Appendix A-1. Summary of chemical and physical analyses performed on sediments and pore waters from SEMO sediment toxicity studies. [Methods: ICPMS=inductively-coupled plasma-mass spectroscopy; ICPAES=inductively-coupled plasma-atomic emission spectroscopy; ISE-ion-selective electrode. Laboratories: CERC=USGS Columbia (MO) Environmental Research Center; Huffman=Huffman Laboratories, Golden CO; LET=L-E-T laboratories, Columbia MO; CRMT=USGS Central Region Minerals Team, Denver CO.

Sample and Analyte	Method	Reference	Units	Detection limit	Lab
SEDIMENT					
Conventionals					
Moisture content	Gravimetric	ASTM D2216-05	(%)	0.2	CERC
Particle size distrib.	Hydrometer	ASTM D422-07	(%)	0.5	CERC
Total organic carbon	Acidification/combustion	USEPA 415.1	(%)	0.1	Huffman
Total Recoverable Metals					
Arsenic	ICPMS (Semi-quantitative scan)	Brumbaugh and May (2008)	(mg/kg DW)	0.1	CERC
Cadmium				0.1	
Chromium				0.1	
Copper				0.1	
Iron				0.5	
Lead				0.1	
Manganese				0.1	
Nickel				0.1	
Zinc				0.5	
Acid-volatile sulfide (AVS) and simultaneously-extracted metals (SEM)					
AVS	Purge/trap; ISE	Brumbaugh et al. (2007); USEPA 376.3	(umol/g DW)	0.05	CERC
Cadmium	ICPMS (Quantitative mode)		(mg/kg DW)	1	
Copper				1	
Nickel				1	
Lead				1	
Zinc				10	
WATER					
Conventionals					
Water Temperature	Orion 140 S-C-T Meter	User Manual	(degrees C)	NA	CERC
Dissolved Oxygen	YSI Meter & Probe		(mg/L)	NA	
Alkalinity	Orion EA940 Meter	APHA et al. (2005)	(mg/L as CaCO3)	NA	
Hardness	EDTA Titration			NA	
Conductivity	Orion 140 S-C-T Meter	User Manual	(uS/cm)	NA	
pH	Orion EA940 Meter		(pH units)	NA	
Ammonia	Orion EA940 Meter		(mg N/L)	0.1	
Dissolved Organic Carbon	UV oxidation/ coulometric titration	USEPA 415.2	(mg/L)	0.2	Huffman
Major Cations					
Manganese	ICPAES	USEPA 200.7	(mg/L)	0.002	LET
Iron				0.02	
Calcium				0.01	
Magnesium				0.01	
Potassium				0.1	
Sodium				0.05	
Trace Metals					
Cadmium	ICPMS (Quantitative mode)	Brumbaugh et al. (2007); USEPA 200.8	(ug/L)	0.05	CERC
Copper				0.2	
Lead				0.1	
Nickel				0.7	
Zinc				1.0	
Anions					
Chloride	Ion chromatography	USEPA 300.0	(mg/L)	0.1	USGS CRMT
Sulfate				0.1	
Nitrate				0.1	

Appendix A-2. Summary of selected quality assurance/quality control results for analysis of SEMO sediments and pore waters. [See Appendix A-1 for analytes and methods. RPD, relative percent difference between duplicates; RSD, relative standard deviation. For missing data: na=not applicable; nd=not determined (below detection limit).]

Recovery from Spiked Samples

					Mean spike recovery (%)					
Matrix	**Spike type**	**Preparation method**	**Analysis method**	**n**	**Cu**	**Ni**	**Zn**	**Cd**	**Pb**	**AVS**
Sediment	pre-digestion	total recoverable	ICPMS-SQ	4	91	94	94	93	107	na
Sediment blank	pre-extraction	SEM-AVS	ICPMS-Q / ISE	2	85	90	94	95	93	102
Pore water	analysis spike	peeper	ICPMS-Q	2	92	92	94	92	92	na

Variation among Replicates:

					Mean RPD or RSD (%)					
Matrix	**Replicate type**	**Preparation method**	**Analysis method**	**n**	**Cu**	**Ni**	**Zn**	**Cd**	**Pb**	**AVS**
Sediment	triplicate digestion	total recoverable	ICPMS-SQ	3	2.3	1.3	2.7	4.8	1.2	na
Sediment	triplicate digestion	total recoverable	ICPMS-SQ	3	4.6	1.6	2.4	3.2	3.9	na
Sediment	duplicate extraction	SEM-AVS	ICPMS-Q / ISE	2	6.8	0.7	10.6	7.9	4.1	13.0
Pore water	analysis duplicate	peeper	ICPMS-Q	2	0.5	1.2	0.5	0.3	1.3	na
Pore water	method duplicate	centrifugation	ICPMS-SQ	1	0	nd	11	nd	0	na

Recovery from Reference Samples:

					Mean Recovery (%)[a]					
Reference ID	**Matrix**	**Preparation method**	**Analysis method**	**n**	**Cu**	**Ni**	**Zn**	**Cd**	**Pb**	**AVS**
NIST 2710	soil	total recoverable	ICPMS-SQ	1	78	100	104	91	99	na
NIST 2704	sediment	total recoverable	ICPMS-SQ	1	81	87	87	95	89	na
NIST 1645	sediment	SEM-AVS	ICPMS-Q / ISE	1	34	46	71	64	66	100
NIST 1643e	water	filtration	ICPMS-Q	2	96	99	100	96	99	na

[a] Metal recovery is expressed relative to total concentration; AVS recovery is expressed relative to CERC historical data.

Appendix A-3. Calculation of probable effect quotients (PEQs) from total-recoverable metal concentrations in two size fractions of SEMO sediments. Metal concentrations in bulk (<2 mm) and fine (<0.25 mm) sediment fractions were determined on a dry weight basis. [TOC=total organic carbon]

A. Total recoverable metal concentration (mg/kg dry wt):

Site ID	Ni		Cu		Zn		Cd		Pb	
	<2 mm	<0.25 mm	<2 mm	<0.25 mm	<2 mm	<0.25 mm	<2 mm	<0.25 mm	<2 mm	<0.25 mm
FL (Control)	20	10	10	10	53	43	0.2	0.2	13	10
SEMO-1	5	10	3	10	20	53	0.04	0.2	11	36
SEMO-2	7	20	4	10	810	1800	11	28	250	3000
SEMO-3	10	20	6	20	980	1700	18	32	840	1900
SEMO-4	20	30	20	80	740	1100	13	19	1500	2000
SEMO-5	10	20	20	50	470	810	8	14	850	1500
SEMO-6	20	30	20	60	530	1200	7	18	950	2300
SEMO-7	10	30	40	60	350	760	6	11	810	2600
SEMO-8	9	20	10	20	190	310	0.4	0.9	110	200
SEMO-9	20	20	30	40	300	390	3	4	1400	2000
SEMO-10	20	20	20	30	250	360	2	3	1200	1800
SEMO-11	10	10	10	10	130	160	1	1	270	340
SEMO-12	10	10	10	20	130	180	1	2	300	400
SEMO-13	10	10	10	10	140	170	1	2	310	360
SEMO-14	10	20	10	20	65	98	0.5	0.7	91	140
SEMO-15	30	20	20	20	180	200	2	2	680	820
SEMO-17	9	10	8	10	110	130	0.6	1	200	320
SEMO-18	20	20	20	20	180	180	2	2	350	350
SEMO-19	10	10	10	10	56	59	0.2	0.2	18	19
SEMO-20	6	7	8	6	31	41	0.2	0.2	35	49
SEMO-21	8	9	5	6	24	29	0.08	0.09	8	9

Appendix A-3 (continued)

B. Probable Effect Quotient (PEQ)

Site ID	Ni		Cu		Zn		Cd		Pb	
	<2 mm	<0.25 mm	<2 mm	<0.25 mm	<2 mm	<0.25 mm	<2 mm	<0.25 mm	<2 mm	<0.25 mm
FL (Control)	0.4	0.2	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.1
SEMO-1	0.1	0.2	0.0	0.1	0.0	0.1	0.0	0.0	0.1	0.3
SEMO-2	0.1	0.4	0.0	0.1	1.8	3.9	2.2	5.6	2.0	23.4
SEMO-3	0.2	0.4	0.0	0.1	2.1	3.7	3.6	6.4	6.6	14.8
SEMO-4	0.4	0.6	0.1	0.5	1.6	2.4	2.6	3.8	11.7	15.6
SEMO-5	0.2	0.4	0.1	0.3	1.0	1.8	1.6	2.8	6.6	11.7
SEMO-6	0.4	0.6	0.1	0.4	1.2	2.6	1.4	3.6	7.4	18.0
SEMO-7	0.2	0.6	0.3	0.4	0.8	1.7	1.2	2.2	6.3	20.3
SEMO-8	0.2	0.4	0.1	0.1	0.4	0.7	0.1	0.2	0.9	1.6
SEMO-9	0.4	0.4	0.2	0.3	0.7	0.8	0.6	0.8	10.9	15.6
SEMO-10	0.4	0.4	0.1	0.2	0.5	0.8	0.4	0.6	9.4	14.1
SEMO-11	0.2	0.2	0.1	0.1	0.3	0.3	0.2	0.2	2.1	2.7
SEMO-12	0.2	0.2	0.1	0.1	0.3	0.4	0.2	0.4	2.3	3.1
SEMO-13	0.2	0.2	0.1	0.1	0.3	0.4	0.2	0.4	2.4	2.8
SEMO-14	0.2	0.4	0.1	0.1	0.1	0.2	0.1	0.1	0.7	1.1
SEMO-15	0.6	0.4	0.1	0.1	0.4	0.4	0.4	0.4	5.3	6.4
SEMO-17	0.2	0.2	0.1	0.1	0.2	0.3	0.1	0.2	1.6	2.5
SEMO-18	0.4	0.4	0.1	0.1	0.4	0.4	0.4	0.4	2.7	2.7
SEMO-19	0.2	0.2	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.1
SEMO-20	0.1	0.1	0.1	0.0	0.1	0.1	0.0	0.0	0.3	0.4
SEMO-21	0.2	0.2	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.1

Appendix A-3 (continued)

C. Mean PEQ

Site ID	5 metals		Cd and Zn		Cd, Zn, Pb		TOC (%)	5 metals @ 1%TOC
	<2 mm	<0.25 mm	<2 mm	<0.25 mm	<2 mm	<0.25 mm		<2 mm
FL (Control)	0.1	0.1	0.1	0.1	0.1	0.1	1.00	0.1
SEMO-1	0.1	0.1	0.0	0.1	0.0	0.1	0.27	0.2
SEMO-2	1.2	6.7	2.0	4.8	2.0	11.0	0.12	10.2
SEMO-3	2.5	5.1	2.9	5.1	4.1	8.3	2.40	1.0
SEMO-4	3.3	4.6	2.1	3.1	5.3	7.3	4.07	0.8
SEMO-5	1.9	3.4	1.3	2.3	3.1	5.4	2.54	0.8
SEMO-6	2.1	5.0	1.3	3.1	3.3	8.1	2.49	0.8
SEMO-7	1.8	5.0	1.0	1.9	2.8	8.1	1.22	1.4
SEMO-8	0.3	0.6	0.2	0.4	0.5	0.8	0.48	0.7
SEMO-9	2.6	3.6	0.6	0.8	4.1	5.8	1.21	2.1
SEMO-10	2.2	3.2	0.5	0.7	3.4	5.1	0.58	3.7
SEMO-11	0.6	0.7	0.2	0.3	0.9	1.1	0.56	1.0
SEMO-12	0.6	0.9	0.2	0.4	0.9	1.3	0.86	0.7
SEMO-13	0.6	0.8	0.3	0.4	1.0	1.2	0.83	0.8
SEMO-14	0.2	0.4	0.1	0.2	0.3	0.5	0.67	0.4
SEMO-15	1.4	1.6	0.4	0.4	2.0	2.4	0.80	1.7
SEMO-17	0.4	0.7	0.2	0.2	0.6	1.0	0.27	1.6
SEMO-18	0.8	0.8	0.4	0.4	1.2	1.2	1.24	0.7
SEMO-19	0.1	0.1	0.1	0.1	0.1	0.1	1.07	0.1
SEMO-20	0.1	0.1	0.1	0.1	0.1	0.2	0.28	0.4
SEMO-21	0.1	0.1	0.0	0.0	0.0	0.1	0.60	0.1

Appendix A-4. Summary of test conditions whole-sediment toxicity tests conducted with amphipods and mussel in SEMO sediments. [References: USEPA 2000; ASTM 2008a,b; Wang et al. 2007b; Ingersoll et al. 2008]

Parameter	**Description**
Test type:	Whole-sediment exposures with water renewal (ASTM 2008a,b; USEPA 2000)
Test organisms	Amphipods (*Hyalella azteca*), about 7-d old Mussels (fatmucket, *Lampsilis siliquoidea*), 2-months old
Test sediments	20 SEMO sediments (Table 1) plus control (Florissant soil)
Temperature:	23±1°C
Lighting	Ambient laboratory light; 16 hr light/8 hr dark
Test chamber:	300-ml beakers, with screened overflow
Sediment preparation:	Amphipods: composite sediments (<2 mm particle diameter) Mussel: fine sediments (<250 µm particle diameter)
Sediment volume:	100 ml, with 175 ml of overlying water
Water Renewal:	2 volumes/d, starting 24 hours before start of test. Water and sediment equilibrated under static conditions for 7 d before the start of water renewal.
Organisms/beaker:	10
Number of replicates:	Amphipod: 5 per sediment (including one chamber for chemical analyses Mussels: 4 per sediment
Feeding:	Amphipods: yeast-cereal leaves-trout food suspension, 1 mL/d (1.8 mg/d) Mussels: Instant algal mixture; 2 ml twice daily (Wang et al. 2007b, ASTM 2008b)
Aeration:	None
Test water:	Diluted well water (200 mg/L hardness as $CaCO_3$ and pH 8.1)
Test Duration:	28 d
Chemical Analyses	See Appendix 1
Endpoints:	Survival, growth, and biomass. See text for details.
Test acceptability:	80% control survival. See also ASTM (2008a,b) and USEPA (2000) performance-based criteria.

Appendix A-5. Water quality of overlying water during sediment toxicity tests with SEMO sediments: (a) amphipod tests; (b) mussel tests. [Means and standard deviations (SD).]

Site ID	Temperature		Dissolved Oxygen		pH		Conductivity		Alkalinity		Hardness		Total Ammonia		Unionized Ammonia	
	(°C)		(mg/L)				(µS/cm)		(mg/L as $CaCO_3$)				(mg N/L)		(mg N/L)	
	[N=5]		[N=5]		[N=2]		[N=5]		[N=2]		[N=2]		[N=2]		[N=2]	
	Mean / SD		Mean / SD		Mean / SD		Mean / SD		Mean / SD		Mean / SD		Mean / SD		Mean / SD	
AMPHIPOD TEST																
CONTROL	22.5	1.0	6.2	1.0	8.32	0.16	360	22	145	16	205	7	0.20	0.24	0.010	0.014
SEMO-1	22.5	1.1	6.3	0.9	8.50	0.08	365	20	147	24	197	4	0.16	0.20	0.015	0.021
SEMO-2	22.6	0.8	5.9	1.0	8.51	0.07	363	19	148	17	188	20	0.16	0.21	0.015	0.021
SEMO-3	22.7	0.7	5.5	1.1	8.53	0.03	372	26	153	18	201	30	0.10	0.11	0.010	0.014
SEMO-4	22.7	0.8	6.1	0.9	8.45	0.03	362	22	148	17	195	7	0.23	0.30	0.025	0.035
SEMO-5	22.7	0.8	5.6	0.9	8.55	0.02	379	27	154	17	200	0	0.13	0.16	0.015	0.021
SEMO-6	22.7	0.8	5.1	0.8	8.57	0.10	379	15	154	14	200	14	0.21	0.26	0.025	0.035
SEMO-7	22.7	0.8	5.6	1.0	8.53	0.04	376	18	153	16	192	17	0.24	0.30	0.025	0.035
SEMO-8	22.6	0.8	6.0	1.0	8.43	0.13	370	29	149	24	200	28	0.21	0.23	0.020	0.014
SEMO-9	22.6	0.9	4.9	1.2	8.34	0.11	368	23	145	24	195	21	0.24	0.31	0.015	0.021
SEMO-10	22.6	0.9	6.0	0.8	8.36	0.21	362	22	145	21	194	8	0.11	0.13	0.005	0.007
SEMO-11	22.6	0.8	5.7	1.0	8.48	0.06	370	19	152	11	200	0	0.17	0.21	0.015	0.021
SEMO-12	22.7	0.8	5.3	0.8	8.51	0.03	373	20	154	11	193	18	0.30	0.40	0.035	0.049
SEMO-13	22.6	0.8	5.8	0.8	8.42	0.03	369	21	83	115	191	16	0.11	0.12	0.010	0.014
SEMO-14	22.6	0.9	5.6	1.0	8.35	0.13	375	22	154	17	202	3	0.23	0.30	0.025	0.035
SEMO-15	22.6	0.9	6.2	0.8	8.47	0.03	364	21	149	16	190	14	0.36	0.48	0.040	0.057
SEMO-17	22.6	0.9	6.0	0.9	8.42	0.10	366	21	149	21	197	10	0.32	0.42	0.025	0.035
SEMO-18	22.6	0.9	5.4	0.8	8.55	0.13	381	22	157	13	201	16	0.11	0.13	0.010	0.014
SEMO-19	22.6	0.9	5.3	0.8	8.52	0.04	375	26	152	17	200	28	0.18	0.23	0.020	0.028
SEMO-20	22.6	0.9	6.2	0.8	8.45	0.11	363	18	144	20	190	14	0.43	0.57	0.040	0.057
SEMO-21	22.6	0.8	5.6	0.7	8.29	0.28	366	21	155	7	192	25	0.19	0.23	0.020	0.028

Appendix A-5 (continued).

Site ID	Temperature		Dissolved Oxygen		pH		Conductivity		Alkalinity		Hardness		Total Ammonia		Unionized Ammonia	
	(°C)		(mg/L)				(µS/cm)		(mg/L as $CaCO_3$)				(mg N/L)		(mg N/L)	
	[N=5]		[N=5]		[N=2]		[N=5]		[N=2]		[N=2]		[N=2]		[N=2]	
	Mean / SD		Mean / SD		Mean / SD		Mean / SD		Mean / SD		Mean / SD		Mean / SD		Mean / SD	
MUSSEL TEST																
CONTROL	22.32	1.52	6.82	0.87	8.20	0.00	362	25	148	11	185	21	0.05	0.01	0.000	0.000
SEMO-1	22.32	1.52	5.89	1.17	8.21	0.39	368	22	149	16	205	38	0.04	0.01	0.000	0.000
SEMO-2	22.40	1.34	5.90	1.21	8.32	0.24	370	23	152	17	199	13	0.04	0.01	0.000	0.000
SEMO-3	22.40	1.34	5.15	1.21	8.34	0.03	375	26	158	3	200	8	0.11	0.08	0.005	0.007
SEMO-4	22.38	1.39	5.71	0.88	8.34	0.13	374	21	152	17	196	17	0.06	0.01	0.005	0.007
SEMO-5	22.78	0.49	4.88	1.25	8.40	0.21	384	18	160	0	200	0	0.03	0.03	0.000	0.000
SEMO-6	22.74	0.58	4.44	1.23	8.10	0.07	392	19	157	7	207	18	0.21	0.19	0.010	0.014
SEMO-7	22.78	0.49	5.20	0.94	8.31	0.15	377	19	154	8	206	8	0.04	0.02	0.000	0.000
SEMO-8	22.78	0.49	6.26	0.91	8.36	0.01	367	24	150	20	196	23	0.05	0.00	0.005	0.007
SEMO-9	22.40	1.34	5.96	0.90	8.24	0.31	369	23	148	25	187	18	0.04	0.02	0.000	0.000
SEMO-10	22.44	1.25	6.67	0.80	8.41	0.07	359	23	156	6	195	21	0.03	0.01	0.005	0.007
SEMO-11	22.42	1.30	6.19	1.14	8.46	0.00	370	19	151	21	191	21	0.04	0.01	0.005	0.007
SEMO-12	22.36	1.43	6.30	0.97	8.54	0.07	374	26	147	18	195	21	0.03	0.01	0.005	0.007
SEMO-13	22.36	1.43	6.26	1.11	8.55	0.01	367	26	149	27	194	28	0.02	0.01	0.000	0.000
SEMO-14	22.38	1.39	6.08	0.91	8.53	0.14	368	24	151	13	195	21	0.04	0.04	0.005	0.007
SEMO-15	22.38	1.39	6.74	0.82	8.50	0.03	361	23	141	21	195	21	0.03	0.02	0.005	0.007
SEMO-17	22.32	1.52	6.46	0.90	8.54	0.04	366	23	168	11	205	7	0.05	0.01	0.005	0.007
SEMO-18	22.30	1.57	5.83	1.02	8.54	0.17	377	19	151	13	195	21	0.02	0.00	0.000	0.000
SEMO-19	22.34	1.48	5.94	1.13	8.63	0.12	373	20	154	8	204	23	0.03	0.01	0.000	0.000
SEMO-20	22.32	1.52	6.53	0.85	8.52	0.11	365	23	149	16	193	27	0.03	0.01	0.000	0.000
SEMO-21	22.30	1.57	6.28	0.98	8.54	0.16	364	21	150	17	193	24	0.02	0.01	0.000	0.000

Appendix A-6. USFWS mussel survey sites in Southeast Missouri mining area matched with USGS sediment toxicity sites.

USGS ID	USFWS ID	Site description	Date	Latitude (degrees W)	Longitude (degrees N)	Distance between sites (km)
SEMO-1	ID	Big R. downstream of Cedar Creek	27-Aug-08	37.81917	90.70792	0.02
SEMO-2	LW	Big R. at MDC Leadwood Access	3-Sep-08	37.87284	90.58838	0.59
SEMO-3	67D	Big R. at Old Hwy 67	30-Sep-08	37.88969	90.50881	0.15
SEMO-4	HK	Big R. at Hwy K	30-Sep-08	37.92686	90.50106	0.34
SEMO-5	67C	Big R. at Hwy 67 Xing	3-Sep-08	37.95495	90.55277	0.04
SEMO-6	HE	Big R. at Hwy E	3-Sep-08	37.96762	90.57481	0.01
SEMO-7	CC	Big R. at Hwy CC	1-Oct-08	38.04398	90.62029	0.17
SEMO-8	--	[No mussel survey data]	--	--	--	--
SEMO-9	MA	Big R. at Mammoth MDC Access	3-Sep-08	38.12414	90.67906	0.46
SEMO-10	BF	Big R. at Brown's Ford	1-Oct-08	38.21250	90.70611	0.20
SEMO-11	--	[No mussel survey data]	--	--	--	--
SEMO-12	CHB	Big R. below Cedar Hill Dam	7-Oct-08	38.34960	90.64467	0.07
SEMO-13	--	[No mussel survey data]	--	--	--	--
SEMO-14	RBB	Big R. at Rockford Beach below dam	25-Aug-08	38.42277	90.59111	0.13
SEMO-15	BMB2	Big R. Below Byrne's Mill Dam	29-Oct-08	38.43792	90.58663	0.35
SEMO-17	HW	Big R. at Hwy W	2-Sep-08	38.45481	90.62354	0.07
SEMO-18	--	[No mussel survey data]	--	--	--	--
SEMO-19	MPP	Meramec River at Pacific Palisades	16-Oct-08	38.47451	90.71298	0.60
SEMO-20	--	[No mussel survey data]	--	--	--	--
SEMO-21	BREF	Bourbeuse River at mile 0.4	26-Aug-08	38.39552	90.89529	1.64

Appendix A-7. Results of USFWS qualitative and quantitative field mussel sampling at sites in the SEMO mining area (Roberts, et al in prep.). For qualitative data, shaded cells indicate sites with number of live mussel taxa below the reference envelope. For quantitative data, means with same letter are not signficantly different (one-way rank ANOVA [p<0.0001] and Tukey's test). [REF=reference site; CPUE=Catch per unit effort (animals/person-hour); SE=standard error]

USGS ID	USFWS ID	Qualitative sampling		Quantitative sampling (mussels / m^2)			
		Live taxa	CPUE	Mean	SE	N	Tukey
SEMO-1	ID-REF	6	45	1.86	0.36	58	b
SEMO-2	LW	2	1.71	0.07	0.07	60	c
SEMO-3	67D	0	0				
SEMO-4a	HK	0	0	0.00	0.00	79	c
SEMO-4b	(not sampled)			0.00	0.00	60	c
SEMO-5	67C	1	2.4				
SEMO-6	HE	0	0				
SEMO-7	CC	1	1.14				
SEMO-9	MA	1	0.25	0.00	0.00	41	c
(not tested)	Morse			0.40	0.14	80	c
SEMO-10	BF	3	14				
SEMO-12	CHB	3	7	0.16	0.09	77	c
SEMO-14	RBB	16	36				
SEMO-15	BMB2	18	40				
SEMO-17	HW	24	135				
SEMO-19	MPP	25	81				
SEMO-21	B-REF	26	77	9.11	1.21	83	a

Appendix A-8. Determination of reliability of sediment toxicity thresholds for predicting results of SEMO toxicity tests and mussel survey. Values are percent of sites in cach category, with green shading indicating: <20% of sites toxic below threshold, >50% of sites toxic above threshold, or >80% correct classification. Bold text indicates thresholds that meet all three criteria. [Endpoints: S=survival, L=length, B=biomass, T=taxa richness]

Amphipod toxicity

Threshold			Size fraction	Endpoint	Low threshold			High Threshold		
Index	Low	High			Toxic below	Toxic above	Correct	Toxic below	Toxic above	Correct
Zn-PEQ	0.5	1.0	<2 mm	S	--	--	--	--	--	--
				L	25	0	45	20	0	60
				B	25	0	45	20	0	60
			<0.25 mm	S	--	--	--	--	--	--
				L	27	0	40	21	0	55
				B	27	0	40	21	0	55
Cd-PEQ	0.5	1.0	<2 mm	S	--	--	--	--	--	--
				L	23	0	50	21	0	55
				B	23	0	50	21	0	55
			<0.25 mm	S	--	--	--	--	--	--
				L	25	0	45	21	0	55
				B	25	0	45	21	0	55
Pb-PEQ	1.0	5.0	<2 mm	S	--	--	--	--	--	--
				L	0	21	45	17	13	55
				B	0	21	45	17	13	55
			<0.25 mm	S	--	--	--	--	--	--
				L	0	21	45	17	13	55
				B	0	21	45	17	13	55
ZnCd-PEQ	0.5	1.0	<2 mm	S	--	--	--	--	--	--
				L	23	0	50	20	0	60
				B	23	0	50	20	0	60
			<0.25 mm	S	--	--	--	--	--	--
				L	25	0	45	21	0	55
				B	25	0	45	21	0	55
ZnPb-PEQ	0.5	1.0	<2 mm	S	--	--	--	--	--	--
				L	0	23	50	17	0	75
				B	0	23	50	17	0	75
			<0.25 mm	S	--	--	55	8	50	75
				L	0	21	45	17	13	55
				B	0	21	45	17	13	55
ZnCdPb-PEQ	1.0	5.0	<2 mm	S	--	--	--	--	--	--
				L	20	10	45	16	0	80
				B	20	10	45	16	0	80
			<0.25 mm	S	--	--	--	--	--	--
				L	0	23	50	25	0	45
				B	0	23	50	25	0	45
SEM-AVS	0.0	5.0	<2 mm	S	--	--	--	--	--	--
				L	0	20	40	18	0	70
				B	0	20	40	18	0	70
ESB Index	130	3000	<2 mm	S	--	--	--	--	--	--
				L	17	13	55	15	NA	85
				B	17	13	55	15	NA	85

Appendix A-8 (continued).

Mussel toxicity

Threshold			Size fraction	Endpoint	Low threshold			High Threshold		
Index	Low	High			Toxic below	Toxic above	Correct	Toxic below	Toxic above	Correct
Zn-PEQ	0.5	1.0	<2 mm	S	0	38	75	**0**	**60**	**90**
				L	**0**	**63**	**85**	**0**	**100**	**100**
				B	**0**	**50**	**80**	**0**	**80**	**95**
			<0.25 mm	S	0	33	70	**0**	**50**	**85**
				L	**0**	**56**	**80**	**0**	**83**	**95**
				B	0	44	75	**0**	**67**	**90**
Cd-PEQ	0.5	1.0	<2 mm	S	0	43	80	**0**	**50**	**85**
				L	**0**	**71**	**90**	**0**	**83**	**95**
				B	0	57	85	**0**	**67**	**90**
			<0.25 mm	S	0	38	75	**0**	**50**	**85**
				L	0	63	85	**0**	**83**	**95**
				B	**0**	**50**	**80**	**0**	**67**	**90**
Pb-PEQ	1.0	5.0	<2 mm	S	0	21	45	0	38	75
				L	0	36	55	8	50	75
				B	0	29	50	**0**	**50**	**80**
			<0.25 mm	S	0	21	45	0	38	75
				L	0	36	55	8	50	75
				B	0	29	50	**0**	**50**	**80**
ZnCd-PEQ	0.5	1.0	<2 mm	S	0	43	80	**0**	**60**	**90**
				L	**0**	**71**	**90**	**0**	**100**	**100**
				B	**0**	**57**	**85**	**0**	**80**	**95**
			<0.25 mm	S	0	38	75	**0**	**50**	**85**
				L	**0**	**63**	**85**	**0**	**83**	**95**
				B	0	50	80	**0**	**67**	**90**
ZnPb-PEQ	0.5	1.0	<2 mm	S	0	23	50	17	0	75
				L	0	38	60	22	50	75
				B	0	31	55	**17**	**50**	**80**
			<0.25 mm	S	0	21	45	0	38	75
				L	0	36	55	8	50	75
				B	0	29	50	**0**	**50**	**80**
ZnCdPb-PEQ	1.0	5.0	<2 mm	S	0	30	65	**16**	**0**	**80**
				L	0	50	75	21	100	80
				B	0	40	70	**16**	**100**	**85**
			<0.25 mm	S	0	23	50	0	38	75
				L	0	38	60	**0**	**63**	**85**
				B	0	31	55	**0**	**50**	**80**
SEM-AVS	0.0	5.0	<2 mm	S	20	13	30	12	33	80
				L	20	27	40	**18**	**67**	**80**
				B	20	20	35	**12**	**67**	**85**
ESB Index	130	3000	<2 mm	S	17	13	55	15	NA	**85**
				L	17	38	65	25	NA	75
				B	17	25	60	20	NA	**80**

Appendix A-8 (continued).

Mussel taxa richness

Toxicity Index	Threshold		Size fraction	Endpoint	Low threshold			High Threshold		
	Low	High			Toxic below	Toxic above	Correct	Toxic below	Toxic above	Correct
Zn-PEQ	0.5	1.0	<2	T	**14**	**100**	**93**	40	100	73
			<0.25		**14**	**100**	**93**	33	100	80
Cd-PEQ	0.5	1.0	<2	T	25	100	87	33	100	80
			<0.25		**14**	**100**	**93**	33	100	80
Pb-PEQ	1.0	5.0	<2	T	**0**	**82**	**87**	29	88	**80**
			<0.25		**0**	**75**	**80**	**17**	**89**	**87**
ZnCd-PEQ	0.5	1.0	<2	T	25	100	87	40	100	73
			<0.25		**14**	**100**	**93**	33	100	80
ZnPb-PEQ	1.0	5.0	<2	T	**0**	**90**	**93**	54	100	53
			<0.25		**0**	**82**	**87**	**14**	**100**	**93**
ZnCdPb-PEQ	1.0	5.0	<2	T	**17**	**89**	**87**	57	100	47
			<0.25		**0**	**90**	**93**	**14**	**100**	**93**
SEM-AVS	0.0	5.0	<2	T	25	73	73	50	100	60
ESB Index	130	3000			50	71	60	60	NA	40