315	315	310	315	375
SR-11-SS-P (1)	6.4	4.7	5.6	4.9	4.8	3.9	3.7	2.4	4.1 (2)	3.0 (2)	7.5	365	410	400	400	380	370	360	370	360	365	380
SR-20-SS-P	6.7	4.3	5.8	4.7	4.9	4.2	4.1	4.0	8.5	8.6	8.1	350	450	400	410	410	375	375	380	420	390	420
SR-4-SS-P (1)	6.0	4.6	5.7	4.8	5.6	4.8	4.0	3.4	8.0	7.9	7.8	370	420	410	420	395	365	365	380	385	395	400
SR-13-SS-P (1)	6.3	4.6	4.6	4.9	3.8	3.7	3.6	2.4 (3)	8.5	8.3	7.7	360	420	425	425	410	360	375	375	390	500	500
Technician's Initials	[illegible]	[illegible]	[illegible]	[illegible]	JGL	JGL	JGL	BJT	BJT	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	JGL	JGL	JGL	BJT	BJT	[illegible]	[illegible]

WQ Instruments Used: DO II-A-19 Conductivity II-A-100C

Comments: (1) Worm like organisms (~1-1.5cm in length) on sediment surface (2) D.O. meter recalibrated & reading rechecked. (3) aeration stopped (4) aeration has stopped on W.Q. jar again, all other reps were aerating; DO checked on rep A = 8.1 mg/L

Data Verified By: [illegible signature]

Date Verified: Oct 8 97

Note: Aeration initiated on Day 8.

EVS CONSULTANTS

10-d FRESHWATER SEDIMENT TOXICITY TEST - DAILY WATER QUALITY MONITORING

Client NOAA
EVS Project No. 9/575-37.10
EVS Work Order No. 9700659

Test Initiation Date (Day 0) August 26, 1997
Test Termination Date (Day 10) September 5, 1997
Test Species H. azteca
Source/Batch [illegible] Aug. 11-12, 1997

Sample ID	Dissolved Oxygen (mg/L) 0	1	2	3	4	5	6	7	8	9	10
SR-2-33-PB	6.5	4.5	5.2	4.9	4.9	4.2	4.0	3.8	8.4	8.5	7.8
SR-15-33-F	6.7	4.6	4.1	5.0	4.0	3.7	4.0	3.7	8.4	8.5	7.7
SR-13-33-F	7.1	4.7	6.4 (5.8)	4.8	4.6	4.3	4.2	4.0	8.5	8.5	7.7
SR-7-33-F	7.1	4.3	6.4	4.4	5.9	4.9	4.8	5.0	8.4	8.6	7.8
SR-3-33-PB	6.4	4.3	5.7	4.6	4.8	3.5	4.4	4.0 (3.7)	8.4	8.5	8.1
SR-16-33-F	6.5	4.7	6.1	4.8	3.9	3.7	4.6	4.0	8.4	8.6	7.8
SR-1-33-PB	6.6	4.4	6.0	4.2	4.9	4.5	4.1	4.1	8.4	8.6	7.5
SR-10-33-F	6.7	4.5	6.1	4.7	5.1	4.4	4.9	5.3	8.5	8.5	7.7
Technician's Initials	[illegible]	[illegible]	[illegible]	[illegible]	JGL	JGL	JGL	BST	BST	[illegible]	[illegible]

Sample ID	Conductivity (µmhos/cm) 0	1	2	3	4	5	6	7	8	9	10
SR-2-33-PB	350	410	415	420	400	360	360	365	425	400	420
SR-15-33-F	350	400	420	420	400	370	380	380	400	380	380
SR-13-33-F	340	430	380	400	380	345	340	350	400	380	400
SR-7-33-F	335	440	375	390	375	346	350	390	380	350	380
SR-3-33-PB	355	440	380	390	360	355	350	345	440	550	550
SR-16-33-F	360	410	320	340	390	360	360	365	500	500	380
SR-1-33-PB	345	400	370	340	370	350	340	345	600	600	600
SR-10-33-F	370	410	470	420	410	390	390	380	480	410	420
Technician's Initials	[illegible]	[illegible]	[illegible]	[illegible]	JGL	JGL	JGL	BST	BST	[illegible]	[illegible]

WQ Instruments Used: DO II-A-19 Conductivity II-A-100C

Comments

Data Verified By [illegible] Date Verified Oct 3/97

EVS CONSULTANTS
SEDIMENT TOXICITY TESTS - SURVIVAL AND FINAL WATER QUALITY DATA

Client: NOAA
EVS Project No.: 91575-37.1
EVS Work Order No.: 9700659

Test Type: 10-d Freshwater Sediment Toxicity Test
Test Species: H. azteca
Test Initiation Date (Day 0): August 26, 1997
Test Termination Date: September 5, 1997

Sample ID	Rep.	Pan No.	No. Alive	No. Dead	Total Recovered	No. Missing	Tech. Init.		Temp. (°C)	pH	Cond. (µmhos/cm) ☑ Salinity (ppt) ☐	DO (mg/L)
Control	WQ								22	8.0	375	8.1
	A	1	10	0	10	0	[illegible]		22	7.9	330	8.3
	B	2	10	0	10	0	[illegible]		22	7.9	350	8.2
	C	3	10	0	10	0	[illegible]		22	7.9	390	7.9
	D	4	9	1	10	0	[illegible]		22	7.9	460	7.8
	E	5	9	1	10	0	[illegible]		22	7.8	350	7.7
	F	6	10	0	10	0	[illegible]		22	7.9	340	7.8
SR-18-SS-F	WQ								22	7.9	380	7.7
	A	109	10	0	10	0	[illegible]		22	7.9	500	7.8
	B	110	7	0	7	3	[illegible]		22	8.0	380	7.9
	C	111	6	0	6	4	[illegible]		22	8.1	380	8.1
	D	112	8	0	8	2	[illegible]		22	8.1	500	8.0
	E	113	8	1	9	1	[illegible]		22	7.9	380	7.7
	F	114	8	0	8	2	[illegible]		22	7.9	410	7.8
									~~22~~			7.8
						Technician's Initials			[illegible]	[illegible]	[illegible]	[illegible]

WQ Instruments Used: Temp. Cal. Hg therm. pH II-A-26 Cond./Sal. II-A-100C DO II-A-19

Data Verified By: C. McPherson Date Verified: Oct 8/97

Form/Lab/Data/Sediment/SURVIVAL.WPD February 21, 1997

EVS CONSULTANTS

SEDIMENT TOXICITY TESTS - SURVIVAL AND FINAL WATER QUALITY DATA

Client: NDAA
EVS Project No.: 1/575-37-10
EVS Work Order No.: 9700459

Test Type: 10-d Freshwater Sediment Toxicity Test
Test Species: H. azteca
Test Initiation Date (Day 0): August 26, 1997
Test Termination Date: September 5, 1997

Sample ID	Rep.	Pan No.	No. Alive	No. Dead	Total Recovered	No. Missing	Tech. Init.	Temp. (°C)	pH	Cond. (µmhos/cm) ☑ Salinity (ppt) ☐	DO (mg/L)
SR-19-SS-F	WQ	\						22	8.1	500	7.8
	A	7	~~5~~ 8	0	~~5~~ 8	~~5~~ 2	[illegible]	22	8.0	380	7.6
	B	8	1	0	1	9	[illegible]	22	8.1	500	7.7
	C	9	10	0	10	0	[illegible]	22	8.0	420	7.8
	D	10	2	0	2	8	[illegible]	22	8.1	380	7.7
	E	11	6	0	6	4	[illegible]	22	8.0	370	7.9
	F	12	9	0	9	1	[illegible]	22	8.1	380	7.9
SR-20-SS-F	WQ	\						22	8.1	420	8.1
	A	13	① 8	0	8	2	PAH	22	8.0	400	7.9
	B	14	① 5	0	5	5	PAH	22	8.1	410	7.8
	C	15	① 9	0	9	1	PAH	22	8.1	410	8.0
	D	16	① 8	0	8	2	PAH	22	8.1	420	7.9
	E	17	① 6	0	6	4	PAH	22	8.1	500	7.8
	F	18	① 2	0	2	8	PAH	22	8.0	420	7.9
							Technician's Initials	[illegible]	[illegible]	[illegible]	[illegible]

WQ Instruments Used: Temp. Cal. Hg Therm. pH II-A-26 Cond./Sal. II-A-100C DO II-A-19

Data Verified By: C. McPherson
Date Verified: Oct 8/97

Form/Lab/Data/Sed/Sediment/SURVIVAL.WPD February 21, 1997

① tiny red worms present

EVS CONSULTANTS

SEDIMENT TOXICITY TESTS - SURVIVAL AND FINAL WATER QUALITY DATA

Client: NOAA
EVS Project No.: 7/575-57.10
EVS Work Order No.: 9700659

Test Type: 10-d Freshwater Sediment Toxicity Test
Test Species: H. azteca
Test Initiation Date (Day 0): August 26, 1997
Test Termination Date: September 5, 1997

Sample ID	Rep.	Pan No.	No. Alive	No. Dead	Total Recovered	No. Missing	Tech. Init.	Temp. (°C)	pH	Cond. (μmhos/cm) ☑ Salinity (ppt) ☐	DO (mg/L)
SR-15-SSF	WQ	\						22	7.8	390	7.4
	A	19	0	0	0	10	BSJ	22	7.7	380	7.2
	B	20	7	0	7	3	BSJ	22	7.9	390	7.6
	C	21	10	0	10	0	BSJ	22	7.8	380	7.4
	D	22	10	0	10	0	BSJ	22	7.9	380	7.5
	E	23	8	1	9	1	BSJ	22	7.7	400	7.6
	F	24	5 4	1	6 5	4 5	BSJ	22	7.9	390	7.7
SR-17-SSF	WQ	\						22	8.0	400	7.7
	A	25	8	0	8	2	KB	22	7.7	370	7.4
	B	26	7	0	7	3	KB	22	7.8	400	7.6
	C	27	8	0	8	2	KB	22	7.8	370	7.5
	D	28	10	0	10	0	KB	22	7.9	450	7.7
	E	29	10	0	10	0	KB	22	8.0	490	7.8
	F	30	9	0	9	1	KB	22	8.0	410	7.8
							Technician's Initials	Gm	Gm	Gm	Gm

WQ Instruments Used: Temp. Cal. Hg therm. pH II-A-26 Cond./Sal. II-A-100 C DO II-A-19

Data Verified By: C. McPherson Date Verified: Oct 8/97

Form/Lab/Data/ts/Sediment/SURVIVAL.WPD February 21, 1997

EVS CONSULTANTS
SEDIMENT TOXICITY TESTS - SURVIVAL AND FINAL WATER QUALITY DATA

Client: NOAA
EVS Project No.: 9/575-37.10
EVS Work Order No.: 9700659

Test Type: 10-d Freshwater Sediment Toxicity Test
Test Species: H. azteca
Test Initiation Date (Day 0): August 26, 1997
Test Termination Date: September 5, 1997

Sample ID	Rep.	Pan No.	No. Alive	No. Dead	Total Recovered	No. Missing	Tech. Init.	Temp. (°C)	pH	Cond. (µmhos/cm) ☑ Salinity (ppt) ☐	DO (mg/L)
SR-13-SS-F	WQ	\						22	7.9	~~380~~ 500	7.7
	A	31	5	2	7	3	BSS	22	7.9	400	7.6
	B	32	3	2	5	5	BSS	22	7.9	410	7.7
	C	33	10	0	10	0	BSS	22	7.7	500	7.4
	D	34	29	0	29	0	BSS	22	7.6	550	7.2
	E	35	7	0	7	3	BSS	22	7.9	450	7.7
	F	36	5	1	6	4	BSS	22	7.8	420	7.6
SR-12-SS-F	WQ	\						22	7.7	380	7.5
	A	37	9	0	9	1	[illegible]	22	7.8	380	7.6
	B	38	7	0	7	3	[illegible]	22	7.8	470	7.7
	C	39	8	0	8	2	[illegible]	22	7.7	500	7.4
	D	40	10	0	10	0	[illegible]	22	7.7	390	7.5
	E	41	9	0	9	1	[illegible]	22	7.8	400	7.6
	F	42	10	0	10	0	[illegible]	22	7.8	550	7.6
							Technician's Initials	[illegible]	[illegible]	[illegible]	[illegible]

WQ Instruments Used: Temp. Cal. Hg thermom. pH II-A-26 Cond./Sal. II-A-100 C DO II-A-19

Data Verified By: C. McPherson Date Verified: Oct 8/97

Forms\LabData\Sediment\SURVIVAL.WPD February 21, 1997

EVS CONSULTANTS

SEDIMENT TOXICITY TESTS - SURVIVAL AND FINAL WATER QUALITY DATA

Client NOAA
EVS Project No. 9/575-37.10
EVS Work Order No. 9700459

Test Type 10-d Freshwater Sediment Toxicity Test
Test Species H. azteca
Test Initiation Date (Day 0) August 26, 1997
Test Termination Date September 5, 1997

Sample ID	Rep.	Pan No.	No. Alive	No. Dead	Total Recovered	No. Missing	Tech. Init.	Temp. (°C)	pH	Cond. (µmhos/cm) ☑ Salinity (ppt) ☐	DO (mg/L)
SR-1-SS-F	WQ	/						22	7.7	600	7.5
	A	43	8	0	8	2	JF	22	7.8	~~600~~ 600	7.6
	B	44	10	0	10	0	JF	22	7.8	370	7.6
	C	45	9	0	9	1	JF	22	7.7	380	7.4
	D	46	10	0	10	0	JF	22	7.9	360	7.6
	E	47	10	0	10	0	JF	22	7.9	380	7.7
	F	48	10	0	10	0	JF	22	7.9	550	7.7
SR-7-SS-F	WQ	/						22	8.0	380	7.8
	A	49	0	0	0	10	AO	22	8.0	360	7.7
	B	50	0	0	0	10	AO	22	8.0	370	7.8
	C	51	0	0	0	10	AO	22	7.9	380	7.7
	D	52	0	0	0	10	AO	22	7.8	500	7.5
	E	53	0	0	0	10	AO	22	7.8	390	7.6
	F	54	0	0	0	10	AO	22	7.8	550	7.6
							Technician's Initials	G	G	G	G

WQ Instruments Used: Temp. Cal. thermometer pH II-A-21 Cond./Sal. II-A-100 C DO II-A-19
Data Verified By C. McPherson Date Verified Oct 8/97

EVS CONSULTANTS .

SEDIMENT TOXICITY TESTS - SURVIVAL AND FINAL WATER QUALITY DATA

Client NOAA

EVS Project No. 9/575-57.10

EVS Work Order No. 9700659

Test Type 10-d Freshwater Sediment Toxicity Test

Test Species H. azteca

Test Initiation Date (Day 0) August 26, 1997

Test Termination Date September 5, 1997

Sample ID	Rep.	Pan No.	No. Alive	No. Dead	Total Recovered	No. Missing	Tech. Init.	Temp. (°C)	pH	Cond. (µmhos/cm) ☑ Salinity (ppt) ☐	DO (mg/L)
SR-3-SS Fem	WQ	/						22	8.0	550	8.1
	A	55	8	0	8	2	GM	22	8.0	390	7.8
	B	56	6	0	6	4	GM	22	8.1	400	8.2
	C	57	8 7	0	8 7	3	GM	22	8.1	470	8.1
	D	58	8	0	8	2	GM	22	8.1	550	8.2
	E	59	3	0	3	7	AW	22	8.1	500	8.1
	F	60	9	0	9	1	GM	22	8.1	480	8.0
SR-4-SS	WQ	/						22	8.1	400	7.8
	A	61	3	0	3	7	AW	22	8.0	370	7.7
	B	62	5	0	5	5	AW	22	8.1	500	7.9
	C	63	4	0	4	6	AW	22	8.0	400	7.7
	D	64	4	0	4	6	AW	22	8.1	380	7.8
	E	65	6	0	6	4	AW	22	8.1	500	7.7
	F	66	6	0	6	4	AW	22	8.1	410	7.8
							Technician's Initials	[illegible]	[illegible]	[illegible]	[illegible]

WQ Instruments Used: Temp. Ql-Hg Therm. pH II-A-26 Cond./Sal. II-A-100 C DO II-A-19

Data Verified By C. McPherson Date Verified Oct 8/97

Forms/Lab/Details/Sediment/SURVIVAL.WPD February 21, 1997

EVS CONSULTANTS
SEDIMENT TOXICITY TESTS - SURVIVAL AND FINAL WATER QUALITY DATA

Client: NOAA
EVS Project No.: 9/575-87.10
EVS Work Order No.: 9700459

Test Type: 10-d Freshwater Sediment Toxicity Test
Test Species: H. azteca
Test Initiation Date (Day 0): August 26, 1997
Test Termination Date: September 5, 1997

Sample ID	Rep.	Pan No.	No. Alive	No. Dead	Total Recovered	No. Missing	Tech. Init.	Temp. (°C)	pH	Cond. (µmhos/cm) ☑ Salinity (ppt) ☐	DO (mg/L)
SR-14-SS-F	WQ	/						22	8.1	550	7.9
	A	67	8	0	8	2	[illegible]	22	8.0	390	7.8
	B	68	10	0	10	0	[illegible]	22	8.0	400	7.9
	C	69	7	0	7	3	[illegible]	22	7.9	420	7.6
	D	70	9	0	9	1	[illegible]	22	7.9	370	7.5
	E	71	6	0	6	4	[illegible]	22	7.9	550	7.6
	F	72	7	0	7	3	[illegible]	22	8.0	430	7.8
SR-10-SS-F	WQ	/						22	8.1	450	7.8
	A	73	4	0	4	6	KTB	22	8.1	390	7.7
	B	74	8	2	10	0	KTB	22	8.2	400	7.8
	C	75	8	0	8	2	KTB	22	8.2	550	7.8
	D	76	9	0	9	1	KTB	22	8.1	420	7.7
	E	77	8	0	8	2	KTB	22	8.1	400	7.8
	F	78	3	0	3	7	KTB	22	8.1	380	7.7
								[illegible]			
						Technician's Initials		[illegible]	[illegible]	[illegible]	[illegible]

WQ Instruments Used: Temp. Gl. Hg Therm. pH II-A-26 Cond./Sal. II-A-100 C DO II-A-19

Data Verified By: C McPherson Date Verified: Oct 9/97

Form/Lab/Datasheets/Sediment/SURVIVAL.WPD February 11, 1997

EVS CONSULTANTS
SEDIMENT TOXICITY TESTS - SURVIVAL AND FINAL WATER QUALITY DATA

Client: NOAA
EVS Project No.: 9/575-37.10
EVS Work Order No.: 9700659

Test Type: 10-d Freshwater Sediment Toxicity Test
Test Species: H. azteca
Test Initiation Date (Day 0): August 26, 1997
Test Termination Date: September 5, 1997

Sample ID	Rep.	Pan No.	No. Alive	No. Dead	Total Recovered	No. Missing	Tech. Init.	Temp. (°C)	pH	Cond. (µmhos/cm) ☑ Salinity (ppt) ☐	DO (mg/L)
SR-2-SS-F	WQ	\						22	8.1	420	7.8
	A	79	8	0	8	2	EC	22	8.0	370	7.7
	B	80	7	0	7	3	EC	22	8.0	380	7.6
	C	81	9	0	9	1	EC	22	7.9	400	7.4
	D	82	9	0	9	1	EC	22	7.9	380	7.7
	E	83	10	0	10	0	EC	22	7.7	370	7.6
	F	84	9	0	9	1	EC	22	7.7	380	7.1
SR-8-SS-F	WQ	\						22	8.0	400	7.8
	A	85	9	1	10	0	BSJ	22	7.9	440	7.7
	B	86	9	0	9	1	BSJ	22	7.8	400	7.4
	C	87	10	0	10	0	BSJ	22	7.8	420	7.4
	D	88	10	0	10	0	BSJ	22	7.8	500	7.3
	E	89	8	0	8	2	BSJ	22	7.8	500	7.3
	F	90	9	1	10	0	BSJ	22	7.8	420	7.3
							Technician's Initials	EC	EC	EC	EC

WQ Instruments Used: Temp. Cal. Hg Thermo. pH II-A-26 Cond./Sal. II-A-100C DO II-A-19

Data Verified By: C McPherson Date Verified: Oct 8/97

Form/Lab/Databk/Sediment/SURVIVAL.WPD February 21, 1997

EVS CONSULTANTS
SEDIMENT TOXICITY TESTS - SURVIVAL AND FINAL WATER QUALITY DATA

Client: NOAA
EVS Project No. 9/575-37.10
EVS Work Order No. 9700659

Test Type: 10-d Freshwater Sediment Toxicity Test
Test Species: H. azteca
Test Initiation Date (Day 0): August 26, 1997
Test Termination Date: September 5, 1997

Sample ID	Rep.	Pan No.	No. Alive	No. Dead	Total Recovered	No. Missing	Tech. Init.	Temp. (°C)	pH	Cond. (µmhos/cm) ☑ Salinity (ppt) ☐	DO (mg/L)
SR-16-SS-F	WQ	\						22	8.1	380	7.8
	A	91	7	0	7	3	[illegible]	22	8.0	380	7.6
	B	92	2	0	2	8	[illegible]	22	8.0	390	7.6
	C	93	6	0	6	4	[illegible]	22	8.1	420	7.7
	D	94	8	0	8	2	[illegible]	22	8.1	390	7.8
	E	95	4	1	5	5	[illegible]	22	8.1	400	7.7
	F	96	10	0	10	0	[illegible]	22	8.1	380	7.7
SR-9-SS-F	WQ	\						22	8.1	380	7.9
	A	97	10	0	10	0	KTB	22	8.0	380	7.7
	B	98	10	0	10	0	KTB	22	8.1	400	7.8
	C	99	0	0	0	10	KTB	22	8.1	600	7.7
	D	100	10	0	10	0	KTB	22	8.1	500	7.9
	E	101	10	0	10	0	KTB	22	8.1	420	7.8
	F	102	5	0	5	5	KTB	22	8.1	410	7.8
							Technician's Initials	[illegible]	[illegible]	[illegible]	[illegible]

WQ Instruments Used: Temp. Cal. Hg therm. pH II-A-26 Cond./Sal. II-A-100C DO II-A-19

Data Verified By: C. McPherson Date Verified: Oct 8/97

EVS CONSULTANTS
SEDIMENT TOXICITY TESTS - SURVIVAL AND FINAL WATER QUALITY DATA

Client NOAA
EVS Project No. 91575-37.10
EVS Work Order No. 9700659

Test Type 10-d Freshwater Sediment Toxicity Test
Test Species H. azteca
Test Initiation Date (Day 0) August 26, 1997
Test Termination Date September 5, 1997

Sample ID	Rep.	Pan No.	No. Alive	No. Dead	Total Recovered	No. Missing	Tech. Init.	Temp. (°C)	pH	Cond. (µmhos/cm) ☑ Salinity (ppt) ☐	DO (mg/L)
SR-11-SS-F	WQ							22	7.7	380	7.5
	A	103	8	0	8	2	[illegible]	22	7.7	450	7.4
	B	104	8	0	8	2	[illegible]	22	7.6	550	7.3
	C	105	10	0	10	0	[illegible]	22	7.7	400	7.6
	D	106	8	1	9	1	[illegible]	22	7.8	390	7.7
	E	107	9	0	9	1	[illegible]	22	7.8	380	7.7
	F	108	8	0	8	2	[illegible]	22	7.8	500	7.6
							Technician's Initials	[illegible]	[illegible]	[illegible]	[illegible]

WQ Instruments Used: Temp. Gl. thermom. pH II-A-26 Cond./Sal. II-A-100C DO II-A-19
Data Verified By C McPherson Date Verified Oct 8/97

Form/Lab/Data/Sediment/SURVIVAL.WPD February 21, 1997

Test: HY-Freshwater Amphipod Survival and Growth Test	Test ID: EVS5460
Species: HA-Hyalella azteca	Protocol: ASTM 96
Sample ID: VARIOUS	Sample Type: SEDIMENT2-Freshwater
Start Date: 8/26/97 End Date: 9/5/97	Lab ID: EVS-Environment Consultants

Pos	ID	Rep	Group	Survival Start	Survival Day 10	# of Amphipods Weighed	Pan Weight (mg)	Pan + Amphipod (mg)
	1	1	D-Control	10	10	10	1017.9	1019.2
	2	2	D-Control	10	10	10	1026.7	1027.8
	3	3	D-Control	10	10	10	1027.3	1029
	4	4	D-Control	10	9	9	1025.5	1026.1
	5	5	D-Control	10	9	9	1021.5	1022.6
	6	6	D-Control	10	10	10	976.9	978
	7	1	SR-19-SS-F	10	8	8	978.3	979.8
	8	2	SR-19-SS-F	10	1	1	970.3	970.6
	9	3	SR-19-SS-F	10	10	10	973.3	974.9
	10	4	SR-19-SS-F	10	2	2	1017.3	1017.7
	11	5	SR-19-SS-F	10	6	6	973.4	974.4
	12	6	SR-19-SS-F	10	9	9	975.9	977.3
	13	1	SR-20-SS-F	10	8	8	975.6	976.5
	14	2	SR-20-SS-F	10	5	5	977.4	978.2
	15	3	SR-20-SS-F	10	9	9	976.3	977.4
	16	4	SR-20-SS-F	10	8	8	976.1	977.3
	17	5	SR-20-SS-F	10	6	6	980.2	980.7
	18	6	SR-20-SS-F	10	2	2	977.5	977.9
	19	1	SR-15-SS-F	10	0	0	975.7	975.7
	20	2	SR-15-SS-F	10	7	7	974	975.3
	21	3	SR-15-SS-F	10	10	10	972.9	974.5
	22	4	SR-15-SS-F	10	10	10	973.5	975
	23	5	SR-15-SS-F	10	8	8	981.1	982.1
	24	6	SR-15-SS-F	10	4	4	981.5	982
	25	1	SR-17-SS-F	10	8	8	982.8	984
	26	2	SR-17-SS-F	10	7	7	1019.3	1020.8
	27	3	SR-17-SS-F	10	8	8	982	983.4
	28	4	SR-17-SS-F	10	10	10	979.9	981.3
	29	5	SR-17-SS-F	10	10	10	978.1	980.1
	30	6	SR-17-SS-F	10	9	9	978	978.7
	31	1	SR-13-SS-F	10	5	5	1016.5	1017
	32	2	SR-13-SS-F	10	3	3	1021	1021.3
	33	3	SR-13-SS-F	10	10	10	1024.3	1025.3
	34	4	SR-13-SS-F	30	29	29	1017.8	1019.5
	35	5	SR-13-SS-F	10	7	7	969.3	970
	36	6	SR-13-SS-F	10	5	5	969.9	970.2
	37	1	SR-12-SS-F	10	9	9	968.1	969
	38	2	SR-12-SS-F	10	7	7	970.4	971.5
	39	3	SR-12-SS-F	10	8	8	970	970.8
	40	4	SR-12-SS-F	10	10	10	968.4	969.4
	41	5	SR-12-SS-F	10	9	9	1026.8	1028.2
	42	6	SR-12-SS-F	10	10	10	1016.3	1017.3
	43	1	SR-1-SS-~~F~~ B	10	8	8	1016	1017
	44	2	SR-1-SS-~~F~~ B	10	10	10	1021.4	1023
	45	3	SR-1-SS-~~F~~ B	10	9	9	1023	1024.2
	46	4	SR-1-SS-~~F~~ B	10	10	10	1028.7	1030.4
	47	5	SR-1-SS-~~F~~ B	10	10	10	1015.8	1017.7
	48	6	SR-1-SS-~~F~~ B	10	10	10	1016	1017.7
	49	1	SR-7-SS-F	10	0	0	1014.5	1014.5
	50	2	SR-7-SS-F	10	0	0	1017.7	1017.7
	51	3	SR-7-SS-F	10	0	0	1016.9	1016.9
	52	4	SR-7-SS-F	10	0	0	1016	1016

 ToxCalc 5.0 Reviewed by: [signature]

Test: HY-Freshwater Amphipod Survival and Growth Test | Test ID: EVS5460
Species: HA-Hyalella azteca | Protocol: ASTM 96
Sample ID: VARIOUS | Sample Type: SEDIMENT2-Freshwater
Start Date: 8/26/97 | End Date: 9/5/97 | Lab ID: EVS-Environment Consultants

	53	5	SR-7-SS-F	10	0		0	1014.8	1014.8
	54	6	SR-7-SS-F	10	0		0	1021.3	1021.3
	55	1	SR-3-SS-F	10	8		8	1026	1027.6
	56	2	SR-3-SS-F	10	6		6	1024.3	1025.6
	57	3	SR-3-SS-F	10	7		7	1023	1023.9
	58	4	SR-3-SS-F	10	8		8	1020.6	1021.9
	59	5	SR-3-SS-F	10	3		3	1021.1	1021.7
	60	6	SR-3-SS-F	10	9		9	1015.8	1017
	61	1	SR-4-SS-F	10	3		3	1018.7	1019.2
	62	2	SR-4-SS-F	10	5		5	976	977.8
	63	3	SR-4-SS-F	10	4		4	978.9	979.6
	64	4	SR-4-SS-F	10	4		4	1019.8	1020.4
	65	5	SR-4-SS-F	10	6		6	1016.2	1016.7
	66	6	SR-4-SS-F	10	6		6	980.4	981.4
	67	1	SR-14-SS-F	10	8		8	982	982.6
	68	2	SR-14-SS-F	10	10		10	983.9	985.2
	69	3	SR-14-SS-F	10	7		7	986.7	987.2
	70	4	SR-14-SS-F	10	9		9	986.7	987.6
	71	5	SR-14-SS-F	10	6		6	985.4	985.8
	72	6	SR-14-SS-F	10	7		7	982.5	983.5
	73	1	SR-10-SS-F	10	4		4	987.1	988.1
	74	2	SR-10-SS-F	10	8		8	982.7	983.8
	75	3	SR-10-SS-F	10	8		8	979.9	980.8
	76	4	SR-10-SS-F	10	9		9	1013.2	1014.4
	77	5	SR-10-SS-F	10	8		8	981	982
	78	6	SR-10-SS-F	10	3		3	1023.6	1024.3
	79	1	SR-2-SS-F	10	8		8	981.8	982.8
	80	2	SR-2-SS-F	10	7		7	979.9	980.7
	81	3	SR-2-SS-F	10	9		9	976.7	977.9
	82	4	SR-2-SS-F	10	9		9	981.9	983.3
	83	5	SR-2-SS-F	10	10		10	985	986.4
	84	6	SR-2-SS-F	10	9		9	980.7	982.3
	85	1	SR-8-SS-F	10	9		9	980.6	981.7
	86	2	SR-8-SS-F	10	9		9	979.8	982.2
	87	3	SR-8-SS-F	10	10		10	980.2	981.9
	88	4	SR-8-SS-F	10	10		10	976.6	977.5
	89	5	SR-8-SS-F	10	8		8	972.5	974.4
	90	6	SR-8-SS-F	10	9		9	974.7	977.1
	91	1	SR-16-SS-F	10	7		7	1016.2	1017
	92	2	SR-16-SS-F	10	2		2	1019.1	1019.5
	93	3	SR-16-SS-F	10	6		6	1005	1005.9
	94	4	SR-16-SS-F	10	8		8	1005.6	1006.7
	95	5	SR-16-SS-F	10	4		4	1007.5	1008.2
	96	6	SR-15-SS-F	10	10		10	1012.2	1013.4
	97	1	SR-9-SS-F	10	10		10	1005.5	1007.1
	98	2	SR-9-SS-F	10	10		10	1005.1	1006.7
	99	3	SR-9-SS-F	10	0		0	1016.5	1016.5
	100	4	SR-9-SS-F	10	10		10	1020.1	1022.5
	101	5	SR-9-SS-F	10	10		10	1010	1011.6
	102	6	SR-9-SS-F	10	5		5	1010.4	1011
	103	1	SR-11-SS-F	10	8		8	1008.6	1009.8
	104	2	SR-11-SS-F	10	8		8	1017.5	1018
	105	3	SR-11-SS-F	10	10		10	1009.3	1010.2
	106	4	SR-11-SS-F	10	8		8	1001.6	1002.9

 ToxCalc 5.0 Reviewed by: [signature] 9/17/97

Test: HY-Freshwater Amphipod Survival and Growth Test | Test ID: EVS5460
Species: HA-Hyalella azteca | Protocol: ASTM 96
Sample ID: VARIOUS | Sample Type: SEDIMENT2-Freshwater
Start Date: 8/26/97 End Date: 9/5/97 | Lab ID: EVS-Environment Consultants

	107	5	SR-11-SS-F	10	9	8	1005	1006.3
	108	6	SR-11-SS-F	10	8	7	1005.4	1006.5
	109	1	SR-18-SS-F	10	10	10	1004.4	1005.8
	110	2	SR-18-SS-F	10	7	7	1004.3	1005.2
	111	3	SR-18-SS-F	10	6	6	1006.5	1007.4
	112	4	SR-18-SS-F	10	8	8	1008.9	1009.8
	113	5	SR-18-SS-F	10	8	8	1008.6	1009.5
	114	6	SR-18-SS-F	10	8	8	1014.5	1015.4

Comments: NOAA: 9/575-37.1; 9700659; Hyallella azteca

Freshwater Amphipod Survival and Growth Test-10 d Survival

Start Date:	8/25/97	Test ID:	EVS5460	Sample ID:	VARIOUS
End Date:	9/5/97	Lab ID:	EVS-Environment Consultan	Sample Type:	SEDIMENT2-Freshwater
Sample Date:	8/13/97	Protocol:	ASTM 96	Test Species:	HA-Hyalella azteca

Comments: NOAA: 9/575-37.1; 9700659; Hyalella azteca

Conc-%	1	2	3	4	5	6
D-Control	1.0000	1.0000	1.0000	0.9000	0.9000	1.0000
SR-19-SS-F	0.8000	0.1000	1.0000	0.2000	0.6000	0.9000
SR-20-SS-F	0.8000	0.5000	0.9000	0.8000	0.6000	0.2000
SR-15-SS-F	0.0000	0.7000	1.0000	1.0000	0.8000	0.4000
SR-17-SS-F	0.8000	0.7000	0.8000	1.0000	1.0000	0.9000
SR-13-SS-F	0.5000	0.3000	1.0000	0.9667	0.7000	0.5000
SR-12-SS-F	0.9000	0.7000	0.8000	1.0000	0.9000	1.0000
SR-1-SS-F	0.8000	1.0000	0.9000	1.0000	1.0000	1.0000
SR-7-SS-F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SR-3-SS-F	0.8000	0.6000	0.7000	0.8000	0.3000	0.9000
SR-4-SS-F	0.3000	0.5000	0.4000	0.4000	0.6000	0.6000
SR-14-SS-F	0.8000	1.0000	0.7000	0.8000	0.6000	0.7000
SR-10-SS-F	0.4000	0.8000	0.8000	0.9000	0.8000	0.3000
SR-2-SS-F	0.8000	0.7000	0.9000	0.9000	1.0000	0.9000
SR-8-SS-F	0.9000	0.9000	1.0000	1.0000	0.8000	0.9000
SR-16-SS-F	0.7000	0.2000	0.6000	0.8000	0.4000	1.0000
SR-9-SS-F	1.0000	1.0000	0.0000	1.0000	1.0000	0.5000
SR-11-SS-F	0.8000	0.8000	1.0000	0.8000	0.9000	0.8000
SR-18-SS-F	1.0000	0.7000	0.6000	0.8000	0.8000	0.8000

			Transform: Untransformed						1-Tailed	
Conc-%	Mean	SD	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
D-Control	0.9667	0.0516	0.9667	0.9000	1.0000	5.342	6			
*SR-19-SS-F	0.6000	0.3742	0.6000	0.1000	1.0000	62.361	6	2.378	2.015	0.0479
*SR-20-SS-F	0.6333	0.2582	0.6333	0.2000	0.9000	40.768	6	3.101	2.015	0.0233
SR-15-SS-F	0.6500	0.3886	0.6500	0.0000	1.0000	59.763	6	1.979	2.015	0.0516
SR-17-SS-F	0.8667	0.1211	0.8667	0.7000	1.0000	13.974	6	1.861	2.015	0.0058
*SR-13-SS-F	0.6611	0.2800	0.6611	0.3000	1.0000	42.355	6	2.629	2.015	0.0272
SR-12-SS-F	0.8833	0.1169	0.8833	0.7000	1.0000	13.234	6	1.597	2.015	0.0055
SR-1-SS-F	0.9500	0.0837	0.9500	0.8000	1.0000	8.807	6	0.415	2.015	0.0032
SR-7-SS-F	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	6			
*SR-3-SS-F	0.6833	0.2137	0.6833	0.3000	0.9000	31.273	6	3.157	2.015	0.0102
*SR-4-SS-F	0.4667	0.1211	0.4667	0.3000	0.6000	25.951	6	9.303	2.015	0.0058
*SR-14-SS-F	0.7833	0.1472	0.7833	0.6000	1.0000	18.791	6	2.870	2.015	0.0082
*SR-10-SS-F	0.6667	0.2503	0.6667	0.3000	0.9000	37.550	6	2.875	2.015	0.0219
*SR-2-SS-F	0.8667	0.1033	0.8667	0.7000	1.0000	11.917	6	2.121	2.015	0.0045
SR-8-SS-F	0.9167	0.0753	0.9167	0.8000	1.0000	8.212	6	1.342	2.015	0.0028
*SR-16-SS-F	0.6167	0.2858	0.6167	0.2000	1.0000	46.342	6	2.952	2.015	0.0283
SR-9-SS-F	0.7500	0.4183	0.7500	0.0000	1.0000	55.777	6	1.259	2.015	0.0597
*SR-11-SS-F	0.8500	0.0837	0.8500	0.8000	1.0000	9.843	6	2.907	2.015	0.0032
*SR-18-SS-F	0.7833	0.1329	0.7833	0.6000	1.0000	16.968	6	3.149	2.015	0.0068

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates non-normal distribution (p <= 0.01)	1.26995	1.035	-0.882	1.63082
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)
Heteroscedastic t Test indicates significant differences

* Indicates a significant difference when compared to control.

--All replicates included in statistical analysis.

ToxCalc v5.0

Reviewed by:

Freshwater Amphipod Survival and Growth Test-Dry Weight

Start Date:	8/26/97	Test ID:	EVS5460	Sample ID:	VARIOUS
End Date:	9/5/97	Lab ID:	EVS-Environment Consultan	Sample Type:	SEDIMENT2-Freshwater
Sample Date:	8/13/97	Protocol:	ASTM 96	Test Species:	HA-Hyalella azteca

Comments: NOAA: 9/575-37.1; 9700659; Hyalella azteca

Conc-%	1	2	3	4	5	6
D-Control	0.1300	0.1100	0.1700	0.0667	0.1222	0.1100
SR-19-SS-F	0.1875	0.3000	0.1500	0.2000	0.1667	0.1556
SR-20-SS-F	0.1125	0.1600	0.1222	0.1500	0.0833	0.2000
SR-15-SS-F	0.1857	0.1600	0.1500	0.1250	0.1250	
SR-17-SS-F	0.1500	0.2143	0.1750	0.1400	0.2000	0.0778
SR-13-SS-F	0.1000	0.1000	0.1000	0.0586	0.1000	0.0600
SR-12-SS-F	0.1000	0.1571	0.1000	0.1000	0.1556	0.1000
SR-1-SS-F	0.1250	0.1600	0.1333	0.1700	0.1900	0.1700
SR-3-SS-F	0.2000	0.2167	0.1286	0.1625	0.2000	0.1333
SR-4-SS-F	0.1667	0.3600	0.1750	0.1500	0.0833	0.1667
SR-14-SS-F	0.0750	0.1300	0.0714	0.1000	0.0667	0.1429
SR-10-SS-F	0.2500	0.1375	0.1125	0.1333	0.1250	0.2333
SR-2-SS-F	0.1250	0.1143	0.1333	0.1556	0.1400	0.1778
SR-6-SS-F	0.1222	0.2667	0.1700	0.0900	0.2375	0.2667
SR-16-SS-F	0.1143	0.2000	0.1500	0.1375	0.1750	0.1200
SR-9-SS-F	0.1600	0.1600	0.2400	0.1600	0.1200	
SR-11-SS-F	0.1625	0.0625	0.0900	0.1625	0.1444	0.1571
SR-18-SS-F	0.1400	0.1286	0.1500	0.1125	0.1125	0.1125

			Transform: Untransformed						1-Tailed	
Conc-%	Mean	SD	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
D-Control	0.1181	0.0330	0.1181	0.0667	0.1700	28.399	6			
SR-19-SS-F	0.1933	0.0556	0.1933	0.1500	0.3000	28.780	6			
SR-20-SS-F	0.1380	0.0409	0.1380	0.0833	0.2000	29.628	6			
SR-15-SS-F	0.1491	0.0256	0.1491	0.1250	0.1857	17.166	5	-1.691	1.833	0.0006
SR-17-SS-F	0.1595	0.0491	0.1595	0.0778	0.2143	30.752	6	-1.705	1.812	0.0011
SR-13-SS-F	0.0864	0.0210	0.0864	0.0586	0.1000	24.314	6			
SR-12-SS-F	0.1188	0.0291	0.1188	0.1000	0.1571	24.501	6	-0.035	1.812	0.0006
SR-1-SS-F	0.1581	0.0245	0.1581	0.1250	0.1900	15.532	6	-2.351	1.812	0.0005
SR-3-SS-F	0.1735	0.0375	0.1735	0.1286	0.2167	21.596	6			
SR-4-SS-F	0.1836	0.0927	0.1836	0.0833	0.3600	50.476	6			
SR-14-SS-F	0.0977	0.0324	0.0977	0.0667	0.1429	33.200	6			
SR-10-SS-F	0.1653	0.0600	0.1653	0.1125	0.2500	36.312	6			
SR-2-SS-F	0.1410	0.0228	0.1410	0.1143	0.1778	16.155	6			
SR-6-SS-F	0.1922	0.0761	0.1922	0.0900	0.2667	39.614	6	-2.180	1.812	0.0021
SR-16-SS-F	0.1495	0.0330	0.1495	0.1143	0.2000	22.099	6			
SR-9-SS-F	0.1680	0.0438	0.1680	0.1200	0.2400	26.082	5	-2.141	1.833	0.0010
SR-11-SS-F	0.1298	0.0429	0.1298	0.0625	0.1625	33.060	6			
SR-18-SS-F	0.1260	0.0163	0.1260	0.1125	0.1500	12.920	6			

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.96639	0.919	-0.1895	0.19521
Bartlett's Test indicates equal variances (p = 0.38)	6.39006	16.8119		

Hypothesis Test (1-tail, 0.05)

Homoscedastic t Test indicates no significant differences

—All replicates included in statistical analysis.

 Reviewed by: ______

Freshwater Amphipod Survival and Growth Test-10 d Survival

Start Date:	8/26/97	Test ID:	EVS5460B	Sample ID:	VARIOUS
End Date:	9/5/97	Lab ID:	EVS-Environment Consultan	Sample Type:	SEDIMENT2-Freshwater
Sample Date:	8/13/97	Protocol:	ASTM 90	Test Species:	HA-Hyalella azteca

Comments: NOAA: 9/575-37.1; 9700650; Hyalella azteca

Conc-%	1	2	3	4	5	6
D-Control	1.0000	1.0000	1.0000	0.9000	0.9000	1.0000
SR-19-SS-F	0.8000	0.1000	1.0000	0.2000	0.6000	0.9000
SR-20-SS-F	0.8000	0.5000	0.9000	0.8000	0.6000	0.2000
SR-15-SS-F	0.7000	1.0000	1.0000	0.8000	0.4000	
SR-17-SS-F	0.8000	0.7000	0.8000	1.0000	1.0000	0.9000
SR-13-SS-F	0.5000	0.3000	1.0000	0.7000	0.5000	
SR-12-SS-F	0.9000	0.7000	0.8000	1.0000	0.9000	1.0000
SR-1-SS-F	0.8000	1.0000	0.9000	1.0000	1.0000	1.0000
SR-7-SS-F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SR-3-SS-F	0.8000	0.6000	0.7000	0.8000	0.3000	0.9000
SR-4-SS-F	0.3000	0.5000	0.4000	0.4000	0.6000	0.6000
SR-14-SS-F	0.8000	1.0000	0.7000	0.9000	0.6000	0.7000
SR-10-SS-F	0.4000	0.8000	0.8000	0.9000	0.8000	0.3000
SR-2-SS-F	0.8000	0.7000	0.9000	0.9000	1.0000	0.9000
SR-8-SS-F	0.9000	0.9000	1.0000	1.0000	0.8000	0.9000
SR-16-SS-F	0.7000	0.2000	0.6000	0.8000	0.4000	1.0000
SR-9-SS-F	1.0000	1.0000	1.0000	1.0000	0.5000	
SR-11-SS-F	0.8000	0.8000	1.0000	0.8000	0.9000	0.8000
SR-18-SS-F	1.0000	0.7000	0.6000	0.8000	0.8000	0.8000

			Transform: Untransformed						1-Tailed	
Conc-%	Mean	SD	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
D-Control	0.9667	0.0516	0.9667	0.9000	1.0000	5.342	6			
*SR-19-SS-F	0.6000	0.3742	0.6000	0.1000	1.0000	62.361	6	2.378	2.015	0.0479
*SR-20-SS-F	0.6333	0.2582	0.6333	0.2000	0.9000	40.768	6	3.101	2.015	0.0233
SR-15-SS-F	0.7800	0.2490	0.7800	0.4000	1.0000	31.923	5	1.647	2.128	0.0273
SR-17-SS-F	0.8667	0.1211	0.8667	0.7000	1.0000	13.974	6	1.861	2.015	0.0058
*SR-13-SS-F	0.6000	0.2646	0.6000	0.3000	1.0000	44.096	5	3.051	2.128	0.0307
SR-12-SS-F	0.8833	0.1169	0.8833	0.7000	1.0000	13.234	6	1.597	2.015	0.0055
SR-1-SS-F	0.9500	0.0837	0.9500	0.8000	1.0000	8.807	6	0.415	2.015	0.0032
SR-7-SS-F	0.0000	0.0000	0.0000	0.0000	0.0000	0.000	6			
*SR-3-SS-F	0.6833	0.2137	0.6833	0.3000	0.9000	31.273	6	3.157	2.015	0.0162
*SR-4-SS-F	0.4667	0.1211	0.4667	0.3000	0.6000	25.951	6	9.303	2.015	0.0058
*SR-14-SS-F	0.7833	0.1472	0.7833	0.6000	1.0000	18.791	6	2.879	2.015	0.0082
*SR-10-SS-F	0.6667	0.2503	0.6667	0.3000	0.9000	37.550	6	2.876	2.015	0.0219
*SR-2-SS-F	0.8667	0.1033	0.8667	0.7000	1.0000	11.917	6	2.121	2.015	0.0045
SR-8-SS-F	0.9167	0.0753	0.9167	0.8000	1.0000	8.212	6	1.342	2.015	0.0028
*SR-16-SS-F	0.6167	0.2858	0.6167	0.2000	1.0000	46.342	6	2.952	2.015	0.0283
SR-9-SS-F	0.9000	0.2236	0.9000	0.5000	1.0000	24.845	5	0.652	2.127	0.0222
*SR-11-SS-F	0.8500	0.0837	0.8500	0.8000	1.0000	9.843	6	2.907	2.015	0.0032
*SR-18-SS-F	0.7833	0.1329	0.7833	0.6000	1.0000	16.968	6	3.149	2.015	0.0068

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates non-normal distribution (p <= 0.01)	1.13051	1.035	-0.5492	0.6973
Equality of variance cannot be confirmed				
Hypothesis Test (1-tail, 0.05)				
Heteroscedastic t Test indicates significant differences				

* Indicates a significant difference when compared to control.

** Indicates samples with one replicate removed from statistical analysis due to possible misseeding.

Reviewed by [signature]

Freshwater Amphipod Survival and Growth Test-Dry Weight

Start Date:	8/26/97	Test ID:	EVS5460B	Sample ID:	VARIOUS
End Date:	9/5/97	Lab ID:	EVS-Environment Consultan	Sample Type:	SEDIMENT2-Freshwater
Sample Date:	8/13/97	Protocol:	ASTM 96	Test Species:	HA-Hyalella azteca
Comments:	NOAA: 9/575-37.1; 9700659; Hyalella azteca				

Conc-%	1	2	3	4	5	6
D-Control	0.1300	0.1100	0.1700	0.0667	0.1222	0.1100
SR-19-SS-F	0.1875	0.3000	0.1500	0.2000	0.1667	0.1556
SR-20-SS-F	0.1125	0.1600	0.1222	0.1500	0.0833	0.2000
** SR-15-SS-F	0.1857	0.1600	0.1500	0.1250	0.1250	
SR-17-SS-F	0.1500	0.2143	0.1750	0.1400	0.2000	0.0778
** SR-13-SS-F	0.1000	0.1000	0.1000	0.1000	0.0600	
SR-12-SS-F	0.1000	0.1571	0.1000	0.1000	0.1556	0.1000
P## SR-1-SS-FB	0.1250	0.1600	0.1333	0.1700	0.1900	0.1700
SR-3-SS-FB	0.2000	0.2167	0.1286	0.1625	0.2000	0.1333
SR-4-SS-FB	0.1667	0.3600	0.1750	0.1500	0.0833	0.1667
SR-14-SS-F	0.0750	0.1300	0.0714	0.1000	0.0667	0.1429
SR-10-SS-F	0.2500	0.1375	0.1125	0.1333	0.1250	0.2333
P## SR-2-SS-FB	0.1250	0.1143	0.1333	0.1556	0.1400	0.1778
SR-8-SS-F	0.1222	0.2667	0.1700	0.0900	0.2375	0.2667
SR-16-SS-F	0.1143	0.2000	0.1500	0.1375	0.1750	0.1200
** SR-9-SS-F	0.1600	0.1600	0.2400	0.1600	0.1200	
SR-11-SS-F	0.1625	0.0625	0.0900	0.1625	0.1444	0.1571
SR-18-SS-F	0.1400	0.1286	0.1500	0.1125	0.1125	0.1125

			Transform: Untransformed						1-Tailed	
Conc-%	Mean	SD	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
D-Control	0.1181	0.0336	0.1181	0.0667	0.1700	28.399	6			
SR-19-SS-F	0.1933	0.0556	0.1933	0.1500	0.3000	28.780	6			
SR-20-SS-F	0.1380	0.0409	0.1380	0.0833	0.2000	29.628	6			
SR-15-SS-F	0.1491	0.0256	0.1491	0.1250	0.1857	17.166	5	-1.691	1.833	0.0006
SR-17-SS-F	0.1595	0.0491	0.1595	0.0778	0.2143	30.752	6	-1.705	1.812	0.0011
SR-13-SS-F	0.0920	0.0179	0.0920	0.0600	0.1000	19.444	5			
SR-12-SS-F	0.1188	0.0291	0.1188	0.1000	0.1571	24.501	6	-0.035	1.812	0.0006
P## SR-1-SS-FB	0.1581	0.0245	0.1581	0.1250	0.1900	15.532	6	-2.351	1.812	0.0005
SR-3-SS-FB	0.1735	0.0375	0.1735	0.1286	0.2167	21.596	6			
SR-4-SS-FB	0.1836	0.0927	0.1836	0.0833	0.3600	50.476	6			
SR-14-SS-F	0.0977	0.0324	0.0977	0.0667	0.1429	33.200	6			
SR-10-SS-F	0.1653	0.0600	0.1653	0.1125	0.2500	36.312	6			
P## SR-2-SS-FB	0.1410	0.0228	0.1410	0.1143	0.1778	16.155	6			
SR-8-SS-F	0.1922	0.0761	0.1922	0.0900	0.2667	39.614	6	-2.180	1.812	0.0021
SR-16-SS-F	0.1495	0.0330	0.1495	0.1143	0.2000	22.099	6			
SR-9-SS-F	0.1680	0.0438	0.1680	0.1200	0.2400	26.082	5	-2.141	1.833	0.0010
SR-11-SS-F	0.1298	0.0429	0.1298	0.0625	0.1625	33.000	6			
SR-18-SS-F	0.1260	0.0163	0.1260	0.1125	0.1500	12.920	6			

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.01)	0.96639	0.919	-0.1895	0.19521
Bartlett's Test indicates equal variances (p = 0.34)	6.78888	16.8119		

Hypothesis Test (1-tail, 0.05)

Homoscedastic t Test indicates no significant differences

** Indicates samples with one replicate removed from statistical analysis due to possible misseeding.

 ToxCalc v5.0 Reviewed by: [signature] 10/10/97

EVS CONSULTANTS
FRESHWATER SEDIMENT TOXICITY TEST DATA SUMMARY

Client NOAA
EVS Project No. 91575-37.10
EVS Work Order No. 9700659

EVS Analysts GSY, JSK, ABD, MKL
Test Type 96-h Reference Toxicant
Test Initiation Date August 26, 1997

SAMPLE
Identification Zn Reference Toxicant (97-R-003)
Amount Received —
Date Collected —
Date Received —

TEST SPECIES INFORMATION
Organism H. azteca
Source/Date Received ARO / Aug. 22 /97
Age/Dry Weight on Day 0 (mg/ind) 14 d / 0.04mg
Reference Toxicant Zn
Current Reference Toxicant Result (LC50 and 95% CL)
145.0 µg/L Zn (95% CL: 129.8 and 162.0) µg/L Zn
Reference Toxicant Warning Limits (mean ± 2SD) Due to insufficient data points a laboratory mean has yet to be determined.
(227.0 ± 175.0) µg/L Zn

DILUTION AND CONTROL MEDIUM
Water Type Moderately Hard Water
Temperature (°C) 23
pH 7.9
Dissolved Oxygen (mg/L) 8.7
Conductivity (µmhos/cm) 300
Hardness (mg/L as $CaCO_3$) 98
Alkalinity (mg/L as $CaCO_3$) 68
Other

TEST CONDITIONS
Temperature Range (°C) 22.5 - 24.0
pH Range 7.7 - 8.0
Dissolved Oxygen Range (mg/L) 7.4 - 8.5
Conductivity (µmhos/cm) 310 - 320
Hardness (mg/L as $CaCO_3$) —
Alkalinity (mg/L as $CaCO_3$) —
Photoperiod (L:D h) 16:8
Other

Sample ID (µg/L Zn)	Mean ± SD	
	Survival (%)	Individual Dry Weight (mg)
320	0	
180	23.3	
100	93.3	
56	96.7	
32	100	
Control	100	

Data Verified By C. McPherson Date Verified Oct 2/97

EVS CONSULTANTS

FRESHWATER SEDIMENT - 96-h REFERENCE TOXICANT TEST DATA

Client: NOAA
EVS Project No. 9/575-33.10
EVS Work Order No. 9300659
Test Initiation Date: August 26/97

Reference Toxicant: Zn
EVS Stock ID/Preparation Date: 97-3-003
Test Species: Hyalella azteca
Source/Collection Date: ARO / Aug 11-13 '97
No. Organisms/Test Volume: 10/200 mL

Concentration NH (mg/L-2n)	Number of Survivors (24 to 96 hours)				Dissolved Oxygen (mg/L)					Temperature (°C)					pH					Conductivity (umhos/cm)	
	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	96
320 A/WQ	10	1	0	—	8.5	7.8	8.2	7.9	—	22.5	23.0	24.0	22.0	—	8.0				—	310	—
B	9	0	0	—		7.8			—		23.0	24.0		—							—
C	10	3	0	—		7.7			—		23.0	24.0		—							—
180 A/WQ	10	4	3	1	8.5	7.6	8.1	7.9	7.5	22.5	23.0	24.0	23.0	23.0	8.0				7.7	310	320
B	10	5	3	2		7.7					23.0	24.0									
C	10	5	4	4		7.7					23.0	24.0									
Technician Init.	CP	M	CR	JGL	AJW	CP	M	CR	JGL	AJW	CP	M	CP	JGL	AJW				JGL	AJW	JGL

WQ Instruments Used: Temperature: Cal. Hg Therm. pH: II-A-24 DO: II-A-19 Cond.: II-A-1005

Comments:

Test Set Up By: CSM
Data Verified By: [illegible signature]
Date Verified: Oct 8/97

EVS CONSULTANTS

FRESHWATER SEDIMENT - 96-h REFERENCE TOXICANT TEST DATA

Client: NOAA
EVS Project No.: 9/575-37.0
EVS Work Order No.: 9700459
Test Initiation Date: August 26/97

Reference Toxicant: Zn
EVS Stock ID/Preparation Date: 97-3-003
Test Species: Hyalella azteca
Source/Collection Date: ABO / Aug. 11-12 '97
No. Organisms/Test Volume: 10/200mL

Concentration µM (µg/L Zn)	Number of Survivors (24 to 96 hours)				Dissolved Oxygen (mg/L)					Temperature (°C)					pH					Conductivity (µmhos/cm)	
	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	96
100 A/WQ	10	10	10	9	8.5	7.6	8.1	7.7	7.5	22.5	23.0	24.0	23.0	23.0	8.0				7.7	510	320
B	10	10	10	10		7.6					23.6	24.6									
C	10	9	9	9		7.6					23.6	24.0									
56 A/WQ	10	10	10	10	8.5	7.7	8.1	7.8	7.4	22.5	23.0	24.0	23.0	23.0	8.0				7.7	510	320
B	10	10	10	10		7.6					23.6	24.0									
C	10	10	10	9		7.7					23.0	24.0									
Technician Init.	[illegible]	[illegible]	[illegible]	[illegible]	AJW	[illegible]	[illegible]	[illegible]	[illegible]	AJW	[illegible]	[illegible]	[illegible]	[illegible]	AJW				[illegible]	AJW	[illegible]

WQ Instruments Used: Temperature: Cal. Hg therm. pH: II-A-20 DO: II-A-17 Cond.: II-A-100-C

Comments:

Test Set Up By: CSY
Data Verified By: D. McPherson
Date Verified: Oct 8/97

EVS CONSULTANTS

FRESHWATER SEDIMENT - 96-h REFERENCE TOXICANT TEST DATA

Client: NOAA
EVS Project No. 9/575-37.00
EVS Work Order No. 9700659
Test Initiation Date: August 26/97

Reference Toxicant: Zn
EVS Stock ID/Preparation Date: 97-Z-003
Test Species: Hyalella azteca
Source/Collection Date: ARO / Aug. 11-12 '97
No. Organisms/Test Volume: 10/200 mL

Concentration mg/L (Zn)	Number of Survivors (24 to 96 hours)				Dissolved Oxygen (mg/L)					Temperature (°C)					pH					Conductivity (µmhos/cm)	
	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	96
32 A/WQ	10	10	10	10	8.5	7.6	8.1	7.7	7.4	22.5	23.0	24.0	23.0	23.0	8.0	/	/	/	7.7	310	320
B	10	10	10	10		7.7					23.6	24.0				/	/	/			
C	10	10	10	10		7.6					23.6	24.6				/	/	/			
																/	/	/			
Control A/WQ	10	10	10	10	8.5	7.7	9.1	7.8	7.4	22.5	23.0	24.0	23.0	23.0	8.0	/	/	/	7.7	310	320
B	10	10	10	10		7.4					23.6	24.6				/	/	/			
C	10	10	10	10		7.7					23.0	24.0				/	/	/			
																/	/	/			
Technician Init.	CH	m	CR	JGL	AJW	CH	m	CR	JGL	AJW	CH	m	CR	JGL	AJW				JGL	AJW	JGL

WQ Instruments Used: Temperature: Sol. Hg thermo; pH: II-A-26; DO: II-A-19; Cond.: II-A-100-6

Comments: ______

Test Set Up By: CSY
Data Verified By: B. McPherson
Date Verified: Oct 8/97

Test: AR-Amphipod Acute Reftox
Species: HA-Hyalella azteca
Sample ID: REF-Ref Toxicant
Start Date: 8/26/97 End Date: 8/30/97

Test ID: RTHAZN3
Protocol: EPAFS 94-EPA Freshwater Sediment
Sample Type: ZNSO-Zinc sulfate
Lab ID: EVS-Environment Consultants

Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	control	10				10	
	2	2	control	10				10	
	3	3	control	10				10	
	4	1	32.000	10				10	
	5	2	32.000	10				10	
	6	3	32.000	10				10	
	7	1	56.00	10				10	
	8	2	56.00	10				10	
	9	3	56.00	10				9	
	10	1	100.00	10				9	
	11	2	100.00	10				10	
	12	3	100.00	10				9	
	13	1	180.00	10				1	
	14	2	180.00	10				2	
	15	3	180.00	10				4	
	16	1	320.00	10				0	
	17	2	320.0	10				0	
	18	3	320.0	10				0	

Comments: 9/575-37,10 (wo#9700659); 9/743-03 (wo#9700669); Source: ARO

 Reviewed by: QHM 9/3/97

Amphipod Acute Reftox-96 Hr Survival

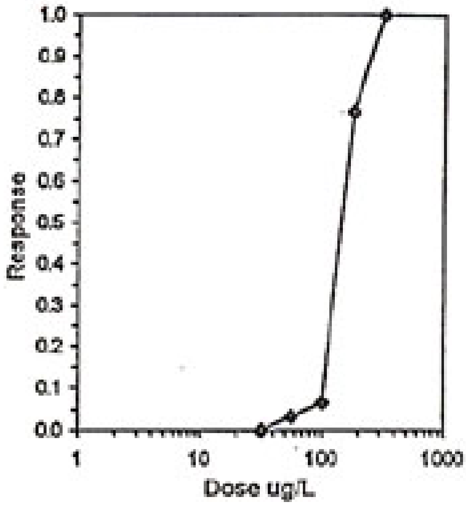
Start Date:	8/26/97	Test ID:	RTHAZN3	Sample ID:	REF-Ref Toxicant
End Date:	8/30/97	Lab ID:	EVS-Environment Consultan	Sample Type:	ZNSO-Zinc sulfate
Sample Date:		Protocol:	EPAFS 94-EPA Freshwater	Test Species:	HA-Hyalella azteca

Comments: 8/575-37.10 (wo#9700659); 8/743-03 (wo#9700669); Source: Aquatic Research Organisms(ARO)

Conc-ug/L	1	2	3
control	1.0000	1.0000	1.0000
32	1.0000	1.0000	1.0000
56	1.0000	1.0000	0.9000
100	0.9000	1.0000	0.9000
180	0.1000	0.2000	0.4000
320	0.0000	0.0000	0.0000

Trimmed Spearman-Karber

Trim Level	EC50	95% CL	
0.0%	145.02	129.80	162.02
5.0%	147.95	132.46	165.24
10.0%	146.51	131.70	162.99
20.0%	144.11	130.09	159.63
Auto-0.0%	145.02	129.80	162.02 µg/L Zn



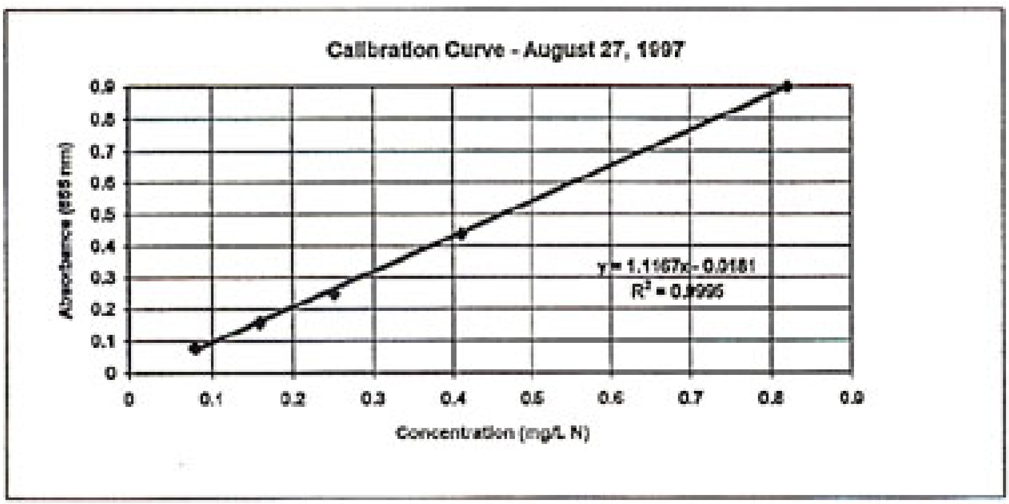
 ToxCalc v5.0 Reviewed by: [illegible] 10/3/97

Total Ammonia Measurements (reported as ammonia nitrogen, mg/L N)

Client:	NOAA		Test Type:	10-d Freshwater Sediment Toxicity Test
Project No.:	9/575-37.1		Test Species:	*Hyalella azteca*
Work Order No.:	9700650		Date Initiated:	26-Aug-97
Date Sampled:	26-Aug-97	Day 0	Date Terminated	5-Sep-97
Date Measured:	27-Aug-97			

Standard Concentrations (mg/L N)	Absorbance of standards
0.08	0.08
0.16	0.16
0.25	0.25
0.41	0.44
0.82	0.90

Sample ID Interstitial water	Absorbance of samples	Dilution factor	Ammonia concentrations (mg/L N)
Control	0.02	25.00	<0.1
SR-1-SS-B	0.22	50.00	10.7
SR-2-SS-B	0.71	25.00	16.3
SR-3-SS-B	0.23	50.00	11.1
SR-4-SS-B	0.64	50.00	29.5
SR-7-SS-F	0.15	50.00	7.5
SR-8-SS-F	0.38	50.00	17.8
SR-9-SS-F	0.28	50.00	13.3
SR-10-SS-F	0.51	50.00	23.6
SR-11-SS-F	0.45	50.00	21.0
SR-12-SS-F	0.34	50.00	16.0
SR-13-SS-F	0.55	50.00	25.4
SR-14-SS-F	0.60	50.00	27.7
SR-15-SS-F	0.62	50.00	28.6
SR-15-SS-F rep	0.62	50.00	28.6
SR-16-SS-F	0.43	50.00	20.1
SR-17-SS-F	0.30	50.00	14.2
SR-18-SS-F	0.75	25.00	17.2
SR-18-SS-F rep	0.77	50.00	35.3
SR-19-SS-F	0.45	50.00	21.0
SR-20-SS-F	0.81	25.00	18.5



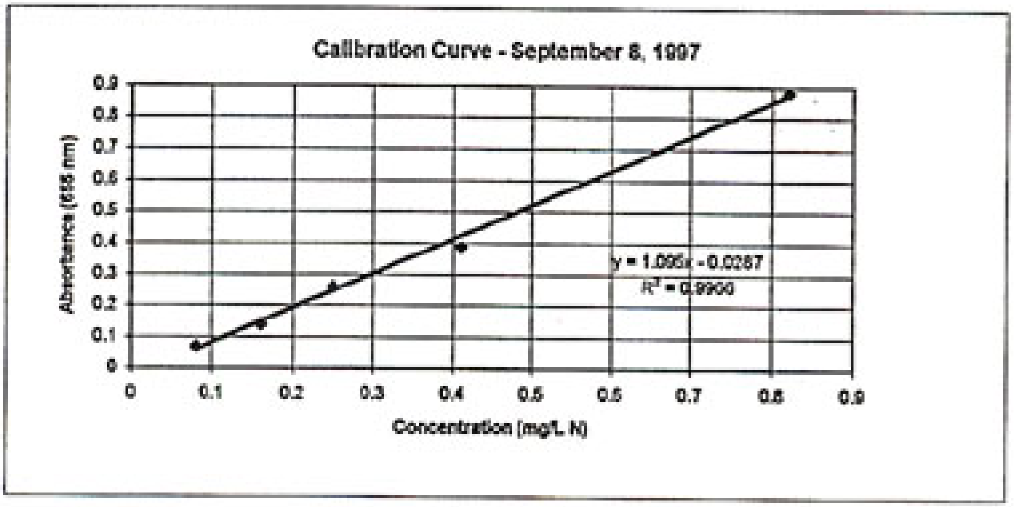
Oct 7/97

Total Ammonia Measurements (reported as ammonia nitrogen, mg/L N)

Client:	NOAA	Test Type:	10-d Freshwater Sediment Toxicity Test
Project No.:	9/575-37.1	Test Species:	*Hyalella azteca*
Work Order No.:	9700659	Date Initiated:	26-Aug-97
Date Sampled:	5-Sep-97	Day 10 Date Terminated	5-Sep-97
Date Measured:	8-Sep-97		

Standard Concentrations (mg/L N)	Absorbance of standards
0.08	0.07
0.16	0.14
0.25	0.26
0.41	0.39
0.82	0.86

Sample ID Interstitial water	Absorbance of samples	Dilution factor	Ammonia concentrations (mg/L N)
Control	0.10	12.50	1.5
SR-1-SS-B	0.15	50.00	8.2
SR-2-SS-B	0.21	50.00	10.9
SR-3-SS-B	0.20	50.00	10.4
SR-4-SS-B	0.16	100.00	17.2
SR-7-SS-F	0.08	50.00	5.0
SR-7-SS-F rep	0.08	50.00	5.0
SR-8-SS-F	0.20	50.00	10.4
SR-9-SS-F	0.10	50.00	5.9
SR-10-SS-F	0.18	100.00	19.1
SR-11-SS-F	0.14	100.00	15.4
SR-12-SS-F	0.20	50.00	10.4
SR-13-SS-F	0.15	100.00	16.3
SR-14-SS-F	0.13	100.00	14.5
SR-15-SS-F	0.19	100.00	20.0
SR-16-SS-F	0.14	100.00	15.4
SR-17-SS-F	0.17	50.00	9.1
SR-18-SS-F	0.20	50.00	10.4
SR-19-SS-F	0.14	100.00	15.4
SR-20-SS-F	0.30	50.00	15.0
SR-20-SS-F rep	0.28	50.00	14.1



Cdd 9/97

Total Sulfide Measurements (reported as mg/L S)

Combination Silver/Sulfide Method

Client: NOAA
Project No.: 9/575-37.10
Work Order No.: 9700659
Notes: Days 0&10
Please note sulfides preserved on sampling date.

Test Type: 10-d Sediment Toxicity Test
Test Species: H.azteca
Date Initiated: 26-Aug-97
Date Terminated: 05-Sep-97

Sample ID	Date Sampled	Date Measured	Sulfide(mg/L)	Comments
SR-1-SS-B	26-Aug-97	23-Sep-97	0.000	Day 0
SR-2-SS-B	26-Aug-97	23-Sep-97	0.000	Day 0
SR-3-SS-B	26-Aug-97	23-Sep-97	0.000	Day 0
SR-4-SS-B	26-Aug-97	23-Sep-97	0.000	Day 0
SR-7-SS-F	26-Aug-97	22-Sep-97	0.000	Day 0
SR-8-SS-F	26-Aug-97	22-Sep-97	0.015	Day 0
SR-9-SS-F	26-Aug-97	23-Sep-97	0.000	Day 0
SR-10-SS-F	26-Aug-97	23-Sep-97	0.000	Day 0
SR-11-SS-F	26-Aug-97	22-Sep-97	0.015	Day 0
SR-12-SS-F	26-Aug-97	23-Sep-97	0.000	Day 0
SR-13-SS-F	26-Aug-97	23-Sep-97	0.000	Day 0
SR-14-SS-F	26-Aug-97	23-Sep-97	0.000	Day 0
SR-15-SS-F	26-Aug-97	23-Sep-97	0.000	Day 0
SR-16-SS-F	26-Aug-97	23-Sep-97	0.000	Day 0
SR-17-SS-F	26-Aug-97	23-Sep-97	0.000	Day 0
SR-18-SS-F	26-Aug-97	23-Sep-97	0.000	Day 0
SR-19-SS-F	26-Aug-97	23-Sep-97	0.000	Day 0
SR-20-SS-F	26-Aug-97	23-Sep-97	0.000	Day 0
SR-1-SS-B	05-Sep-97	23-Sep-97	0.000	Day 10
SR-2-SS-B	05-Sep-97	23-Sep-97	0.000	Day 10
SR-3-SS-B	05-Sep-97	23-Sep-97	0.000	Day 10
SR-4-SS-B	05-Sep-97	23-Sep-97	0.000	Day 10
SR-7-SS-F	05-Sep-97	23-Sep-97	0.000	Day 10
SR-8-SS-F	05-Sep-97	23-Sep-97	0.000	Day 10
SR-9-SS-F	05-Sep-97	23-Sep-97	0.000	Day 10
SR-10-SS-F	05-Sep-97	23-Sep-97	0.000	Day 10
SR-11-SS-F	05-Sep-97	23-Sep-97	0.001	Day 10
SR-12-SS-F	05-Sep-97	23-Sep-97	0.000	Day 10
SR-13-SS-F	05-Sep-97	23-Sep-97	0.000	Day 10
SR-14-SS-F	05-Sep-97	23-Sep-97	0.000	Day 10
SR-15-SS-F	05-Sep-97	23-Sep-97	0.000	Day 10
SR-16-SS-F	05-Sep-97	23-Sep-97	0.000	Day 10
SR-17-SS-F	05-Sep-97	23-Sep-97	0.000	Day 10
SR-18-SS-F	05-Sep-97	23-Sep-97	0.000	Day 10
SR-19-SS-F	05-Sep-97	23-Sep-97	0.000	Day 10
SR-20-SS-F	05-Sep-97	23-Sep-97	0.000	Day 10

Oct 10/97

EVS CONSULTANTS

Alkalinity/Hardness Measurements

Client	NOAA	Test Type	10-d Sediment Toxicity Test
EVS Project No	9/575-37.10	Test Species	*H.azteca*
EVS Work Order No.	9700659	Test Initiation Date	August 26, 1997
		Test Termination Date	September 5, 1997

Sample ID	Subsample Date	Alkalinity Measurement					Hardness Measurement			
		Subsample Volume (mL)	Initial H_2SO_4 Volume (mL)	Volume to pH 4.5 (mL)	Total Volume to pH 4.2 (mL)	Alkalinity (mg/L as $CaCO_3$)	Subsample Volume (mL)	Initial EDTA Volume (mL)	Final EDTA Volume (mL)	Hardness (mg/L as $CaCO_3$)
SR-1-SS-~~F~~ B	Aug. 26/97	50	0	4.8	4.9	94	50	0	6.2	124
SR-2-SS-~~F~~ B	Aug. 26/97	50	0	5.6	5.7	110	50	0	6.5	130
SR-3-SS-~~F~~ B	Aug. 26/97	50	0	5.0	5.1	98	50	0	6.0	120
SR-4-SS-~~F~~ B	Aug. 26/97	50	0	5.5	5.6	108	50	0	6.5	130
SR-7-SS-F	Aug. 26/97	50	0	3.9	4.0	76	50	0	5.5	110
SR-8-SS-F	Aug. 26/97	50	0	5.0	5.1	98	50	0	6.5	130
SR-9-SS-F	Aug. 26/97	50	0	4.6	4.7	90	50	0	5.9	118
SR-10-SS-F	Aug. 26/97	50	0	5.7	5.8	112	50	0	6.8	136
SR-11-SS-F	Aug. 26/97	50	0	4.9	5.0	96	50	0	6.5	130
SR-12-SS-F	Aug. 26/97	50	0	4.7	4.8	92	50	0	5.9	118
SR-13-SS-F	Aug. 26/97	50	0	5.2	5.3	102	50	0	6.3	126
SR-14-SS-F	Aug. 26/97	50	0	5.2	5.3	102	50	0	6.3	126
SR-15-SS-F	Aug. 26/97	50	0	5.2	5.3	102	50	0	6.2	124
SR-16-SS-F	Aug. 26/97	50	0	4.9	5.0	96	50	0	6.1	122
SR-17-SS-F	Aug. 26/97	50	0	4.7	4.8	92	50	0	5.9	118
SR-18-SS-F	Aug. 26/97	50	0	5.2	5.3	102	50	0	6.2	124
SR-19-SS-F	Aug. 26/97	50	0	5.1	5.2	100	50	0	6.2	124
SR-20-SS-F	Aug. 26/97	50	0	5.1	5.2	100	50	0	6.0	120
CONTROL	Aug. 26/97	50	0	3.3	3.4	64	50	0	4.7	94

CGM Oct 8/97

APPENDIX D

Benthic Community Data

EVS CONSULTANTS

Environmental Services

20% SORTING QA/QC LOG

EVS PROJECT #: 2/575-37.11
PROJECT NAME: SHEBOYGAN RIVER

	Sample I.D.	#QA Organisms	Total Abund.	% Sorting Efficiency	P / F	Comments
1	SR-1-BC-B-1	0	189	100.0	P	0 QA/QC ORGANISMS
2	SR-1-BC-B-2	0	151	100.0	P	0 QA/QC ORGANISMS
3	SR-1-BC-B-3	0	338	100.0	P	0 QA/QC ORGANISMS
4	SR-1-BC-B-4	0	241	100.0	P	0 QA/QC ORGANISMS
5	SR-1-BC-B-5	0	132	100.0	P	0 QA/QC ORGANISMS
6	SR-2-BC-B-1	0	58	100.0	P	0 QA/QC ORGANISMS
7	SR-2-BC-B-2	0	75	100.0	P	0 QA/QC ORGANISMS
8	SR-2-BC-B-3	0	171	100.0	P	0 QA/QC ORGANISMS
9	SR-2-BC-B-4	0	87	100.0	P	0 QA/QC ORGANISMS
10	SR-2-BC-B-5	0	209	100.0	P	0 QA/QC ORGANISMS
11	SR-3-BC-B-1	1	221	97.7	P	Oligs. found In QA/QC
12	SR-3-BC-B-2	0	28	100.0	P	0 QA/QC ORGANISMS
13	SR-3-BC-B-3	1	289	98.3	P	Oligs. found In QA/QC
14	SR-3-BC-B-4	1	327	98.5	P	Oligs. found In QA/QC
15	SR-3-BC-B-5	2	219	95.4	P	Oligs. found In QA/QC
16	SR-4-BC-B-1	0	102	100.0	P	0 QA/QC ORGANISMS
17	SR-4-BC-B-2	1	107	95.3	P	Oligs. found In QA/QC
18	SR-4-BC-B-3	0	102	100.0	P	0 QA/QC ORGANISMS
19	SR-4-BC-B-4	0	100	100.0	P	0 QA/QC ORGANISMS
20	SR-4-BC-B-5	1	135	96.3	P	Oligs. found In QA/QC
21	SR-7-BC-F-1	0	82	100.0	P	0 QA/QC ORGANISMS
22	SR-7-BC-F-2	0	49	100.0	P	0 QA/QC ORGANISMS
23	SR-7-BC-F-3	0	30	100.0	P	0 QA/QC ORGANISMS
24	SR-7-BC-F-4	0	22	100.0	P	0 QA/QC ORGANISMS
25	SR-7-BC-F-5	0	5	100.0	P	0 QA/QC ORGANISMS
26	SR-8-BC-F-1	1	589	99.2	P	Oligs. found In QA/QC
27	SR-8-BC-F-2	5	617	96.0	P	Oligs. found In QA/QC
28	SR-8-BC-F-3	2	249	96.0	P	Oligs. found In QA/QC
29	SR-8-BC-F-4	3	419	96.4	P	Oligs. found In QA/QC
30	SR-8-BC-F-5	5	555	95.5	P	Oligs. found In QA/QC
31	SR-9-BC-F-1	2	374	97.3	P	Oligs. found In QA/QC
32	SR-9-BC-F-2	2	354	97.2	P	Oligs. found In QA/QC
33	SR-9-BC-F-3	2	367	97.3	P	Oligs. found In QA/QC

P/F = Pass/Fail

EVS CONSULTANTS **20% SORTING QA/QC LOG**

Environmental Services

EVS PROJECT #: 2/575-37.11
PROJECT NAME: SHEBOYGAN RIVER

	Sample I.D.	#QA Organisms	Total Abund.	% Sorting Efficiency	P / F	Comments
34	SR-9-BC-F-4	2	541	98.2	P	Oligs. found In QA/QC
35	SR-9-BC-F-5	3	520	97.1	P	Oligs. found In QA/QC
36	SR-10-BC-F-1	0	432	100.0	P	0 QA/QC ORGANISMS
37	SR-10-BC-F-2	0	214	100.0	P	0 QA/QC ORGANISMS
38	SR-10-BC-F-3	0	302	100.0	P	0 QA/QC ORGANISMS
39	SR-10-BC-F-4	0	292	100.0	P	0 QA/QC ORGANISMS
40	SR-10-BC-F-5	0	254	100.0	P	0 QA/QC ORGANISMS
41	SR-11-BC-F-1	2	378	97.4	P	Oligs. found In QA/QC
42	SR-11-BC-F-2	1	259	98.1	P	Oligs. found In QA/QC
43	SR-11-BC-F-3	0	183	100.0	P	0 QA/QC ORGANISMS
44	SR-11-BC-F-4	1	329	98.5	P	Oligs. found In QA/QC
45	SR-11-BC-F-5	2	342	97.1	P	Oligs. found In QA/QC
46	SR-12-BC-F-1	0	371	100.0	P	0 QA/QC ORGANISMS
47	SR-12-BC-F-2	1	385	98.7	P	Oligs. found In QA/QC
48	SR-12-BC-F-3	1	381	98.7	P	Oligs. found In QA/QC
49	SR-12-BC-F-4	2	461	97.8	P	Oligs. found In QA/QC
50	SR-12-BC-F-5	0	356	100.0	P	0 QA/QC ORGANISMS
51	SR-13-BC-F-1	1	1714	99.7	P	Oligs. found In QA/QC
52	SR-13-BC-F-2	0	1446	100.0	P	0 QA/QC ORGANISMS
53	SR-13-BC-F-3	0	946	100.0	P	0 QA/QC ORGANISMS
54	SR-13-BC-F-4	1	648	99.2	P	Oligs. found In QA/QC
55	SR-13-BC-F-5	1	688	99.3	P	Oligs. found In QA/QC
56	SR-14-BC-F-1	3	421	96.4	P	Oligs. found In QA/QC
57	SR-14-BC-F-2	1	342	98.5	P	Oligs. found In QA/QC
58	SR-14-BC-F-3	0	259	100.0	P	0 QA/QC ORGANISMS
59	SR-14-BC-F-4	4	518	96.1	P	Oligs. found In QA/QC
60	SR-14-BC-F-5	1	330	98.5	P	Oligs. found In QA/QC
61	SR-15-BC-F-1	2	284	96.5	P	Oligs. found In QA/QC
62	SR-15-BC-F-2	0	351	100.0	P	0 QA/QC ORGANISMS
63	SR-15-BC-F-3	3	515	97.1	P	Oligs. found In QA/QC
64	SR-15-BC-F-4	4	494	96.0	P	Oligs. found In QA/QC
65	SR-15-BC-F-5	4	495	96.0	P	Oligs. found In QA/QC
66	SR-16-BC-F-1	1	344	98.5	P	Oligs. found In QA/QC

P/F = Pass/Fail

EVS CONSULTANTS **20% SORTING QA/QC LOG**

Environmental Services

EVS PROJECT #: 2/575-37.11
PROJECT NAME: SHEBOYGAN RIVER

	Sample I.D.	#QA Organisms	Total Abund.	% Sorting Efficiency	P / F	Comments
67	SR-16-BC-F-2	1	363	98.6	P	Oligs. found In QA/QC
68	SR-16-BC-F-3	2	214	95.3	P	Oligs. found In QA/QC
69	SR-16-BC-F-4	0	313	100.0	P	0 QA/QC ORGANISMS
70	SR-16-BC-F-5	1	290	98.3	P	Oligs. found In QA/QC
71	SR-17-BC-F-1	3	339	95.6	P	Oligs. found In QA/QC
72	SR-17-BC-F-2	0	224	100.0	P	0 QA/QC ORGANISMS
73	SR-17-BC-F-3	3	482	96.9	P	Oligs. found In QA/QC
74	SR-17-BC-F-4	2	368	97.3	P	Oligs. found In QA/QC
75	SR-17-BC-F-5	1	302	98.3	P	Oligs. found In QA/QC
76	SR-18-BC-F-1	0	409	100.0	P	0 QA/QC ORGANISMS
77	SR-18-BC-F-2	0	326	100.0	P	0 QA/QC ORGANISMS
78	SR-18-BC-F-3	1	298	98.3	P	Oligs. found In QA/QC
79	SR-18-BC-F-4	2	327	96.9	P	Oligs. found In QA/QC
80	SR-18-BC-F-5	2	441	97.7	P	Oligs. found In QA/QC
81	SR-19-BC-F-1	2	318	96.9	P	Oligs. found In QA/QC
82	SR-19-BC-F-2	0	335	100.0	P	0 QA/QC ORGANISMS
83	SR-19-BC-F-3	2	324	96.9	P	Oligs. found In QA/QC
84	SR-19-BC-F-4	0	171	100.0	P	0 QA/QC ORGANISMS
85	SR-19-BC-F-5	2	739	98.6	P	Oligs. found In QA/QC
86	SR-20-BC-F-1	0	588	100.0	P	0 QA/QC ORGANISMS
87	SR-20-BC-F-2	2	578	98.3	P	Oligs. found In QA/QC
88	SR-20-BC-F-3	0	680	100.0	P	0 QA/QC ORGANISMS
89	SR-20-BC-F-4	0	405	100.0	P	0 QA/QC ORGANISMS
90	SR-20-BC-F-5	3	520	97.1	P	Oligs. found In QA/QC

P/F = Pass/Fail

Benthic taxonomic results for the 1997 Sheboygan ERA

	T01-1	T01-2	T01-3	T01-4	T01-5	T02-1	T02-2	T02-3	T02-4	T02-5	T03-1	T03-2
Ablabesmyia sp.	0	0	0	0	0	0	0	0	0	0	0	0
Baetidae	0	0	0	0	0	1	0	0	0	0	0	0
Baetis sp.	0	1	0	0	0	0	0	0	0	0	0	0
Baetis tricaudatus	0	0	3	1	0	0	0	0	0	0	0	0
Caecidotea sp.	0	0	0	0	0	0	0	0	0	0	0	0
Caenis sp.	1	0	0	0	0	0	0	0	0	0	0	0
Ceratopogoninae sp.	0	0	0	0	1	0	0	0	0	0	0	0
Chironomini	0	0	0	0	0	0	0	0	0	0	0	0
Chironomus sp.	1	0	1	0	0	0	0	0	0	0	10	2
Chloroperlidae	0	0	0	0	0	0	0	0	0	0	0	0
Cladopelma sp.	0	0	0	0	0	0	0	0	0	0	0	0
Clinotanypus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Coenagrionidae	0	0	0	0	0	0	0	0	0	0	0	0
Cricotopus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Cryptochironomus sp.	0	0	1	1	0	0	0	0	0	0	0	1
Cryptotendipes sp.	0	0	0	0	0	0	0	0	0	0	0	0
Dicrotendipes sp.	0	0	0	0	0	0	0	0	0	0	0	0
Dineutus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Dubiraphia sp.	16	25	64	43	23	0	1	5	0	1	26	2
Endochironomus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Ephemeroptera	0	0	0	0	0	0	0	0	0	0	0	0
Erioptera sp.	1	0	0	0	0	0	0	0	0	0	0	0
Eukiefferiella sp.	0	0	0	0	0	1	0	0	0	0	0	0
Gammarus sp.	0	2	0	0	0	0	0	0	0	0	0	0
Glossosomatidae	0	1	0	0	0	0	0	0	0	0	0	0
Glutops sp.	0	0	0	0	0	0	0	0	0	0	0	0
Glyptotendipes sp.	0	0	0	0	0	0	0	0	0	0	0	0
Harnischia sp.	0	0	0	0	0	0	0	0	0	0	0	0
Helobdella stagnalis	0	0	0	0	0	0	0	0	0	0	0	0
Heptageniidae	0	0	0	0	0	0	0	0	0	0	0	0
Hexagenia sp.	1	0	0	0	0	0	0	0	0	0	0	0
Hirudinea	0	0	0	0	0	0	0	0	0	0	0	0
Hyalella azteca	6	0	0	0	0	0	0	0	0	0	0	0
Hydropsyche sp.	0	0	0	0	0	0	0	0	0	0	0	0
Microchironomus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Microcylloepus sp.	1	0	1	1	0	0	0	0	0	0	0	0
Micropsectra sp.	0	0	0	0	0	0	0	0	0	0	0	0
Microtendipes sp.	0	0	0	0	0	0	0	0	0	0	0	0
Oecetis sp.	0	0	0	0	0	0	0	0	0	0	0	0
Ordobrevia sp.	0	0	0	1	0	0	0	0	0	0	0	0
Paralauterborniella sp.	0	0	0	0	0	0	0	0	0	0	0	0
Paramerina sp.	0	0	0	0	0	0	0	0	0	0	0	0
Paratanytarsus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Paratendipes sp.	0	1	0	0	0	0	0	0	0	0	0	0
Pentaneurini	0	0	0	0	0	0	0	0	0	0	1	0
Polypedilum sp.	0	2	3	1	0	0	0	0	0	0	5	1
Procladiini	0	0	0	0	0	0	0	0	0	0	0	0
Procladius sp.	2	1	1	2	0	0	0	0	0	0	1	0
Rheotanytarsus sp.	0	1	1	0	0	0	0	0	0	0	0	0
Sialis sp.	0	0	0	0	0	0	0	0	0	0	0	0
Sphaeriidae	0	1	0	0	0	0	0	0	0	0	0	0
Stenochironomus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Stictochironomus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Tabanidae	0	0	0	0	0	0	0	0	0	0	0	0
Tanypus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Tanytarsini	0	0	0	0	0	0	0	0	0	0	0	0
Tanytarsus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Thienemannimyia gr. sp.	0	0	1	0	0	0	0	0	0	0	0	0
Tricorythodes sp.	0	0	0	0	0	0	0	0	0	0	0	0
Tubificidae	160	116	262	191	108	56	74	166	87	208	178	22
Turbellaria	0	0	0	0	0	0	0	0	0	0	0	0
Total	**189**	**151**	**338**	**241**	**132**	**58**	**75**	**171**	**87**	**209**	**221**	**28**
*see Note at end of table												

Benthic taxonomic results for the 1997 Sheboygan ERA

	T03-3	T03-4	T03-5	T04-1	T04-2	T04-3	T04-4	T04-5	T07-1	T07-2	T07-3	T07-4
Ablabesmyia sp.	0	0	0	0	0	0	0	0	1	1	0	0
Baetidae	0	0	0	0	0	0	0	0	0	0	0	0
Baetis sp.	0	0	0	0	0	0	0	0	0	0	0	0
Baetis tricaudatus	1	0	0	0	0	0	0	0	0	0	0	0
Caecidotea sp.	0	0	0	0	0	0	0	0	0	1	0	0
Caenis sp.	0	0	1	0	0	0	0	0	0	0	0	0
Ceratopogoninae sp.	0	0	1	0	0	0	0	0	0	0	0	0
Chironomini	1	0	0	0	0	0	0	0	0	0	0	0
Chironomus sp.	16	19	9	1	0	0	0	0	5	3	4	5
Chloroperlidae	1	0	0	0	0	0	0	0	0	0	0	0
Cladopelma sp.	0	0	0	0	0	0	0	0	0	0	0	0
Clinotanypus sp.	0	0	0	5	0	0	0	0	0	0	0	0
Coenagrionidae	0	0	0	0	0	0	0	0	1	0	0	0
Cricotopus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Cryptochironomus sp.	2	2	0	0	0	0	2	3	0	2	2	0
Cryptotendipes sp.	0	0	0	0	0	0	0	0	0	0	0	0
Dicrotendipes sp.	0	0	0	0	0	0	0	0	9	3	0	1
Dineutus sp.	0	0	0	0	0	0	0	0	1	0	0	0
Dubiraphia sp.	17	23	12	2	1	0	0	0	3	6	2	1
Endochironomus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Ephemeroptera	0	0	0	0	0	0	0	0	0	0	0	0
Erioptera sp.	0	0	0	0	0	0	0	0	0	0	0	0
Eukiefferiella sp.	0	0	0	0	0	0	0	0	0	0	0	0
Gammarus sp.	0	0	0	1	0	0	0	0	0	0	0	0
Glossosomatidae	0	0	0	0	0	0	0	0	0	0	0	0
Glutops sp.	0	0	0	0	0	0	0	0	0	0	0	0
Glyptotendipes sp.	0	0	0	0	0	0	0	0	35	4	1	0
Harnischia sp.	0	0	0	0	0	0	0	0	0	0	0	0
Helobdella stagnalis	0	0	0	0	0	0	0	0	0	0	0	0
Heptageniidae	0	0	0	0	0	0	0	0	1	0	0	0
Hexagenia sp.	0	0	0	0	0	0	1	0	0	1	1	0
Hirudinea	0	0	0	0	0	0	0	0	0	0	0	0
Hyalella azteca	0	0	0	0	0	0	0	0	0	0	0	0
Hydropsyche sp.	0	0	0	0	0	0	0	0	0	0	0	0
Microchironomus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Microcylloepus sp.	0	3	1	0	0	0	0	0	1	0	0	0
Micropsectra sp.	0	0	0	0	0	0	0	0	0	0	0	0
Microtendipes sp.	1	1	0	0	0	0	0	0	0	0	0	0
Oecetis sp.	0	0	0	0	0	0	0	0	0	0	0	0
Ordobrevia sp.	0	0	0	1	0	0	0	0	0	0	0	0
Paralauterborniella sp.	0	0	0	0	0	0	0	0	0	0	0	0
Paramerina sp.	0	0	0	0	0	0	0	0	0	0	0	0
Paratanytarsus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Paratendipes sp.	0	0	0	0	0	0	0	0	0	0	0	0
Pentaneurini	1	0	1	0	0	0	0	0	0	0	1	0
Polypedilum sp.	12	11	8	0	0	0	0	0	3	2	1	2
Procladiini	0	0	0	0	0	0	0	0	0	0	0	0
Procladius sp.	1	0	4	1	3	1	9	1	15	5	5	4
Rheotanytarsus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Sialis sp.	0	0	0	0	0	0	0	0	0	0	0	0
Sphaeriidae	0	0	0	0	0	0	0	0	0	0	0	0
Stenochironomus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Stictochironomus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Tabanidae	0	0	0	0	0	0	0	0	3	1	1	0
Tanypus sp.	0	0	0	5	3	0	5	8	0	0	0	0
Tanytarsini	0	0	0	0	0	0	0	0	0	0	0	0
Tanytarsus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Thienemannimyia gr. sp.	0	1	0	0	0	0	0	0	0	0	0	0
Tricorythodes sp.	0	0	0	0	0	0	0	0	2	0	0	0
Tubificidae	236	267	182	86	100	101	83	123	2	20	12	9
Turbellaria	0	0	0	0	0	0	0	0	0	0	0	0
Total	**289**	**327**	**219**	**102**	**107**	**102**	**100**	**135**	**82**	**49**	**30**	**22**
*see Note at end of table												

Benthic taxonomic results for the 1997 Sheboygan ERA

	T07-5	T08-1	T08-2	T08-3	T08-4	T08-5	T09-1	T09-2	T09-3	T09-4	T09-5	T10-1
Ablabesmyia sp.	0	0	11	8	5	1	0	0	0	0	0	0
Baetidae	0	0	0	0	0	0	0	0	0	0	0	0
Baetis sp.	0	0	0	0	0	0	0	0	0	0	0	0
Baetis tricaudatus	0	0	0	0	0	0	0	0	0	0	0	0
Caecidotea sp.	0	0	3	1	1	1	0	0	1	0	0	0
Caenis sp.	0	1	1	0	0	0	0	0	1	0	0	0
Ceratopogoninae sp.	0	0	0	0	0	0	2	0	2	2	0	1
Chironomini	0	0	0	0	0	0	2	0	0	1	2	0
Chironomus sp.	0	2	3	2	1	1	1	0	0	0	1	0
Chloroperlidae	0	0	0	0	0	0	0	0	0	0	0	0
Cladopelma sp.	0	0	0	0	0	0	0	0	0	0	0	0
Clinotanypus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Coenagrionidae	0	0	0	0	0	0	0	0	0	0	0	0
Cricotopus sp.	0	0	0	0	0	0	0	0	0	1	1	0
Cryptochironomus sp.	0	2	11	1	1	3	1	0	2	0	2	4
Cryptotendipes sp.	0	0	0	0	0	0	0	0	0	5	0	0
Dicrotendipes sp.	0	4	5	4	3	0	1	0	0	0	0	0
Dineutus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Dubiraphia sp.	0	12	24	2	10	17	4	10	13	11	12	2
Endochironomus sp.	0	0	1	0	0	0	0	0	0	0	0	0
Ephemeroptera	0	2	0	0	0	0	0	0	0	0	0	0
Erioptera sp.	0	0	0	0	0	0	0	0	0	0	0	0
Eukiefferiella sp.	0	0	0	0	0	0	0	0	0	0	0	0
Gammarus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Glossosomatidae	0	0	0	0	0	0	0	0	0	0	0	0
Glutops sp.	0	0	0	0	0	0	0	0	0	0	0	0
Glyptotendipes sp.	0	2	3	3	2	0	0	3	7	8	7	1
Harnischia sp.	0	3	1	0	2	4	17	15	12	15	18	0
Helobdella stagnalis	0	0	0	0	0	1	0	0	0	0	0	0
Heptageniidae	0	0	2	0	0	0	0	0	0	0	0	0
Hexagenia sp.	1	3	2	0	0	0	0	0	0	0	0	0
Hirudinea	0	0	0	0	0	0	0	0	0	0	0	0
Hyalella azteca	0	0	0	0	0	0	0	0	0	0	0	0
Hydropsyche sp.	0	1	0	0	1	0	0	0	0	0	0	0
Microchironomus sp.	0	0	0	0	0	0	0	0	0	0	0	3
Microcylloepus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Micropsectra sp.	0	0	0	0	0	0	0	0	0	0	0	0
Microtendipes sp.	0	0	1	0	0	0	0	0	0	0	0	0
Oecetis sp.	0	0	0	0	0	0	0	0	0	0	0	0
Ordobrevia sp.	0	0	0	0	0	0	0	0	0	1	0	0
Paralauterborniella sp.	0	0	0	0	1	0	0	0	0	0	0	0
Paramerina sp.	0	0	0	1	0	0	1	1	0	0	0	0
Paratanytarsus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Paratendipes sp.	0	0	0	0	0	0	0	0	0	0	0	0
Pentaneurini	0	3	3	0	2	1	0	0	5	1	1	0
Polypedilum sp.	0	4	0	0	1	3	11	9	4	10	12	1
Procladiini	0	0	0	0	0	0	0	0	0	0	2	0
Procladius sp.	0	1	0	0	0	0	22	33	51	31	30	67
Rheotanytarsus sp.	0	0	0	1	1	1	0	0	0	0	0	0
Sialis sp.	0	1	0	0	0	0	0	0	0	0	0	0
Sphaeriidae	1	3	4	1	0	2	0	0	1	1	0	0
Stenochironomus sp.	0	0	1	0	0	0	0	0	0	0	1	0
Stictochironomus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Tabanidae	0	3	4	2	0	1	0	0	5	0	1	0
Tanypus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Tanytarsini	0	0	0	0	1	0	0	0	0	0	0	0
Tanytarsus sp.	0	0	0	0	0	0	2	0	0	0	0	1
Thienemannimyia gr. sp.	0	0	0	0	0	0	0	0	0	0	0	0
Tricorythodes sp.	0	2	2	1	2	0	0	0	0	0	0	0
Tubificidae	3	540	535	222	385	519	310	283	262	454	430	352
Turbellaria	0	0	0	0	0	0	0	0	1	0	0	0
Total	**5**	**589**	**617**	**249**	**419**	**555**	**374**	**354**	**367**	**541**	**520**	**432**
*see Note at end of table												

Benthic taxonomic results for the 1997 Sheboygan ERA

	T10-2	T10-3	T10-4	T10-5	T11-1	T11-2	T11-3	T11-4	T11-5	T12-1	T12-2	T12-3
Ablabesmyia sp.	0	0	0	0	0	0	0	0	0	0	0	0
Baetidae	0	0	0	0	0	0	0	0	0	0	0	0
Baetis sp.	0	0	0	0	0	0	0	0	0	0	0	0
Baetis tricaudatus	0	0	0	0	0	0	0	0	0	0	0	0
Caecidotea sp.	0	0	0	0	0	0	0	0	0	0	0	0
Caenis sp.	0	0	0	0	0	0	0	0	1	0	0	0
Ceratopogoninae sp.	0	0	0	0	0	0	0	0	0	2	0	2
Chironomini	1	0	0	0	0	2	0	0	0	0	0	2
Chironomus sp.	1	1	0	0	6	7	4	12	6	14	29	31
Chloroperlidae	0	0	0	0	0	0	0	0	0	0	0	0
Cladopelma sp.	0	0	0	0	1	0	0	0	1	0	0	0
Clinotanypus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Coenagrionidae	0	0	0	0	0	0	0	0	0	0	0	0
Cricotopus sp.	0	0	0	0	1	0	0	0	0	0	0	0
Cryptochironomus sp.	7	4	3	2	1	3	0	1	3	1	2	2
Cryptotendipes sp.	0	0	0	0	0	0	0	0	0	0	0	0
Dicrotendipes sp.	0	0	0	0	0	0	0	0	1	0	0	0
Dineutus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Dubiraphia sp.	1	0	1	1	7	4	0	2	4	4	2	3
Endochironomus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Ephemeroptera	0	0	0	0	0	0	0	0	0	0	0	0
Erioptera sp.	0	0	0	0	0	0	0	0	0	0	0	0
Eukiefferiella sp.	0	0	0	0	0	0	0	0	0	0	0	0
Gammarus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Glossosomatidae	0	0	0	0	0	0	0	0	0	0	0	0
Glutops sp.	0	0	0	0	0	0	0	0	0	0	0	0
Glyptotendipes sp.	0	0	0	0	0	1	0	1	0	0	1	0
Harnischia sp.	1	1	0	0	7	0	0	3	1	4	8	11
Helobdella stagnalis	0	0	0	0	0	0	0	0	0	0	0	0
Heptageniidae	0	0	0	0	0	0	0	0	0	0	0	0
Hexagenia sp.	0	0	0	0	0	0	0	0	0	0	0	0
Hirudinea	0	0	0	0	0	0	0	0	0	0	0	0
Hyalella azteca	0	0	0	0	0	0	0	0	0	0	0	0
Hydropsyche sp.	0	0	0	0	0	0	0	0	0	0	0	0
Microchironomus sp.	1	3	3	1	3	1	0	5	7	65	4	0
Microcylloepus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Micropsectra sp.	0	0	0	0	0	0	0	0	0	0	0	0
Microtendipes sp.	0	0	1	0	0	0	0	0	0	0	0	0
Oecetis sp.	0	0	0	0	0	0	0	0	0	0	1	0
Ordobrevia sp.	0	0	0	0	0	0	0	0	0	0	0	0
Paralauterborniella sp.	0	0	0	0	0	0	0	0	0	0	0	0
Paramerina sp.	0	0	0	0	0	0	0	0	0	0	1	0
Paratanytarsus sp.	0	0	0	0	0	0	0	0	0	0	1	1
Paratendipes sp.	0	0	1	0	0	0	0	0	0	0	0	0
Pentaneurini	0	0	0	0	0	0	0	0	1	0	0	0
Polypedilum sp.	1	1	0	1	1	2	1	6	3	0	4	3
Procladiini	0	0	0	0	0	0	0	0	0	0	0	0
Procladius sp.	45	45	31	34	29	21	3	22	41	17	17	8
Rheotanytarsus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Sialis sp.	0	0	0	0	0	0	0	0	0	0	0	0
Sphaeriidae	0	0	0	0	0	0	0	0	1	0	0	0
Stenochironomus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Stictochironomus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Tabanidae	0	0	0	0	0	0	0	0	0	0	0	0
Tanypus sp.	0	0	0	0	0	2	1	0	2	0	0	0
Tanytarsini	0	0	0	0	0	0	0	0	0	0	0	0
Tanytarsus sp.	0	0	0	0	0	1	0	0	0	0	0	0
Thienemannimyia gr. sp.	0	0	0	0	0	0	0	0	0	0	0	0
Tricorythodes sp.	0	0	0	0	0	0	0	0	0	0	0	0
Tubificidae	156	247	252	215	322	215	174	277	270	264	315	318
Turbellaria	0	0	0	0	0	0	0	0	0	0	0	0
Total	**214**	**302**	**292**	**254**	**378**	**259**	**183**	**329**	**342**	**371**	**385**	**381**
*see Note at end of table												

Benthic taxonomic results for the 1997 Sheboygan ERA

	T12-4	T12-5	T13-1	T13-2	T13-3	T13-4	T13-5	T14-1	T14-2	T14-3	T14-4	T14-5
Ablabesmyia sp.	0	0	0	0	0	0	0	0	0	0	0	0
Baetidae	0	0	0	0	0	0	0	0	0	0	0	0
Baetis sp.	0	0	0	0	0	0	0	0	0	0	0	0
Baetis tricaudatus	0	0	0	0	0	0	0	0	0	0	0	0
Caecidotea sp.	0	0	0	0	0	0	0	0	0	0	0	0
Caenis sp.	0	0	0	0	0	0	0	0	0	0	0	0
Ceratopogoninae sp.	0	1	0	2	0	0	0	0	0	0	0	0
Chironomini	0	0	0	0	1	0	0	0	0	0	0	1
Chironomus sp.	23	15	26	33	15	10	16	7	6	3	16	8
Chloroperlidae	0	0	0	0	0	0	0	0	0	0	0	0
Cladopelma sp.	0	0	0	0	0	0	0	0	0	0	0	0
Clinotanypus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Coenagrionidae	0	0	0	0	0	0	0	0	0	0	0	0
Cricotopus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Cryptochironomus sp.	3	4	0	0	0	0	0	0	1	0	0	0
Cryptotendipes sp.	0	0	0	0	0	0	0	0	0	0	0	0
Dicrotendipes sp.	0	0	0	0	0	0	0	0	0	0	0	0
Dineutus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Dubiraphia sp.	2	2	0	0	0	0	0	1	0	0	1	1
Endochironomus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Ephemeroptera	0	0	0	0	0	0	0	0	0	0	0	0
Erioptera sp.	0	0	0	0	0	0	0	0	0	0	0	0
Eukiefferiella sp.	0	0	0	0	0	0	0	0	0	0	0	0
Gammarus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Glossosomatidae	0	0	0	0	0	0	0	0	0	0	0	0
Glutops sp.	0	0	0	0	0	0	0	0	0	0	1	0
Glyptotendipes sp.	1	0	0	0	0	0	0	0	0	0	0	0
Harnischia sp.	5	4	0	0	0	0	0	0	0	0	0	0
Helobdella stagnalis	0	0	0	0	0	0	0	0	0	0	0	0
Heptageniidae	0	0	0	0	0	0	0	0	0	0	0	0
Hexagenia sp.	0	0	2	0	0	0	0	0	0	0	0	0
Hirudinea	0	0	0	0	0	0	1	0	0	0	1	0
Hyalella azteca	0	0	0	0	0	0	0	0	0	0	0	0
Hydropsyche sp.	0	0	0	0	0	0	0	0	0	0	0	0
Microchironomus sp.	0	1	0	0	0	0	0	0	0	1	0	0
Microcylloepus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Micropsectra sp.	0	0	0	0	0	0	0	0	0	0	0	0
Microtendipes sp.	0	0	0	0	0	0	0	0	0	0	0	0
Oecetis sp.	1	0	0	0	0	0	0	0	0	0	0	0
Ordobrevia sp.	0	0	0	0	0	0	0	0	0	0	0	0
Paralauterborniella sp.	0	0	0	0	0	0	0	0	0	0	0	0
Paramerina sp.	0	0	0	0	0	0	0	0	0	0	0	0
Paratanytarsus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Paratendipes sp.	0	0	0	0	0	0	0	0	0	0	0	0
Pentaneurini	0	0	0	0	0	0	0	0	0	0	0	1
Polypedilum sp.	0	4	0	0	0	0	0	0	1	0	0	0
Procladiini	0	0	0	0	0	0	0	0	0	0	0	0
Procladius sp.	13	5	4	17	12	5	5	4	3	2	4	2
Rheotanytarsus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Sialis sp.	0	0	0	0	0	0	0	0	0	0	0	0
Sphaeriidae	1	0	0	0	0	0	0	0	0	0	0	0
Stenochironomus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Stictochironomus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Tabanidae	0	0	0	0	0	0	0	0	0	0	0	0
Tanypus sp.	0	0	0	0	0	0	0	1	0	0	0	0
Tanytarsini	0	0	0	0	0	0	0	0	0	0	0	0
Tanytarsus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Thienemannimyia gr. sp.	0	0	0	0	0	0	0	0	0	0	0	0
Tricorythodes sp.	0	0	0	0	0	0	0	0	0	0	0	0
Tubificidae	412	320	1682	1394	918	633	666	408	331	253	495	317
Turbellaria	0	0	0	0	0	0	0	0	0	0	0	0
Total	**461**	**356**	**1714**	**1446**	**946**	**648**	**688**	**421**	**342**	**259**	**518**	**330**
*see Note at end of table												

Benthic taxonomic results for the 1997 Sheboygan ERA

	T15-1	T15-2	T15-3	T15-4	T15-5	T16-1	T16-2	T16-3	T16-4	T16-5	T17-1	T17-2
Ablabesmyia sp.	0	0	0	0	0	0	0	0	0	0	0	0
Baetidae	0	0	0	0	0	0	0	0	0	0	0	0
Baetis sp.	0	0	0	0	0	0	0	0	0	0	0	0
Baetis tricaudatus	0	0	0	0	0	0	0	0	0	0	0	0
Caecidotea sp.	0	0	0	0	0	0	0	0	0	0	0	0
Caenis sp.	0	0	0	0	0	0	0	0	0	0	0	0
Ceratopogoninae sp.	0	0	1	1	0	0	0	0	0	0	0	0
Chironomini	0	0	1	0	0	0	0	0	1	0	0	0
Chironomus sp.	1	7	5	8	4	20	12	17	29	16	8	3
Chloroperlidae	0	0	0	0	0	0	0	0	0	0	0	0
Cladopelma sp.	0	0	0	0	0	0	0	0	0	0	0	0
Clinotanypus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Coenagrionidae	0	0	0	0	0	0	0	0	0	0	0	0
Cricotopus sp.	0	0	0	0	0	1	0	0	0	0	0	0
Cryptochironomus sp.	0	0	0	0	0	0	0	1	0	0	0	0
Cryptotendipes sp.	0	0	0	0	0	0	0	0	0	0	0	0
Dicrotendipes sp.	0	0	0	0	0	0	0	0	0	0	0	0
Dineutus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Dubiraphia sp.	1	1	1	0	0	1	0	0	0	0	1	0
Endochironomus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Ephemeroptera	0	0	0	0	0	0	0	0	0	0	0	0
Erioptera sp.	0	0	0	0	0	0	0	0	0	0	0	0
Eukiefferiella sp.	0	0	0	0	0	0	0	0	0	0	0	0
Gammarus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Glossosomatidae	0	0	0	0	0	0	0	0	0	0	0	0
Glutops sp.	0	0	0	0	0	0	0	0	0	0	0	0
Glyptotendipes sp.	0	0	0	0	0	0	0	0	0	0	0	0
Harnischia sp.	0	0	0	0	0	0	0	0	0	0	0	0
Helobdella stagnalis	0	0	0	0	0	0	0	0	0	0	0	0
Heptageniidae	0	0	0	0	0	0	0	0	0	0	0	0
Hexagenia sp.	0	0	0	0	0	0	0	0	0	0	0	0
Hirudinea	0	0	0	0	0	0	0	0	0	0	0	0
Hyalella azteca	0	0	0	0	0	0	0	0	0	0	0	0
Hydropsyche sp.	1	0	0	1	0	0	0	0	0	0	0	0
Microchironomus sp.	0	0	0	0	0	1	1	0	1	0	0	0
Microcylloepus sp.	1	0	0	0	0	0	0	0	0	0	0	0
Micropsectra sp.	0	0	0	1	0	0	0	0	0	0	0	0
Microtendipes sp.	0	0	0	0	0	0	0	0	0	0	0	0
Oecetis sp.	0	0	0	0	0	0	0	0	0	0	0	0
Ordobrevia sp.	0	0	0	0	0	0	0	0	0	0	0	0
Paralauterborniella sp.	0	0	0	0	0	0	0	0	0	0	0	0
Paramerina sp.	0	0	0	0	0	0	0	0	0	0	0	0
Paratanytarsus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Paratendipes sp.	0	0	0	0	0	0	0	0	0	0	0	0
Pentaneurini	0	0	0	0	0	1	0	0	0	0	0	0
Polypedilum sp.	0	0	0	0	0	0	0	0	0	0	1	0
Procladiini	0	0	0	0	0	0	0	0	0	0	0	0
Procladius sp.	5	3	6	5	5	10	22	8	8	8	1	1
Rheotanytarsus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Sialis sp.	0	0	0	0	0	0	1	0	0	1	0	0
Sphaeriidae	0	0	0	0	0	0	0	0	0	0	0	0
Stenochironomus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Stictochironomus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Tabanidae	0	0	0	0	0	0	0	0	0	0	0	0
Tanypus sp.	0	0	0	0	0	1	1	0	1	0	0	0
Tanytarsini	0	0	0	0	0	0	0	0	0	0	1	0
Tanytarsus sp.	0	0	0	0	0	0	0	0	0	0	0	0
Thienemannimyia gr. sp.	0	0	0	0	0	0	0	0	0	0	0	0
Tricorythodes sp.	0	0	0	0	0	0	0	0	0	0	0	0
Tubificidae	275	340	501	478	486	309	326	188	273	265	327	220
Turbellaria	0	0	0	0	0	0	0	0	0	0	0	0
Total	**284**	**351**	**515**	**494**	**495**	**344**	**363**	**214**	**313**	**290**	**339**	**224**
*see Note at end of table												

Benthic taxonomic results for the 1997 Sheboygan ERA

	T17-3	T17-4	T17-5	T18-1	T18-2	T18-3	T18-4	T18-5	T19-1	T19-2	T19-3	T19-4	T19-5
Ablabesmyia sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
Baetidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Baetis sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
Baetis tricaudatus	0	0	0	0	0	0	0	0	0	0	0	0	0
Caecidotea sp.	0	0	1	0	0	0	0	0	0	0	0	0	0
Caenis sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
Ceratopogoninae sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
Chironomini	0	0	0	0	0	0	0	0	1	1	0	0	0
Chironomus sp.	9	11	1	9	10	2	9	5	9	6	5	6	10
Chloroperlidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Cladopelma sp.	0	0	0	0	0	0	0	0	0	1	0	0	0
Clinotanypus sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
Coenagrionidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Cricotopus sp.	0	0	0	0	0	0	0	0	0	0	1	0	0
Cryptochironomus sp.	1	0	0	0	1	0	0	0	0	0	0	0	0
Cryptotendipes sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
Dicrotendipes sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
Dineutus sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
Dubiraphia sp.	2	1	0	0	1	1	0	0	0	1	0	0	0
Endochironomus sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
Ephemeroptera	0	0	0	0	0	0	0	0	0	0	0	0	0
Erioptera sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
Eukiefferiella sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
Gammarus sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
Glossosomatidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Glutops sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
Glyptotendipes sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
Harnischia sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
Helobdella stagnalis	0	0	0	0	0	0	0	0	0	0	0	0	0
Heptageniidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Hexagenia sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
Hirudinea	0	0	0	0	0	0	0	0	0	0	0	0	0
Hyalella azteca	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydropsyche sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
Microchironomus sp.	0	0	0	0	0	0	1	0	0	1	2	0	0
Microcylloepus sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
Micropsectra sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
Microtendipes sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
Oecetis sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
Ordobrevia sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
Paralauterborniella sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
Paramerina sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
Paratanytarsus sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
Paratendipes sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
Pentaneurini	0	0	0	0	0	0	0	0	0	0	0	0	0
Polypedilum sp.	0	0	0	0	0	0	0	0	2	2	1	0	1
Procladiini	0	0	0	0	0	0	0	0	0	0	0	0	0
Procladius sp.	22	17	8	4	1	3	4	5	7	18	12	5	9
Rheotanytarsus sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
Sialis sp.	0	0	0	0	0	1	0	0	0	0	0	0	0
Sphaeriidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Stenochironomus sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
Stictochironomus sp.	0	0	0	0	0	0	0	0	0	0	0	1	0
Tabanidae	0	0	0	0	0	0	0	0	0	0	0	0	0
Tanypus sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
Tanytarsini	1	0	1	0	0	0	0	0	0	0	0	0	0
Tanytarsus sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
Thienemannimyia gr. sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
Tricorythodes sp.	0	0	0	0	0	0	0	0	0	0	0	0	0
Tubificidae	447	339	291	396	313	291	313	431	299	305	303	159	719
Turbellaria	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**482**	**368**	**302**	**409**	**326**	**298**	**327**	**441**	**318**	**335**	**324**	**171**	**739**
*see Note at end of table													

Benthic taxonomic results for the 1997 Sheboygan ERA

	T20-1	T20-2	T20-3	T20-4	T20-5	Taxon Abun
Ablabesmyia sp.	0	0	0	0	0	27
Baetidae	0	0	0	0	0	1
Baetis sp.	0	0	0	0	0	1
Baetis tricaudatus	0	0	0	0	1	6
Caecidotea sp.	1	0	0	0	0	10
Caenis sp.	0	0	0	0	0	6
Ceratopogoninae sp.	1	0	1	1	0	21
Chironomini	0	0	0	0	0	17
Chironomus sp.	3	4	8	5	2	620
Chloroperlidae	0	0	0	0	0	1
Cladopelma sp.	0	1	0	1	0	5
Clinotanypus sp.	0	0	0	0	0	5
Coenagrionidae	0	0	0	0	0	1
Cricotopus sp.	0	0	0	0	0	5
Cryptochironomus sp.	0	0	0	0	0	83
Cryptotendipes sp.	0	0	0	0	0	5
Dicrotendipes sp.	0	0	0	0	0	31
Dineutus sp.	0	0	0	0	0	1
Dubiraphia sp.	0	0	0	1	1	439
Endochironomus sp.	0	0	0	0	0	1
Ephemeroptera	0	0	0	0	0	2
Erioptera sp.	0	0	0	0	0	1
Eukiefferiella sp.	0	0	0	0	0	1
Gammarus sp.	0	0	0	0	0	3
Glossosomatidae	0	0	0	0	0	1
Glutops sp.	0	0	0	0	0	1
Glyptotendipes sp.	0	0	0	0	0	80
Harnischia sp.	1	0	0	0	0	133
Helobdella stagnalis	0	0	0	0	0	1
Heptageniidae	0	0	0	0	0	3
Hexagenia sp.	0	0	0	0	0	12
Hirudinea	0	0	0	0	0	2
Hyalella azteca	0	0	0	0	0	6
Hydropsyche sp.	0	0	0	0	0	4
Microchironomus sp.	0	0	0	0	0	105
Microcylloepus sp.	0	0	0	0	1	10
Micropsectra sp.	0	0	0	0	0	1
Microtendipes sp.	0	0	0	0	0	4
Oecetis sp.	0	0	0	0	0	2
Ordobrevia sp.	0	0	0	0	0	3
Paralauterborniella sp.	0	0	0	0	0	1
Paramerina sp.	0	0	0	0	0	4
Paratanytarsus sp.	0	0	0	0	0	2
Paratendipes sp.	0	0	0	0	0	2
Pentaneurini	0	0	0	0	0	23
Polypedilum sp.	0	0	0	0	0	141
Procladiini	0	0	0	0	0	2
Procladius sp.	3	3	5	5	4	897
Rheotanytarsus sp.	0	0	0	0	0	5
Sialis sp.	0	0	0	0	0	4
Sphaeriidae	0	0	0	0	0	16
Stenochironomus sp.	0	0	0	0	0	2
Stictochironomus sp.	0	0	0	0	0	1
Tabanidae	0	0	0	0	0	21
Tanypus sp.	0	0	0	0	0	30
Tanytarsini	0	0	0	0	0	4
Tanytarsus sp.	0	0	0	0	0	4
Thienemannimyia gr. sp.	0	0	0	0	0	2
Tricorythodes sp.	0	0	0	0	0	9
Tubificidae	579	570	666	392	511	29310
Turbellaria	0	0	0	0	0	1
Total	**588**	**578**	**680**	**405**	**520**	32142
*see Note at end of table						

APPENDIX E

Life History of *Limnodrilus hoffmeisteri* and *L. cervix*

APPENDIX E
LIFE HISTORY OF
LIMNODRILUS HOFFMEISTERI AND *L. CERVIX*

L. hoffmeisteri is a common species usually found in slow-flowing waters associated with depositional areas (Mason 1994). Benthic algae and bacteria constitute its basic food source (Sauter and Güde 1996). It is a highly pollution-tolerant organism often identified in the literature as an indicator of pollution and organic enrichment (Lafont et al. 1996; Lafont 1984; Verdonschot 1989). It is also known to be tolerant of arsenic, copper, lead, and zinc (Lawrence and Harris 1979). *L. cervix* is slightly less tolerant (Simpson et al. 1984). In general, good indicators of reduced water quality include increased dominance of *L. hoffmeisteri* and *Tubifex tubifex*, reduction in species richness, and increased dominance of oligochaete biomass (Finogenova 1996; Slepukhina 1984). Rapid adaptation, ability to alter its life cycles, and ability to breed earlier than other tubificids contribute to the numerical dominance of *L. hoffmeisteri* in benthic invertebrate communities and its ability to exploit changing environmental conditions (Kennedy 1966; Mason 1994).

Tubificids are known to alternate between sexual and asexual reproductive modes. Asexual reproduction is accomplished chiefly through transverse fission and parthenogenesis. In transverse fission the individual initiates powerful contractions of the body wall causing it to fragment into pieces which regenerate new anterior and posterior ends (Christensen 1984). Parthenogenesis (reproduction by development of an unfertilized gamete) has been documented in *L. hoffmeisteri* (Poddubnaya 1984). If there is a surplus of eggs under natural conditions, the oligochaetes often will reproduce parthenogenetically after bisexual reproduction (Poddubnaya 1984). The ability of *L. hoffmeisteri* to reach sexual maturity and breed at an earlier age gives it a distinct advantage over other tubificid species and is reflected in its near ubiquitous presence in organically enriched depositional environments.

Natural populations of *L. hoffmeisteri* usually produce a single generation each year between spring and summer (Mason 1994). Timing of the reproductive cycle varies with geographic location. The typical pattern in northern temperate streams is to reproduce during May-June or August-September. Study of a broad English canal approximately 2 m deep found that young *L. hoffmeisteri* hatched in spring and the bulk of the population was in the immature stage in early summer. Sexual maturity of *L. hoffmeisteri* occurs between the first and second years of life depending on the physiochemical conditions present (Poddubnaya 1980). Most individuals die after breeding, but some are capable of breeding a second time in the same season (Kennedy 1966). Tubificid worms can potentially live for several years (Pasteris et al. 1996).

In a number of studies *L. hoffmeisteri* is the dominant taxon present, occurring in densities ranging from $503/m^3$ to $2167/m^3$ in a river in Indiana to $46,600/m^2$ in a river delta in St. Petersburg, Russia; accounting for up to 95 percent of the tubificid population (Block et al. 1982; Finogenova 1996). *L. hoffmeisteri* is very sensitive to population density and maturation time is density-dependent. Moderate population densities are reported as $< 20,000/m^2$ and densities $> 25,000/m^2$ are detrimental to survival (Mason 1994). Increased density also negatively affects the percentage of a population that is able to reach maturity (Adreani et al. 1984).

Review of the literature indicates cases where mature *L. hoffmeisteri* are not observed at various times of the year (Block et al. 1982; Kennedy 1966; Steinlechner 1987). Tubificid populations composed mainly of immature specimens have been found to occur during the summer months in England and in the Little Calumet River in Indiana (Block et al. 1982; Kennedy 1966). Routinely, up to 80 percent of the collected oligochaete material may contain immature specimens which cannot be identified to species (Adreani et al. 1984; Steinlechner 1987).

Water temperature has been shown to have a direct effect on density and health of oligochaete populations in "unproductive" habitats containing few nutrients (Mason 1994). *In situ* measurements of growth vs. temperature found that *L. hoffmeisteri* and *T. tubifex* only grew within a very narrow temperature range between 10 and 13°C. A 0.3°C change in temperature from 9.7 to 10.0 appeared to initiate growth (Reynoldson 1987). Other studies indicate that temperatures below 8–12°C interrupt reproductive activity (Poddubnaya 1959; Block et al. 1982). Differences in egg production between *L. hoffmeisteri* and *T. tubifex* have been documented with *L. hoffmeisteri* exhibiting higher egg production levels at higher temperatures of 20–25°C and *T. tubifex* at lower temperatures of 8°C (Reynoldson 1987; Aston 1973).

The conventional assumption is that oligochaetes as a group prefer or require environments characterized by fine-grained substrates. At the family level this is generally true for tubificids, however, at the species level there appears to be significant variation in the range of exploitable substrate types (Sauter and Güde 1996). Numerous studies indicate that the growth and distribution of *L. hoffmeisteri* are relatively insensitive to sediment type (Reynoldson 1987). *L. hoffmeisteri* can inhabit substrates ranging from 15 to 90 percent clay and silt with abundance peaks occurring at 20 to 30 percent and 50 to 60 percent clay and silt (Sauter and Güde 1996). Results from the Main Channel, Hudson River study indicate that *L. hoffmeisteri* is able to inhabit a wide range of substrate types, reaching maximum abundance in high-organic content, silty-sand areas (Simpson et al. 1984).

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APPENDIX F

Parameterization of the Time-Dependent
Food Web Bioaccumulation Model

APPENDIX F
PARAMETERIZATION OF THE TIME-DEPENDENT FOOD WEB BIOACCUMULATION MODEL

This appendix details the data sources used in the parameterization of the food web bioaccumulation model. Model parameters are divided into three major categories: chemical properties, physical attributes of environmental media, and trophic (food web) interactions. Additional information concerning model structure is available in Gobas (1993), Gobas et al. (1995), and Morrison et al. (1996, 1997).

CHEMICAL PROPERTIES AND CONCENTRATIONS

Chemical properties were obtained from Gobas (pers. comm. 1998), who has accumulated a database of chemical data for use in environmental modeling. The values used are presented in Table F-1.

Table F-1. Chemical properties of PCB congeners

PCB CONGENER	MOLECULAR WEIGHT (g/mol)	LOG(OCTANOL-WATER PARTITION COEFFICIENT) ($logK_{ow}$)	HENRY LAW CONSTANT (Pa m^3/mol)
PCB 066	292	6.2	40
PCB 077	292	6.36	1.72
PCB 105	326.5	6.65	20
PCB 118	326.5	6.74	20
PCB 126	326.5	6.89	19
PCB 156	361	7.18	20

High resolution congener-specific PCB concentrations were measured in sediment samples collected from the Sheboygan River for the 1997 ERA. Since bioaccumulation in fish represents time-weighted exposure to a range of sediments, input to the model was based on mean concentrations of all the sediment composites (numbering three to five) in each sampling segment (Table F-2).

Table F-2. PCB congener concentrations in sediment collected for the 1997 ERA

SAMPLING SEGMENT	PCB 066 (µg/kg)	PCB 077 (µg/kg)	PCB 105 (µg/kg)	PCB 118 (µg/kg)	PCB 126 (µg/kg)	PCB 156 (µg/kg)
Segment 1	0.19	0.0163	0.26	0.593	0.0027	0.0572
Segment 2	310	28.1	146.7	295	0.693	16.3
Segment 3	89.7	9.05	40.7	83	0.249	9.01
Segment 5	50	5.95	23.8	43	0.176	4.35

PHYSICAL ATTRIBUTES OF ENVIRONMENTAL MEDIA

Total organic carbon (TOC) content in sediment was estimated by averaging the organic carbon content in all samples throughout the river. The TOC results from the WDNR food chain study and the 1997 ERA sampling program were averaged, yielding a mean value of 4%. While separate TOC levels for each segment could be used in the model, the sampling results exhibited very little variability; therefore the mean was used.

Values for air temperature, water temperature, total suspended solids, and organic carbon content of particulates were available on a monthly basis, and were therefore incorporated into the model in a time-dependent fashion (Table F-3; WDNR 1996). Since the model uses a bioenergetics equation which is dependent on water temperature, it accounts explicitly for the reduced feeding of fish during the winter months.

TROPHIC INTERACTIONS

To develop the food-web bioaccumulation model for smallmouth bass, estimates of feeding behavior are required for each trophic level. Ideally, prey preferences are determined using site-specific stomach contents analyses. In the WDNR food chain study, stomachs from each fish type were preserved at each sampling location. Unfortunately, most of the contents were unrecognizable, and detailed identification of contents has not been attempted. However, some small crayfish were observed in adult smallmouth bass stomachs.

Table F-3. Physical attributes of environmental media

Month	Air Temperature (°C)	Water Temperature (°C)	Total Suspended Solids (kg/L)	Particulate Organic Carbon (%)
January	-7	2	5.31e-06	11.25
February	-2	4	1.00e-05	8.08
March	2	7	2.65e-05	7.03
April	6	10	2.83e-05	7.79
May	10	15	4.40e-05	5.94
June	15	20	3.44e-05	10.27
July	21	24	1.72e-05	11.03
August	17	20	2.69e-05	10.58
September	13	15	2.41e-05	8.62
October	8	10	1.67e-05	11.08
November	3	7	1.81e-05	8.60
December	-2	4	6.65e-06	9.08

Source: WDNR (1996)

Since the smallmouth bass is an upper-trophic-level consumer, the food web is fairly complex. In order to simplify the food web for modeling purposes, biota occupying similar ecological niches were grouped together. For example, benthic fish, represented in the Sheboygan River by white sucker, redhorse, and carp, were considered together since they have similar dietary composition and sizes. The estimated lipid contents of primary producers and benthos are presented in Table F-4. The dietary composition for each type of predator considered in the food web model is summarized in the following section and Table F-5.

Table F-4. Estimated lipid contents of primary producers and benthos

Organism	Estimated Lipid Content (%)	Source
Phytoplankton	1.2	Morrison et al. 1996 (Western Lake Erie phytoplankton)
Microcrustacea	1.0	Morrison et al. 1997 (Western Lake Erie zooplankton)
Bivalves	1.3	Morrison et al. 1997 (Western Lake Erie zebra mussels)
Aquatic insect larvae	4.5	WDNR 1996 (food chain data; Sheboygan River larval invertebrates, including Tricoptera, Diptera, Ephemeroptera, and Chironomid larvae; mean of segments used)

Table F-5. Physiological data and dietary assignments used to parameterize the food chain bioaccumulation model

				Diet composition[i] as percent of volume (age class of prey in parentheses)									
Organism	Age Class (year)	Mean Weight (grams)	Whole Organism Lipid (%)	Plant Matter [j] (%)	Micro-Crustaceans (%)	Sediment (%)	Bivalves (%)	Aquatic Insects (%)	Centrarchid Fish (%)	Benthic Fish (%)	Crayfish (%)	Young-of-Year Fish (%)	Cypriniform Minnows (%)
Smallmouth Bass	0+	0.85[a]	3.9[e]	-	10	-	-	50	-	-	-	40 (0+)	-
	1+	28.4[a]	2.9[f]	-	-	-	-	10	-	-	45 (0+)	20 (0+)	25 (0+)
	2+	54.0[a]	2.9[f]	-	-	-	-	10	-	-	50 (0+)	20 (0+)	20 (0+)
	3+	95.1[a]	2.9[f]	-	-	-	-	10	-	-	55 (0+)	20 (0+)	25 (1+)
	4+	255.6[a]	3.1[g]	-	-	-	-	10	5 (1+)	20 (1+)	55 (1+)	-	10 (1+)
	5+	505.5[a]	3.1[g]	-	-	-	-	10	5 (1+)	20 (1+)	55 (1+)	-	10 (1+)
	6+	640.4[a]	3.1[g]	-	-	-	-	10	5 (1+)	20 (1+)	55 (1+)	-	10 (1+)
	7+	773.9[a]	3.1[g]	-	-	-	-	10	5 (2+)	20 (2+)	55 (2+)	-	10 (2+)
	8+	945.7[a]	3.1[g]	-	-	-	-	10	5 (2+)	20 (2+)	55 (2+)	-	10 (2+)
Benthic Fish	0+	4.0[b]	2.8[e]	-	40	-	-	60	-	-	-	-	-
	1+	13[b]	3.6[g]	15	10	5	20	50	-	-	-	-	-
	2+	81[b]	3.6[g]	15	10	5	20	50	-	-	-	-	-
	3+	208[b]	3.6[g]	15	10	5	20	50	-	-	-	-	-
	4+	413[b]	3.6[g]	15	10	5	20	50	-	-	-	-	-
	5+	644[b]	3.6[g]	15	10	5	20	50	-	-	-	-	-
Crayfish	0+	0.5[c]	1.3[g]	60	-	15	10	15	-	-	-	-	-
	1+	2.0[c]	1.3[g]	60	-	15	10	15	-	-	-	-	-
	2+	20[c]	1.3[g]	60	-	15	10	15	-	-	-	-	-
Young-of-Year Fish	0+	8.5[d]	0.034[e]	-	40	-	-	60	-	-	-	-	-
Cypriniform Minnow	0+	8.5[d]	4.7[h]	20	30	-	-	50	-	-	-	-	-
	1+	28.0[d]	4.7[h]	20	30	-	-	50	-	-	-	-	-
	2+	33.6[d]	4.7[h]	20	30	-	-	50	-	-	-	-	-

[a] Smallmouth bass growth rates based on mean of Lake Erie and Lake Huron studies (Scott and Crossman 1973).

[b] Benthic fish growth rates based on study of silver redhorse (*Moxostoma anisurum;* Meyer 1962; cited in Scott and Crossman 1973).

[c] Best professional judgment.

[d] Growth rates based on Lake Simcoe, Ontario growth of young-of-the-year shiner (*Notropis atherinoides;* McCrimmon 1954; cited in Scott and Crossman 1973).

[e] Mean lipid content (young-of-year fish) from four sampling segments from the WDNR food chain study. Species collected included smallmouth bass and white sucker.

[f] Mean lipid content (juvenile smallmouth bass) from four sampling segments from the 1997 ERA.

[g] Mean lipid content (adults) from four sampling segments from the WDNR food chain study. Species collected included smallmouth bass, longnose dace and white sucker (benthic), and crayfish.

[h] Lipid content of emerald shiner (*Notropis atherinoides*) collected in Western Lake Erie (Morrison et al. 1997).

[i] Dietry composition estimated using Scott and Crossman (1973), Morrison et al. (1997), and Lyons pers. comm. (1997).

[j] Includes phytoplankton, algae, plant detritus, etc.

Smallmouth Bass

The smallmouth bass (*Micropterus dolomieui*) is a piscivorous predator that feeds on insects, crayfish, and various fish (Scott and Crossman 1973). As young bass grow, their diet progresses from plankton, to immature aquatic insects, to crayfish and fishes (Scott and Crossman 1973). Smallmouth bass are very opportunistic feeders; therefore no single species may be identified as preferred fish prey. In the Sheboygan River, both centrarchids (sunfish and rock bass) and cypriniformes (white sucker, minnow, and other species) have been noted as smallmouth bass prey items.

Smallmouth bass actively feed during only about half of the year; during the winter they feed very little and are relatively inactive below a water temperature of approximately 15°C. Below 10°C, the smallmouth bass will scarcely feed at all (Lyons pers. comm. 1997). For adult smallmouth bass in most habitats, crayfish make up the majority of the diet, followed in order of importance by fish and aquatic and terrestrial insects (Scott and Crossman 1973). However, since the smallmouth bass sampled for the 1997 ERA represent juveniles in the size range of 11–20 cm, it is important to assess the age- and size-specific prey composition for this species. Lyons (pers. comm. 1997), indicates that smallmouth bass in this size range will still feed preferentially on crayfish, provided that the appropriate size range of crayfish is available. Dense populations of crayfish would likely support a range of size-classes, from which appropriate prey may be selected. For smallmouth bass in the 11–20 cm size range, the crayfish selected would be about 1 cm long or smaller (Lyons pers. comm. 1997).

Fish are also a significant dietary component for juvenile smallmouth bass. Because smallmouth bass are non-specialized piscivores, a major determinant of dietary composition is the abundance of fish of a suitable size. Because juvenile smallmouth bass are relatively small, they would consume suitably sized young-of-year fish such as suckers, sunfish, and small minnows (Lyons pers. comm. 1997). Because minnows are small throughout their life-cycle, they would likely be consumed more over the course of the year than other species, which would grow to sizes too large to be consumed by juvenile smallmouth bass. Representative minnow species include common shiner (*Notropis cornutus*), sand shiner (*Notropis stramineus*), blackside darter (*Percina maculata*), and hornyhead chub (*Nacomis biguttatus*).

During brief periods, insects (e.g., mayfly larvae) may be a significant component of the smallmouth bass diet, but overall they would amount to only about 5–10% of the dietary intake (Lyons pers. comm. 1997). Insect prey is likely most important in the months of April and May, when young-of-year fish are not yet available. Small fish would compose a larger proportion of the juvenile smallmouth bass diet in June and July. As these fish grow beyond the size preferred by smallmouth bass, crayfish tend to dominate the diet.

Benthic Fish

Benthic fish are bottom feeding fish that live and feed in direct contact with the sediments. Redhorses (*Moxostoma* sp.) feed exclusively on invertebrates, particularly immature insects and small molluscs and crustaceans, that they suck out of the bottom sediments. White suckers (*Catostomus commersoni*) also consume primarily invertebrate prey such as chironomids, cladocerans, and molluscs. Carp (*Cyprinus carpio*) are omnivorous and consume a variety of plant and animal tissues including aquatic insects, crustaceans, annelids and molluscs as well as seeds, aquatic plants, and algae (Scott and Crossman 1973).

Cypriniform Minnows

Cypriniform minnows are short-lived, small fish which may be consumed by centrarchids because of their suitable size range. In general, minnows are omnivorous, with a preference toward consumption of animal food. The common shiner (*Notropis cornutus*), which is a known prey item of smallmouth bass, consumes aquatic insects (adults and larvae), as well as algae, aquatic plants, and other microorganisms. The sand shiner (*Notropis stramineus*) consumes aquatic and terrestrial insects and bottom ooze diatoms. Blackside darters (*Percina maculata*) consume mayfly and midge larvae, corixid nymphs, copepods, and, occasionally, small fish. Hornyhead chub (*Nacomis biguttatus*) consume both plant and animal tissues, with herbivorous material more important in the diet of young fish, which also consume microcrustaceans (e.g., cladocerans) and aquatic insect larvae such as chironomids. Larger hornyhead chub consume more aquatic insect larvae, annelids, crayfish, and small fish (Scott and Crossman 1973).

Young-of-Year Fish

In their early life stages, many fish species in the Sheboygan river have not yet developed specialized feeding preferences, and therefore may be represented as a single broad class of fish with similar diets. Young-of-year fish feed mainly on zooplankton and benthic invertebrates (e.g., insect larvae and microcrustaceans).

Crayfish

Crayfish are macrocrustaceans that are omnivorous, with a tendency to consume more plant than animal material. Crayfish ingest mainly the primary resources at the bottom of the food web, such as detritus and sediment, algae, and aquatic macrophytes. While plant matter and filamentous algae are consumed by all age classes of crayfish, predation of crayfish on a diversity of animal prey including caddisfly larvae, small bivalves, small crayfish, and occasionally small fish, has been well documented (Zaranko et al. 1997).

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APPENDIX G

Impacts on Lake Michigan Salmonids

APPENDIX G
IMPACTS ON LAKE MICHIGAN SALMONIDS

The Sheboygan River has annual runs of chinook salmon, coho salmon, and steelhead trout; the juveniles of these species also rear in the river before outmigrating to Lake Michigan. Although salmonids are not permanent residents of the Sheboygan River, the river is a significant contributor of polychlorinated biphenyls (PCBs) to Lake Michigan and hence provides a level of exposure that may impact the salmonid runs. This section presents an evaluation of the potential impacts to Lake Michigan salmonids. It includes an examination of the pertinent literature regarding bioaccumulation of PCBs in salmonids, biological effects in salmonids observed in the field, and PCB loading to Lake Michigan,

PCBs IN LAKE MICHIGAN SALMONIDS

Over the past 25 years, several species of salmonids in Lake Michigan have been susceptible to accumulating high concentrations of PCBs and other organochlorine substances in their tissues. The indigenous lake trout and the introduced Pacific salmonids (coho and chinook salmon and steelhead trout) have been studied the most. Since the implementation of PCB restrictions in the1970s, Lake Michigan salmonids have demonstrated marked decreases in concentrations of total PCBs. Concentrations appear to have peaked in the early to mid-1970s, generally followed by declines to about the mid-1980s. Concentrations since the mid-1980s appear to have leveled off, with what may be slight increases in coho and chinook salmon (DeVault et al.1996; Stow et al. 1994) (Table G-1). The highest concentrations have been observed in lake trout in which mean tissue burdens as high as 22.9 mg/kg were observed in1974. Concentrations have since leveled off to between 2 and 3mg/kg (DeVault et al. 1996). Chinook salmon appear to have the next highest burdens with concentrations leveling off around 1 to 2 mg/kg followed by coho salmon where concentrations have been below 1 mg/kg since 1984 (Stow et al. 1994). Although mean concentrations were not presented, Stow et al. (1995) reported that tissue burdens and trends in steelhead and brown trout were similar to those in coho salmon.

The level of PCB accumulation observed in Lake Michigan salmonids is also consistent with the life history, behavior, and ecology of each species. As reported, the highest tissue burdens of PCBs have been observed in adult lake trout followed by chinook salmon and coho salmon. Tissue burdens in steelhead trout have been similar to coho salmon. On the basis of exposure periods, this would be expected because the lake trout is a long-lived species living in excess of 10 years in Lake Michigan. The species is not

Table G-1. Mean tissue concentrations (mg/kg ww) of total PCBs in Lake Michigan salmonids

YEAR	LAKE TROUT[a]	COHO SALMON[b]	CHINOOK SALMON[b]
1972	12.9	na	na
1973	18.9	na	na
1974	22.9	5.3	11.7
1975	22.3	3.5	na
1976	18.7	14.3	7.4
1977	11.6	na	na
1978	8.2	5.8	8.8
1979	8.8	3.1	6.1
1980	9.9	1.7	4.5
1981	6.5	1.3	3.1
1982	5.6	1.9	4.8
1983	na	1.5	2.1
1984	4.5	0.7	2.2
1985	na	0.9	1.3
1986	2.6	0.9	2.3
1987	na	na	1.6
1988	3.2	0.7	2.1
1989	na	0.8	1.2
1990	2.7	na	na
1991	na	na	na
1992	3.5	na	na

NOTE: na - not available

[a] DeVault et al. 1996
[b] Stow et al. 1994

anadromous, rather it spawns and rears in the lake. The chinook salmon has the next longest life-span, spending 3 to 4 years in Lake Michigan, while the coho salmon and steelhead trout spend 2 or 3 years in the lake before their spawning migrations to natal streams. None of the anadromous species feed substantially during their spawning runs and therefore would not be expected to accumulate substantial PCB burdens as adults in the river. In addition to lake residence, chinook and coho salmon and steelhead trout rear in natal streams as juveniles for up to one year before outmigrating to the lake.

Studies have also examined tissue burdens in forage species such as alewife, which are considered the preferred prey of adult salmon and steelhead trout in Lake Michigan. Stow et al. (1995) evaluated the trends in PCB tissue burdens in alewife and bloater chub, another forage species, from the1970s to early 1990s and found similar decreases in total

PCBs in both species over the period. Rapid decreases from the early 1970s to mid-1980s occurred, followed by stabilizing levels after 1985. The similarity between alewife and predator PCB concentration trends is consistent with the concept that the food web is the primary route of PCBs into the upper trophic levels. Several other studies (Rasmussen et al. 1990; Oliver and Niimi 1988) have illustrated the importance of the food web in determining PCB concentrations in lake trout in Lake Ontario and other large lake systems.

Stow et al. (1995) surmised that the observed trends in PCB tissue burdens are consistent with ecological changes in the forage base that have occurred in Lake Michigan. During the 1980s, alewife underwent a large decrease in number and biomass in Lake Michigan largely in response to predation by rapidly growing chinook and coho salmon populations (chinook and coho salmon were first introduced to Lake Michigan in the mid-1960s). During the same period, the bloater chub population increased substantially. This decrease in the primary forage base for salmonids coincided with decreases in the growth of chinook and coho salmon. A decrease in growth as a consequence of lower prey availability could result in a decreased-growth dilution effect and be responsible for the slight increases recently observed in adult salmonid tissue burdens. Similarly, a shift in consumption from alewife to bloater chub, which may have occurred as a result of changing prey availability, should not result in a marked change in predator PCB concentrations because of the similar concentrations found in alewife and bloater chub. However, the energetics of forage and consumption are probably different for the two prey species because alewife tend to occupy warmer surface waters while bloater chub are usually found in deeper, cooler waters. A shift in prey may increase the energy requirements of salmonids as they forage in cooler, deeper water and hence they may experience reduced growth.

BIOLOGICAL EFFECTS

As reported, several studies have examined the potential biological effects of high tissue burdens of PCBs in salmonids of the Great Lakes. Leatherland (1993) reviewed the available evidence of reproductive and developmental problems that have been identified in populations and stocks of Great Lake salmonids. Biological effects that have been observed include thyroid enlargement, lowered egg thyroid hormone content, high prevalence of premature sexual maturation in males, loss of secondary sexual characteristics, reduced plasma gonadotropin, change in gonadal steroid hormone content, low egg fertility, and high embryo mortality and deformity. The evidence for an etiology based on the presence of toxic compounds is not as clear as that for fish-eating birds and mammals; however, when taken together, there is strong evidence for environmentally-related impairment of endocrine and reproductive function in salmonids of the Great Lakes.

The strongest correlations between PCBs and biological effects have been found in lake trout. Mac et al. (1993) measured total PCBs and individual PCB congeners in eggs from lake trout captured from Lakes Michigan, Huron, Ontario, and Superior and evaluated several biological endpoints including hatching success, swim-up mortality, fry survival, and fry abnormalities. Results of correlation analysis between the biological endpoints and concentrations of PCBs in the eggs demonstrated a significant relationship between hatching success and a number of indices of PCB contamination. The strongest correlation was between total egg mortality and total PCB concentrations in the eggs (r=0.701, p=0.0002). Nearly all of the individual PCB congeners showed strong correlation with total egg mortality as well, but not as strong as total PCBs. Total PCB concentrations in eggs were negatively correlated with the percent of normal fry hatching (r=-0.686, p=0.0002). Total PCBs in eggs also correlated significantly with age and length of adult females, early egg mortality, and the incidence of the biological abnormality of fry called blue sac. In addition, there was a significant negative correlation between PCB concentrations in adult tissues and the percent normal fry hatch (r=-0.76, p=-0.01). The study did not report any threshold tissue concentrations at which reproductive impacts were significantly higher. No correlation was found between PCB concentrations and fry mortality.

Similar results were obtained by Ankley et al. (1991) who compared hatching success and fry survival of eggs of Lake Michigan chinook salmon to total PCBs and dioxin equivalents. In 10 groups of eggs, a significant correlation between the percent hatch of eggs and the total PCB concentrations in the eggs was found, but no significant relation was found to dioxin equivalents (calculated using mammalian TEFs) or between fry survival and any measure of PCB contamination.

Contrasting results were found by Williams and Giesy (1992) who examined the relation between measures of reproductive success of Lake Michigan chinook salmon eggs and PCB residues. In 20 groups of eggs, no significant correlation was found between PCB contamination and any of six measures of reproductive success. This study measured PCB contamination in eggs as a concentration or as dioxin equivalents calculated using several different sets of potency factors (Safe 1990; Tillitt et al. 1991; Newsted 1991); the Newsted (1991) TEFs were derived based on Ah-mediated responses in fish.

Although data were not sufficient to determine threshold concentrations where reproductive effects would be expected, the studies imply that lake trout are more sensitive than chinook salmon. The average concentration of total PCBs in salmon eggs was higher (7.02 μg/g, standard deviation 2.34) than that in lake trout eggs (1.32 μg/g, standard deviation 1.53) (Mac et al. 1993). The range of biological responses found in chinook salmon was also much lower than for lake trout; only 3 of 20 groups of chinook salmon eggs suffered hatching mortality greater than 10% compared with 14 of 23 groups of lake trout eggs (Mac et al. 1993; Williams and Giesy 1992).

PCB Loading to Lake Michigan

Robertson (1996) used frequency-volume analyses to estimate the PCB loads of major tributaries to Lake Michigan and found that a small number of rivers contribute the great majority of PCBs to the lake. Eighty percent of the load of total PCBs to Lake Michigan was calculated to come from two basins, the Fox and Kalamazoo rivers. Six additional basins, including the Sheboygan River, were calculated to contribute an additional 18.5% of the load. Robertson (1996) estimated that the Sheboygan River contributed an average of 1.92% of the total PCB load to Lake Michigan for the 16-year period from 1975 to 1990. Using data from 1980 to 1983 presented in Marti and Armstrong (1990), PCB loading from the Sheboygan River during that period would have been approximately 21 kg/year. Hall (pers. comm. 1998) estimated that the Sheboygan River contributed 4.4% of the total PCB load to Lake Michigan in 1994 (24 kg/year). The mean water concentration for the Sheboygan River was 83 ng/L (55–105 ng/L), which was higher than any of the other tributaries including the Fox, 65 ng/L, and Kalamazoo, 31 ng/L (Hall pers. comm. 1998).

Contribution of PCBs from the Sheboygan River to Lake Michigan Salmonids

A study by Eggold et al. (1996) found that juvenile salmon planted in the Sheboygan River accumulate significant levels of PCBs in their tissues before outmigrating to Lake Michigan. To determine the relative contribution of PCB contamination in the Sheboygan River to the tissue burdens of salmonids the study evaluated juvenile salmonids during their residence in the Sheboygan River and again when the fish returned as adults. The study released juvenile steelhead trout and coho salmon in the river and analyzed tissue samples for PCBs on a monthly basis until outmigration. Upon returning after one to three years of residence in Lake Michigan, adult tissues were analyzed for PCBs. Juvenile steelhead trout residing in the river were found to accumulate a mean of over 1 mg/kg (whole body, wet weight) after one month and 6.1 mg/kg after 8 months just prior to outmigration. Juvenile coho salmon showed similar trends with a mean of 0.84 mg/kg after 1 month and up to 4.1 mg/kg prior to outmigration. Returning steelhead trout and coho salmon adults that had spent two or three years residing in Lake Michigan had mean tissue burdens of 0.62 and 0.73 mg/kg (skin-on fillets), respectively. No significant differences were observed between Sheboygan River adults and fish tissues from reference rivers (Root and Pigeon Rivers). Considering PCB loading data previously discussed, PCBs from the Sheboygan River would have been accumulated in the fish from the reference rivers during their residence in Lake Michigan.

The results of Eggold et al. (1996) indicated that juveniles stocked in the Sheboygan River during the fall months of 1980, 1991, and 1992 accumulated PCBs rapidly over the winter before outmigration in the spring. While PCB accumulation during stream residence did not contribute substantially to PCB concentrations in adults, the total body burdens of PCBs from juvenile steelhead trout prior to outmigration averaged 70.5μg per whole fish (6.1 mg/kg). An adult steelhead, which weighed 5.2kg after three years residence in Lake Michigan, contained 6,216μg of PCBs and a concentration of 1.2 mg/kg (skin-on fillet sample). This suggests that the contribution of PCB uptake during the smolt stream residence stage was 1.1% of the total PCBs body burden in the adult skin-on fillet, while the remainder of the PCB burden was accumulated in Lake Michigan. Analysis of coho salmon data yields similar results. The concentration of PCBs found in adult steelhead trout and salmon in the Sheboygan River are consistent with the tissue burdens reported in studies by DeVault et al. (1996) and Stow et al. (1994), which evaluated PCB concentrations in coho and chinook salmon in Lake Michigan.

POTENTIAL FOR PCBS FROM THE SHEBOYGAN RIVER TO IMPACT LAKE MICHIGAN SALMONIDS

The results of studies that have evaluated PCB loading, tissue burdens, and biological effects in salmonids of Lake Michigan indicate the following conclusions can be drawn:

- The Sheboygan River contributes approximately 2 to 4% of the load of PCBs to Lake Michigan, or 21 to 24 kg/year (Marti and Armstrong 1990; Robertson 1996; Hall pers. comm. 1998).

- PCBs accumulate in the tissues of adult salmonids residing in Lake Michigan. Concentrations have steadily declined from a peak in the 1970s to a leveling off in the 1980s. The leveling off may be a new equilibrium; similar trends have also been observed in forage species that are salmonid prey.

- PCBs bioaccumulate to the highest concentrations in lake trout, followed by chinook salmon and coho salmon. The concentration of PCBs in steelhead trout appears to be similar to coho salmon.

- A strong correlation has been found between PCB concentrations in eggs of lake trout and chinook salmon and egg hatchability.

- No correlation was found between PCB concentrations and fry mortality.

- Lake trout appear to be more sensitive than chinook salmon.

- Coho salmon and steelhead trout smolts planted in the Sheboygan River could accumulate substantial PCB concentrations before outmigration. The resultant high PCB body burden could pose a significant risk to piscivores. Between 96 and 99% of coho salmon and steelhead trout adult body burden is accumulated during their residence in Lake Michigan, although Lake Michigan fish residing in the vicinity of the river mouth may accumulate higher body burdens of PCBs.

Eggold et al. (1996) found that because of the short residence time that smolts spend in the river compared with Lake Michigan, and the growth dilution that occurs in the lake as the fish grow to adults, the tissue burdens accumulated in the river made up only 1 to 4% of the total PCB burden in adult steelhead trout and coho salmon. Further, adult coho salmon and steelhead trout that were originally planted in the Sheboygan River had no higher tissue burdens as adults than in Lake Michigan populations as a whole (Eggold et al. 1996).

In summary, the purpose of this appendix discussion is to evaluate whether salmonids within Lake Michigan are at risk from PCBs originating from the Sheboygan River, whether the PCBs are accumulated in the river prior to outmigration or in the lake as a result of loading from the river. Three issues are of concern:

1) Are these body burdens sufficient to cause effects in the outmigrating smolts?

2) Are smolts suffering reproductive impacts as adults?

3) Are these body burdens sufficient to cause impacts on piscivorous fish or wildlife that may consume them?

Based on the studies summarized in Table 4-15 of the risk assessment, smolts are unlikely to be impacted directly at these concentrations. Since these smolts or their parents were not reared in the Sheboygan (they were reared in hatcheries), most of their exposure to PCBs took place after the smolts were past their most sensitive life stage. Effects in fingerlings are not observed until body burdens are much higher. For example, Mauck et al. (1978) reported mortality in fry containing 125 mg/kg ww Aroclor 1254.

As discussed in the previous section, returning steelhead trout and coho salmon that have resided two to three years in Lake Michigan have lower PCB body burdens (maximum of 0.73 mg/kg ww). These concentrations are greater than some of the lowest effects concentrations (as low as 0.12 mg/kg ww in flounder ovaries; see Table 4-15 in the risk assessment) so reproductive effects cannot be ruled out, although they are somewhat unlikely (see Section 4.6). While PCBs from the Sheboygan River contribute approximately 1 to 4% of the returning salmonid tissue burden, this does not present high enough PCB concentrations to alone drive risk to Lake Michigan salmonids. Returning adults are not likely to experience adverse reproductive effects solely as a result of exposure to concentrations of PCBs originating from the Sheboygan River.

Piscivorous wildlife and fish may consume these smolts or other young fish, which may contain relatively high concentrations of PCBs, in the Sheboygan River or soon after they outmigrate to Lake Michigan. As described in Section 5.0 of the risk assessment, evaluating risks to these species is dependent on many factors, including the overall percentage of diet that is made up of smolts.

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APPENDIX H

Recommendations for Long-Term Monitoring

APPENDIX H
RECOMMENDATIONS FOR LONG-TERM MONITORING

This appendix provides an outline of recommendations for a long-term monitoring program in the Sheboygan River and Harbor that can be used to evaluate the effectiveness of the selected remedial alternative in reducing risk to fish and wildlife from exposure to polychlorinated biphenyls (PCBs). This monitoring program should be developed in coordination with the U.S. Environmental Protection Agency (USEPA), the Wisconsin Department of Natural Resources (WDNR), and the natural resource trustee agencies. Recommendations are made in this appendix to serve as a starting point for developing the program. The proposed monitoring program focuses on PCB concentrations in fish and sediment, because the greatest risks identified in the *Sheboygan River and Harbor Aquatic Ecological Risk Assessment* (ERA) were associated with PCB exposure to fish and wildlife. There are two basic objectives of the monitoring program:

- Provide the basis for evaluating the effectiveness of remedial actions by supplementing existing site data to establish a comprehensive pre-remediation baseline

- Generate data for periodic re-evaluation of potential fish, piscivorous wildlife, and human exposure to residual PCBs and associated risks

The primary recommendations for the monitoring program include three main components:

1) Resident fish monitoring of adult and young-of-year or juvenile fish

2) Caged fish studies using fathead minnows; these studies would be used to gather the data necessary to assess the contribution of PCBs in the water column to the observed PCB body burdens in resident fish

3) Sediment sampling

These recommendations were based in part on the availability of existing data from the Interim Monitoring Program (BBL 1996), the WDNR food chain study, and the ERA. Biological monitoring of floodplain areas, based on recommendations of the forthcoming floodplain ecological risk assessment, should also be incorporated in the monitoring program. The plan for conducting the baseline monitoring event should be developed and implemented, at a minimum, one year prior to remedial action, recognizing that detailed monitoring programs for all components of the monitoring program may not be developed prior to the completion of the remedial design. The preliminary recommended approach described below is compared to past monitoring and study efforts in Table H-1. Note that these details may change during discussions with other agencies.

Resident fish would be collected in late summer from the four river segments sampled in the ERA and other sampling efforts, Segments 1, 2, 3, and 5. Adult (> 9 in.) fish would be collected from each of the four sampling segments and analyzed for low resolution PCB congeners, moisture content, and lipids. Some of the fish would also be analyzed for high resolution PCB congeners. Adult fish would be collected twice during the baseline sampling event to look for a seasonal influence. Composite samples of young-of-year or juvenile (2–6 in.) fish would also be collected in each of the four segments and analyzed for low resolution PCB congeners. Some of the young-of-year or juvenile fish composite samples would also be analyzed for high resolution PCB congeners. The collection schedule would be determined in cooperation with other agencies and would need to be consistent from year to year.

Caged fathead minnows (0.3–1 g each) would be deployed in the same period each year (e.g., July or August) at each of the same 5 sites used in the Interim Monitoring Program (BBL 1996), unless remedy selection and feasibility study results indicate other areas of concern. Three vessels would be deployed at each site with 150 fish in each; only two vessels would be sampled. The third vessel would be for contingencies. Three composite samples would be collected from each of two vessels after three weeks of exposure and analyzed for low resolution PCB congeners, moisture content, and lipids. A three week exposure period appears to be sufficient based on the results of Rice and White (1987) and Jones and Sloan (1989) and is less likely to stress the fish.

For the sediment component, baseline sediment sampling would be accomplished during the predesign sampling event. The sampling and analysis plan for this event would be reviewed to ensure method compatibility. Long-term monitoring would begin with the verification sampling event following remedy implementation. A plan for continued sediment monitoring would be completed at that time.

Comments were received from other agencies during their review of this document in draft format. Suggested monitoring program elements included water column monitoring, snapping turtle monitoring, sediment traps, and analysis of fish eggs. The final program should be developed in consultation with all involved agencies, and a baseline sampling event should be conducted before any response actions are taken at the site.

Table H-1. Recommended monitoring approach compared to the ERA, the WDNR food chain study, and the Interim Monitoring Program

	Adult Fish (e.g., smallmouth bass)	Young-of-year/Juvenile Fish (e.g., smallmouth bass or white sucker)	Young-of-year/Juvenile Fish (e.g., white sucker)	Caged Fish
Sampling Location Recommendation	Segments 1, 2, 3, 5 (only Segments 2, 3, and 5 were sampled in IMP 1994, 1995)	Segments 1, 2, 3, 5	Segments 1, 2, 3, 5	5 stations (see Figure H-1)
Size Range				
ERA	na	5-8 inches	na	na
WDNR food chain study	8-12 inches	2-4 inches	2-5 inches	na
IMP Work Plan	> 9 inches	na	3-8 inches	Not specified
IMP 1994, 1995	9-15 inches	na	3-6 inches	0.3-1.0 g, average weight per fish
Recommendation	>9 inches (WDNR suggestion; average weight 250 g)	2-6 inches (target 2-4 inches)	2-6 inches (target 2-4 inches)	0.3-1 g to be consistent with IMP 1994, 1995
Sampling Schedule				
ERA	na	Mid August	na	na
WDNR food chain study	October 13-24, 1994	October 13-24, 1994	October 13-24, 1994	na
IMP Work Plan	Not specified	na	Not specified	Not specified
IMP 1994, 1995	Late September	na	Late September	Deployed mid to late September
Recommendation	To be determined in consultation with agencies involved	To be determined in consultation with agencies involved	To be determined in consultation with agencies involved	Deploy in July or August (check for seasonal influence in baseline)

Table H-1. Recommended monitoring approach compared to the ERA, the WDNR food chain study, and the Interim Monitoring Program

	Adult Fish (e.g., smallmouth bass)	Young-of-year/Juvenile Fish (e.g., smallmouth bass or white sucker)	Young-of-year/Juvenile Fish (e.g., white sucker)	Caged Fish
Number of Fish and Composites per Location				
ERA	na	11-14 fish total; 3-5 fish per composite; 3 composites	na	
WDNR food chain study	9-12 fish total; 3-4 fish per composite; 3 composites	18-24 fish total; 6-8 fish per composite; 3 composites	18-27 fish total; 6-9 fish per composite; 3 composites	
IMP Work Plan	12 fish analyzed individually (per compromise with WDNR)	na	Unclear if 25 individual fish or composites	2 vessels with 250 fish in each; duplicate 10-g composites of 20-25 fish collected from each vessel on 21st and 42nd days
IMP 1994, 1995	12 fish analyzed individually	na	50 fish total; 2 fish per composite; 25 composites (not enough fish collected for 25 composites in 1995 at 2 stations); not analyzed to date	200 fish in each of 2 vessels; duplicate composite samples collected from each vessel at 3 and 6 wks (insufficient sample volume in 1995)
Recommendation	To be determined in consultation with agencies involved	To be determined in consultation with agencies involved	To be determined in consultation with agencies involved	150 fish in each of 2 vessels (deploy an additional vessel with 150 fish for backup); 3 composites of 20-25 fish collected from each vessel at 3 wks (may need more fish to obtain sufficient sample for analysis)

Table H-1. Recommended monitoring approach compared to the ERA, the WDNR food chain study, and the Interim Monitoring Program

	Adult Fish (e.g., smallmouth bass)	Young-of-year/Juvenile Fish (e.g., smallmouth bass or white sucker)	Young-of-year/Juvenile Fish (e.g., white sucker)	Caged Fish
PCB Analysis				
ERA (congeners)	na	Axys (1997) method/USEPA method 1668	na	na
WDNR food chain study (congeners)	Wisconsin State Laboratory of Hygiene (SLOH) Method 1410	SLOH Method 1410	SLOH Method 1410	na
IMP Work Plan (Aroclors)	WDNR procedure 1400 (Ribick et al. 1982)	na	WDNR procedure 1400 (Ribick et al. 1982)	WDNR procedure 1400 (modified extraction [HES 1990])
IMP 1994, 1995 (Aroclors)	Information not available (method should be presented in BBL 1996a)	na	Information not available (method should be presented in BBL 1996a)	Information not available (method should be presented in BBL 1996a)
Recommendation	Axys (1997) method/USEPA method 1668 (low resolution congener analysis of all samples; high resolution analysis on 3 samples)	Axys (1997) method/USEPA method 1668 (low resolution congener analysis of all samples; high resolution analysis on 3 samples)	Axys (1997) methods (low resolution congener analysis on all samples)	Axys (1997) methods (low resolution congener analysis on all samples)
	Need to also analyze a standard reference material and perform a cross check between different laboratories and methods.			

Table H-1. Recommended monitoring approach compared to the ERA, the WDNR food chain study, and the Interim Monitoring Program

	Adult Fish (e.g., smallmouth bass)	Young-of-year/Juvenile Fish (e.g., smallmouth bass or white sucker)	Young-of-year/Juvenile Fish (e.g., white sucker)	Caged Fish
Lipid Analysis				
ERA	na	Modified Bligh and Dyer 1959 (methylene chloride)	na	na
WDNR food chain study	Not presented in QAPP (WDNR 1995)	Not presented in QAPP (WDNR 1995)	Not presented in QAPP (WDNR 1995)	na
IMP Work Plan	WDNR procedure 1400 (Ribick et al. 1982)	na	WDNR procedure 1400 (Ribick et al. 1982)	WDNR procedure 1400 (Ribick et al. 1982)
IMP 1994, 1995	Information not available (method should be presented in BBL 1996a)	na	Information not available (method should be presented in BBL 1996a)	Information not available (method should be presented in BBL 1996a)
Recommendation	Modified Bligh and Dyer 1959	Modified Bligh and Dyer 1959	Modified Bligh and Dyer 1959	Modified Bligh and Dyer 1959
Grams of tissue required for recommendation	aliquot from PCB extract	aliquot from PCB extract	aliquot from PCB extract	aliquot from PCB extract
Exposure Period				
IMP Work Plan	na	na	na	3 and 6 week collection (analyze at 6 weeks)
IMP 1994, 1995	na	na	na	3 and 6 week collections and analysis; 3 vs 6 week concentrations varied (equal in 1994 and 2x in 1995)
Recommendation	na	na	na	3 week collection and analysis

SOURCE:
ERA - Sheboygan River and Harbor Aquatic Ecological Risk Assessment
WDNR food chain study - WDNR (1996)
IMP Work Plan - BBL (1996a)
IMP 1994 - BBL (1995)
IMP 1995 - BBL (1996b)

NOTE:
IMP - Interim Monitoring Program
na - not applicable
QAPP - quality assurance project plan
WDNR - Wisconsin Department of Natural Resources

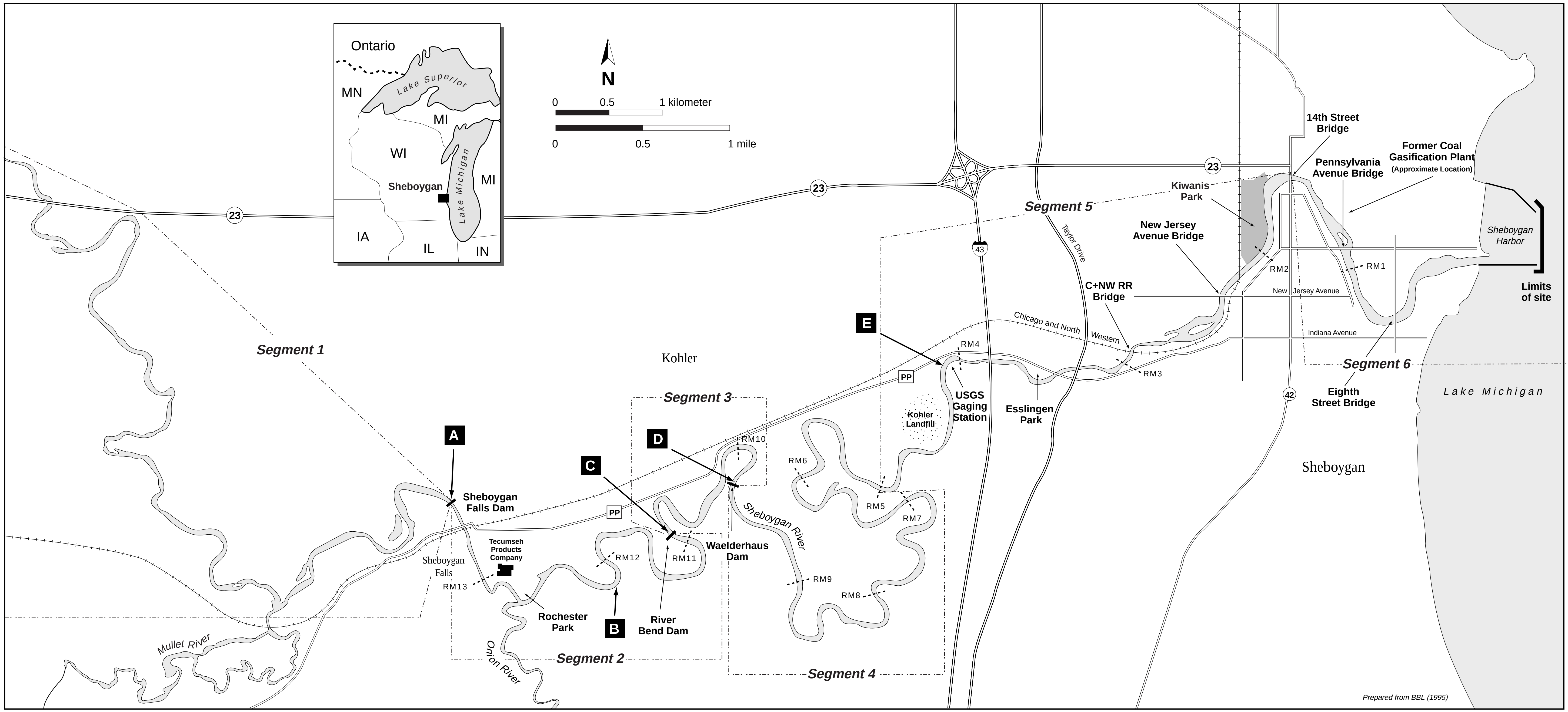

Figure H-1. Location of previous caged fish samples for the Interim Monitoring Program

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APPENDIX I

Analytical Methods

APPENDIX I
ANALYTICAL METHODS

Methods used for the analysis of sediment and tissue collected in August 1997 as part of the *Sheboygan River and Harbor Aquatic Ecological Risk Assessment* are presented in this Appendix. A summary of the data quality objectives, including the specific analytical methods used, is presented in Table I-1 and the targeted detection limits are presented in Table I-2.

All methods are readily accessible in common procedural literature (e.g., U.S. Environmental Protection Agency methods) except the method used by Axys Analytical Services Ltd. for the low resolution analysis of PCB congeners. This method is provided in Attachment I-1.

Table I-1. Summary of data quality objectives

PARAMETER	UNITS	METHOD DETECTION LIMIT	SAMPLE SIZE	PRECISION	ACCURACY	COMPLETENESS	METHOD	REFERENCE	LAB
Sediment									
Total Metals	mg/kg (dry weight)	0.15–95	50 g	±35%	±35%	95%	GFAA/ ICP	USEPA 6010/700	ARI
Mercury	mg/kg (dry weight)	0.05	Aliquot from total metals	±35%	±35%	95%	CVAA	USEPA Method 7471	ARI
Pesticides/ PCBs	µg/kg (dry weight)	0.6–7	150 g	±50%	±50%	95%	GC/ECD	USEPA 8081	ARI
PCB Congeners	pg/g (dry weight)	0.1	30 g	±50%	70-120%	95%	GC/MS	Axys CL-S-01 /Ver.2	Axys
Toxic PCB Congeners	pg/g (dry weight)	0.2–1.5	30 g	±50%	70-120%	95 %	HRGC/HRMS	USEPA Method 1668	Axys
Dioxins and Furans	pg/g (dry weight)	0.05–0.8	30 g	±50%	70-120%	95%	HRGC/HRMS	USEPA Method 1613B	Axys
PAHs	µg/kg (dry weight)	10	150 g	±50%	±50%	95%	GC/MS-SIM	Modified USEPA 8270	ARI
Total organic carbon	% (dry weight)	0.1	25 g	±20%	±20%	95%	Combustion	PSEP 1986; Standard Method 5310B	ARI
Acid-volatile sulfides	µmole/g	0.9	10 g	±30%	±25%	95%	Distillation, titration	Allen et al. 1991	ARI
Simultaneously extracted metals	µmole/g	0.02–0.5	From AVS extract	±35%	±35%	95%	ICP/GFAA	Modified CLP after extraction	ARI
Moisture Content	%	0.1	50 g	±10%	±20%	95%	Combustion	USEPA Method 160.3	ARI
Grain size	0.0001 (dry weight)	na	500 g	±30%	na	95%	Sieve	ASTM D422	Soil Tech.

Table I-1, continued

Parameter	Units	Method Detection Limit	Sample Size	Precision	Accuracy	Completeness	Method	Reference	Lab
Tissue									
Total Metals	mg/kg (as received)	0.025–20	10 g	±35%	±35%	95%	GFAA/ ICP	USEPA 6010/700	ARI
Mercury	mg/kg (as received)	0.005	Aliquot from total metals	±35%	±35%	95%	CVAA	USEPA Method 7471	ARI
Pesticides/ PCBs	µg/kg (as received)	17–100	30 g	±50%	±50%	95%	GC/ECD	Modified USEPA 8081	ARI
PCB Congeners	pg/g (as received)	0.1	30 g	±50%	70-120%	95%	GC/MS	Axys CL-T-02 /Vers. 2	Axys
Toxic PCB Congeners	ng/g (as received)	0.1	30 g	±50%	70-120%	95%	HRGC/HRMS	USEPA Method 1668	Axys
PAHs	µg/kg (as received)	7	20 g	±50%	±50%	95%	GC/MS-SIM	PSEP 1997	ARI
Dioxins and Furans	pg/g (as received)	0.05–0.8	30 g	±50%	70-120%	95%	HRGC/HRMS	USEPA Method 1613B	Axys
Moisture Content	%	0.1	20 g	±10%	±20%	95%	Combustion	USEPA Method 160.3	ARI
Percent lipids	%	na	Aliquot from PAH	±30%	na	95%	Gravimetric	Bligh and Dyer 1959	ARI

NOTE: ARI - Analytical Resources, Inc.
Axys - Axys Analytical Services, Ltd.
CVAA - cold vapor atomic absorption
GC/ECD - gas chromatography/electron captured detector
GC/MS - gas chromatography/mass spectrometry
GFAA - graphite furnace atomic absorption
HRGC/HRMS - High resolution gas chromatography/high resolution mass spectrometry
ICP - inductively coupled plasma atomic emission spectrometry
na - not applicable
PAH - polycyclic aromatic hydrocarbon
PCB - polychlorinated biphenyl
PSEP - Puget Sound Estuary Program
SIM - selected ion monitoring
Soil Tech. - Soil Technology, Inc.
USEPA - U.S. Environmental Protection Agency

Table I-2. Targeted detection limits

Analyte	Sediment	Fish Tissue
PAHs[a] (µg/kg)		
Acenaphthylene	7	na
Acenaphthene	7	na
Fluorene	7	na
Phenanthrene	7	na
Anthracene	7	na
Fluoranthene	7	na
Pyrene	7	na
Benz(a)anthracene	7	na
Chrysene	7	na
Benzo(b)fluoranthene	7	na
Benzo(k)fluoranthene	7	na
Benzo(a)pyrene	7	na
Indeno(1,2,3-cd,)pyrene	7	na
Naphthalene	7	na
Pesticides/PCBs[b] (µg/kg)		
Gamma-BHC Lindane	1.0	na
Heptachlor epoxide	1.0	na
Dieldrin	2.0	na
P,p'-DDE	2.0	na
Endrin	2.0	na
P,p'-DDD	2.0	na
P,p' -DDT	2.0	na
Chlordane	1.0	na
Total DDT	1.0	na
PCBs (each Aroclor)	20	na
Aroclor 1221	40	na
Metals[c] (mg/kg)		
Arsenic	5	na
Cadmium	0.25	na
Chromium	17	na
Copper	12	na
Lead	17	na
Mercury	0.075	na
Nickel	7	na
Silver	0.5	na
Zinc	47	na
PCB Congeners (BZ no.)[d] (ng/g wet weight)		
2,3/2,4′ (5/8)	0.1	0.1
4,4′ (15)	0.1	0.1
2,2′,3/2,4′,6 (16/32)	0.1	0.1
2,2′,4 (17)	0.1	0.1
2,2′,5 (18)	0.1	0.1
2,2′,6 (19)	0.1	0.1
2,3,4′ (22)	0.1	0.1
2,3,6/2,3′,6 (24/27)	0.1	0.1

Table I-2. continued

ANALYTE	SEDIMENT	FISH TISSUE
2,3′,4 (25)	0.1	0.1
2,3′,5 (26)	0.1	0.1
2,4,4′/2,4′,5 (28/31)	0.1	0.1
2′,3,4 (33)	0.1	0.1
2,2′,3,3′ (40)	0.1	0.1
2,2′,3,4/2,3,4′,6/2,3′,4′,6 (41/64/71)	0.1	0.1
2,2′,3,4′ (42)	0.1	0.1
2,2′,3,5′ (44)	0.1	0.1
2,2′,3,6 (45)	0.1	0.1
2,2′,3,6′ (46)	0.1	0.1
2,2′,4,4′/2,2′4,5 (47/48)	0.1	0.1
2,2′,4,5′ (49)	0.1	0.1
2,2′,5,5′ (52)	0.1	0.1
2,3,3′,4′/2,3,4,4′ (56/60)	0.1	0.1
2,3′,4,5′ (68)	0.1	0.1
2,3′,4′,5/2′,3,4,5 (70/76)	0.1	0.1
2,4,4′,5 (74)	0.1	0.1
2,2′,3,3′,5 (83)	0.1	0.1
2,2′,3,3′,6/2,2′,3,4,6′ (84/89)	0.1	0.1
2,2′,3,4,4′ (85)	0.1	0.1
2,2′,3,4,5′ (87)	0.1	0.1
2,2′,3,4′,5/2,2′,4,5,5′ (90/101)	0.1	0.1
2,2′,3,4′,6 (91)	0.1	0.1
2,2′,3,5′,6 (95)	0.1	0.1
2,2′,3′,4,5 (97)	0.1	0.1
2,2′,4,4′,5 (99)	0.1	0.1
2,3,3′,4′,5 (107)	0.1	0.1
2,3,3′,4′,6 (110)	0.1	0.1
2,2′,3,3′,4,4′ (128)	0.1	0.1
2,2′,3,3′,4,5 (129)	0.1	0.1
2,2′,3,3′,4,5′ (130)	0.1	0.1
2,2′,3,3′,4,6 (131)	0.1	0.1
2,2′,3,3′,5,6 (134)	0.1	0.1
2,2′,3,3′,5,6′/2,2′,3,4,5′,6 (135/144)	0.1	0.1
2,2′,3,3′,6,6′ (136)	0.1	0.1
2,2′,3,4,4′,5 (137)	0.1	0.1
2,2′,3,4,4′,5′/2,3,3′,4′,5,6/2,3,3′,4′,5′,6 (138/163/164)	0.1	0.1
2,2′,3,4,5,5′ (141)	0.1	0.1
2,2′,3,4,5′,6 (144)	0.1	0.1
2,2′,3,4′,5,5′ (146)	0.1	0.1
2,2′,3,4′,5′,6 (149)	0.1	0.1
2,2′,3,5,5′,6 (151)	0.1	0.1
2,2′,4,4′,5,5′ (153)	0.1	0.1
2,3,3′,4,4′,5′ (157)	0.1	0.1
2,3,3′,4,4′,6 (158)	0.1	0.1
2,2′,3,3′,4,4′,5/2,3,3′,4,4′,5,6 (170/190)	0.1	0.1
2,2′,3,3′,4,4′,6 (171)	0.1	0.1

Table I-2. continued

ANALYTE	SEDIMENT	FISH TISSUE
2,2′,3,3′,4,5,5′ (172)	0.1	0.1
2,2′,3,3′,4,5,6′ (174)	0.1	0.1
2,2′,3,3′,4,5′,6 (175)	0.1	0.1
2,2′,3,3′,4,6,6′ (176)	0.1	0.1
2,2′,3,3′,4′,5,6 (177)	0.1	0.1
2,2′,3,3′,5,5′,6 (178)	0.1	0.1
2,2′,3,3′,5,6,6′ (179)	0.1	0.1
2,2′,3,4,4′,5,6′/2,2′,3,4′,5,5′,6 (182/187)	0.1	0.1
2,2′,3,4,4′,5′,6 (183)	0.1	0.1
2,2′,3,4,5,5′,6 (185)	0.1	0.1
2,3,3′,4,4′,5′,6 (191)	0.1	0.1
2,3,3′,4′,5,5′,6 (193)	0.1	0.1
2,2′,3,3′,4,4′,5,5′ (194)	0.1	0.1
2,2′,3,3′,4,4′,5,6 (195)	0.1	0.1
2,2′,3,3′,4,4′,5,6′ (196)	0.1	0.1
2,2′,3,3′,4,4′,6,6′ (197)	0.1	0.1
2,2′,3,3′,4,5,5′,6 (198)	0.1	0.1
2,2′,3,3′,4,5,6,6′ (199)	0.1	0.1
2,2′,3,3′,4,5,5′,6′ (201)	0.1	0.1
2,2′,3,4,4′,5,5′,6 (203)	0.1	0.1
2,3,3′,4,4′,5,5′,6 (205)	0.1	0.1
2,2′,3,3′,4,4′,5,5′,6 (206)	0.1	0.1
2,2′,3,3′,4,4′,5,6,6′ (207)	0.1	0.1
2,2′,3,3′,4,5,5′,6,6′ (208)	0.1	0.1
2,2′,3,3′,4,4′,5,5′,6,6′ (209)	0.1	0.1
Toxic PCB Congeners (BZ no.)[d,e] (pg/g wet weight)		
3,3′,4,4′ (77)	0.23	0.23
2′,3,4,4′,5 (123)	0.50	0.50
2,3′,4,4′,5 (118)	0.50	0.50
2,3,4,4′,5 (114)	0.50	0.50
2,3,3′,4,4′ (105)	0.50	0.50
3,3′,4,4′,5 (126)	0.50	0.50
2,3′,4,4′,5,5′ (169)	1.00	1.00
2,3,3′,4,4′,5 (156)	1.00	1.00
2,3′,4,4′,5,5′ (167)	1.00	1.00
2,2′,3,4,4′,5,5′ (180)	1.00	1.00
2,2′,3,3′,4,4′,5 (170)	1.00	1.00
2,3,3′,4,4′,5,5′ (189)	1.00	1.00
Dioxins/furans[e] (pg/g wet weight)	0.2–1.5	0.2–1.5
2,3,7,8-TCDD	0.02	0.02
1,2,3,7,8-PeCDD	0.04	0.04
1,2,3,4,7,8-HxCDD	0.06	0.06
1,2,3,6,7,8-HxCDD	0.06	0.06
1,2,3,7,8,9-HxCDD	0.06	0.06
1,2,3,4,6,7,8-HpCDD	0.15	0.15
OCDD	0.25	0.25

Table I-2. continued

ANALYTE	SEDIMENT	FISH TISSUE
2,3,7,8-TCDF	0.02	0.02
1,2,3,7,8-PeCDF	0.04	0.04
2,3,4,7,8-PeCDF	0.06	0.06
1,2,3,4,7,8-HxCDF	0.06	0.06
1,2,3,6,7,8-HxCDF	0.06	0.06
1,2,3,7,8,9-HxCDF	0.06	0.06
2,3,4,6,7,8-HxCDF	0.06	0.06
1,2,3,4,6,7,8-HpCDF	0.15	0.15
1,2,3,4,7,8,9-HpCDF	0.15	0.15
OCDF	0.25	0.25
Total Tetra-dioxins	0.02	0.02
Total Penta-dioxins	0.04	0.04
Total Hexa-dioxins	0.06	0.06
Total Hepta-dioxins	0.15	0.15
Total Tetra-furans	0.02	0.02
Total Penta-furans	0.04	0.04
Total Hexa-furans	0.06	0.06
Total Hepta-furans	0.15	0.15
Acid Volatile Sulfides (µmole/g)	0.9	na
Simultaneously Extracted Metals (µmole/g)	0.02–0.5	na
Total Organic Carbon (%)	0.1	
Moisture Content (%)	0.1	na
Percent Lipids	na	na
Grain Size	0.0001	na

NOTE: na - not applicable
PAH - polycyclic aromatic hydrocarbon
PCB - polychlorinated biphenyl

[a] PAHs in sediment and tissue are based on detection limits in the WDNR food chain study. This detection limit for sediment is lower than threshold effects levels (TELs) for individual PAHs. The detection limit for tissues is slightly higher than in the food chain study (7 µg/kg). The laboratory (Analytical Resources, Inc. [ARI]) may be able to obtain a detection limit of 5 µg/kg barring any matrix interferences.

[b] Pesticides/PCBs target detection limits in sediment are equal to the TEL (Smith et al. 1996; USEPA 1996). Pesticides/PCBs in mussel tissue are equal to the laboratory (ARI) detection limits.

[c] Metals in sediment are equal to the TEL, except for silver which is equal to the effects range low (ERL). Metals in mussels are the lowest concentrations that were detected in crayfish or insects during the WDNR food chain study for arsenic and copper. For other metals, the target detection limits are equal to the laboratory (ARI) detection limit, because the lowest concentrations in the food chain study could not be obtained (cadmium, chromium, lead, mercury, and silver), or previous data were not available (nickel, zinc).

[d] Ballschmiter-Zell (BZ) number is in parentheses.

[e] Laboratory (Axys Analytical Services, Inc.) detection limits. These are lower than the concentrations associated with TCDD risk to fish in tissue (50 pg/g) and sediment (60 pg/g) (USEPA 1993).

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Attachment I-1

Axys Analytical Services Ltd.

Analysis of PCB congeners
in tissue and sediment/soil samples

ANALYSIS OF PCB CONGENERS IN TISSUE AND SEDIMENT/SOIL SAMPLES

All samples were spiked with an aliquot of surrogate standard solution containing ^{13}C-labelled surrogates (see Table 1). Tissue samples were extracted by column elution and sediment/soil samples were extracted by shaking with solvent. The raw extract was fractionated and cleaned up on a Florisil column. The first fraction (F1) was analyzed by high resolution gas chromatography with low resolution (quadrupole) mass spectrometric detection (HRGC/LRMS) for PCBs as individual congeners.

1. Extraction

Tissue: A subsample of homogenized wet tissue (approximately 10 g wet for initial analyses and 1 g wet for repeat analyses) was mixed with powdered anhydrous sodium sulphate, spiked with an aliquot of the surrogate standard solution and loaded into a chromatographic column. The sample was extracted by eluting the column with 100 mL dichloromethane (DCM) at a rate of 3-5 mL per minute. One mL hexane was added to the DCM and the extract was concentrated to about 5 mL. At this point the raw extract was subsampled for gravimetric lipid determination.

The extract was loaded onto a calibrated Biobeads SX-3 column and eluted with 1:1 dichloromethane:hexane. The Biobeads column is calibrated for the separation of the organochlorines of interest from lipids and other biogenic compounds. The extract was concentrated prior to column cleanup and fractionation.

A separate subsample of tissue was used for gravimetric moisture determination.

Sediment/Soil: A subsample of wet sediment (approximately 10 to 15 g) was weighed into a round bottom flask, spiked with an aliquot of the surrogate standard solution and extracted by shaking with 1:1 methanol:dichloromethane (20 min., decanted) and dichloromethane (20 min., decanted). The extracts were combined and the solvent back-extracted with extracted, distilled water (twice). The extract was dried over anhydrous sodium sulphate, reduced in volume and allowed to react with activated copper to remove sulphur.

A separate subsample of sediment was used for gravimetric moisture determination.

2. Column Chromatography For PCB Congeners

The extract was applied to a Florisil column for which cutpoints had been previously determined. The column was eluted with hexane. The F1 fraction contained the majority of the PCB congeners, (only a few coplanar PCBs not measured by this method elute into F2). F1 was concentrated to a small volume and sediment/soil extracts were again treated with activated copper. All extracts were spiked with an aliquot of recovery standard solution (^{13}C-labelled PCB 153) prior to instrumental analysis.

3. HRGC/LRMS Analysis Of PCB Congeners

The F1+F2 fraction was analyzed for PCBs as individual PCB congeners using a Finnigan INCOS 50 mass spectrometer equipped with a Varian 3400 GC, a CTC autosampler and a Prolab Envirolink system for MS control and data acquisition. Chromatographic separation was achieved using a J&W DB-5 column (60 m x 0.25 mm i.d., o.25 µm film thickness). The MS was operated at unit mass resolution in the EI mode using multiple ion detection (MID) to enhanace sensitivity, acquiring at least two characteristic ions for each target analyte and surrogate standard. The ions monitored were as described in Table 2. A split/splitless injection sequence was used. Reported concentrations were corrected for the recovery of the surrogate standards added prior to workup.

4. Quantification

Compounds were identified if the GC/MS data satisfied the following criteria:

i) The retention time of the peak was within three seconds of the predicted time from that authentic compound in the calibration standard.

ii) Peak response of both ions was at least three times the background noise level.

iii) Peak maxima for both characteristic ions coincided within two seconds.

iv) The ratio of characteristic ion peak areas must have been within +/-20% of the value found in the calibration standard.

Quantification was conducted using HP EnviroQuant and Prolab-MS Extend software linked to Excel spreadsheets. The chromatograms supplied and the ProLab quantitation summary sheets are provided to give areas and retention times only; the data values shown are raw (absolute) numbers and final concentrations are to be taken from final data reports only.

A five point calibration curve was used to determine instrument linearity prior to the analysis of samples. The concentration of the identified compounds were calculated against the surrogate standards thereby automatically correcting the data for the recovery of the surrogates. Mean relative response factors, determined from the calibration standard runs made before and after each batch of samples run were used for quantification.

5. Calculations

Concentrations: The internal standard method was used to quantify all target analytes in the samples. All data reported are corrected for the recovery of the surrogate. Conc $_i$, the concentration of a target analyte was calculated using the following equations:

$$Conc_i = \frac{A_i}{A_{si}} \; x \; \frac{W_{si}}{RRF_{i,si}} \; x \; \frac{1}{W_x}$$

where A_i = area of the analyte peak of interest (compound i)
A_{si} = area of labelled surrogate used to quantify i
W_x = weight of sample taken for analysis
W_{si} = weight of labelled surrogate (compound si) added to sample
$RRF_{i,si}$ = mean relative response factor of i to si from the bracketing calibration runs and defined as

$$\frac{A_i}{A_{si}} \; x \; \frac{W_{si}}{W_i}$$

Detection Limits: Detection limits (DL_i) were also calculated for each analyte using the concentration equations given above, with the minimum detectable peak area used for A_i as follows:

$$DL_i \;=\; \frac{AMIN_I}{A_{si}} \; x \; \frac{W_{si}}{RRF_{i,si}} \; x \; \frac{1}{W_x}$$

where $AMIN_i$ = minimum detectable peak area in the channel of interest

and A_{si}, W_x, W_{si} and $RRF_{i,si}$ as defined above.

$AMIN_i$ is calculated from N, the maximum noise in the predetermined "window" on the mass chromatogram channel of interest as follows:

$$AMIN_i \;=\; N \, x \, \frac{A_s}{H_s} \, x \, 3$$

where N was determined by the EnviroQuant/Prolab software; and A_s and H_s are the area and the height of the peak for ^{13}C-PCB 101.

The noise for each target analyte was determined from the actual chromatogram of the sample of interest.

Surrogate Standard Recoveries: Recoveries of surrogate standards were calculated using the following equations:

$$\%Recovery \;=\; \frac{A_{si}}{A_{rs}} \; x \; \frac{W_{rs}}{RRF_{si,rs}} \; x \; \frac{1}{W_{si}} \; x \; 100$$

where A_{rs} and A_{si} were the peak areas of recovery (internal) standard and labelled surrogate added to the sample, W_{rs} and W_{si} were the weights of recovery standard and labelled surrogate added to the sample, and

$RRF_{si,rs}$ was the mean relative response factor of the labelled surrogate to the recovery standard as determined by daily runs of the quantification solution and defined as

$$\frac{A_{si}}{A_{rs}} \ x \ \frac{W_{rs}}{W_{si}}$$

Surrogate standard recoveries (reported with each sample result) were required to be in the range considered acceptable.

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TABLE 1.

SURROGATE AND INTERNAL (RECOVERY) STANDARD USED FOR PCB ANALYSES

SURROGATE STANDARD (Axys ID CL027A-SUR)
$^{13}C_{12}$-PCB 101
$^{13}C_{12}$-PCB 105
$^{13}C_{12}$-PCB 118
$^{13}C_{12}$-PCB 180
$^{13}C_{12}$-PCB 209

INTERNAL (RECOVERY) STANDARD (Axys ID CL0010A-REC)
$^{13}C_{12}$-PCB 153

TABLE 2.

IONS MONITORED BY HRGC/LRMS FOR QUANTIFICATION OF PCBs

PCB CONGENER GROUP	QUANTITATION ION	CONFIRMING ION
Dichlorobiphenyls	222	224
Trichlorobiphenyls	256	258
Tetrachlorobiphenyls	290	292
Pentachlorobiphenyls	326	328, 330
Hexachlorobiphenyls	360	362
Heptachlorobiphenyls	394	396
Octachlorobiphenyls	428	430
Nonachlorobiphenyls	462	464
Decachlorobiphenyl	498	500

APPENDIX J

Taxonomic Methods

LABORATORY TAXONOMIC METHODS

EcoAnalysts, Inc. used the methods described below to process the macroinvertebrate samples from this project. Included are lists of the equipment and some of the taxonomic keys employed.

We received the samples, inventoried them, and compared our findings with the chain-of-custody forms enclosed with the samples. After assuring we had all the samples, we entered the sample identification information into our computerized tracking system. A technician re-screened the samples to remove the formalin solution in which the samples were originally preserved. The technician returned the samples to their original containers and filled them with 70% ethanol containing 1.5 grams/gallon of Rose Bengal dye. We let the samples stand for three days, agitating each sample twice a day to ensure the stain was well distributed.

After staining was complete, our technicians sorted the samples. The protocol provided by EVS Environment Consultants (EVS) permitted count-based subsampling if necessary, with a target count of 500 organisms and a 95% sorting efficacy. If a sample was subsampled, the following procedures were used. The material from each sample was evenly distributed throughout a gridded (30, 6x6 cm squares) Caton (1991) subsampler. A square was chosen at random and the material removed from the tray and placed in a glass petri dish. Using dissecting stereomicroscopes, technicians removed all the invertebrates from the material. Each square was sorted completely, even if the technician reached the target count "mid-square." The technician returned the sorted material to the original sample container. Another square was selected and the process repeated until the sorter reached the target count or completely sorted the sample. Technicians placed the sorted invertebrates in plastic vials, covered them with 70% ethanol, and inserted appropriate labels. On the sample label and on the associated sorting record sheets, the technician recorded the number of individuals removed.

After the initial sort was complete, the sample material (or sorted portion thereof) was redistributed (by a different technician) in a Caton tray for the quality control (QC) sort. The new technician resorted six squares (20% of the area) using the method described. Any invertebrates removed during this sort were added to the total from the first sort and this grand total was divided into the QC resort total to calculate a percent efficacy. If the QC sort exceeded 5% of the grand total, the technician resorted the entire sample and the QC process was repeated until the sample passed. We recorded all pertinent information on a QC sheet and delivered it to EVS.

Once samples were satisfactorily sorted, they were identified by our staff taxonomists. The macroinvertebrates were removed from the sorting vials, sorted morphologically, enumerated, and identified. EVS specified that Insecta be identified to the lowest practical level (genus and species) including Chironomidae to genus, and Oligochata (aquatic worms) to family. Other non-insect taxa were taken to the lowest practical level. The keys used in making the identifications are listed below. In addition, our taxonomists referred to our specimen reference collection, most of which have been verified by recognized experts. Questionable identifications were examined by all of our taxonomists. Damaged or immature specimens were identified to the lowest possible level and noted, as were any pupae encountered. Our midge specialist identified Chrionomidae specimens under a compound scope using temporary wet mounts. Oligochaetes were mounted on glass slides in CMCP-10, dried, and identified with a compound microscope. We compiled a synoptic collection of the taxa identified in the project, which was reviewed by all of our taxonomists upon completion of the project.

As they were determined, identifications and enumerations were recorded and entered into a desktop computer using our customized entry program. The data were associated with their respective sample identifiers, compiled, formatted, and delivered to EVS.

Equipment/supplies used:

- Zeiss Stemi 2000 dissecting microscope
- Fiber optic light source
- Caton subsamplers
- Zeiss Axiolab phase contrast compound microscope with turret condenser
- 70% ethanol for preservative
- Tally counters
- Water/alcohol-proof pens
- Label paper
- Miscellaneous forceps, petri dishes, probes, etc.
- Taxonomic keys
- Specimen reference collection, representing over 700 taxa
- Archive-quality laser printed taxa and determination labels
- Desktop computer

Taxonomic Keys:
This list includes specifically those keys used on this particular project. Our library includes more than 700 individual articles, papers, and handbooks we use address taxonomy at the genus and species level.

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