Development and Evaluation of an Approach to the Assessment of Sediment Quality in Florida Coastal Waters

Volume 3 - Supporting Documentation: Biological Effects Database for Sediment

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GLOSSARY OF ACRONYMS

-	=	Indeterminate
*	=	Hit
ACOE	=	Army Corps of Engineers
ADT	=	Adult
ADT/JUV	=	Adult and/or Juvenile
AET	=	Apparent Effects Threshold
AETA	=	Apparent Effects Threshold Approach
AVS	=	Acid Volatile Sulphide
C.L.	=	Confidence Limit
COA	=	Co-occurrence Analysis
d	=	Day
EC50	=	Effective Concentration to 50% of the tested organisms
EPA	=	Environmental Protection Agency
EqP	=	Equilibrium Partitioning
EqPA	=	Equilibrium Partitioning Approach
FCV	=	Final Chronic Value
FT	=	Flow-through Test
GAM	=	Gamete
h	=	Hour
HAT	=	Hatchling
I	=	Instar
JUV	=	Juvenile
L&M	=	Long and Morgan
LAR	=	Larval
LC50	=	Lethal Concentration to 50% of the tested organisms
LPL	=	Lower Prediction Limit
m	=	Month
MFO	=	Mixed-Function Oxidase
N	=	Number of Organisms
NC	=	No Concordance
NE	=	No Effect
NEO	=	Neonate
NG	=	No Gradient
NSLC	=	National Screening Level Concentration
NYM	=	Nymph
PSDDA	=	Puget Sound Dredge Disposal Analysis
S	=	Species
SBA	=	Sediment Background Approach
SD	=	Standard Deviation
SDUs	=	Species Diversity Units
SG	=	Small Gradient
SLCA	=	Screening Level Concentration Approach
sp.	=	Species
spp.	=	Species (plural)

sq.m.	=	Square meter
SQG	=	Sediment Quality Guideline
SQO	=	Sediment Quality Objective
SRUs	=	Species Richness Units
SSBA	=	Spike Sediment Bioassay Approach
ST	=	Static Test
SUBADT	=	Sub-Adult
TLm	=	Median Tolerance Limit
TOC	=	Total Organic Carbon
TU/g	=	Toxic Units / gram
wk	=	Week

Table 1. A summary of the available data on the biological effects associated with sediment-sorbed ARSENIC (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Arsenic	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.13		NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (4.8+/-2.28% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1983a
0.13		NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (15.8+/-4.21% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1983a
0.13		NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (1.2+/-.447% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1983a
0.7		NC	Mobile Bay, AL	COA		Significantly toxic (10% mortality)	Mysidopsis bahia (mysid shrimp)		0.009	0.004	EMAP Louisiana Province 1991
1	+/-0.3	NE	Stamford, CT	COA	96-h	Not toxic (10% mortality)	Palaemonetes pugio (shrimp)				Lee & Mariani 1977
1.09	+/-1.02	NE	Matagorda Ship Channel, TX	COA	10-d	Not toxic (7.2+/-2.77% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1985a
1.09	+/-1.02	NE	Matagorda Ship Channel, TX	COA	10-d	Not toxic (10.6+/-5.18% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1985a
1.09	+/-1.02	NE	Matagorda Ship Channel, TX	COA	10-d	Not toxic (0.2+/-0.447% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1985a
1.1	+/-2	NE	Brunswick Harbour Entrance, GA	COA	48-h	Not significantly toxic (86.6+/-4.25% normal development)	Arbacia punctulata (sea urchin)		0.181+/-0.162	182+/-208 ug/g	Windom In Prep
1.15	+/-0.15	NE	Houston Ship Channel, TX	COA		Not significantly toxic (15+/-13.2% mortality)	Sheepshead minnow	ADT	0.05+/-0.0242		Crocker et al. 1991
1.23	+/-0.32	NE	Pascagoula Naval Station, MS	COA	10-d	Not significantly toxic (1+/-1.41% mortality)	Crossostrea virginica (oyster)	ADT	7.31+/-3.86		Parrish 1990
1.23	+/-0.32	NE	Pascagoula Naval Station, MS	COA	10-d	Not significantly toxic (4+/-2.83% mortality)	Penaeus duorarum (pink shrimp)	ADT	7.31+/-3.86		Parrish 1990
1.23	+/-0.32	NE	Pascagoula Naval Station, MS	COA	10-d	Not significantly toxic (5+/-1.41% mortality)	Nereis virens (polychaete)	ADT	7.31+/-3.86		Parrish 1990
1.3		NE	Duwamish River, WA	COA	96-h	Not toxic (0-10% mortality)	Palaemonetes pugio (shrimp)				Lee & Mariani 1977
1.36		NE	Georgetown Harbor, SC	COA		Not toxic (species richness or abundance)	Benthic species		0.12		Van Dolah et al. 1984
1.5		NC	Charleston Harbor, SC	COA		Low species richness (5.16; SRUs)	Benthic species				Winn et al. 1989
1.5		NC	Charleston Harbor, SC	COA		Moderate diversity (2.3+/-0.2; SDUs)	Benthic species				Winn et al. 1989
1.5		NC	Charleston Harbor, SC	COA		Low diversity (1.16; SDUs)	Benthic species				Winn et al. 1989
1.57	+/-0.208	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (6+/-2.35% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1983b
1.57	+/-0.208	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (2.6+/-2.97% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1983b
1.57	+/-0.208	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (1.8+/-1.79% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1983b
1.59	+/-0.36	NC	Charleston Harbor, SC	COA		Moderate species richness (9.05+/-1.33; SRUs)	Benthic species				Winn et al. 1989
1.7		NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (18% mortality)	Ampelisca abdita (amphipod)		0.028	9 ug/g	Windom In Prep
1.7	+/-0.464	NE	Houston Ship Channel, TX	COA	10-d	Not significantly toxic (5.4+/-3.6% mortality)	Amphipod	ADT	0.129+/-0.054		Crocker et al. 1991
1.71	+/-0.984	NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (55.0+/-19.5% mortality)	Streblospio benedicti (polychaete worm)		0.349+/-0.11	1.07+/-0.66	Hall et al. 1992
1.72	+/-0.6	NE	Charleston Harbor, SC	COA		High diversity (4.15+/-0.59; SDUs)	Benthic species				Winn et al. 1989
1.73	+/-0.784	NE	Houston Ship Channel, TX	COA	10-d	Not significantly toxic (4.7+/-4.29% mortality)	Amphipod	ADT	0.144+/-0.123		Crocker et al. 1991
1.75	+/-1.48	NC	Mobile Bay, AL	COA	10-d	Significantly toxic (46+/-49.3% mortality)	Ampelisca abdita (amphipod)		0.22+/-0.298	3.84+/-5.43	EMAP Louisiana Province 1991
1.86	+/-0.514	NE	Houston Ship Channel, TX	COA	7-d	Not significantly toxic (7.5+/-5% mortality)	Sheepshead minnow	ADT	0.137+/-0.056		Crocker et al. 1991
1.88		*	Black Rock Harbor, CT	COA	14-d	Significantly toxic (100% mortality)	Nereis virens (sandworm)				Simmers et al. 1984
1.94	+/-1.32	NC	Tampa Bay, FL	COA	1-h	Moderately toxic (44.5+/-17.8% fertilization)	Arbacia punctulata (sea urchin)	GAM		0.622+/-1.12	Long 1993
1.98	+/-0.248	SG	Houston Ship Channel, TX	COA	10-d	Significantly toxic (22.7+/-0.778% mortality)	Amphipod	ADT	0.248+/-0.132		Crocker et al. 1991
2	+/-1	NE	Charleston Harbor, SC	COA		High species richness (14.9+/-2.04; SRUs)	Benthic species				Winn et al. 1989
2.1		NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (0% mortality)	Arbacia punctulata (sea urchin)		0.03	19 ug/g	Windom In Prep
2.1	+/-1.56	NC	Mississippi Sound, MS	COA	10-d	Significantly toxic (11.6+/-3.39% mortality)	Ampelisca abdita (amphipod)		0.111+/-0.045	0.03	EMAP Louisiana Province 1991
2.11	+/-0.942	NE	Tampa Bay, FL	COA	1-h	Least toxic (83+/-4.26% fertilization)	Arbacia punctulata (sea urchin)	GAM		0.131+/-0.169	Long 1993
2.12	+/-1.26	NC	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29.8+/-11.1% mortality)	Streblospio benedicti (polychaete worm)		0.316+/-0.12	2.13+/-2.46	Hall et al. 1992
2.12	+/-1.26	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.003+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.316+/-0.120	2.13+/-2.46	Hall et al. 1992
2.24		NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
2.26	+/-1.5	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (7.2+/-1.92% mortality)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992

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Arsenic Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
2.26 +/-1.5	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.6+/-0.55% reburial)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
2.26 +/-1.5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
2.26 +/-1.5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
2.28 +/-2.7	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (51.3+/-6.95% mortality)	Mulinia lateralis (bivalve)	LAR	1.8+/-1.71	29.6+/-46.3	Bricker et al. 1993
2.41 +/-1.98	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (15.3+/-11.0% mortality)	Hyalella azteca (amphipod)	JUV	0.648+/-0.641	1.74+/-1.39	Hall et al. 1992
2.51 +/-1.47	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (0.33+/-0.516% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
2.51 +/-1.47	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (2.33+/-1.03% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
2.51 +/-1.47	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.367+/-0.085 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
2.51 +/-1.47	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.0005 mg/day growth)	Streblospio benedicti (polychaete worm)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
2.54 +/-1.15	NE	Galveston Bay, TX	COA		High abundance (155+/-49.5 N/0.00203 sq.m.)	Oligochaeta		1.2+/-1.27	4.27+/-3.85	Carr 1992
2.56 +/-1.64	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.001+/-0.001 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.555+/-0.471	2.68+/-2.3	Hall et al. 1992
2.61 +/-1.22	SG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (55.0+/-22.6% mortality)	Hyalella azteca (amphipod)	JUV	0.338+/-0.133	2.9+/-3.11	Hall et al. 1992
2.7 +/-1.94	NE	Galveston Bay, TX	COA		High abundance (154+/-30.2 N/0.00203 sq.m.)	Benthic invertebrates		0.47+/-0.27	9.07+/-2.94	Carr 1992
2.77 +/-1.33	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (28.3+/-6.11% mortality)	Mysidopsis bahia (mysid)		0.246+/-0.051	127+/-24 ug/g	Windom In Prep
2.8 +/-0.3	NE	Newport, RI	COA	96-h	Not toxic (0% mortality)	Palaemonetes pugio (shrimp)				Lee & Mariani 1977
2.8 +/-0.92	NE	Galveston Bay, TX	COA		High abundance (156+/-22.9 N/0.00203 sq.m.)	Polychaeta		0.916+/-0.661	2.94+/-2.3	Carr 1992
2.8 +/-2.26	NC	Apalachee Bay, FL	COA	10-d	Significantly toxic (15.6% mortality)	Ampelisca abdita (amphipod)		0.438+/-0.442	0.421+/-0.593	EMAP Louisiana Province 1991
2.86 +/-1.63	NE	Tampa Bay, FL	COA		Not significantly toxic (EC50; 0.133+/-0.103 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)			1.23+/-1.96	Long 1993
2.95 +/-1.87	NE	Tampa Bay, FL	COA	10-d	Not significantly toxic (9.5+/-6.15% mortality)	Ampelisca abdita (amphipod)	SUBADT		1.56+/-2.73	Long 1993
3.14 +/-0.215	NE	Galveston Bay, TX	COA		High abundance (27.3+/-10 N/0.00203 sq.m.)	Mollusca		1.64+/-0.4	1.39+/-0.17	Carr 1992
3.18 +/-0.602	NE	Chandeleur Sound, LA	COA		Not significantly toxic (1.03+/-2.05% mortality)	Mysidopsis bahia (mysid shrimp)		0.824+/-0.915	1.69+/-0.920	EMAP Louisiana Province 1991
3.21 +/-1.11	NE	Galveston Bay, TX	COA		High abundance (16.2+/-6.19 N/0.00203 sq.m.)	Copepoda		0.844+/-0.524	4.73+/-3.1	Carr 1992
3.21 +/-2	NE	Galveston Bay, TX	COA		Low species (11.2+/-1.94 S/0.00203 sq.m.)	Benthic species		0.642+/-0.356	13.4+/-8.65	Carr 1992
3.31 +/-0.373	NE	Galveston Bay, TX	COA		High species richness (24.5+/-3.7 S/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
3.31 +/-0.373	NE	Galveston Bay, TX	COA		High abundance (359+/-92.8 N/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
3.36 +/-1.37	SG	Galveston Bay, TX	COA		Moderate abundance (58.3+/-16.2 N/0.00203 sq.m.)	Oligochaeta		0.632+/-0.274	7.93+/-5.6	Carr 1992
3.4	NE	Curtis Creek, Baltimore, MD	COA	10-d	Not significantly toxic (11.3% mortality)	Leptocheirus plumulosus (amphipod)	JUV			McGee et al. 1993
3.4 +/-0.5	NE	Norwalk River, CT	COA	96-h	Not toxic (0% mortality)	Palaemonetes pugio (shrimp)				Lee & Mariani 1977
3.44 +/-1.89	NE	Galveston Bay, TX	COA	48-h	Not toxic (98.1+/-1.79% normal development)	Arbacia punctulata (sea urchin)	EMB	.748+/-0.476	4.16+/-3.45	Carr 1992
3.48 +/-1.75	NE	Galveston Bay, TX	COA	1-h	Not toxic (92.5+/-6.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	0.77+/-0.448	6.37+/-6.58	Carr 1992
3.5 +/-0.769	NG	Chandeleur Sound, LA	COA	10-d	Significantly toxic (11.5+/-4.86% mortality)	Ampelisca abdita (amphipod)		0.811+/-0.711	1.87+/-0.973	EMAP Louisiana Province 1991
3.5 +/-1.99	NE	Chandeleur Sound, LA	COA	10-d	Not significantly toxic (2.87+/-4.05% mortality)	Ampelisca abdita (amphipod)		0.517+/-0.166	2.02+/-1.38	EMAP Louisiana Province 1991
3.71 +/-3.26	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (9.78+/-5.33% mortality)	Mysidopsis bahia (mysid)		0.24+/-0.247	91.9+/-73.4 ug/g	Windom In Prep
3.76 +/-1.5	SG	Chandeleur Sound, LA	COA		Significantly toxic (7.6+/-1.32% mortality)	Mysidopsis bahia (mysid shrimp)		0.624+/-0.197	2.07+/-1.19	EMAP Louisiana Province 1991
3.77	SG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29% mortality)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
3.77	SG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (89.7% reburial)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
3.77	SG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
3.77	SG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	6.41	Hall et al. 1992
3.78 +/-1.73	NC	Galveston Bay, TX	COA		Low abundance (0.3+/-0.651 N/0.00203 sq.m.)	Amphipoda		0.859+/-0.487	7.67+/-8.12	Carr 1992
3.83 +/-3.46	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (4+/-2.83% mortality)	Menidia beryllina (silverside)		0.243+/-0.264	90.5+/-78.4 ug/g	Windom In Prep

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Arsenic Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
3.96 +/-3.39	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (11.6+/-4.33% mortality)	Ampelisca abdita (amphipod)		0.267+/-0.25	102+/-71.1 ug/g	Windom In Prep
4.01 +/-2	SG	Galveston Bay, TX	COA		Low abundance (1.86+/-2.59 N/0.00203 sq.m.)	Mollusca		0.784+/-0.421	8.29+/-8.13	Carr 1992
4.02 +/-2.04	SG	Galveston Bay, TX	COA		Low species richness (10+/-3.73 S/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
4.02 +/-2.04	SG	Galveston Bay, TX	COA		Low abundance (89+/-60.7 N/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
4.05 +/-2.62	NC	Galveston Bay, TX	COA	10-d	Significantly toxic (15.8+/-3.89% mortality)	Ampelisca abdita (amphipod)		0.647+/-0.606	0.160+/-0.184	EMAP Louisiana Province 1991
4.07 +/-2.87	NE	Narragansett Bay, RI	COA	10-d	Not significantly toxic (5.28+/-3.04% mortality))	Ampelisca abdita (amphipod)	ADT			Munns et al. 1991
4.12 +/-0.488	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (16.5+/-9.19% mortality)	Streblospio benedicti (polychaete worm)		0.783+/-0.845	4.83+/-2.23	Hall et al. 1992
4.15 +/-1.06	NE	Baltimore, MD	COA	20-d	Not significantly toxic (25.4+/-17.1% mortality)	Leptocheirus plumulosus (amphipod)	JUV			McGee et al. 1993
4.18 +/-3.93	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (27.5+/-10.6% mortality)	Mysidopsis bahia (mysid)		0.237+/-0.311	74.6+/-85.5 ug/g	Windom In Prep
4.19 +/-2.04	SG	Galveston Bay, TX	COA		Low abundance (4.21+/-5.66 N/0.00203 sq.m.)	Oligochaeta		0.895+/-0.453	7.85+/-8.8	Carr 1992
4.22 +/-2.36	SG	Galveston Bay, TX	COA		Low abundance (53+/-33.9 N/0.00203 sq.m.)	Benthic invertebrates		0.985+/-0.247	22+/-11.2	Carr 1992
4.29 +/-3.52	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (91.3+/-2.91% normal development)	Arbacia punctulata (sea urchin)		0.299+/-0.251	114+/-68.4 ug/g	Windom In Prep
4.3 +/-2.03	SG	Galveston Bay, TX	COA		Low abundance (41.7+/-21.8 N/0.00203 sq.m.)	Polychaeta		0.848+/-0.427	9.21+/-8.61	Carr 1992
4.33 +/-2.03	*	Tampa Bay, FL	COA	1-h	Most toxic (1.96+/-3.19% fertilization)	Arbacia punctulata (sea urchin)	GAM		3.95+/-5.94	Long 1993
4.42 +/-2.21	SG	Galveston Bay, TX	COA		Low abundance (2.05+/-1.58 N/0.00203 sq.m.)	Copepoda		0.879+/-0.47	9.63+/-9.65	Carr 1992
4.46	*	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.003 mg/day growth)	Lepidactylus dytiscus (amphipod)		1.38	3.25	Hall et al. 1992
4.46	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1% mortality)	Streblospio benedicti (polychaete worm)		1.38	3.25	Hall et al. 1992
4.5 +/-0.283	NE	Mississippi River, MS, LA	COA	10-d	Not significantly toxic (7.8+/-1.63% mortality)	Ampelisca abdita (amphipod)		1.15+/-1.04	2.31+/-0.651	EMAP Louisiana Province 1991
4.51 +/-2.56	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.074+/-0.043 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.27+/-0.626	6.21+/-5.41	Bricker et al. 1993
4.52 +/-1.83	SG	Galveston Bay, TX	COA	48-h	Toxic (4.65+/-16.1% normal development)	Arbacia punctulata (sea urchin)	EMB	1.06+/-0.449	14.5+/-9.2	Carr 1992
4.6 +/-0.141	NE	Mississippi River, MS, LA	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		1.3+/-0.83	1.14+/-1	EMAP Louisiana Province 1991
4.65 +/-3.71	*	Savannah River Entrance Channel, GA	COA	48-h	Significantly toxic (25.4+/-7.66% mortality)	Arbacia punctulata (sea urchin)		0.344+/-0.242	129.5+/-59.3 ug/g	Windom In Prep
4.71 +/-1.66	NE	Tampa Bay, FL	COA	48-h	Not significantly toxic (38.5+/-2.9% mortality)	Mulinaria lateralis (coot clam)	LAR		2.64+/-3.04	Long 1993
4.78 +/-2.58	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (25.9+/-5.01% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.21+/-0.444	2.41+/-2.32	Bricker et al. 1993
4.83 +/-1.86	NE	Freeport Harbor, TX	COA	10-d	Not toxic (2+/-1% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1985b
4.83 +/-1.86	NE	Freeport Harbor, TX	COA	10-d	Not toxic (9.6+/-4.22% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1985b
4.83 +/-1.86	NE	Freeport Harbor, TX	COA	10-d	Not toxic (0% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1985b
4.86 +/-2.45	SG	Tampa Bay, FL	COA		Significantly toxic (EC50; 0.021+/-0.012 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)			6.13+/-8.06	Long 1993
4.99 +/-2.58	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99.3+/-0.827% normal development)	Mulinia lateralis (bivalve)	LAR	1.43+/-0.738	14.7+/-24	Bricker et al. 1993
5 +/-3	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.096+/-0.101 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.37+/-0.759	6.93+/-6.83	Bricker et al. 1993
5.04 +/-1.54	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-7.99% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.14+/-0.352	6.09+/-5.38	Bricker et al. 1993
5.05 +/-2.53	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.125+/-0.084 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.25+/-0.468	1.98+/-2.25	Bricker et al. 1993
5.2 +/-1.61	NE	Curtis Creek, Baltimore, MD	COA	10-d	Not significantly toxic (15+/-7.21% mortality)	Hyalella azteca (amphipod)	JUV			McGee et al. 1993
5.3 +/-2.7	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (30.5+/-16.4% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.62+/-0.777	17.7+/-26.3	Bricker et al. 1993
5.35 +/-0.354	SG	Tampa Bay, FL	COA	48-h	Significantly toxic (48.1+/-1.91% mortality)	Mulinaria lateralis (coot clam)	LAR		2.82+/-2.65	Long 1993
5.42 +/-3.25	NE	Mississippi Sound, MS	COA		Not significantly toxic (0.789+/-1.59% mortality)	Mysidopsis bahia (mysid shrimp)		0.827+/-0.757	1.46+/-1.58	EMAP Louisiana Province 1991
5.43 +/-1.97	SG	Galveston Bay, TX	COA	1-h	Toxic (20.4+/-18.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	1.26+/-0.47	14.6+/-10.1	Carr 1992
5.43 +/-3.03	NE	Galveston Bay, TX	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		0.934+/-0.657	0.457+/-0.530	EMAP Louisiana Province 1991
5.46 +/-2.25	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (12.3+/-14.5% mortality)	Mulinia lateralis (bivalve)	LAR	1.53+/-0.743	15.7+/-23.2	Bricker et al. 1993
5.47 +/-2.88	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (6.48+/-10.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993

Table 1. A summary of the available data on the biological effects associated with sediment-sorbed ARSENIC (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Arsenic Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
5.47 +/-2.88	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99+/-0.862% normal development)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
5.54 +/-1.84	SG	Tampa Bay, FL	COA	10-d	Significantly toxic (32.1+/-16.9% mortality)	Ampelisca abdita (amphipod)	SUBADT		7.63+/-9.44	Long 1993
5.8 +/-6.36	NE	Southern California	COA	10-d	Not significantly toxic (23.2% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
6.03 +/-7.88	NE	Apalachee Bay, FL	COA		Not significantly toxic (0.75+/-1.5% mortality)	Mysidopsis bahia (mysid shrimp)		0.540+/-0.385	0.405+/-0.417	EMAP Louisiana Province 1991
6.08 +/-1.06	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (88.5+/-8.39% normal development)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.05	38.1+/-38.9	Bricker et al. 1993
6.1 +/-4.16	NE	Galveston Bay, TX	COA		High Abundance (6+/-1.41 N/0.00203 sq.m.)	Amphipoda		0.955+/-0.629	7.21+/-8.2	Carr 1992
6.17 +/-2.11	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-6.07% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.71+/-0.9	15.3+/-23.2	Bricker et al. 1993
6.24 +/-5.61	NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (9+/-1.73% mortality)	Nereis virens (polychaetes)	ADT			EG&G Bionomics 1980
6.24 +/-5.61	NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (13+/- 3.61% mortality)	Penaeus duorarum (pink shrimp)	ADT			EG&G Bionomics 1980
6.24 +/-5.61	NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (11.3+/-3.21% mortality)	Crassostrea virginica (oyster)	ADT			EG&G Bionomics 1980
6.25 +/-0.71	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (19.3+/-5.86% mortality)	Ampelisca abidta (amphipod)	SUB ADT	1.82+/-0.225	6.3+/-6.2	Bricker et al. 1993
6.34 +/-3.41	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.167+/-0.198 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.59+/-1.09	4.67+/-6.99	Bricker et al. 1993
6.4 +/-2.76	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (17+/-16.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.99+/-1	21.6+/-24.5	Bricker et al. 1993
6.47 +/-0.935	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (91.5+/-7.28% normal development)	Mulinia lateralis (bivalve)	LAR	2.6+/-0.899	36.8+/-34.9	Bricker et al. 1993
6.53 +/-1.57	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.016+/-0.007 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.26+/-0.936	43.4+/-35.6	Bricker et al. 1993
6.53 +/-2.9	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.1+/-2.78% normal development)	Mulinia lateralis (bivalve)	LAR	2.12+/-1.04	22.9+/-23.7	Bricker et al. 1993
6.67 +/-2.93	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (34.9+/-15.7% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.23+/-1.04	25.4+/-25.5	Bricker et al. 1993
6.68 +/-1.73	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (23+/-4.24% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.46+/-1.22	40+/-55.1	Bricker et al. 1993
6.92 +/-2.94	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.1+/-13.3% mortality)	Mulinia lateralis (bivalve)	LAR	2.68+/-0.955	31.8+/-24.4	Bricker et al. 1993
6.94 +/-4.75	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.008+/-0.001 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.19+/-1.27	12+/-11.3	Bricker et al. 1993
7.03 +/-1.67	NE	Matagorda Bay, TX	COA		Not significantly toxic (1.58+/-1.82% mortality)	Mysidopsis bahia (mysid shrimp)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
7.03 +/-1.67	NE	Matagorda Bay, TX	COA	10-d	Not significantly toxic (2.33+/-4.65% mortality)	Ampelisca abdita (amphipod)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
7.05 +/-0.354	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (96+/-1.66% normal development)	Mulinia lateralis (bivalve)	LAR	2.52+/-0.997	35+/-42.9	Bricker et al. 1993
7.05 +/-1.48	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (15.2+/-9.21% mortality)	Mulinia lateralis (bivalve)	LAR	2.17+/-0.663	18.4+/-19.9	Bricker et al. 1993
7.16 +/-1.54	NC	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.014+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.51+/-0.45	29.6+/-15.7	Bricker et al. 1993
7.23 +/-1.64	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.3+/-2.22% normal development)	Mulinia lateralis (bivalve)	LAR	2.18+/-0.531	19.1+/-12.5	Bricker et al. 1993
7.23 +/-2.94	SG	Galveston Bay, TX	COA		Significantly toxic (13.4+/-9.11% mortality)	Mysidopsis bahia (mysid shrimp)		0.778+/-0.482	1.21+/-0.778	EMAP Louisiana Province 1991
7.24		***TEL***								
7.25 +/-3.34	NE	Mississippi Sound, MS	COA	10-d	Not significantly toxic (1.4+/-1.73% mortality)	Ampelisca abdita (amphipod)		0.998+/-0.602	2.01+/-1.82	EMAP Louisiana Province 1991
7.27 +/-1.63	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.061+/-0.038 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.8+/-0.477	8.52+/-10.7	Bricker et al. 1993
7.35 +/-3.28	*	Curtis Creek, Baltimore, MD	COA	10-d	Significantly toxic (82.8+/-22.2% mortality)	Leptocheirus plumulosus (amphipod)	JUV			McGee et al. 1993
7.46 +/-6.28	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (10.6+/-3.17% mortality)	Ampelisca abdita (amphipod)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
7.46 +/-6.28	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (8.00+/-2.92% mortality)	Mysidopsis bahia (mysid)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
7.48 +/-2.45	NE	Galveston Bay, TX	COA	10-d	Not significantly toxic (1.35+/-1.45% mortality)	Ampelisca abdita (amphipod)		0.961+/-0.537	1.17+/-0.640	EMAP Louisiana Province 1991
7.52 +/-1.65	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (39.5+/-18.2% mortality)	Ampelisca abidta (amphipod)	SUB ADT	2.06+/-0.523	20.1+/-13.9	Bricker et al. 1993
7.52 +/-1.72	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.5+/-11.4% mortality)	Mulinia lateralis (bivalve)	LAR	2.33+/-0.364	26.8+/-9.42	Bricker et al. 1993
7.75 +/-1.9	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.013+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.79+/-0.744	37.6+/-25.3	Bricker et al. 1993
7.88 +/-3.43	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (21.5+/-6.36% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.35+/-1.05	10.5+/-13.4	Bricker et al. 1993
7.91 +/-6.36	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (9.61+/-2.7% mortality)	Menidia beryllina (silverside)		1.22+/-1.13	9172+/-13363 ug/g	Windom In Prep
7.93 +/-6.37	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (5.43+/-3.21% mortality)	Mysidopsis bahia (mysid)		1.21+/-1.13	9096+/-13378 ug/g	Windom In Prep

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Arsenic	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
8		*	Southern California	AETA		Southern California AET Values	Benthic species				Becker et al. 1990
8.07	+/-2.6	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (29.8+/-13.9% mortality)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.07	32.1+/-28.4	Bricker et al. 1993
8.17	+/-3.48	SG	Curtis Creek, Baltimore, MD	COA	20-d	Significantly toxic (94.6+/-9.35% mortality)	Leptocheirus plumulosus (amphipod)	JUV			McGee et al. 1993
8.2		*	United States	EqPA		EPA Chronic Marine EP Threshold	Aquatic biota		1		Lyman et al. 1987
8.21	+/-2.23	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (96.6+/-3.79% normal development)	Mulinia lateralis (bivalve)	LAR	2.87+/-0.94	35.1+/-25.9	Bricker et al. 1993
8.25		*	United States	EqPA		Chronic Marine EqP Threshold	Aquatic biota		1		Bolton et al. 1985
8.32	+/-5.21	SG	Southern California	COA	10-d	Significantly toxicity (51.7% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
8.37	+/-2.25	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (38+/-13% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.92+/-0.937	34.6+/-23.9	Bricker et al. 1993
8.49	+/-1.35	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (75.1+/-10.6% mortality)	Mulinia lateralis (bivalve)	LAR	3.32+/-0.317	42.3+/-19.2	Bricker et al. 1993
8.79	+/-1.42	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.011+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.28+/-0.363	45.3+/-21.4	Bricker et al. 1993
8.8	+/-3.77	SG	Mississippi Sound, MS	COA		Significantly toxic (12.2+/-4.42% mortality)	Mysidopsis bahia (mysid shrimp)		0.939+/-0.335	2.63+/-2.3	EMAP Louisiana Province 1991
9.1	+/-0.93	NE	Jetty Island Pier, Everett Marina, WA	COA	10-d	Not toxic (12.3+/-2.87% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.08+/-0.66		Hart Crowser & Associates Inc. 1986
9.15	+/-8.64	NE	Bayou Casotte, MS	COA	10-d	Not significantly toxic (5.3+/-3.06% mortality)	Penaeus duorarum (pink shrimp)	ADT	5.2+/-2.6		Parrish 1988b
9.15	+/-8.64	NE	Bayou Casotte, MS	COA	10-d	Not significantly toxic (8+/-6% mortality)	Arenicola cristata (lugworm)	ADT	5.2+/-2.6		Parrish 1988b
9.15	+/-8.64	NE	Bayou Casotte, MS	COA	10-d	Not significantly toxic (0% mortality)	Crossostrea virginica (oyster)	ADT	5.2+/-2.6		Parrish 1988b
9.25	+/-11.8	NE	Apalachee Bay, FL	COA	10-d	Not significantly toxic (3.3+/-3.25% mortality)	Ampelisca abdita (amphipod)		0.643+/-0.455	0.390+/-0.410	EMAP Louisiana Province 1991
9.3	+/-0.51	NE	Puget Sound, WA	COA	15-min	Not significantly toxic (EC50; 0.283+/-0.168% extract)	Microtox (Photobacterium phosphoreum)		1.39+/-0.37		Pastorok & Becker 1990
10		NC	Puget Sound, WA	COA	10-d	Significantly toxic (56% mortality)	Panope generosa (geoduck)	JUV	2.1		Pastorok & Becker 1990
10.1	+/-8.20	*	Mississippi River, MS, LA	COA		Significantly toxic (32.9+/-36.4% mortality)	Mysidopsis bahia (mysid shrimp)		1.07+/-0.924	1.41+/-1.93	EMAP Louisiana Province 1991
10.2	+/-8.06	*	Mississippi River, MS, LA	COA	10-d	Significantly toxic (15.9+/-6.65% mortality)	Ampelisca abdita (amphipod)		1.22+/-0.717	0.235+/-0.276	EMAP Louisiana Province 1991
10.4	+/-13.4	NC	San Francisco Bay, CA	COA	10-d	Moderately toxic (33.8+/-4.7% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
11.5		SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (16% mortality)	Mysidopsis bahia (mysid)		1.8	7095 ug/g	Windom In Prep
11.6		SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (22.3% mortality)	Menidia beryllina (silverside)		1.71	6562 ug/g	Windom In Prep
11.6	+/-8.02	NE	Mobile Bay, AL	COA		Not significantly toxic (1.07+/-1.85% mortality)	Mysidopsis bahia (mysid shrimp)		0.968+/-0.815	8.23+/-3.4	EMAP Louisiana Province 1991
12		*	Curtis Creek, Baltimore, MD	COA	10-d	Significantly toxic (55% mortality)	Hyalella azteca (amphipod)	JUV			McGee et al. 1993
12.4	+/-9.27	NE	Burrard Inlet, BC	COA	10-d	Not toxic (5.21+/-3.61% emergence)	Corophium volutator (amphipod)	ADT	3.18+/-2.1		McLeay et al. 1991
12.5	+/-1.76	*	Brunswick Harbor Entrance, GA	COA	48-h	Significantly toxic (14.6+/-18.9% normal development)	Arbacia punctulata (sea urchin)		1.99+/-0.562	14009+/-13434 ug/g	Windom In Prep
12.5		NE	Puget Sound, WA	SBA		EPA/ACOE Puget Sound Interim Criteria	Aquatic biota				USACOE 1988
12.8		*	Los Angeles, CA	COA	96-h	Highly toxic (>50% mortality)	Palaemonetes pugio (shrimp)				Lee & Mariani 1977
13		NC	Puget Sound, WA	COA	2-d	Significantly toxic (3.8% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.5		Pastorok & Becker 1990
13	+/-8.44	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (5.8+/-3.7% mortality)	Rhepoxynius abronius (amphipod)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
13	+/-8.44	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (3.4+/-1.82% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
13	+/-8.44	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (11.2+/-3.7% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
13	+/-8.44	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (3.52+/-1.66% mortality)	Macoma nasuta (clam)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
13.1	+/-2.15	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (23.3+/-6.14% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.738		Word et al. 1988
13.3	+/-1.97	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (10.4+/-6.3% mortality)	Nephtys caecoides (polychaete)		1.63+/-0.657		Word et al. 1988
13.3	+/-1.97	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (0.2+/-0.6% mortality)	Macoma nasuta (clam)		1.63+/-0.657		Word et al. 1988
13.7	+/-14.8	NE	San Francisco Bay, CA	COA	48-h	Least toxic (23.3+/-7.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
13.8	+/-8.64	NE	Burrard Inlet, BC	COA	10-d	Not toxic (4.5+/-3.02% emergence)	Rhepoxynius abronius (amphipod)	ADT	2.66+/-2.15		McLeay et al. 1991
14	+/-0.78	SG	Oakland Harbor, CA	COA	10-d	Significantly toxic (35.3+/-2.5% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.56+/-0.07		Word et al. 1988

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14 +/-8.54	NE	Puget Sound, WA	COA	20-d	Not significantly toxic (5+/-3.86% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.46+/-0.26		Pastorok & Becker 1990
14.2 +/-6.5	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (13.8+/-4.09% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.47+/-0.306		Pastorok & Becker 1990
14.7 +/-13.9	NC	San Francisco Bay, CA	COA	10-d	Significantly toxic (42.9+/-19.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
15.2 +/-7.88	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (6.67+/-8.07% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.51+/-0.330		Pastorok & Becker 1990
15.4 +/-8.63	NE	Burrard Inlet, BC	COA	10-d	Not toxic (8.9+/-2.99% mortality)	Corophium volutator (amphipod)	ADT	2.8+/-1.96		McLeay et al. 1991
15.4 +/-8.63	NE	Burrard Inlet, BC	COA	10-d	Not toxic (97.2+/-2.84% reburial)	Rhepoxynius abronius (amphipod)	ADT	2.8+/-1.96		McLeay et al. 1991
16	*	United States	EqPA		EPA Acute Marine EP Threshold	Aquatic biota		1		Lyman et al. 1987
16 +/-3.54	NE	Mobile Bay, AL	COA	10-d	Not significantly toxic (0.5+/-0.778% mortality)	Ampelisca abdita (amphipod)		1.24+/-0.948	8.51+/-4.76	EMAP Louisiana Province 1991
17.2 +/-14.2	NC	San Francisco Bay, CA	COA	10-d	Highly toxic (67+/-11.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
17.9 +/-6.81	NE	Burrard Inlet, BC	COA	10-d	Not toxic (7.9+/-5.12% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.64+/-2.14		McLeay et al. 1991
18 +/-1.34	NE	Pensacola Naval Air Station, FL	COA	10-d	Not significantly toxic (0% mortality)	Crossostrea virginica (oyster)	ADT	2.5+/-2.83		Parrish 1988a
18 +/-1.34	NE	Pensacola Naval Air Station, FL	COA	10-d	Not significantly toxic (5+/-1.41% mortality)	Penaeus duorarum (pink shrimp)	ADT	2.5+/-2.83		Parrish 1988a
18 +/-1.34	NE	Pensacola Naval Air Station, FL	COA	10-d	Not significantly toxic (8% mortality)	Arenicola cristata (lugworm)	ADT	2.5+/-2.83		Parrish 1988a
19.8 +/-0.666	NE	Black Rock Beach, NS	COA	10-d	Not toxic (6.67+/-4.51% mortality)	Corophium volutator (amphipod)	ADT/JUV	0.24+/-0.18		Nicol & Doe 1990
19.8 +/-0.666	NE	Black Rock Beach, NS	COA	10-d	Not toxic (2.33+/-1.53% mortality)	Rhepoxynius abronius (amphipod)	ADT/JUV	0.24+/-0.18		Nicol & Doe 1990
19.8 +/-0.666	NE	Black Rock Beach, NS	COA	10-d	Not toxic (100% reburial)	Rhepoxynius abronius (amphipod)	ADT/JUV	0.24+/-0.18		Nicol & Doe 1990
20 +/-12.7	*	Jetty Island Pier, Everett Marina, WA	COA	10-d	Toxic (19.5+/-0.707% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.15+/-0.071		Hart Crowser & Associates Inc. 1986
20	NE	Galveston Harbor, TX	COA	10-d	Not toxic (2.4+/-1.52% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Grieco 1984
20	NE	Galveston Harbor, TX	COA	10-d	Not toxic (0% mortality)	Mercenaria mercenaria (hard clams)	ADT			Grieco 1984
20	NE	Galveston Harbor, TX	COA	10-d	Not toxic (2.8+/-2.17% mortality)	Nereis virens (sandworm)	ADT			Grieco 1984
20	NE	Burrard Inlet, BC	SQO		Sediment Quality Objectives	Aquatic biota				Swain & Nijman 1991
20.5 +/-22.3	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (4.43+/-2.1% mortality)	Panope generosa (geoduck)	JUV	1.51+/-0.261		Pastorok & Becker 1990
22 +/-18.7	NE	San Francisco Bay, CA	COA	48-h	Not significantly toxic (31.9+/-15.5% abnormal)	Bivalve	LAR			Long & Morgan 1990
22.1 +/-19.4	*	San Francisco Bay, CA	COA	48-h	Moderately toxic (59.4+/-11.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
22.1 +/-23.8	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (2.09+/-1.73% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.56+/-0.329		Pastorok & Becker 1990
22.4 +/-23.7	*	Puget Sound, WA	COA	15-min	Significantly toxic (EC50; 0.065+/-0.043% extract)	Microtox (Photobacterium phosphoreum)		1.58+/-0.255		Pastorok & Becker 1990
22.8 +/-22.1	NC	San Francisco Bay, CA	COA	48-h	Significantly toxic (55.7+/-22.7% abnormal)	Bivalve	LAR			Long & Morgan 1990
22.9 +/-27.5	SG	Puget Sound, WA	COA	2-d	Significantly toxic (60.4+/-46.5% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.57+/-0.287		Pastorok & Becker 1990
23.2	SG	Burrard Inlet, BC	COA	10-d	Highly toxic (23% emergence)	Corophium volutator (amphipod)	ADT	3.5		McLeay et al. 1991
23.2	SG	Burrard Inlet, BC	COA	10-d	Highly toxic (30.5% emergence)	Rhepoxynius abronius (amphipod)	ADT	3.5		McLeay et al. 1991
27.8 +/-30.8	NE	Commencement Bay, WA	COA	48-h	Least toxic (15.1+/-3.1% abnormality)	Oyster	LAR			Tetra Tech 1985
28 +/-21.5	NE	San Francisco Bay, CA	COA	10-d	Least toxic (18+/-6.6% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
28.2 +/-33.2	SG	Puget Sound, WA	COA	10-d	Significantly toxic (80.8+/-30.6% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.266		Pastorok & Becker 1990
28.3 +/-26.6	NE	Commencement Bay, WA	COA	10-d	Least toxic (12.5+/-4.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
30.3 +/-22.4	NE	San Francisco Bay, CA	COA	10-d	Not significantly toxic (18.4+/-6.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
32	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (3% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
32	NE	Sidney Tar Pond, NS	COA	10-d	Not significantly toxic (4% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
32	NE	Sidney Tar Pond, NS	COA	10-d	Not significantly toxic (3% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
32 +/-14.3	NE	Baltimore Harbor, MD	COA	48-h	Least toxic; TLm	Fundulus heteroclitus (mummichog)				Tsai et al. 1979
32 +/-14.3	NE	Baltimore Harbor, MD	COA	48-h	Least toxic; TLm	Leiostomus xanthurus (spot)				Tsai et al. 1979

Table 1. A summary of the available data on the biological effects associated with sediment-sorbed ARSENIC (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Arsenic	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
33.7	+/-14	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (6.8+/-7.31% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
33.7	+/-14	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (8.5+/-6.06% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
33.7	+/-14	NE	Halifax Harbour, NS	COA	20-d	Not significantly toxic (0.7+/-1.63% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
34.5	+/-3.54	NE	Sidney Tar Pond, NS	COA	20-d	Not significantly toxic (8+/-5.66% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
37		SG	Sidney Tar Pond, NS	COA	10-d	Significantly toxic (100% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
37		SG	Sidney Tar Pond, NS	COA	10-d	Significantly toxic (100% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
38		SG	Sidney Tar Pond, NS	COA	20-d	Significantly toxic (52% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
41.3	+/-15.2	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (5.2+/-3.5% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
41.3	+/-15.2	NE	Halifax Harbour, NS	COA	20-d	Not significantly toxic (1+/-2% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
41.6			***PEL***								
43	+/-43.3	*	Puget Sound, WA	COA	20-d	Significantly toxic (37.3+/-22% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.87+/-0.208		Pastorok & Becker 1990
44.3	+/-17	SG	Halifax Harbour, NS	COA	10-d	Significantly toxic (61.7+/-12.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
50.7	+/-29.3	*	San Francisco Bay, CA	COA	48-h	Highly toxic (92.4+/-4.5% abnormal)	Bivalve	LAR			Long & Morgan 1990
54		*	San Francisco Bay, CA	AETA	48-h	San Francisco Bay AET	Oyster; mussel	LAR			Long & Morgan 1990
54		NE	San Francisco Bay, CA	COA	48-h	Least toxic (17.3% mortality)	Mussel	LAR	1.25		Chapman et al. 1987a
56.3	+/-6.34	NE	San Francisco Bay, CA	COA	4-wk	Least toxic (116+/-4.3 young produced)	Tigriopus californicus (copepod)	ADT	1.23+/-.09		Chapman et al. 1987a
57	+/-10.6	NC	San Francisco Bay, CA	COA	48-h	Moderately toxic (57.1+/-13.6% mortality)	Mussel	LAR	1.14+/-.33		Chapman et al. 1987a
57		*	Puget Sound, WA	AETA		1988 Puget Sound AET	Benthic community				PTI 1988
57		*	Puget Sound, WA	SQG		Chemical Criteria	Benthic community		1		WDE 1989
57		NC	San Francisco Bay, CA	COA	10-d	Most toxic (95% mortality)	Amphipod	ADT	4.03		Chapman et al. 1987a
57		NC	San Francisco Bay, CA	COA	10-d	Highly toxic (37% avoidance)	Amphipod	ADT	4.03		Chapman et al. 1987a
57.9	+/-9.46	NE	San Francisco Bay, CA	COA	10-d	Least toxic (13.6+/-7.76% mortality)	Amphipod	ADT	1.4 +/- 0.79		Chapman et al. 1987a
58.7	+/-10.5	NE	San Francisco Bay, CA	COA	48-h	Least toxic (18+/-8.01% abnormal)	Mussel	LAR	1.2+/-.38		Chapman et al. 1987a
58.7	+/-148.0	*	Commencement Bay, WA	COA	48-h	Moderately toxic (23+/-2.3% abnormality)	Oyster	LAR			Tetra Tech 1985
59.6	+/-10.1	NE	San Francisco Bay, CA	COA	10-d	Least Toxic (4.63+/-2.91% avoidance)	Amphipod	ADT	1.44+/-.74		Chapman et al. 1987a
59.7	+/-11.6	SG	San Francisco Bay, CA	COA	48-h	Moderately toxic (25.1+/-6.61% abnormal)	Mussel	LAR	1.26+/-0.17		Chapman et al. 1987a
61.5		SG	San Francisco Bay, CA	COA	48-h	Highly toxic (66.8% abnormal)	Mussel	LAR	3.59		Chapman et al. 1987a
63.2	+/-148.0	SG	Commencement Bay, WA	COA	10-d	Moderately toxic (26+/-5.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
65	+/-7.55	SG	San Francisco Bay, CA	COA	48-h	Highly toxic (92.3+/-5.5% mortality)	Mussel	LAR	2.87+/-1.32		Chapman et al. 1987a
65	+/-7.55	SG	San Francisco Bay, CA	COA	4-wk	Moderately toxic (94.9+/-10.1 young produced)	Tigriopus californicus (copepod)	ADT	2.87+/-1.07		Chapman et al. 1987a
69.3	+/-3.06	SG	San Francisco Bay, CA	COA	10-d	Moderately toxic (28.3+/-7.51% mortality)	Amphipod	ADT	2.01+/-.98		Chapman et al. 1987a
70		*	San Francisco Bay, CA	AETA	10-d	San Francisco Bay AET	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
70		*	California	AETA	48-h	California AET Values	Mytilus edulis (bivalve)	LAR			Becker et al. 1990
70		*	California	AETA		California AET Values	Benthic species				Becker et al. 1990
70		*	Northern California	AETA		Northern California AET Values	Benthic species				Becker et al. 1990
70		NE	Puget Sound, WA	AETA		PSDDA Screening level concentration	Aquatic biota				USACOE 1988
>72		-	Northern California	AETA	10-d	Northern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
>72		-	California	AETA	10-d	California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
85		*	Puget Sound, WA	AETA		1986 Puget Sound AET	Benthic species		15		Bellar et al. 1986
91.8	+/-78.6	*	Baltimore Harbor, MD	COA	48-h	Most toxic; TLm	Fundulus heteroclitus (mummichog)				Tsai et al. 1979

Table 1. A summary of the available data on the biological effects associated with sediment-sorbed ARSENIC (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Arsenic	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
91.8	+/-78.6	*	Baltimore Harbor, MD	COA	48-h	Most toxic; TLm	Leiostomus xanthurus (spot)				Tsai et al. 1979
93		*	Puget Sound, WA	AETA	10-d	1988 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT			PTI 1988
93		*	Puget Sound, WA	AETA	10-d	1986 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT	15		Bellar et al. 1986
128	+/-124	NE	Bayou La Batre, AB	COA	10-d	Not significantly toxic (46.7+/-11.4% mortality)	Nereis virens (polychaete)	ADT			Parrish 1987a
128	+/-124	NE	Bayou La Batre, AB	COA	10-d	Not significantly toxic (5.3+/-2.31% mortality)	Crossostrea virginica (oyster)	ADT			Parrish 1987a
128	+/-124	NE	Bayou La Batre, AB	COA	10-d	Not significantly toxic (14+/-9.17% mortality)	Penaeus duorarum (pink shrimp)	ADT			Parrish 1987a
139	+/-216	NE	Pascagoula Mississippi Channel, MS	COA	10-d	Not significantly toxic (5.6+/-2.2% mortality)	Arenicola cristata (lugworm)	ADT			Parrish 1987c
139	+/-216	NE	Pascagoula Mississippi Channel, MS	COA	10-d	Not significantly toxic (6.5+/-5.14% mortality)	Penaeus duorarum (pink shrimp)	ADT			Parrish 1987c
139	+/-216	NE	Pascagoula Mississippi Channel, MS	COA	10-d	Not significantly toxic (0.7+/-0.82% mortality)	Crossostrea virginica (oyster)	ADT			Parrish 1987c
178	+/-150	NE	Howe Sound, BC	COA	10-d	Not toxic (10.5+/-4.09% mortality)	Rhepoxynius abronius (amphipod)	ADT	3.4+/-4.39		McLeay et al. 1991
178	+/-150	NE	Howe Sound, BC	COA	10-d	Not toxic (5.83+/-5.48% emergence)	Rhepoxynius abronius (amphipod)	ADT	3.4+/-4.39		McLeay et al. 1991
178	+/-150	NE	Howe Sound, BC	COA	10-d	Not toxic (96.3+/-4.19% reburial)	Rhepoxynius abronius (amphipod)	ADT	3.4+/-4.39		McLeay et al. 1991
690	+/-2351	*	Commencement Bay, WA	COA	48-h	Highly toxic (44.5+/-19% abnormality)	Oyster	LAR			Tetra Tech 1985
700		*	Puget Sound, WA	AETA	15-min	1988 Puget Sound AET	Microtox (Photobacterium phosphoreum)				PTI 1988
700		*	Puget Sound, WA	AETA	48-h	1988 Puget Sound AET	Crassostrea gigas (oyster)	LAR			PTI 1988
700		*	Puget Sound, WA	AETA		PSDDA Maximum Level Criteria	Aquatic biota				USACOE 1988
700		*	Puget Sound, WA	AETA	15-min	1986 Puget Sound AET	Microtox (Photobacterium phosphoreum)		15		Bellar et al. 1986
700		*	Puget Sound, WA	AETA	48-h	1986 Puget Sound AET	Crassostrea gigas (oyster)	LAR	15		Bellar et al. 1986
2257	+/-4214	*	Commencement Bay, WA	COA	10-d	Highly toxic (78.5+/-19.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985

Table 2. A summary of the available data on the biological effects associated with sediment-sorbed CADMIUM (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Cadmium	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.015		NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
0.02		NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (18% mortality)	Ampelisca abdita (amphipod)		0.028	9 ug/g	Windom In Prep
0.02		NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (0% mortality)	Arbacia punctulata (sea urchin)		0.03	19 ug/g	Windom In Prep
0.03		NC	Mobile Bay, AL	COA		Significantly toxic (10% mortality)	Mysidopsis bahia (mysid shrimp)		0.009	0.004	EMAP Louisiana Province 1991
0.03		NE	Apalachee Bay, FL	COA	10-d	Not significantly toxic (3.3+/-3.25% mortality)	Ampelisca abdita (amphipod)		0.643+/-0.455	0.390+/-0.410	EMAP Louisiana Province 1991
0.033	+/-0.022	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (28.3+/-6.11% mortality)	Mysidopsis bahia (mysid)		0.246+/-0.051	127+/-24 ug/g	Windom In Prep
0.035	+/-0.01	NE	Apalachee Bay, FL	COA		Not significantly toxic (0.75+/-1.5% mortality)	Mysidopsis bahia (mysid shrimp)		0.540+/-0.385	0.405+/-0.417	EMAP Louisiana Province 1991
0.038	+/-0.015	NE	Chandeleur Sound, LA	COA		Not significantly toxic (1.03+/-2.05% mortality)	Mysidopsis bahia (mysid shrimp)		0.824+/-0.915	1.69+/-0.920	EMAP Louisiana Province 1991
0.04	+/-0.014	NC	Mississippi Sound, MS	COA	10-d	Significantly toxic (11.6+/-3.39% mortality)	Ampelisca abdita (amphipod)		0.111+/-0.045	0.03	EMAP Louisiana Province 1991
<0.04		NE	Fraser River Estuary, BC	COA		Sediments populated by feral clams	Macoma balthica (bivalve)		0.45		McGreer 1982
0.04	+/-0.014	SG	Apalachee Bay, FL	COA	10-d	Significantly toxic (15.6% mortality)	Ampelisca abdita (amphipod)		0.438+/-0.442	0.421+/-0.593	EMAP Louisiana Province 1991
0.045	+/-0.018	NC	Chandeleur Sound, LA	COA	10-d	Significantly toxic (11.5+/-4.86% mortality)	Ampelisca abdita (amphipod)		0.811+/-0.711	1.87+/-0.973	EMAP Louisiana Province 1991
0.045	+/-0.021	NC	Mobile Bay, AL	COA	10-d	Significantly toxic (46+/-49.3% mortality)	Ampelisca abdita (amphipod)		0.22+/-0.298	3.84+/-5.43	EMAP Louisiana Province 1991
0.05	+/-0.014	NC	Mississippi Sound, MS	COA		Significantly toxic (12.2+/-4.42% mortality)	Mysidopsis bahia (mysid shrimp)		0.939+/-0.335	2.63+/-2.3	EMAP Louisiana Province 1991
0.051	+/-0.048	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (4+/-2.83% mortality)	Menidia beryllina (silverside)		0.243+/-0.264	90.5+/-78.4 ug/g	Windom In Prep
0.053	+/-0.045	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (9.78+/-5.33% mortality)	Mysidopsis bahia (mysid)		0.24+/-0.247	91.9+/-73.4 ug/g	Windom In Prep
0.057	+/-0.046	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (11.6+/-4.33% mortality)	Ampelisca abdita (amphipod)		0.267+/-0.25	102+/-71.1 ug/g	Windom In Prep
0.057	+/-0.046	NE	Chandeleur Sound, LA	COA	10-d	Not significantly toxic (2.87+/-4.05% mortality)	Ampelisca abdita (amphipod)		0.517+/-0.166	2.02+/-1.38	EMAP Louisiana Province 1991
0.058	+/-0.033	SG	Chandeleur Sound, LA	COA		Significantly toxic (7.6+/-1.32% mortality)	Mysidopsis bahia (mysid shrimp)		0.624+/-0.197	2.07+/-1.19	EMAP Louisiana Province 1991
0.062	+/-0.018	NE	Gulf of Mexico	COA	10-d	Not toxic (0.36+/-0.261% emergence/d)	Rhepoxynius abronius (amphipod)	ADT	0.42+/-0.13		Chapman et al. 1991
0.063	+/-0.047	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (91.3+/-2.91% normal development)	Arbacia punctulata (sea urchin)		0.299+/-0.251	114+/-68.4 ug/g	Windom In Prep
0.063	+/-0.052	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (27.5+/-10.6% mortality)	Mysidopsis bahia (mysid)		0.237+/-0.311	74.6+/-85.5 ug/g	Windom In Prep
0.07	+/-0.048	*	Savannah River Entrance Channel, GA	COA	48-h	Significantly toxic (25.4+/-7.66% mortality)	Arbacia punctulata (sea urchin)		0.344+/-0.242	129.5+/-59.3 ug/g	Windom In Prep
0.08	+/-0.02	NE	Pascagoula Naval Station, MS	COA	10-d	Not significantly toxic (1+/-1.41% mortality)	Crossostrea virginica (oyster)	ADT	7.31+/-3.86		Parrish 1990
0.08	+/-0.02	NE	Pascagoula Naval Station, MS	COA	10-d	Not significantly toxic (4+/-2.83% mortality)	Penaeus duorarum (pink shrimp)	ADT	7.31+/-3.86		Parrish 1990
0.08	+/-0.02	NE	Pascagoula Naval Station, MS	COA	10-d	Not significantly toxic (5+/-1.41% mortality)	Nereis virens (polychaete)	ADT	7.31+/-3.86		Parrish 1990
0.087	+/-0.055	NE	Mississippi Sound, MS	COA	10-d	Not significantly toxic (1.4+/-1.73% mortality)	Ampelisca abdita (amphipod)		0.998+/-0.602	2.01+/-1.82	EMAP Louisiana Province 1991
0.093	+/-0.06	NE	Mississippi Sound, MS	COA		Not significantly toxic (0.789+/-1.59% mortality)	Mysidopsis bahia (mysid shrimp)		0.827+/-0.757	1.46+/-1.58	EMAP Louisiana Province 1991
0.095	+/-0.041	NE	Matagorda Bay, TX	COA		Not significantly toxic (1.58+/-1.82% mortality)	Mysidopsis bahia (mysid shrimp)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
0.095	+/-0.041	NE	Matagorda Bay, TX	COA	10-d	Not significantly toxic (2.33+/-4.65% mortality)	Ampelisca abdita (amphipod)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
0.098	+/-0.107	NE	Gulf of Mexico	COA	48-h	Not toxic (4.54+/-5.37% mortality)	Crassostrea gigas (oyster)	LAR	0.443+/-0.127		Chapman et al. 1991
0.1		NE	Georgetown Harbor, SC	COA		Not toxic (species richness or abundance)	Benthic species		0.12		Van Dolah et al. 1984
0.1		NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (3% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
0.1		NE	Sidney Tar Pond, NS	COA	10-d	Not significantly toxic (4% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
0.1		NE	Sidney Tar Pond, NS	COA	10-d	Not significantly toxic (3% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
0.1		NE	Galveston Bay, TX	COA		High species richness (24.5+/-3.7 S/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
0.1		NE	Galveston Bay, TX	COA		High abundance (359+/-92.8 N/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
0.1		NE	Galveston Bay, TX	COA		High abundance (156+/-22.9 N/0.00203 sq.m.)	Polychaeta		0.916+/-0.661	2.94+/-2.3	Carr 1992
0.1		NE	Galveston Bay, TX	COA		High abundance (155+/-49.5 N/0.00203 sq.m.)	Oligochaeta		1.2+/-1.27	4.27+/-3.85	Carr 1992
0.1		NE	Galveston Bay, TX	COA		High abundance (27.3+/-10 N/0.00203 sq.m.)	Mollusca		1.64+/-0.4	1.39+/-0.17	Carr 1992
0.1	+/-0.03	NE	Pensacola Naval Air Station, FL	COA	10-d	Not significantly toxic (0% mortality)	Crossostrea virginica (oyster)	ADT	2.5+/-2.83		Parrish 1988a
0.1	+/-0.03	NE	Pensacola Naval Air Station, FL	COA	10-d	Not significantly toxic (5+/-1.41% mortality)	Penaeus duorarum (pink shrimp)	ADT	2.5+/-2.83		Parrish 1988a

Table 2. A summary of the available data on the biological effects associated with sediment-sorbed CADMIUM (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Cadmium	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.1	+/-0.03	NE	Pensacola Naval Air Station, FL	COA	10-d	Not significantly toxic (8% mortality)	Arenicola cristata (lugworm)	ADT	2.5+/-2.83		Parrish 1988a
0.102	+/-0.1	NE	Gulf of Mexico	COA	48-h	Not significantly toxic (7.76+/-1.89% abnormality)	Crassostrea gigas (oyster)	LAR	0.425+/-0.128		Chapman et al. 1991
0.11	+/-0.099	NC	Galveston Bay, TX	COA	10-d	Significantly toxic (15.8+/-3.89% mortality)	Ampelisca abdita (amphipod)		0.647+/-0.606	0.160+/-0.184	EMAP Louisiana Province 1991
0.111	+/-0.041	NE	Galveston Bay, TX	COA		High abundance (16.2+/-6.19 N/0.00203 sq.m.)	Copepoda		0.844+/-0.524	4.73+/-3.1	Carr 1992
0.114		NC	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (22.3% mortality)	Menidia beryllina (silverside)		1.71	6562 ug/g	Windom In Prep
0.118	+/-0.043	SG	Galveston Bay, TX	COA		Moderate abundance (58.3+/-16.2 N/0.00203 sq.m.)	Oligochaeta		0.632+/-0.274	7.93+/-5.6	Carr 1992
0.122	+/-0.095	NE	Galveston Bay, TX	COA	1-h	Not toxic (92.5+/-6.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	0.77+/-0.448	6.37+/-6.58	Carr 1992
0.122	+/-0.105	NE	Galveston Bay, TX	COA	48-h	Not toxic (98.1+/-1.79% normal development)	Arbacia punctulata (sea urchin)	EMB	0.748+/-0.476	4.16+/-3.45	Carr 1992
0.126	+/-0.053	NE	Galveston Bay, TX	COA		High abundance (154+/-30.2 N/0.00203 sq.m.)	Benthic invertebrates		0.47+/-0.27	9.07+/-2.94	Carr 1992
0.126	+/-0.144	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (15.3+/-11.0% mortality)	Hyalella azteca (amphipod)	JUV	0.648+/-0.641	1.74+/-1.39	Hall et al. 1992
0.127	+/-0.076	NE	Galveston Bay, TX	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		0.934+/-0.657	0.457+/-0.530	EMAP Louisiana Province 1991
0.127	+/-0.091	NE	Mobile Bay, AL	COA		Not significantly toxic (1.07+/-1.85% mortality)	Mysidopsis bahia (mysid shrimp)		0.968+/-0.815	8.23+/-3.4	EMAP Louisiana Province 1991
0.13		NC	Gulf of Mexico	COA		Most toxic (100 TU/g)	Microtox (Photobacterium phosphoreum)		0.4		Chapman et al. 1991
0.13	+/-0.03	NE	Bayou Casotte, MS	COA	10-d	Not significantly toxic (5.3+/-3.06% mortality)	Penaeus duorarum (pink shrimp)	ADT	5.2+/-2.6		Parrish 1988b
0.13	+/-0.03	NE	Bayou Casotte, MS	COA	10-d	Not significantly toxic (8+/-6% mortality)	Arenicola cristata (lugworm)	ADT	5.2+/-2.6		Parrish 1988b
0.13	+/-0.03	NE	Bayou Casotte, MS	COA	10-d	Not significantly toxic (0% mortality)	Crossostrea virginica (oyster)	ADT	5.2+/-2.6		Parrish 1988b
0.137	+/-0.099	NC	Galveston Bay, TX	COA		Low abundance (0.3+/-0.651 N/0.00203 sq.m.)	Amphipoda		0.859+/-0.487	7.67+/-8.12	Carr 1992
0.137	+/-0.057	NE	Galveston Bay, TX	COA		Low species (11.2+/-1.94 S/0.00203 sq.m.)	Benthic species		0.642+/-0.356	13.4+/-8.65	Carr 1992
0.141	+/-0.137	NC	Gulf of Mexico	COA	10-d	Significantly toxic (41.75+/-38.9% mortality)	Rhepoxynius abronius (amphipod)	ADT	0.45+/-0.058		Chapman et al. 1991
0.155	+/-0.131	SG	Galveston Bay, TX	COA		Low abundance (1.86+/-2.59 N/0.00203 sq.m.)	Mollusca		0.784+/-0.421	8.29+/-8.13	Carr 1992
0.157	+/-0.133	SG	Galveston Bay, TX	COA		Low abundance (89+/-60.7 N/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
0.158	+/-0.082	SG	Galveston Bay, TX	COA		Low abundance (53+/-33.9 N/0.00203 sq.m.)	Benthic invertebrates		0.985+/-0.247	22+/-11.2	Carr 1992
0.16	+/-0.059	NE	Galveston Bay, TX	COA	10-d	Not significantly toxic (1.35+/-1.45% mortality)	Ampelisca abdita (amphipod)		0.961+/-0.537	1.17+/-0.640	EMAP Louisiana Province 1991
0.16	+/-0.099	NE	Mobile Bay, AL	COA	10-d	Not significantly toxic (0.5+/-0.778% mortality)	Ampelisca abdita (amphipod)		1.24+/-0.948	8.51+/-4.76	EMAP Louisiana Province 1991
0.16	+/-0.072	SG	Galveston Bay, TX	COA		Significantly toxic (13.4+/-9.11% mortality)	Mysidopsis bahia (mysid shrimp)		0.778+/-0.482	1.21+/-0.778	EMAP Louisiana Province 1991
0.16	+/-0.13	SG	Galveston Bay, TX	COA		Low species richness (10+/-3.73 S/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
0.163	+/-0.142	SG	Galveston Bay, TX	COA		Low abundance (4.21+/-5.66 N/0.00203 sq.m.)	Oligochaeta		0.895+/-0.453	7.85+/-8.8	Carr 1992
0.167	+/-0.141	SG	Galveston Bay, TX	COA		Low abundance (41.7+/-21.8 N/0.00203 sq.m.)	Polychaeta		0.848+/-0.427	9.21+/-8.61	Carr 1992
0.172	+/-0.17	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (5.8+/-3.7% mortality)	Rhepoxynius abronius (amphipod)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
0.172	+/-0.17	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (3.4+/-1.82% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
0.172	+/-0.17	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (11.2+/-3.7% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
0.172	+/-0.17	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (3.52+/-1.66% mortality)	Macoma nasuta (clam)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
0.172	+/-0.203	NE	Tampa Bay, FL	COA	1-h	Least toxic (83+/-4.26% fertilization)	Arbacia punctulata (sea urchin)	GAM		0.131+/-0.169	Long 1993
0.175	+/-0.05	NE	Jetty Island Pier, Everett Marina, WA	COA	10-d	Not toxic (12.3+/-2.87% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.08+/-0.66		Hart Crowser & Associates Inc. 1986
0.177	+/-0.155	SG	Galveston Bay, TX	COA		Low abundance (2.05+/-1.58 N/0.00203 sq.m.)	Copepoda		0.879+/-0.47	9.63+/-9.65	Carr 1992
0.178	+/-0.201	NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (55.0+/-19.5% mortality)	Streblospio benedicti (polychaete worm)		0.349+/-0.11	1.07+/-0.66	Hall et al. 1992
0.183	+/-0.092	NE	Miami River/Seybold Canal, FL	COA	10-d	Not significantly toxic (6.7+/-2.31% mortality)	Pennaeus aztecus aztecus (brown shrimp)	ADT			Vittor & Associates 1988
0.19	+/-0.057	NE	Mississippi River, MS, LA	COA	10-d	Not significantly toxic (7.8+/-1.63% mortality)	Ampelisca abdita (amphipod)		1.15+/-1.04	2.31+/-0.651	EMAP Louisiana Province 1991
0.193	+/-0.074	NE	Puget Sound, WA	COA	15-min	Not significantly toxic (EC50; 0.283+/-0.168% extract)	Microtox (Photobacterium phosphoreum)		1.39+/-0.37		Pastorok & Becker 1990
0.193	+/-0.142	SG	Galveston Bay, TX	COA	48-h	Toxic (4.65+/-16.1% normal development)	Arbacia punctulata (sea urchin)	EMB	1.06+/-0.449	14.5+/-9.2	Carr 1992
0.2		NG	Sidney Tar Pond, NS	COA	20-d	Significantly toxic (52% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
0.2	+/-0.14	NE	Sidney Tar Pond, NS	COA	20-d	Not significantly toxic (8+/-5.66% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990

Table 2. A summary of the available data on the biological effects associated with sediment-sorbed CADMIUM (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Cadmium	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.2	+/-0.18	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (7.2+/-1.92% mortality)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
0.2	+/-0.18	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.6+/-0.55% reburial)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
0.2	+/-0.18	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
0.2	+/-0.18	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
0.25		NE	Freeport Harbor, TX	COA	10-d	Not toxic (2+/-1% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1985b
0.25		NE	Freeport Harbor, TX	COA	10-d	Not toxic (9.6+/-4.22% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1985b
0.25		NE	Freeport Harbor, TX	COA	10-d	Not toxic (0% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1985b
0.25		NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (4.8+/-2.28% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1983a
0.25		NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (15.8+/-4.21% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1983a
0.25		NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (1.2+/-.447% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1983a
0.25		NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (6+/-2.35% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1983b
0.25		NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (2.6+/-2.97% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1983b
0.25		NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (1.8+/-1.79% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1983b
0.25	+/-0.3	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (5.2+/-3.5% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
0.25	+/-0.3	NE	Halifax Harbour, NS	COA	20-d	Not significantly toxic (1+/-2% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
0.26		NE	Massachusetts Bay, MA	COA		High density (22 N/0.1 sq.m.)	Rhynchocoela	VAR			Gilbert et al. 1976
0.265	+/-0.049	NE	Mississippi River, MS, LA	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		1.3+/-0.83	1.14+/-1	EMAP Louisiana Province 1991
0.267	+/-0.170	*	Galveston Bay, TX	COA	1-h	Toxic (20.4+/-18.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	1.26+/-0.47	14.6+/-10.1	Carr 1992
0.271	+/-0.347	NE	Brunswick Harbor Entrance, GA	COA	48-h	Not significantly toxic (86.6+/-4.25% normal development)	Arbacia punctulata (sea urchin)		0.181+/-0.162	182+/-208 ug/g	Windom In Prep
0.283	+/-0.029	NE	Houston Ship Channel, TX	COA		Not significantly toxic (15+/-13.2% mortality)	Sheepshead minnow	ADT	0.05+/-0.0242		Crocker et al. 1991
0.288		NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.003 mg/day growth)	Lepidactylus dytiscus (amphipod)		1.38	3.25	Hall et al. 1992
0.288		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1% mortality)	Streblospio benedicti (polychaete worm)		1.38	3.25	Hall et al. 1992
0.3		*	Sidney Tar Pond, NS	COA	10-d	Significantly toxic (100% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
0.3		*	Sidney Tar Pond, NS	COA	10-d	Significantly toxic (100% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
0.3	+/-0.346	*	Halifax Harbour, NS	COA	10-d	Significantly toxic (61.7+/-12.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
0.3	+/-0.014	NE	Massachusetts Bay, MA	COA		High density (299+/-40.3 N/0.1 sq.m.)	Arthropoda	VAR			Gilbert et al. 1976
0.31		NE	Massachusetts Bay, MA	COA		High density (24 N/0.1 sq.m.)	Echinodermata	VAR			Gilbert et al. 1976
0.318	+/-0.397	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (10.6+/-3.17% mortality)	Ampelisca abdita (amphipod)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
0.318	+/-0.397	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (8.00+/-2.92% mortality)	Mysidopsis bahia (mysid)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
0.343	+/-0.37	NE	Matagorda Ship Channel, TX	COA	10-d	Not toxic (7.2+/-2.77% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1985a
0.343	+/-0.37	NE	Matagorda Ship Channel, TX	COA	10-d	Not toxic (10.6+/-5.18% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1985a
0.343	+/-0.37	NE	Matagorda Ship Channel, TX	COA	10-d	Not toxic (0.2+/-0.447% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1985a
0.346	+/-0.512	*	Tampa Bay, FL	COA	1-h	Moderately toxic (44.5+/-17.8% fertilization)	Arbacia punctulata (sea urchin)	GAM		0.622+/-1.12	Long 1993
0.346	+/-0.448	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (5.43+/-3.21% mortality)	Mysidopsis bahia (mysid)		1.21+/-1.13	9096+/-13378 ug/g	Windom In Prep
0.347	+/-0.349	NE	Galveston Bay, TX	COA		High Abundance (6+/-1.41 N/0.00203 sq.m.)	Amphipoda		0.955+/-0.629	7.21+/-8.2	Carr 1992
0.35		SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (16% mortality)	Mysidopsis bahia (mysid)		1.8	7095 ug/g	Windom In Prep
0.353	+/-0.093	NE	Massachusetts Bay, MA	COA		High species richness (102+/-4.73 S/0.1 sq.m.)	Benthic species	VAR			Gilbert et al. 1976
0.356	+/-0.469	SG	Brunswick Harbor Entrance, GA	COA	48-h	Significantly toxic (14.6+/-18.9% normal development)	Arbacia punctulata (sea urchin)		1.99+/-0.562	14009+/-13434 ug/g	Windom In Prep
0.358	+/-0.673	NE	Gulf of Mexico	COA		Not toxic (3.21+/-0.239 diversity index)	Benthic species		0.464+/-0.143		Chapman et al. 1991
0.38	+/-0.436	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (9.61+/-2.7% mortality)	Menidia beryllina (silverside)		1.22+/-1.13	9172+/-13363 ug/g	Windom In Prep
0.381	+/-0.705	NE	Gulf of Mexico	COA		Least toxic (6.32+/-3.68 TU/g)	Microtox (Photobacterium phosphoreum)		0.47+/-0.149		Chapman et al. 1991
0.383	+/-0.077	NE	Massachusetts Bay, MA	COA		High density (201+/-33.4 N/0.1 sq.m.)	Mollusca	VAR			Gilbert et al. 1976

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Cadmium	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.397	+/-0.274	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.125+/-0.084 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.25+/-0.468	1.98+/-2.25	Bricker et al. 1993
0.4	+/-0.1	NE	San Francisco Bay, CA	COA	48-h	Least toxic (23.3+/-7.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
0.4	+/-0.3	NE	Southern California	COA		High abundance (191+/-70.1 N/0.1 sq.m.)	Echinoderm				Word & Mearns 1979 (As cited in L&M 1990)
0.4		SG	Strait of Georgia, BC	COA	48-h	Significant increase in burrowing time	Macoma balthica (bivalve)		1.13		McGreer 1979
0.407	+/-0.405	NE	Miami River/Seybold Canal, FL	COA	10-d	Not significantly toxic (2.3+/-1.51% mortality)	Mercenaria mercenaria (atlantic quahog)	ADT			Vittor & Associates 1988
0.407	+/-0.405	NE	Miami River/Seybold Canal, FL	COA	10-d	Not significantly toxic (7.7+/-3.02% mortality)	Nereis virens (sandworm)	ADT			Vittor & Associates 1988
0.41		NC	Puget Sound, WA	COA	10-d	Significantly toxic (56% mortality)	Panope generosa (geoduck)	JUV	2.1		Pastorok & Becker 1990
0.415	+/-0.375	SG	Mississippi River, MS, LA	COA		Significantly toxic (32.9+/-36.4% mortality)	Mysidopsis bahia (mysid shrimp)		1.07+/-0.924	1.41+/-1.93	EMAP Louisiana Province 1991
0.421	+/-0.327	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (21.5+/-6.36% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.35+/-1.05	10.5+/-13.4	Bricker et al. 1993
0.426	+/-0.19	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-7.99% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.14+/-0.352	6.09+/-5.38	Bricker et al. 1993
0.435	+/-0.049	NC	Tampa Bay, FL	COA	48-h	Significantly toxic (48.1+/-1.91% mortality)	Mulinaria lateralis (coot clam)	LAR		2.82+/-2.65	Long 1993
0.44	+/-0.612	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.0005 mg/day growth)	Streblospio benedicti (polychaete worm)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
0.441	+/-0.612	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (0.33+/-0.516% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
0.441	+/-0.612	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (2.33+/-1.03% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
0.441	+/-0.612	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.367+/-0.085 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
0.45	+/-0.212	*	Jetty Island Pier, Everett Marina, WA	COA	10-d	Toxic (19.5+/-0.707% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.15+/-0.071		Hart Crowser & Associates Inc. 1986
0.456	+/-0.265	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (6.48+/-10.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
0.456	+/-0.265	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99+/-0.862% normal development)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
0.46		NE	Massachusetts Bay, MA	COA		High density (4135 N/0.1 sq.m.)	Annelida	VAR			Gilbert et al. 1976
0.467	+/-0.274	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (25.9+/-5.01% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.21+/-0.444	2.41+/-2.32	Bricker et al. 1993
0.471	+/-0.679	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.003+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.316+/-0.120	2.13+/-2.46	Hall et al. 1992
0.471	+/-0.679	SG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29.8+/-11.1% mortality)	Streblospio benedicti (polychaete worm)		0.316+/-0.12	2.13+/-2.46	Hall et al. 1992
0.472	+/-0.217	NE	Houston Ship Channel, TX	COA	10-d	Not significantly toxic (4.7+/-4.29% mortality)	Amphipod	ADT	0.144+/-0.123		Crocker et al. 1991
0.475	+/-0.177	NC	Houston Ship Channel, TX	COA	10-d	Significantly toxic (22.7+/-0.778% mortality)	Amphipod	ADT	0.248+/-0.132		Crocker et al. 1991
0.48		*	Northern California	AETA		Northern California AET Values	Benthic species				Becker et al. 1990
0.483	+/-0.834	NE	Gulf of Mexico	COA	10-d	Not significantly toxic (9+/-3.96% mortality)	Rhepoxynius abronius (amphipod)	ADT	0.471+/-0.18		Chapman et al. 1991
0.486	+/-0.165	NE	Houston Ship Channel, TX	COA	10-d	Not significantly toxic (5.4+/-3.6% mortality)	Amphipod	ADT	0.129+/-0.054		Crocker et al. 1991
0.49	+/-0.269	*	Mississippi River, MS, LA	COA	10-d	Significantly toxic (15.9+/-6.65% mortality)	Ampelisca abdita (amphipod)		1.22+/-0.717	0.235+/-0.276	EMAP Louisiana Province 1991
0.5	+/-0.3	NC	Southern California	COA		Moderate abundance (56.2+/-23 N/0.1 sq.m.)	Echinoderm				Word & Mearns 1979 (As cited in L&M 1990)
0.5	+/-0.3	NC	San Francisco Bay, CA	COA	10-d	Moderately toxic (33.8+/-4.7% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
0.5		NE	Charleston Harbor, SC	COA		High species richness (14.9+/-2.04; SRUs)	Benthic species				Winn et al. 1989
0.5		NE	Charleston Harbor, SC	COA		High diversity (4.15+/-0.59; SDUs)	Benthic species				Winn et al. 1989
0.5		NE	Curtis Creek, Baltimore, MD	COA	10-d	Not significantly toxic (11.3% mortality)	Leptocheirus plumulosus (amphipod)	JUV			McGee et al. 1993
0.5		NE	Curtis Creek, Baltimore, MD	COA	20-d	Not significantly toxic (25.4+/-17.1% mortality)	Leptocheirus plumulosus (amphipod)	JUV			McGee et al. 1993
<0.5		NE	Duwamish River, WA	COA	96-h	Not toxic (0-10% mortality)	Palaemonetes pugio (shrimp)				Lee & Mariani 1977
<0.5		NE	Newport, RI	COA	96-h	Not toxic (0% mortality)	Palaemonetes pugio (shrimp)				Lee & Mariani 1977
0.5		NG	Charleston Harbor, SC	COA		Moderate species richness (9.05+/-1.33; SRUs)	Benthic species				Winn et al. 1989
0.5		NG	Charleston Harbor, SC	COA		Low species richness (5.16; SRUs)	Benthic species				Winn et al. 1989
0.5		NG	Charleston Harbor, SC	COA		Moderate diversity (2.3+/-0.2; SDUs)	Benthic species				Winn et al. 1989
0.5		NG	Charleston Harbor, SC	COA		Low diversity (1.16; SDUs)	Benthic species				Winn et al. 1989
0.506	+/-0.598	NE	Narragansett Bay, RI	COA	10-d	Not significantly toxic (5.28+/-3.04% mortality)	Ampelisca abdita (amphipod)	ADT			Munns et al. 1991
0.526	+/-0.323	SG	Massachusetts Bay, MA	COA		Low density (1316+/-768 N/0.1 sq.m.)	Annelida	VAR			Gilbert et al. 1976

Table 2. A summary of the available data on the biological effects associated with sediment-sorbed CADMIUM (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Cadmium	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.53	+/-0.364	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.074+/-0.043 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.27+/-0.626	6.21+/-5.41	Bricker et al. 1993
0.53	+/-0.64	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.001+/-0.001 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.555+/-0.471	2.68+/-2.3	Hall et al. 1992
0.544	+/-0.369	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (19.3+/-5.86% mortality)	Ampelisca abidta (amphipod)	SUB ADT	1.82+/-0.225	6.3+/-6.2	Bricker et al. 1993
0.55	+/-0.477	NE	Black Rock Beach, NS	COA	10-d	Not toxic (6.67+/-4.51% mortality)	Corophium volutator (amphipod)	ADT/JUV	0.24+/-0.18		Nicol & Doe 1990
0.55	+/-0.477	NE	Black Rock Beach, NS	COA	10-d	Not toxic (2.33+/-1.53% mortality)	Rhepoxynius abronius (amphipod)	ADT/JUV	0.24+/-0.18		Nicol & Doe 1990
0.55	+/-0.477	NE	Black Rock Beach, NS	COA	10-d	Not toxic (100% reburial)	Rhepoxynius abronius (amphipod)	ADT/JUV	0.24+/-0.18		Nicol & Doe 1990
0.561	+/-0.576	NE	Puget Sound, WA	COA	20-d	Not significantly toxic (5+/-3.86% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.46+/-0.26		Pastorok & Becker 1990
0.57		*	California	AETA	48-h	California AET Values	Mytilus edulis (bivalve)	LAR			Becker et al. 1990
0.57	+/-0.493	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.061+/-0.038 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.8+/-0.477	8.52+/-10.7	Bricker et al. 1993
0.588	+/-0.095	NE	Houston Ship Channel, TX	COA	7-d	Not significantly toxic (7.5+/-5% mortality)	Sheepshead minnow	ADT	0.137+/-0.056		Crocker et al. 1991
0.588	+/-1.03	NE	Tampa Bay, FL	COA	10-d	Not significantly toxic (9.5+/-6.15% mortality)	Ampelisca abdita (amphipod)	SUBADT		1.56+/-2.73	Long 1993
0.6		NE	Palos Verdes, CA	COA		High abundance (208 N/0.1 sq.m.)	Echinoderms	VAR			Ferraro et al. 1991
0.6	+/-0.4	NC	San Francisco Bay, CA	COA	48-h	Significantly toxic (55.7+/-22.7% abnormal)	Bivalve	LAR			Long & Morgan 1990
0.6	+/-0.7	NC	Southern California	COA		Moderate species richness (72+/-3.3 S/0.1 sq.m.)	Benthic species				Word & Mearns 1979 (As cited in L&M 1990)
0.6	+/-0.3	NE	San Francisco Bay, CA	COA	48-h	Not significantly toxic (31.9+/-15.5% abnormal)	Bivalve	LAR			Long & Morgan 1990
0.6	+/-0.3	NE	San Francisco Bay, CA	COA	10-d	Not significantly toxic (18.4+/-6.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
0.6	+/-0.3	NG	San Francisco Bay, CA	COA	10-d	Least toxic (18+/-6.6% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
0.606	+/-0.863	*	Gulf of Mexico	COA	10-d	Highly toxic (2.5+/-1.05% emergence/d)	Rhepoxynius abronius (amphipod)	ADT	0.5+/-0.155		Chapman et al. 1991
0.625	+/-0.25	NE	Curtis Creek, Baltimore, MD	COA	10-d	Not significantly toxic (15+/-7.21% mortality)	Hyalella azteca (amphipod)	JUV			McGee et al. 1993
0.629	+/-0.428	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.096+/-0.101 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.37+/-0.759	6.93+/-6.83	Bricker et al. 1993
0.63	+/-0.502	NE	Miami River/Seybold Canal, FL	COA	10-d	Significantly toxic (24.7+/-15% mortality)	Pennaeus aztecus (brown shrimp)	ADT			Vittor & Associates 1988
0.63	+/-0.4	NG	San Francisco Bay, CA	COA	10-d	Significantly toxic (42.9+/-19.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
0.631	+/-0.491	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99.3+/-0.827% normal development)	Mulinia lateralis (bivalve)	LAR	1.43+/-0.738	14.7+/-24	Bricker et al. 1993
0.64	+/-0.73	NC	Puget Sound, WA	COA	10-d	Significantly toxic (80.8+/-30.6% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.266		Pastorok & Becker 1990
0.641	+/-0.691	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.167+/-0.198 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.59+/-1.09	4.67+/-6.99	Bricker et al. 1993
0.644	+/-1.41	NE	Tampa Bay, FL	COA		Not significantly toxic (EC50; 0.133+/-0.103 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)			1.23+/-1.96	Long 1993
0.655	+/-0.486	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-6.07% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.71+/-0.9	15.3+/-23.2	Bricker et al. 1993
0.662	+/-0.721	NC	Puget Sound, WA	COA	2-d	Significantly toxic (60.4+/-46.5% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.57+/-0.287		Pastorok & Becker 1990
0.664	+/-0.017	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.008+/-0.001 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.19+/-1.27	12+/-11.3	Bricker et al. 1993
0.671	+/-0.515	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (12.3+/-14.5% mortality)	Mulinia lateralis (bivalve)	LAR	1.53+/-0.743	15.7+/-23.2	Bricker et al. 1993
0.676			***TEL***								
0.7		NE	Palos Verdes, CA	COA		High density (93.4 N/0.1 sq.m.)	Echinoderm		1.3+/-0.77		Swartz et al. 1986
0.7		NE	Puget Sound, WA	SBA		EPA/ACOE Puget Sound Interim Criteria	Aquatic biota				USACOE 1988
0.7	+/-0.3	SG	San Francisco Bay, CA	COA	48-h	Highly toxic (92.4+/-4.5% abnormal)	Bivalve	LAR			Long & Morgan 1990
0.7	+/-0.5	SG	San Francisco Bay, CA	COA	48-h	Moderately toxic (59.4+/-11.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
0.7	+/-0.7	NC	Southern California	COA		Moderate abundance (72.6+/-6.8 N/0.1 sq.m.)	Arthropods				Word & Mearns 1979 (As cited in L&M 1990)
0.709	+/-.688	*	Massachusetts Bay, MA	COA		Low density (2.76+/-2.7 N/0.1 sq.m.)	Echinodermata	VAR			Gilbert et al. 1976
0.71	+/-0.687	*	Massachusetts Bay, MA	COA		Low density (7.14+/-4.23 N/0.1 sq.m.)	Rhynchocoela	VAR			Gilbert et al. 1976
0.72	+/-0.693	*	Massachusetts Bay, MA	COA		Low density (61.1+/-36.6 N/0.1 sq.m.)	Arthropoda	VAR			Gilbert et al. 1976
0.726	+/-0.701	*	Massachusetts Bay, MA	COA		Low species richness (57.2+/-12.2 S/0.1 sq.m.)	Benthic species	VAR			Gilbert et al. 1976
0.733	+/-0.709	SG	Massachusetts Bay, MA	COA		Low density (39.1+/-30.8 N/0.1 sq.m.)	Mollusca	VAR			Gilbert et al. 1976
0.743	+/-0.383	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (23.3+/-6.14% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.738		Word et al. 1988

Table 2. A summary of the available data on the biological effects associated with sediment-sorbed CADMIUM (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Cadmium	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.746	+/-0.355	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (10.4+/-6.3% mortality)	Nephtys caecoides (polychaete)		1.63+/-0.657		Word et al. 1988
0.746	+/-0.355	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (0.2+/-0.6% mortality)	Macoma nasuta (clam)		1.63+/-0.657		Word et al. 1988
0.75	+/-0.289	SG	Curtis Creek, Baltimore, MD	COA	10-d	Significantly toxic (82.8+/-22.2% mortality)	Leptocheirus plumulosus (amphipod)	JUV			McGee et al. 1993
0.753	+/-0.565	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (30.5+/-16.4% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.62+/-0.777	17.7+/-26.3	Bricker et al. 1993
0.756	+/-0.786	*	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (55.0+/-22.6% mortality)	Hyalella azteca (amphipod)	JUV	0.338+/-0.133	2.9+/-3.11	Hall et al. 1992
0.76	+/-0.256	SG	Oakland Harbor, CA	COA	10-d	Significantly toxic (35.3+/-2.5% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.56+/-0.07		Word et al. 1988
0.772	+/-0.550	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (15.2+/-9.21% mortality)	Mulinia lateralis (bivalve)	LAR	2.17+/-0.663	18.4+/-19.9	Bricker et al. 1993
0.8	+/-1.1	NC	Southern California	COA		Moderate abundance (75.6+/-12.7 N/0.1 sq.m.)	Benthic species				Word & Mearns 1979 (As cited in L&M 1990)
0.815	+/-1.03	*	Gulf of Mexico	COA	48-h	Highly toxic (59.4+/-15.5% mortality)	Crassostrea gigas (oyster)	LAR	0.5+/-0.18		Chapman et al. 1991
0.833	+/-0.289	SG	Curtis Creek, Baltimore, MD	COA	20-d	Significantly toxic (94.6+/-9.35% mortality)	Leptocheirus plumulosus (amphipod)	JUV			McGee et al. 1993
0.84	+/-0.51	NE	San Francisco Bay, CA	COA	10-d	Highly toxic (67+/-11.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
0.859	+/-0.95	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (4.43+/-2.1% mortality)	Panope generosa (geoduck)	JUV	1.51+/-0.261		Pastorok & Becker 1990
0.86	+/-0.447	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.3+/-2.22% normal development)	Mulinia lateralis (bivalve)	LAR	2.18+/-0.531	19.1+/-12.5	Bricker et al. 1993
0.883	+/-0.736	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (6.8+/-7.31% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
0.883	+/-0.736	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (8.5+/-6.06% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
0.883	+/-0.736	NE	Halifax Harbour, NS	COA	20-d	Not significantly toxic (0.7+/-1.63% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
0.893	+/-0.456	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (39.5+/-18.2% mortality)	Ampelisca abidta (amphipod)	SUB ADT	2.06+/-0.523	20.1+/-13.9	Bricker et al. 1993
0.9		NE	San Diego Bay, CA	COA	96-h	Not significantly toxic (4% mortality)	Citharichthys stigmaeus (sanddab)				Salazar & Salazar 1985
0.9		NE	San Diego Bay, CA	COA	10-d	Not significantly toxic (14% mortality)	Acanthomysis sculpta (mysid)				Salazar & Salazar 1985
0.9		NE	San Diego Bay, CA	COA	20-d	Not significantly toxic (13% mortality)	Neanthes arenaceodentata (polycheate)				Salazar & Salazar 1985
0.9		NE	San Diego Bay, CA	COA	20-d	Not significantly toxic (1% mortality)	Macoma nasuta (clam)				Salazar & Salazar 1985
0.9		NE	San Diego Bay, CA	COA	96-h	Not significantly toxic (0% mortality)	Acanthomysis sculpta (mysid)				Salazar & Salazar 1985
0.9		NE	San Diego Bay, CA	COA	96-h	Not significantly toxic (18% mortality)	Acartia tonsa (copepod)				Salazar & Salazar 1985
0.9	+/-0.424	NE	Palos Verdes, CA	COA		High abundance (54.6+/-5.09 N/0.1 sq.m.)	Amphipods	VAR			Ferraro et al. 1991
0.9	+/-0.424	NE	Palos Verdes, CA	COA		High abundance (30.7+/-0.99 N/0.1 sq.m.)	Phoxocephalids	VAR			Ferraro et al. 1991
0.9	+/-1.0	NE	Southern California	COA		High abundance (148+/-58 N/0.1 sq.m.)	Arthropods				Word & Mearns 1979 (As cited in L&M 1990)
0.908	+/-1	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (2.09+/-1.73% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.56+/-0.329		Pastorok & Becker 1990
0.956	+/-1.05	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (13.8+/-4.09% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.47+/-0.306		Pastorok & Becker 1990
0.96		NE	Puget Sound, WA	AETA		PSDDA Screening level concentration	Aquatic biota				USACOE 1988
0.967	+/-0.960	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (16.5+/-9.19% mortality)	Streblospio benedicti (polychaete worm)		0.783+/-0.845	4.83+/-2.23	Hall et al. 1992
0.969	+/-0.663	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (17+/-16.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.99+/-1	21.6+/-24.5	Bricker et al. 1993
0.988	+/-0.972	*	Puget Sound, WA	COA	15-min	Significantly toxic (EC50; 0.065+/-0.043% extract)	Microtox (Photobacterium phosphoreum)		1.58+/-0.255		Pastorok & Becker 1990
1		NE	San Francisco Bay, CA	COA	10-d	Least toxic (13.6+/-7.76% mortality)	Amphipod	ADT	1.4 +/- 0.79		Chapman et al. 1987a
1		NE	San Francisco Bay, CA	COA	10-d	Least Toxic (4.63+/-2.91% avoidance)	Amphipod	ADT	1.44+/-.74		Chapman et al. 1987a
1		NE	San Francisco Bay, CA	COA	48-h	Least toxic (18+/-8.01% abnormal)	Mussel	LAR	1.2+/-.38		Chapman et al. 1987a
1		NE	San Francisco Bay, CA	COA	48-h	Least toxic (17.3% mortality)	Mussel	LAR	1.25		Chapman et al. 1987a
1		NE	San Francisco Bay, CA	COA	4-wk	Least toxic (116+/-4.3 young produced)	Tigriopus californicus (copepod)	ADT	1.23+/-.09		Chapman et al. 1987a
1		NE	Burrard Inlet, BC	SQO		Sediment Quality Objectives	Aquatic biota				Swain & Nijman 1991
1		NG	San Francisco Bay, CA	COA	10-d	Moderately toxic (28.3+/-7.51% mortality)	Amphipod	ADT	2.01+/-.98		Chapman et al. 1987a
1		NG	San Francisco Bay, CA	COA	10-d	Most toxic (95% mortality)	Amphipod	ADT	4.03		Chapman et al. 1987a
1		NG	San Francisco Bay, CA	COA	10-d	Highly toxic (37% avoidance)	Amphipod	ADT	4.03		Chapman et al. 1987a
1		NG	San Francisco Bay, CA	COA	48-h	Moderately toxic (25.1+/-6.61% abnormal)	Mussel	LAR	1.26+/-0.17		Chapman et al. 1987a

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Cadmium	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
1		NG	San Francisco Bay, CA	COA	48-h	Highly toxic (66.8% abnormal)	Mussel	LAR	3.59		Chapman et al. 1987a
1		NG	San Francisco Bay, CA	COA	48-h	Moderately toxic (57.1+/-13.6% mortality)	Mussel	LAR	1.14+/-.33		Chapman et al. 1987a
1		NG	San Francisco Bay, CA	COA	48-h	Highly toxic (92.3+/-5.5% mortality)	Mussel	LAR	2.87+/-1.32		Chapman et al. 1987a
1		NG	San Francisco Bay, CA	COA	4-wk	Moderately toxic (94.9+/-10.1 young produced)	Tigriopus californicus (copepod)	ADT	2.87+/-1.07		Chapman et al. 1987a
1		SG	Curtis Creek, Baltimore, MD	COA	10-d	Significantly toxic (55% mortality)	Hyalella azteca (amphipod)	JUV			McGee et al. 1993
1.01	+/-1.09	*	Laboratory	SSBA	10-d	LC50	Rhepoxynius abronius (amphipod)				Ott 1986
1.04	+/-1.13	*	Gulf of Mexico	COA	48-h	Significantly toxic (32.6+/-14.2% abnormality)	Crassostrea gigas (oyster)	LAR	0.567+/-0.153		Chapman et al. 1991
1.04	+/-1.21	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (23+/-4.24% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.46+/-1.22	40+/-55.1	Bricker et al. 1993
1.08	+/-1.2	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (6.67+/-8.07% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.51+/-0.330		Pastorok & Becker 1990
1.1		SG	Puget Sound, WA	COA	2-d	Significantly toxic (3.8% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.5		Pastorok & Becker 1990
1.1	+/-2.0	NC	Southern California	COA		Low abundance (57.6+/-13.6 N/0.1 sq.m.)	Benthic species				Word & Mearns 1979 (As cited in L&M 1990)
1.11	+/-0.355	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.014+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.51+/-0.45	29.6+/-15.7	Bricker et al. 1993
1.12	+/-0.777	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.1+/-2.78% normal development)	Mulinia lateralis (bivalve)	LAR	2.12+/-1.04	22.9+/-23.7	Bricker et al. 1993
1.13	+/-0.867	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (96+/-1.66% normal development)	Mulinia lateralis (bivalve)	LAR	2.52+/-0.997	35+/-42.9	Bricker et al. 1993
1.14	+/-0.155	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.5+/-11.4% mortality)	Mulinia lateralis (bivalve)	LAR	2.33+/-0.364	26.8+/-9.42	Bricker et al. 1993
1.2		*	San Francisco Bay, CA	AETA	10-d	San Francisco Bay AET	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
1.2	+/-1.0	*	Fraser River Estuary, BC	COA		Sediments devoid of feral clams	Macoma balthica (bivalve)		1.95		McGreer 1982
1.2	+/-0.36	NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (9+/-1.73% mortality)	Nereis virens (polychaetes)	ADT			EG&G Bionomics 1980
1.2	+/-0.36	NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (13+/- 3.61% mortality)	Penaeus duorarum (pink shrimp)	ADT			EG&G Bionomics 1980
1.2	+/-0.36	NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (11.3+/-3.21% mortality)	Crassostrea virginica (oyster)	ADT			EG&G Bionomics 1980
1.28	+/-0.866	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (34.9+/-15.7% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.23+/-1.04	25.4+/-25.5	Bricker et al. 1993
1.29	+/-0.3	NE	Bayou La Batre, AB	COA	10-d	Not significantly toxic (46.7+/-11.4% mortality)	Nereis virens (polychaete)	ADT			Parrish 1987a
1.29	+/-0.3	NE	Bayou La Batre, AB	COA	10-d	Not significantly toxic (5.3+/-2.31% mortality)	Crossostrea virginica (oyster)	ADT			Parrish 1987a
1.29	+/-0.3	NE	Bayou La Batre, AB	COA	10-d	Not significantly toxic (14+/-9.17% mortality)	Penaeus duorarum (pink shrimp)	ADT			Parrish 1987a
1.31	+/-1.12	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.016+/-0.007 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.26+/-0.936	43.4+/-35.6	Bricker et al. 1993
1.4		SG	Strait of Georgia, BC	COA	24-h	Significantly toxic (avoidance)	Macoma balthica (bivalve)		3.09		McGreer 1979
1.46	+/-1.86	*	Tampa Bay, FL	COA	1-h	Most toxic (1.96+/-3.19% fertilization)	Arbacia punctulata (sea urchin)	GAM		3.95+/-5.94	Long 1993
1.46	+/-0.797	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (29.8+/-13.9% mortality)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.07	32.1+/-28.4	Bricker et al. 1993
1.49	+/-1.85	*	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (51.3+/-6.95% mortality)	Mulinia lateralis (bivalve)	LAR	1.8+/-1.71	29.6+/-46.3	Bricker et al. 1993
1.5	+/-4.0	NE	Southern California	COA		High species richness (96.3+/-22.3 S/0.1 sq.m.)	Benthic species				Word & Mearns 1979 (As cited in L&M 1990)
1.54	+/-1.3	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (91.5+/-7.28% normal development)	Mulinia lateralis (bivalve)	LAR	2.6+/-0.899	36.8+/-34.9	Bricker et al. 1993
1.57	+/-0.829	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.013+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.79+/-0.744	37.6+/-25.3	Bricker et al. 1993
1.6		*	Black Rock Harbor, CT	COA	14-d	Significantly toxic (100% mortality)	Nereis virens (sandworm)				Simmers et al. 1984
1.64	+/-0.85	NE	Miami River, FL	COA	10-d	Not toxic (18.6+/-7.27% mortality)	Pennaeus aztecus aztecus (brown shrimp)	ADT			ERCO 1985
1.64	+/-0.85	NE	Miami River, FL	COA	10-d	Not toxic (1.2+/-.837% mortality)	Mercenaria mercenaria (atlantic quahog)	ADT			ERCO 1985
1.64	+/-0.85	NE	Miami River, FL	COA	10-d	Not toxic (3.6+/-1.67% mortality)	Nereis virens (sandworm)	ADT			ERCO 1985
1.64	+/-1.79	NE	Tampa Bay, FL	COA	48-h	Not significantly toxic (38.5+/-2.9% mortality)	Mulinaria lateralis (coot clam)	LAR		2.64+/-3.04	Long 1993
1.65		*	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29% mortality)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
1.65		*	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (89.7% reburial)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
1.65		*	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
1.65		*	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	6.41	Hall et al. 1992
1.7		*	San Francisco Bay, CA	AETA	48-h	San Francisco Bay AET	Oyster; mussel	LAR			Long & Morgan 1990

Table 2. A summary of the available data on the biological effects associated with sediment-sorbed CADMIUM (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Cadmium	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
1.7		*	Northern California	AETA	10-d	Northern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
1.72	+/-0.871	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (96.6+/-3.79% normal development)	Mulinia lateralis (bivalve)	LAR	2.87+/-0.94	35.1+/-25.9	Bricker et al. 1993
1.73	+/-1.03	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.1+/-13.3% mortality)	Mulinia lateralis (bivalve)	LAR	2.68+/-0.955	31.8+/-24.4	Bricker et al. 1993
1.8	+/-0.84	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (38+/-13% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.92+/-0.937	34.6+/-23.9	Bricker et al. 1993
1.81	+/-1.66	*	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (88.5+/-8.39% normal development)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.05	38.1+/-38.9	Bricker et al. 1993
1.86	+/-2.03	NE	Pascagoula Mississippi Channel, MS	COA	10-d	Not significantly toxic (5.6+/-2.2% mortality)	Arenicola cristata (lugworm)	ADT			Parrish 1987c
1.86	+/-2.03	NE	Pascagoula Mississippi Channel, MS	COA	10-d	Not significantly toxic (6.5+/-5.14% mortality)	Penaeus duorarum (pink shrimp)	ADT			Parrish 1987c
1.86	+/-2.03	NE	Pascagoula Mississippi Channel, MS	COA	10-d	Not significantly toxic (0.7+/-0.82% mortality)	Crossostrea virginica (oyster)	ADT			Parrish 1987c
1.9	+/-1.41	*	Puget Sound, WA	COA	20-d	Significantly toxic (37.3+/-22% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.87+/-0.208		Pastorok & Becker 1990
1.9	+/-1.1	NE	Commencement Bay, WA	COA	48-h	Least toxic (15.1+/-3.1% abnormality)	Oyster	LAR			Tetra Tech 1985
1.93	+/-1.58	*	Tampa Bay, FL	COA		Significantly toxic (EC50; 0.021+/-0.012 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)			6.13+/-8.06	Long 1993
1.96	+/-1.2	NE	Burrard Inlet, BC	COA	10-d	Not toxic (4.5+/-3.02% emergence)	Rhepoxynius abronius (amphipod)	ADT	2.66+/-2.15		McLeay et al. 1991
2		NE	Baltimore Harbor, MD	COA	48-h	Least toxic; TLm	Fundulus heteroclitus (mummichog)				Tsai et al. 1979
2		NE	Baltimore Harbor, MD	COA	48-h	Least toxic; TLm	Leiostomus xanthurus (spot)				Tsai et al. 1979
2.06	+/-0.61	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.011+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.28+/-0.363	45.3+/-21.4	Bricker et al. 1993
2.07	+/-0.929	NE	Galveston Harbor, TX	COA	10-d	Not toxic (2.4+/-1.52% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Grieco 1984
2.07	+/-0.929	NE	Galveston Harbor, TX	COA	10-d	Not toxic (0% mortality)	Mercenaria mercenaria (hard clams)	ADT			Grieco 1984
2.07	+/-0.929	NE	Galveston Harbor, TX	COA	10-d	Not toxic (2.8+/-2.17% mortality)	Nereis virens (sandworm)	ADT			Grieco 1984
2.2	+/-1.24	NE	Burrard Inlet, BC	COA	10-d	Not toxic (5.21+/-3.61% emergence)	Corophium volutator (amphipod)	ADT	3.18+/-2.1		McLeay et al. 1991
2.25	+/-0.813	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (75.1+/-10.6% mortality)	Mulinia lateralis (bivalve)	LAR	3.32+/-0.317	42.3+/-19.2	Bricker et al. 1993
2.3	+/-1.3	NE	Commencement Bay, WA	COA	10-d	Least toxic (12.5+/-4.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
2.3	+/-1.36	NE	Burrard Inlet, BC	COA	10-d	Not toxic (8.9+/-2.99% mortality)	Corophium volutator (amphipod)	ADT	2.8+/-1.96		McLeay et al. 1991
2.3	+/-1.36	NE	Burrard Inlet, BC	COA	10-d	Not toxic (97.2+/-2.84% reburial)	Rhepoxynius abronius (amphipod)	ADT	2.8+/-1.96		McLeay et al. 1991
2.33	+/-1.96	NE	Palos Verdes, CA	COA		High density (20.9+/-0.23 N/0.1 sq.m.)	Amphipod		1.7+/-0.61		Swartz et al. 1986
2.33	+/-1.96	NE	Palos Verdes, CA	COA		High density (11.2+/-1.64 N/0.1 sq.m.)	Phoxocephalid		1.7+/-0.61		Swartz et al. 1986
2.35	+/-0.954	NE	Howe Sound, BC	COA	10-d	Not toxic (10.5+/-4.09% mortality)	Rhepoxynius abronius (amphipod)	ADT	3.4+/-4.39		McLeay et al. 1991
2.35	+/-0.954	NE	Howe Sound, BC	COA	10-d	Not toxic (5.83+/-5.48% emergence)	Rhepoxynius abronius (amphipod)	ADT	3.4+/-4.39		McLeay et al. 1991
2.35	+/-0.954	NE	Howe Sound, BC	COA	10-d	Not toxic (96.3+/-4.19% reburial)	Rhepoxynius abronius (amphipod)	ADT	3.4+/-4.39		McLeay et al. 1991
2.36	+/-1.51	NE	Burrard Inlet, BC	COA	10-d	Not toxic (7.9+/-5.12% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.64+/-2.14		McLeay et al. 1991
2.4		NC	Chesapeake Bay, MD, VI; Delaware Bay, DE	COA		Significantly toxic (mean ET50; burrowing time 1.4 h)	Mya arenaria (clam)	1-2 cm			Phelps 1990
2.4		NE	Palos Verdes, CA	COA		High density (4.4 N/0.1 sq.m.)	Echinoderm		0.9		Swartz et al. 1985a
2.4		NE	Palos Verdes, CA	COA		High density (88 N/0.1 sq.m.)	Foraminifera (sponge)		0.9		Swartz et al. 1985a
2.4		NE	Palos Verdes, CA	COA		High density (132 N/0.1 sq.m.)	Ophiuroidea (brittle star)		0.9		Swartz et al. 1985a
2.42	+/-0.084	NE	Chesapeake Bay, MD, VI; Delaware Bay, DE	COA		Not significantly toxic (mean ET50; burrowing time 0.704+/-0.17 h)	Mya arenaria (clam)	1-2 cm			Phelps 1990
2.7	+/-2.0	SG	Commencement Bay, WA	COA	48-h	Moderately toxic (23+/-2.3% abnormality)	Oyster	LAR			Tetra Tech 1985
2.8	+/-0.1	NE	Stamford, CT	COA	96-h	Not toxic (10% mortality)	Palaemonetes pugio (shrimp)				Lee & Mariani 1977
2.9	+/-2.3	SG	Commencement Bay, WA	COA	10-d	Moderately toxic (26+/-5.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
3		SG	Los Angeles, CA	COA	96-h	Highly toxic (>50% mortality)	Palaemonetes pugio (shrimp)				Lee & Mariani 1977
3.09	+/-2.19	*	Tampa Bay, FL	COA	10-d	Significantly toxic (32.1+/-16.9% mortality)	Ampelisca abdita (amphipod)	SUBADT		7.63+/-9.44	Long 1993
3.24	+/-5.95	NE	Southern California	COA	10-d	Not significantly toxic (23.2% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
4		*	Burrard Inlet, BC	COA	10-d	Highly toxic (30.5% emergence)	Rhepoxynius abronius (amphipod)	ADT	3.5		McLeay et al. 1991
4		SG	Burrard Inlet, BC	COA	10-d	Highly toxic (23% emergence)	Corophium volutator (amphipod)	ADT	3.5		McLeay et al. 1991

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Cadmium	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
4.1	+/-0.2	NE	Norwalk River, CT	COA	96-h	Not toxic (0% mortality)	Palaemonetes pugio (shrimp)				Lee & Mariani 1977
4.1	+/-1.25	NE	Palos Verdes, CA	COA		High abundance (944+/-101 N/0.1 sq.m.)	Benthic species	VAR			Ferraro et al. 1991
4.21			***PEL***								
4.3	+/-11.4	*	Southern California	COA		Low abundance (35.3+/-15.8 N/0.1 sq.m.)	Arthropods				Word & Mearns 1979 (As cited in L&M 1990)
4.3	+/-1.57	NC	Chesapeake Bay, MD, VI; Delaware Bay, DE	COA		Significantly toxic (mean ET50; burrowing time 3.79+/-3.29 h)	Mya arenaria (clam)	1-2 cm			Phelps 1990
4.41	+/-3.19	NE	Palos Verdes, CA	COA		High species richness (70.9+/-16.9 S/0.1 sq.m.)	Benthic species	VAR			Ferraro et al. 1991
4.5	+/-3.64	NE	Palos Verdes, CA	COA		High species richness (80.8+/-13.7 S/0.1 sq.m.)	Macro benthos		2.10+/-1.15		Swartz et al. 1985a
4.5	+/-3.64	NE	Palos Verdes, CA	COA		High density (54.5+/-9.91 N/0.1 sq.m.)	Amphipod		2.1+/-1.15		Swartz et al. 1985a
4.5	+/-3.64	NE	Palos Verdes, CA	COA		High density (34.3+/-5.67 N/0.1 sq.m.)	Phoxocephalid		2.1+/-1.15		Swartz et al. 1985a
4.5	+/-3.64	NE	Palos Verdes, CA	COA		High density (111+/-32 N/0.1 sq.m.)	Crustacea		2.1+/-1.15		Swartz et al. 1985a
4.7	+/-12.2	*	Southern California	COA		Low species richness (51.2+/-8.6 S/0.1 sq.m.)	Benthic species				Word & Mearns 1979 (As cited in L&M 1990)
5.1		*	Puget Sound, WA	AETA		1988 Puget Sound AET	Benthic community				PTI 1988
5.1		*	Puget Sound, WA	SQG		Chemical Criteria	Benthic community		1		WDE 1989
5.32	+/-11.4	SG	Southern California	COA	10-d	Significantly toxicity (51.7% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
5.4		*	Laboratory	SSBA	72-h	Significantly toxic (98% avoidance)	Eohaustorius sencillus (amphipod)				Oakden et al. 1984b
5.6		*	Laboratory	SSBA	72-h	Significantly toxic (70% avoidance)	Rhepoxynius spp.				Oakden et al. 1984a
5.6		*	Laboratory	SSBA	72-h	Significantly toxic (40% mortality)	Rhepoxynius spp.				Oakden et al. 1984a
5.8		*	Puget Sound, WA	AETA		1986 Puget Sound AET	Benthic species		15		Bellar et al. 1986
6.2	+/-13.1	*	Southern California	COA		Low abundance (6.1+/-7.2 N/0.1 sq.m.)	Echinoderm				Word & Mearns 1979 (As cited in L&M 1990)
6.5		*	Laboratory	SSBA	72-h	Significantly toxic (84% avoidance)	Rhepoxynius abronius (amphipod)				Oakden et al. 1984b
6.5		*	Laboratory	SSBA	10-d	EC50; reburial	Rhepoxynius abronius (amphipod)	ADT			Swartz et al. 1985c
6.7		*	Puget Sound, WA	AETA	10-d	1988 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT			PTI 1988
6.7		*	Puget Sound, WA	AETA	10-d	1986 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT	15		Bellar et al. 1986
6.74	+/-7.2	NE	Palos Verdes, CA	COA	10-d	Not significantly toxic (11.9+/-5.36% mortality)	Rhepoxynius abronius (amphipod)	VAR			Ferraro et al. 1991
6.9		*	Laboratory	SSBA	10-d	LC50	Rhepoxynius abronius (amphipod)	ADT			Swartz et al. 1985c
7.61	+/-7.31	*	Palos Verdes, CA	COA		Low abundance (2.4+/-5.65 N/0.1 sq.m.)	Echinoderms	VAR			Ferraro et al. 1991
7.7		*	United States	EqPA		EPA Chronic Marine EP Threshold	Aquatic biota		1		Lyman et al. 1987
7.75		*	United States	EqPA		Chronic Marine EqP Threshold	Aquatic biota		1		Bolton et al. 1985
7.92	+/-14	NE	Chesapeake Bay, MD, VI; Delaware Bay, DE	COA		Not significantly toxic (mean ET50; burrowing time 0.76+/-0.266 h)	Mya arenaria (clam)	1-2 cm			Phelps 1990
8		*	Laboratory	SSBA	10-d	EC30; emergence	Rhepoxynius abronius (amphipod)	ADT			Swartz et al. 1985b
8.2		*	Laboratory	SSBA	10-d	LC50	Rhepoxynius abronius (amphipod)	JUV			Robinson et al. 1988
8.32	+/-9.04	*	Palos Verdes, CA	COA		Low abundance (415+/-94.4 N/0.1 sq.m.)	Benthic species	VAR			Ferraro et al. 1991
8.4		*	Laboratory	SSBA	72-h	LC98	Eohaustorius sencillus (amphipod)				Oakden et al. 1984b
8.4		*	Laboratory	SSBA	72-h	Significantly toxic (94% avoidance)	Eohaustorius sencillus (amphipod)				Oakden et al. 1984b
8.5		*	Laboratory	SSBA	72-h	LC76	Rhepoxynius abronius (amphipod)				Oakden et al. 1984b
8.68	+/-7.38	*	Palos Verdes, CA	COA		Low abundance (13.8+/-11.4 N/0.1 sq.m.)	Amphipods	VAR			Ferraro et al. 1991
8.68	+/-7.38	*	Palos Verdes, CA	COA		Low abundance (5.87+/-7.06 N/0.1 sq.m.)	Phoxocephalids	VAR			Ferraro et al. 1991
8.7		*	Laboratory	SSBA	10-d	LC50	Rhepoxynius abronius (amphipod)				Robinson et al. 1988
8.7		NE	Palos Verdes, CA	COA		High density (2177 N/0.1 sq.m.)	Polychaeta		3.2		Swartz et al. 1985a
8.8		*	Laboratory	SSBA	10-d	LC50	Rhepoxynius abronius (amphipod)				Kemp et al. 1986
8.88	+/-9.24	NE	Palos Verdes, CA	COA		High density (594+/-688 N/0.1 sq.m.)	Mollusca		2.53+/-1.27		Swartz et al. 1985a
8.88	+/-9.24	NE	Palos Verdes, CA	COA	10-d	Not significantly toxic (8+/-5.7% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.53+/-1.27		Swartz et al. 1985a

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Cadmium	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
8.9		*	California	AETA		California AET Values	Benthic species				Becker et al. 1990
8.9		*	Southern California	AETA		Southern California AET Values	Benthic species				Becker et al. 1990
8.93		*	Laboratory	SSBA		LC50	Rhepoxynius abronius (amphipod)				Ott 1986
9.07		*	Laboratory	SSBA	10-d	EC50; reburial	Rhepoxynius abronius (amphipod)				Mearns et al. 1986
9.4	+/-17.3	NE	Southern California	COA		High abundance (88.9+/-35.4 N/0.1 sq.m.)	Benthic species				Word & Mearns 1979 (As cited in L&M 1990)
9.6		*	Puget Sound, WA	AETA	15-min	1988 Puget Sound AET	Microtox (Photobacterium phosphoreum)				PTI 1988
9.6		*	Puget Sound, WA	AETA	48-h	1988 Puget Sound AET	Crassostrea gigas (oyster)	LAR			PTI 1988
9.6		*	Puget Sound, WA	AETA		PSDDA Maximum Level Criteria	Aquatic biota				USACOE 1988
9.6		*	Puget Sound, WA	AETA	15-min	1986 Puget Sound AET	Microtox (Photobacterium phosphoreum)		15		Bellar et al. 1986
9.6		*	Puget Sound, WA	AETA	48-h	1986 Puget Sound AET	Crassostrea gigas (oyster)	LAR	15		Bellar et al. 1986
9.72		*	Laboratory	SSBA	10-d	EC50; emergence	Rhepoxynius abronius (amphipod)				Mearns et al. 1986
9.81		*	Laboratory	SSBA	10-d	LC50	Rhepoxynius abronius (amphipod)				Mearns et al. 1986
10		*	Laboratory	SSBA	10-d	LC50	Rhepoxynius abronius (amphipod)				Kemp et al. 1986
10.8	+/-10.2	NE	Palos Verdes, CA	COA	10-d	Not significantly toxic (9.5+/-5.45% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.42+/-0.88		Swartz et al. 1986
11		*	Laboratory	SSBA	446-d	Significantly toxic at 60-d	Pimephales affinis (minnow)				Sundelin 1984
11.5		*	Laboratory	SSBA	10-d	LC50	Rhepoxynius abronius (amphipod)	ADT			Robinson et al. 1988
11.8	+/-6.6	NE	Hudson-Raritan Bay, NY	COA	14-d	Not toxic (increased growth rate)	Chromadorina germanica (nematode)				Tietjen & Lee 1984
12.9	+/-9.91	*	Palos Verdes, CA	COA		Low density (0.2+/-0.14 N/0.1 sq.m.)	Echinoderm		2.64+/-0.77		Swartz et al. 1986
15.3	+/-45.1	*	Commencement Bay, WA	COA	48-h	Highly toxic (44.5+/-19% abnormality)	Oyster	LAR			Tetra Tech 1985
16		*	Laboratory	SSBA	10-d	EC60; emergence	Rhepoxynius abronius (amphipod)	ADT			Swartz et al. 1985b
18.6	+/-8.9	SG	Hudson-Raritan Bay, NY	COA	14-d	Significantly toxic (reduced growth rate)	Chromadorina germanica (nematode)				Tietjen & Lee 1984
18.8	+/-13.1	*	Palos Verdes, CA	COA		Low density (365+/-178 N/0.1 sq.m.)	Polychaeta		3.15+/-1.32		Swartz et al. 1985a
19.3	+/-6.11	*	Palos Verdes, CA	COA		Low density (5.3+/-3.7 N/0.1 sq.m.)	Amphipod		3.13+/-0.15		Swartz et al. 1986
19.3	+/-6.11	*	Palos Verdes, CA	COA		Low density (0.13+/-0.23 N/0.1 sq.m.)	Phoxocephalid		3.13+/-0.15		Swartz et al. 1986
19.9	+/-11.7	*	Palos Verdes, CA	COA		Low density (0.03+/-0.08 N/0.1 sq.m.)	Echinoderm		3.53+/-0.742		Swartz et al. 1985a
19.9	+/-11.7	*	Palos Verdes, CA	COA		Low density (0.233+/-0.367 N/0.1 sq.m.)	Foraminifera (sponge)		3.53+/-0.742		Swartz et al. 1985a
19.9	+/-11.7	*	Palos Verdes, CA	COA		Low density (0.3+/-0.8 N/0.1 sq.m.)	Ophiuroidea (brittle star)		3.53+/-0.742		Swartz et al. 1985a
20.8		*	Laboratory	SSBA	4-d	EC50; reburial	Rhepoxynius abronius (amphipod)	ADT			Swartz et al. 1985c
22.7		NE	San Diego Bay, CA	COA		Not toxic (<3% mortality)	Neanthes arenaceodentata (polychaete)				Salazar et al. 1980
22.8	+/-19.8	*	Baltimore Harbor, MD	COA	48-h	Most toxic; TLm	Fundulus heteroclitus (mummichog)				Tsai et al. 1979
22.8	+/-19.8	*	Baltimore Harbor, MD	COA	48-h	Most toxic; TLm	Leiostomus xanthurus (spot)				Tsai et al. 1979
23		*	Palos Verdes, CA	COA		Low species richness (19.2 S/0.1 sq.m.)	Benthic species	VAR			Ferraro et al. 1991
24		*	United States	EqPA		EPA Acute Marine EP Threshold	Aquatic biota		1		Lyman et al. 1987
25.9		*	Laboratory	SSBA	4-d	LC50	Rhepoxynius abronius (amphipod)	ADT			Swartz et al. 1985c
27	+/-4.16	*	Palos Verdes, CA	COA		Low species richness (26.0+/-11.5 S/0.1 sq.m.)	Macro benthos		3.95+/-0.238		Swartz et al. 1985a
27	+/-4.16	*	Palos Verdes, CA	COA		Low density (1.0+/-1.2 N/0.1 sq.m.)	Amphipod		3.95+/-0.238		Swartz et al. 1985a
27	+/-4.16	*	Palos Verdes, CA	COA		Low density (0 N/0.1 sq.m.)	Phoxocephalid		3.95+/-0.238		Swartz et al. 1985a
27	+/-4.16	*	Palos Verdes, CA	COA		Low density (8.7+/-6.01 N/0.1 sq.m.)	Crustacea		3.95+/-0.238		Swartz et al. 1985a
27.2	+/-8.25	*	Laboratory	SSBA	72-h	LC50	Rhepoxynius spp.				Oakden et al. 1984a
28		NE	San Diego Bay, CA	COA		Not toxic (<3% mortality)	M. elongata (mysid)				Salazar et al. 1980
28.7	+/-3.06	*	Palos Verdes, CA	COA		Low density (21.5+/-11.6 N/0.1 sq.m.)	Mollusca		4+/-0.265		Swartz et al. 1985a
28.7	+/-3.06	*	Palos Verdes, CA	COA	10-d	Significantly toxic (21+/-6.3% mortality)	Rhepoxynius abronius (amphipod)	ADT	4+/-0.265		Swartz et al. 1985a

Table 2. A summary of the available data on the biological effects associated with sediment-sorbed CADMIUM (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Cadmium Std Dev		Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
>32		-	California	AETA	10-d	California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
>32		-	Southern California	AETA	10-d	Southern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
32.5		NE	San Diego Bay, CA	COA		Not toxic (<3% mortality)	Protothaca staminea (clam)				Salazar et al. 1980
32.5		NE	San Diego Bay, CA	COA		Not toxic (<3% mortality)	Citharichthys stigmaeus (sanddab)				Salazar et al. 1980
32.5		NE	San Diego Bay, CA	COA		Not toxic (<3% mortality)	M. elongata (mysid)				Salazar et al. 1980
38.6		NE	New York Harbor, NY	COA	100-d	Not toxic (<10% mortality)	Nereis virens (sandworm)	ADT			Rubinstein et al. 1983
38.6		NE	New York Harbor, NY	COA	100-d	Not toxic (<10% mortality)	Mercenaria mercenaria (hard clam)	ADT			Rubinstein et al. 1983
38.6		NE	New York Harbor, NY	COA	100-d	Not toxic (<10% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Rubinstein et al. 1983
40		NE	Laboratory	SSBA	28-d	Not significantly toxic	Nereis virens (sandworm)				Olla et al. 1988
41.6	+/-79.8	*	Commencement Bay, WA	COA	10-d	Highly toxic (78.5+/-19.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
46.3	+/-41.5	NE	Gulfport Mississippi Channel, MS	COA	10-d	Not significantly toxic (8+/-2% mortality)	Crossostrea virginica (oyster)	ADT	6.73+/-2.04		Parrish 1987b
46.3	+/-41.5	NE	Gulfport Mississippi Channel, MS	COA	10-d	Not significantly toxic (22+/-5.29% mortality)	Arenicola cristata (lugworm)	ADT	6.73+/-2.04		Parrish 1987b
46.3	+/-41.5	NE	Gulfport Mississippi Channel, MS	COA	10-d	Not significantly toxic (3.3+/-3.06% mortality)	Penaeus duorarum (pink shrimp)	ADT	6.73+/-2.04		Parrish 1987b
290	+/-84.9	*	Laboratory	SSBA	10-d	LC50	Rhepoxynius hudsoni (amphipod)	SUBADT		1.31+/-1.46	DiToro et al. 1990
1070	+/-311	*	Laboratory	SSBA	10-d	LC50	Ampelisca abdita (amphipod)	SUBADT		4.34+/-1.57	DiToro et al. 1990
2580	+/-403	*	Laboratory	SSBA	10-d	LC50	Ampelisca abdita (amphipod)	SUBADT			DiToro et al. 1990
2850	+/-700	*	Laboratory	SSBA	10-d	LC50	Ampelisca abdita (amphipod)	SUBADT		14.9+/-1.41	DiToro et al. 1990

Table 3. A summary of the available data on the biological effects associated with sediment-sorbed CHROMIUM (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Chromium Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.6	NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
1.32 +/-1.34	NE	Matagorda Ship Channel, TX	COA	10-d	Not toxic (7.2+/-2.77% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1985a
1.32 +/-1.34	NE	Matagorda Ship Channel, TX	COA	10-d	Not toxic (10.6+/-5.18% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1985a
1.32 +/-1.34	NE	Matagorda Ship Channel, TX	COA	10-d	Not toxic (0.2+/-0.447% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1985a
2.46	NE	Georgetown Harbor, SC	COA		Not toxic (species richness or abundance)	Benthic species		0.12		Van Dolah et al. 1984
2.74 +/-1.82	NE	Chesapeake Bay, MD, VI; Delaware Bay, DE	COA		Not significantly toxic (mean ET50; burrowing time 0.704+/-0.17 h)	Mya arenaria (clam)	1-2 cm			Phelps 1990
4	NC	Mobile Bay, AL	COA		Significantly toxic (10% mortality)	Mysidopsis bahia (mysid shrimp)		0.009	0.004	EMAP Louisiana Province 1991
4.2 +/-2.43	NE	Charleston Harbor, SC	COA		High species richness (14.9+/-2.04; SRUs)	Benthic species				Winn et al. 1989
4.5 +/-2.12	NC	Apalachee Bay, FL	COA	10-d	Significantly toxic (15.6% mortality)	Ampelisca abdita (amphipod)		0.438+/-0.442	0.421+/-0.593	EMAP Louisiana Province 1991
5.6	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (18% mortality)	Ampelisca abdita (amphipod)		0.028	9 ug/g	Windom In Prep
6	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (0% mortality)	Arbacia punctulata (sea urchin)		0.03	19 ug/g	Windom In Prep
6 +/-2.94	NE	Apalachee Bay, FL	COA		Not significantly toxic (0.75+/-1.5% mortality)	Mysidopsis bahia (mysid shrimp)		0.540+/-0.385	0.405+/-0.417	EMAP Louisiana Province 1991
6.25	*	United States	EqPA		Chronic Marine EqP Threshold	Aquatic biota		1		Bolton et al. 1985
6.4	SG	Charleston Harbor, SC	COA		Low species richness (5.16; SRUs)	Benthic species				Winn et al. 1989
6.64 +/-2.47	NE	Charleston Harbor, SC	COA		High diversity (4.15+/-0.59; SDUs)	Benthic species				Winn et al. 1989
6.67 +/-5.03	NE	Houston Ship Channel, TX	COA		Not significantly toxic (15+/-13.2% mortality)	Sheepshead minnow	ADT	0.05+/-0.0242		Crocker et al. 1991
6.8	SG	Charleston Harbor, SC	COA		Low diversity (1.16; SDUs)	Benthic species				Winn et al. 1989
7.5 +/-3.54	NE	Apalachee Bay, FL	COA	10-d	Not significantly toxic (3.3+/-3.25% mortality)	Ampelisca abdita (amphipod)		0.643+/-0.455	0.390+/-0.410	EMAP Louisiana Province 1991
7.63 +/-8.94	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (15.3+/-11.0% mortality)	Hyalella azteca (amphipod)	JUV	0.648+/-0.641	1.74+/-1.39	Hall et al. 1992
8	SG	Chesapeake Bay, MD, VI; Delaware Bay, DE	COA		Significantly toxic (mean ET50; burrowing time 1.4 h)	Mya arenaria (clam)	1-2 cm			Phelps 1990
8.02 +/-2.45	SG	Charleston Harbor, SC	COA		Moderate species richness (9.05+/-1.33; SRUs)	Benthic species				Winn et al. 1989
8.37 +/-2.30	NE	Freeport Harbor, TX	COA	10-d	Not toxic (2+/-1% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1985b
8.37 +/-2.30	NE	Freeport Harbor, TX	COA	10-d	Not toxic (9.6+/-4.22% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1985b
8.37 +/-2.30	NE	Freeport Harbor, TX	COA	10-d	Not toxic (0% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1985b
8.43 +/-2.49	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (4.8+/-2.28% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1983a
8.43 +/-2.49	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (15.8+/-4.21% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1983a
8.43 +/-2.49	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (1.2+/-.447% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1983a
9.32 +/-3.27	SG	Charleston Harbor, SC	COA		Moderate diversity (2.3+/-0.2; SDUs)	Benthic species				Winn et al. 1989
9.5 +/-9.19	NC	Mississippi Sound, MS	COA	10-d	Significantly toxic (11.6+/-3.39% mortality)	Ampelisca abdita (amphipod)		0.111+/-0.045	0.03	EMAP Louisiana Province 1991
10	NE	Massachusetts Bay, MA	COA		High density (24 N/0.1 sq.m.)	Echinodermata	VAR			Gilbert et al. 1976
10.6 +/-10.6	NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (55.0+/-19.5% mortality)	Streblospio benedicti (polychaete worm)		0.349+/-0.11	1.07+/-0.66	Hall et al. 1992
11.8 +/-3.7	NE	Commencement Bay, WA	COA	48-h	Least toxic (15.1+/-3.1% abnormality)	Oyster	LAR			Tetra Tech 1985
11.8 +/-4.61	NE	Brunswick Harbor Entrance, GA	COA	48-h	Not significantly toxic (86.6+/-4.25% normal development)	Arbacia punctulata (sea urchin)		0.181+/-0.162	182+/-208 ug/g	Windom In Prep
12	NE	Curtis Creek, Baltimore, MD	COA	10-d	Not significantly toxic (11.3% mortality)	Leptocheirus plumulosus (amphipod)	JUV			McGee et al. 1993
12 +/-9.7	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (7.2+/-1.92% mortality)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
12 +/-9.7	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.6+/-0.55% reburial)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
12 +/-9.7	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
12 +/-9.7	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
13.2 +/-14	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (27.5+/-10.6% mortality)	Mysidopsis bahia (mysid)		0.237+/-0.311	74.6+/-85.5 ug/g	Windom In Prep
13.3 +/-11.5	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (9.78+/-5.33% mortality)	Mysidopsis bahia (mysid)		0.24+/-0.247	91.9+/-73.4 ug/g	Windom In Prep
13.5 +/-12.3	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (4+/-2.83% mortality)	Menidia beryllina (silverside)		0.243+/-0.264	90.5+/-78.4 ug/g	Windom In Prep
13.5 +/-6.11	SG	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (28.3+/-6.11% mortality)	Mysidopsis bahia (mysid)		0.246+/-0.051	127+/-24 ug/g	Windom In Prep
14 +/-14.1	NC	Mobile Bay, AL	COA	10-d	Significantly toxic (46+/-49.3% mortality)	Ampelisca abdita (amphipod)		0.22+/-0.298	3.84+/-5.43	EMAP Louisiana Province 1991
14.2 +/-11.9	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (11.6+/-4.33% mortality)	Ampelisca abdita (amphipod)		0.267+/-0.25	102+/-71.1 ug/g	Windom In Prep

Table 3. A summary of the available data on the biological effects associated with sediment-sorbed CHROMIUM (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Chromium Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
14.7 +/-12.5	NE	Houston Ship Channel, TX	COA	10-d	Not significantly toxic (5.4+/-3.6% mortality)	Amphipod	ADT	0.129+/-0.054		Crocker et al. 1991
15 +/-4.24	NE	Curtis Creek, Baltimore, MD	COA	20-d	Not significantly toxic (25.4+/-17.1% mortality)	Leptocheirus plumulosus (amphipod)	JUV			McGee et al. 1993
15.3 +/-2.0	NE	Duwamish River, WA	COA	96-h	Not toxic (0-10% mortality)	Palaemonetes pugio (shrimp)				Lee & Mariani 1977
15.4 +/-8.41	NE	Galveston Bay, TX	COA		High abundance (155+/-49.5 N/0.00203 sq.m.)	Oligochaeta		1.2+/-1.27	4.27+/-3.85	Carr 1992
15.8 +/-11.9	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (91.3+/-2.91% normal development)	Arbacia punctulata (sea urchin)		0.299+/-0.251	114+/-68.4 ug/g	Windom In Prep
16.1 +/-8.17	NE	Tampa Bay, FL	COA	1-h	Least toxic (83+/-4.26% fertilization)	Arbacia punctulata (sea urchin)	GAM		0.131+/-0.169	Long 1993
16.2 +/-8.1	NE	Commencement Bay, WA	COA	10-d	Least toxic (12.5+/-4.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
17.4 +/-12.2	*	Savannah River Entrance Channel, GA	COA	48-h	Significantly toxic (25.4+/-7.66% mortality)	Arbacia punctulata (sea urchin)		0.344+/-0.242	129.5+/-59.3 ug/g	Windom In Prep
17.6 +/-13	NE	Galveston Bay, TX	COA		High abundance (154+/-30.2 N/0.00203 sq.m.)	Benthic invertebrates		0.47+/-0.27	9.07+/-2.94	Carr 1992
17.7	NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.003 mg/day growth)	Lepidactylus dytiscus (amphipod)		1.38	3.25	Hall et al. 1992
17.7	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1% mortality)	Streblospio benedicti (polychaete worm)		1.38	3.25	Hall et al. 1992
17.7 +/-7.3	SG	Commencement Bay, WA	COA	48-h	Moderately toxic (23+/-2.3% abnormality)	Oyster	LAR			Tetra Tech 1985
17.7 +/-7.3	SG	Commencement Bay, WA	COA	10-d	Moderately toxic (26+/-5.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
17.9 +/-0.173	NE	Galveston Harbor, TX	COA	10-d	Not toxic (2.4+/-1.52% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Grieco 1984
17.9 +/-0.173	NE	Galveston Harbor, TX	COA	10-d	Not toxic (0% mortality)	Mercenaria mercenaria (hard clams)	ADT			Grieco 1984
17.9 +/-0.173	NE	Galveston Harbor, TX	COA	10-d	Not toxic (2.8+/-2.17% mortality)	Nereis virens (sandworm)	ADT			Grieco 1984
18 +/-4.93	NE	Gulfport Mississippi Channel, MS	COA	10-d	Not significantly toxic (8+/-2% mortality)	Crossostrea virginica (oyster)	ADT	6.73+/-2.04		Parrish 1987b
18 +/-4.93	NE	Gulfport Mississippi Channel, MS	COA	10-d	Not significantly toxic (22+/-5.29% mortality)	Arenicola cristata (lugworm)	ADT	6.73+/-2.04		Parrish 1987b
18 +/-4.93	NE	Gulfport Mississippi Channel, MS	COA	10-d	Not significantly toxic (3.3+/-3.06% mortality)	Penaeus duorarum (pink shrimp)	ADT	6.73+/-2.04		Parrish 1987b
19 +/-12.7	NE	Massachusetts Bay, MA	COA		High density (299+/-40.3 N/0.1 sq.m.)	Arthropoda	VAR			Gilbert et al. 1976
19.7 +/-11.3	SG	Commencement Bay, WA	COA	10-d	Highly toxic (78.5+/-19.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
19.7 +/-4.45	NE	Galveston Bay, TX	COA		High abundance (156+/-22.9 N/0.00203 sq.m.)	Polychaeta		0.916+/-0.661	2.94+/-2.3	Carr 1992
19.9 +/-0.4	NE	Newport, RI	COA	96-h	Not toxic (0% mortality)	Palaemonetes pugio (shrimp)				Lee & Mariani 1977
20 +/-1.97	NE	Galveston Bay, TX	COA		High abundance (27.3+/-10 N/0.00203 sq.m.)	Mollusca		1.64+/-0.4	1.39+/-0.17	Carr 1992
20 +/-5	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (6+/-2.35% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1983b
20 +/-5	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (2.6+/-2.97% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1983b
20 +/-5	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (1.8+/-1.79% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1983b
20.5 +/-14.3	NE	Houston Ship Channel, TX	COA	7-d	Not significantly toxic (7.5+/-5% mortality)	Sheepshead minnow	ADT	0.137+/-0.056		Crocker et al. 1991
20.8 +/-7.97	NE	Curtis Creek, Baltimore, MD	COA	10-d	Not significantly toxic (15+/-7.21% mortality)	Hyalella azteca (amphipod)	JUV			McGee et al. 1993
21.2 +/-7.65	NE	Black Rock Beach, NS	COA	10-d	Not toxic (6.67+/-4.51% mortality)	Corophium volutator (amphipod)	ADT/JUV	0.24+/-0.18		Nicol & Doe 1990
21.2 +/-7.65	NE	Black Rock Beach, NS	COA	10-d	Not toxic (2.33+/-1.53% mortality)	Rhepoxynius abronius (amphipod)	ADT/JUV	0.24+/-0.18		Nicol & Doe 1990
21.2 +/-7.65	NE	Black Rock Beach, NS	COA	10-d	Not toxic (100% reburial)	Rhepoxynius abronius (amphipod)	ADT/JUV	0.24+/-0.18		Nicol & Doe 1990
21.5 +/-3.51	NE	Galveston Bay, TX	COA		High species richness (24.5+/-3.7 S/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
21.5 +/-3.51	NE	Galveston Bay, TX	COA		High abundance (359+/-92.8 N/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
21.6 +/-8.67	NE	Galveston Bay, TX	COA		High abundance (16.2+/-6.19 N/0.00203 sq.m.)	Copepoda		0.844+/-0.524	4.73+/-3.1	Carr 1992
22 +/-13.5	NE	Galveston Bay, TX	COA		Low species (11.2+/-1.94 S/0.00203 sq.m.)	Benthic species		0.642+/-0.356	13.4+/-8.65	Carr 1992
22.2 +/-9	SG	Commencement Bay, WA	COA	48-h	Highly toxic (44.5+/-19% abnormality)	Oyster	LAR			Tetra Tech 1985
22.3 +/-10.7	NE	Massachusetts Bay, MA	COA		High species richness (102+/-4.73 S/0.1 sq.m.)	Benthic species	VAR			Gilbert et al. 1976
23.4 +/-10.3	SG	Galveston Bay, TX	COA		Moderate abundance (58.3+/-16.2 N/0.00203 sq.m.)	Oligochaeta		0.632+/-0.274	7.93+/-5.6	Carr 1992
23.5 +/-3.54	NG	Houston Ship Channel, TX	COA	10-d	Significantly toxic (22.7+/-0.778% mortality)	Amphipod	ADT	0.248+/-0.132		Crocker et al. 1991
23.7 +/-15.6	NE	Galveston Bay, TX	COA	48-h	Not toxic (98.1+/-1.79% normal development)	Arbacia punctulata (sea urchin)	EMB	0.748+/-0.476	4.16+/-3.45	Carr 1992
23.7 +/-22.3	NE	Houston Ship Channel, TX	COA	10-d	Not significantly toxic (4.7+/-4.29% mortality)	Amphipod	ADT	0.144+/-0.123		Crocker et al. 1991
24.6 +/-29.9	SG	Tampa Bay, FL	COA	1-h	Moderately toxic (44.5+/-17.8% fertilization)	Arbacia punctulata (sea urchin)	GAM		0.622+/-1.12	Long 1993
24.8 +/-22.5	NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (9+/-1.73% mortality)	Nereis virens (polychaetes)	ADT			EG&G Bionomics 1980

Table 3. A summary of the available data on the biological effects associated with sediment-sorbed CHROMIUM (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Chromium Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
24.8 +/-22.5	NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (13+/- 3.61% mortality)	Penaeus duorarum (pink shrimp)	ADT			EG&G Bionomics 1980
24.8 +/-22.5	NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (11.3+/-3.21% mortality)	Crassostrea virginica (oyster)	ADT			EG&G Bionomics 1980
25 +/-14.4	NE	Galveston Bay, TX	COA	1-h	Not toxic (92.5+/-6.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	0.77+/-0.448	6.37+/-6.58	Carr 1992
26	NE	San Diego Bay, CA	COA	96-h	Not significantly toxic (4% mortality)	Citharichthys stigmaeus (sanddab)				Salazar & Salazar 1985
26	NE	San Diego Bay, CA	COA	10-d	Not significantly toxic (14% mortality)	Acanthomysis sculpta (mysid)				Salazar & Salazar 1985
26	NE	San Diego Bay, CA	COA	20-d	Not significantly toxic (13% mortality)	Neanthes arenaceodentata (polycheate)				Salazar & Salazar 1985
26	NE	San Diego Bay, CA	COA	20-d	Not significantly toxic (1% mortality)	Macoma nasuta (clam)				Salazar & Salazar 1985
26	NE	San Diego Bay, CA	COA	96-h	Not significantly toxic (0% mortality)	Acanthomysis sculpta (mysid)				Salazar & Salazar 1985
26	NE	San Diego Bay, CA	COA	96-h	Not significantly toxic (18% mortality)	Acartia tonsa (copepod)				Salazar & Salazar 1985
26.4 +/-5.08	NE	Pensacola Naval Air Station, FL	COA	10-d	Not significantly toxic (0% mortality)	Crossostrea virginica (oyster)	ADT	2.5+/-2.83		Parrish 1988a
26.4 +/-5.08	NE	Pensacola Naval Air Station, FL	COA	10-d	Not significantly toxic (5+/-1.41% mortality)	Penaeus duorarum (pink shrimp)	ADT	2.5+/-2.83		Parrish 1988a
26.4 +/-5.08	NE	Pensacola Naval Air Station, FL	COA	10-d	Not significantly toxic (8% mortality)	Arenicola cristata (lugworm)	ADT	2.5+/-2.83		Parrish 1988a
26.7 +/-12	NC	Galveston Bay, TX	COA		Low abundance (0.3+/-0.651 N/0.00203 sq.m.)	Amphipoda		0.859+/-0.487	7.67+/-8.12	Carr 1992
27	*	Puget Sound, WA	AETA	15-min	1986 Puget Sound AET	Microtox (Photobacterium phosphoreum)		15		Bellar et al. 1986
28 +/-40.1	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (0.33+/-0.516% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
28 +/-40.1	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (2.33+/-1.03% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
28 +/-40.1	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.367+/-0.085 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
28 +/-40.1	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.0005 mg/day growth)	Streblospio benedicti (polychaete worm)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
28.7 +/-7.68	NE	Bayou La Batre, AB	COA	10-d	Not significantly toxic (46.7+/-11.4% mortality)	Nereis virens (polychaete)	ADT			Parrish 1987a
28.7 +/-7.68	NE	Bayou La Batre, AB	COA	10-d	Not significantly toxic (5.3+/-2.31% mortality)	Crossostrea virginica (oyster)	ADT			Parrish 1987a
28.7 +/-7.68	NE	Bayou La Batre, AB	COA	10-d	Not significantly toxic (14+/-9.17% mortality)	Penaeus duorarum (pink shrimp)	ADT			Parrish 1987a
29	NE	Massachusetts Bay, MA	COA		High density (4135 N/0.1 sq.m.)	Annelida	VAR			Gilbert et al. 1976
29.1 +/-15.7	SG	Galveston Bay, TX	COA		Low abundance (1.86+/-2.59 N/0.00203 sq.m.)	Mollusca		0.784+/-0.421	8.29+/-8.13	Carr 1992
29.1 +/-25.4	NE	Pascagoula Naval Station, MS	COA	10-d	Not significantly toxic (1+/-1.41% mortality)	Crossostrea virginica (oyster)	ADT	7.31+/-3.86		Parrish 1990
29.1 +/-25.4	NE	Pascagoula Naval Station, MS	COA	10-d	Not significantly toxic (4+/-2.83% mortality)	Penaeus duorarum (pink shrimp)	ADT	7.31+/-3.86		Parrish 1990
29.1 +/-25.4	NE	Pascagoula Naval Station, MS	COA	10-d	Not significantly toxic (5+/-1.41% mortality)	Nereis virens (polychaete)	ADT	7.31+/-3.86		Parrish 1990
29.2 +/-16	SG	Galveston Bay, TX	COA		Low species richness (10+/-3.73 S/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
29.2 +/-16	SG	Galveston Bay, TX	COA		Low abundance (89+/-60.7 N/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
29.6 +/-15.6	NE	Southern California	COA		High abundance (191+/-70.1 N/0.1 sq.m.)	Echinoderm				Word & Mearns 1979 (As cited in L&M 1990)
29.8 +/-11.3	NE	Chandeleur Sound, LA	COA		Not significantly toxic (1.03+/-2.05% mortality)	Mysidopsis bahia (mysid shrimp)		0.824+/-0.915	1.69+/-0.920	EMAP Louisiana Province 1991
30 +/-44.4	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.003+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.316+/-0.120	2.13+/-2.46	Hall et al. 1992
30 +/-44.4	SG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29.8+/-11.1% mortality)	Streblospio benedicti (polychaete worm)		0.316+/-0.12	2.13+/-2.46	Hall et al. 1992
30.5 +/-16.1	SG	Galveston Bay, TX	COA		Low abundance (4.21+/-5.66 N/0.00203 sq.m.)	Oligochaeta		0.895+/-0.453	7.85+/-8.8	Carr 1992
31 +/-12.9	SG	Galveston Bay, TX	COA		Low abundance (53+/-33.9 N/0.00203 sq.m.)	Benthic invertebrates		0.985+/-0.247	22+/-11.2	Carr 1992
31 +/-16.5	SG	Galveston Bay, TX	COA		Low abundance (41.7+/-21.8 N/0.00203 sq.m.)	Polychaeta		0.848+/-0.427	9.21+/-8.61	Carr 1992
31.1 +/-33.2	NE	Tampa Bay, FL	COA		Not significantly toxic (EC50; 0.133+/-0.103 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)			1.23+/-1.96	Long 1993
31.3 +/-16.1	*	Curtis Creek, Baltimore, MD	COA	10-d	Significantly toxic (82.8+/-22.2% mortality)	Leptocheirus plumulosus (amphipod)	JUV			McGee et al. 1993
32.3 +/-17.5	SG	Southern California	COA		Moderate abundance (56.2+/-23 N/0.1 sq.m.)	Echinoderm				Word & Mearns 1979 (As cited in L&M 1990)
32.7 +/-17.1	SG	Galveston Bay, TX	COA		Low abundance (2.05+/-1.58 N/0.00203 sq.m.)	Copepoda		0.879+/-0.47	9.63+/-9.65	Carr 1992
33 +/-13.9	NC	Chesapeake Bay, MD, VI; Delaware Bay, DE	COA		Significantly toxic (mean ET50; burrowing time 3.79+/-3.29 h)	Mya arenaria (clam)	1-2 cm			Phelps 1990
33.3 +/-17.7	NC	Tampa Bay, FL	COA	48-h	Significantly toxic (48.1+/-1.91% mortality)	Mulinaria lateralis (coot clam)	LAR		2.82+/-2.65	Long 1993
33.4 +/-42.2	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.001+/-0.001 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.555+/-0.471	2.68+/-2.3	Hall et al. 1992
33.5 +/-10.5	NC	Chandeleur Sound, LA	COA	10-d	Significantly toxic (11.5+/-4.86% mortality)	Ampelisca abdita (amphipod)		0.811+/-0.711	1.87+/-0.973	EMAP Louisiana Province 1991
33.6 +/-35.9	NE	Tampa Bay, FL	COA	10-d	Not significantly toxic (9.5+/-6.15% mortality)	Ampelisca abdita (amphipod)	SUBADT		1.56+/-2.73	Long 1993

Table 3. A summary of the available data on the biological effects associated with sediment-sorbed CHROMIUM (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Chromium Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
34 +/-10.8	NE	Burrard Inlet, BC	COA	10-d	Not toxic (4.5+/-3.02% emergence)	Rhepoxynius abronius (amphipod)	ADT	2.66+/-2.15		McLeay et al. 1991
34.6 +/-11.5	SG	Galveston Bay, TX	COA	48-h	Toxic (4.65+/-16.1% normal development)	Arbacia punctulata (sea urchin)	EMB	1.06+/-0.449	14.5+/-9.2	Carr 1992
35.7 +/-16.5	*	Curtis Creek, Baltimore, MD	COA	20-d	Significantly toxic (94.6+/-9.35% mortality)	Leptocheirus plumulosus (amphipod)	JUV			McGee et al. 1993
35.7 +/-18.5	NE	Chandeleur Sound, LA	COA	10-d	Not significantly toxic (2.87+/-4.05% mortality)	Ampelisca abdita (amphipod)		0.517+/-0.166	2.02+/-1.38	EMAP Louisiana Province 1991
36.2 +/-11.2	NE	Burrard Inlet, BC	COA	10-d	Not toxic (5.21+/-3.61% emergence)	Corophium volutator (amphipod)	ADT	3.18+/-2.1		McLeay et al. 1991
>37	-	Puget Sound, WA	AETA	48-h	1986 Puget Sound AET	Crassostrea gigas (oyster)	LAR	15		Bellar et al. 1986
37.5 +/-12.9	NE	Burrard Inlet, BC	COA	10-d	Not toxic (8.9+/-2.99% mortality)	Corophium volutator (amphipod)	ADT	2.8+/-1.96		McLeay et al. 1991
37.5 +/-12.9	NE	Burrard Inlet, BC	COA	10-d	Not toxic (97.2+/-2.84% reburial)	Rhepoxynius abronius (amphipod)	ADT	2.8+/-1.96		McLeay et al. 1991
37.8 +/-13.4	SG	Chandeleur Sound, LA	COA		Significantly toxic (7.6+/-1.32% mortality)	Mysidopsis bahia (mysid shrimp)		0.624+/-0.197	2.07+/-1.19	EMAP Louisiana Province 1991
38.1 +/-36.3	NC	Southern California	COA		Moderate species richness (72+/-3.3 S/0.1 sq.m.)	Benthic species				Word & Mearns 1979 (As cited in L&M 1990)
38.5 +/-26.3	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (10.6+/-3.17% mortality)	Ampelisca abdita (amphipod)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
38.5 +/-26.3	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (8.00+/-2.92% mortality)	Mysidopsis bahia (mysid)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
39.1 +/-13.1	SG	Galveston Bay, TX	COA	1-h	Toxic (20.4+/-18.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	1.26+/-0.47	14.6+/-10.1	Carr 1992
39.9 +/-12.7	NE	Burrard Inlet, BC	COA	10-d	Not toxic (7.9+/-5.12% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.64+/-2.14		McLeay et al. 1991
39.9 +/-27.1	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (9.61+/-2.7% mortality)	Menidia beryllina (silverside)		1.22+/-1.13	9172+/-13363 ug/g	Windom In Prep
40.1 +/-23.5	NE	Mississippi Sound, MS	COA		Not significantly toxic (0.789+/-1.59% mortality)	Mysidopsis bahia (mysid shrimp)		0.827+/-0.757	1.46+/-1.58	EMAP Louisiana Province 1991
40.2 +/-27.3	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (5.43+/-3.21% mortality)	Mysidopsis bahia (mysid)		1.21+/-1.13	9096+/-13378 ug/g	Windom In Prep
40.7 +/-30.9	NE	Southern California	COA		High abundance (148+/-58 N/0.1 sq.m.)	Arthropods				Word & Mearns 1979 (As cited in L&M 1990)
41.9 +/-34	NE	Narragansett Bay, RI	COA	10-d	Not significantly toxic (5.28+/-3.04% mortality)	Ampelisca abdita (amphipod)	ADT			Munns et al. 1991
42 +/-11	NE	Fraser River Estuary, BC	COA		Sediments populated by feral clams	Macoma balthica (bivalve)		0.45		McGreer 1982
42 +/-39.8	NC	Southern California	COA		Moderate abundance (75.6+/-12.7 N/0.1 sq.m.)	Benthic species				Word & Mearns 1979 (As cited in L&M 1990)
42.5 +/-37	NE	Tampa Bay, FL	COA	48-h	Not significantly toxic (38.5+/-2.9% mortality)	Mulinaria lateralis (coot clam)	LAR		2.64+/-3.04	Long 1993
43 +/-26.9	NC	Galveston Bay, TX	COA	10-d	Significantly toxic (15.8+/-3.89% mortality)	Ampelisca abdita (amphipod)		0.647+/-0.606	0.160+/-0.184	EMAP Louisiana Province 1991
45.8 +/-21.5	NE	Massachusetts Bay, MA	COA		High density (201+/-33.4 N/0.1 sq.m.)	Mollusca	VAR			Gilbert et al. 1976
46.3 +/-43.3	SG	Southern California	COA		Moderate abundance (72.6+/-6.8 N/0.1 sq.m.)	Arthropods				Word & Mearns 1979 (As cited in L&M 1990)
47.6 +/-2.7	SG	Los Angeles, CA	COA	96-h	Highly toxic (>50% mortality)	Palaemonetes pugio (shrimp)				Lee & Mariani 1977
48.1 +/-22.8	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (5.8+/-3.7% mortality)	Rhepoxynius abronius (amphipod)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
48.1 +/-22.8	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (3.4+/-1.82% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
48.1 +/-22.8	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (11.2+/-3.7% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
48.1 +/-22.8	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (3.52+/-1.66% mortality)	Macoma nasuta (clam)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
48.3 +/-51.9	*	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (55.0+/-22.6% mortality)	Hyalella azteca (amphipod)	JUV	0.338+/-0.133	2.9+/-3.11	Hall et al. 1992
49.3 +/-21.9	NE	Galveston Bay, TX	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		0.934+/-0.657	0.457+/-0.530	EMAP Louisiana Province 1991
49.6 +/-24.1	SG	Massachusetts Bay, MA	COA		Low density (1316+/-768 N/0.1 sq.m.)	Annelida	VAR			Gilbert et al. 1976
50.2 +/-26.1	NE	Bayou Casotte, MS	COA	10-d	Not significantly toxic (5.3+/-3.06% mortality)	Penaeus duorarum (pink shrimp)	ADT	5.2+/-2.6		Parrish 1988b
50.2 +/-26.1	NE	Bayou Casotte, MS	COA	10-d	Not significantly toxic (8+/-6% mortality)	Arenicola cristata (lugworm)	ADT	5.2+/-2.6		Parrish 1988b
50.2 +/-26.1	NE	Bayou Casotte, MS	COA	10-d	Not significantly toxic (0% mortality)	Crossostrea virginica (oyster)	ADT	5.2+/-2.6		Parrish 1988b
51	NE	Gulf of Mexico	COA		Most toxic (100 TU/g)	Microtox (Photobacterium phosphoreum)		0.4		Chapman et al. 1991
51.2 +/-18.3	NE	Mississippi Sound, MS	COA	10-d	Not significantly toxic (1.4+/-1.73% mortality)	Ampelisca abdita (amphipod)		0.998+/-0.602	2.01+/-1.82	EMAP Louisiana Province 1991
51.2 +/-42.9	NE	Galveston Bay, TX	COA		High Abundance (6+/-1.41 N/0.00203 sq.m.)	Amphipoda		0.955+/-0.629	7.21+/-8.2	Carr 1992
51.6 +/-3.05	NE	Gulf of Mexico	COA	10-d	Not toxic (0.36+/-0.261% emergence/d)	Rhepoxynius abronius (amphipod)	ADT	0.42+/-0.13		Chapman et al. 1991
51.7 +/-2.56	NE	Gulf of Mexico	COA	48-h	Not toxic (4.54+/-5.37% mortality)	Crassostrea gigas (oyster)	LAR	0.443+/-0.127		Chapman et al. 1991
51.9 +/-2.42	NE	Gulf of Mexico	COA	48-h	Not significantly toxic (7.76+/-1.89% abnormality)	Crassostrea gigas (oyster)	LAR	0.425+/-0.128		Chapman et al. 1991
52.3		***TEL***								
52.8 +/-2.36	NE	Gulf of Mexico	COA	10-d	Significantly toxic (41.75+/-38.9% mortality)	Rhepoxynius abronius (amphipod)	ADT	0.45+/-0.058		Chapman et al. 1991

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Chromium Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
53.8 +/-14.2	NE	Matagorda Bay, TX	COA		Not significantly toxic (1.58+/-1.82% mortality)	Mysidopsis bahia (mysid shrimp)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
53.8 +/-14.2	NE	Matagorda Bay, TX	COA	10-d	Not significantly toxic (2.33+/-4.65% mortality)	Ampelisca abdita (amphipod)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
54	*	Curtis Creek, Baltimore, MD	COA	10-d	Significantly toxic (55% mortality)	Hyalella azteca (amphipod)	JUV			McGee et al. 1993
54 +/-83.5	NC	Southern California	COA		Low abundance (57.6+/-13.6 N/0.1 sq.m.)	Benthic species				Word & Mearns 1979 (As cited in L&M 1990)
54.7	SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (16% mortality)	Mysidopsis bahia (mysid)		1.8	7095 ug/g	Windom In Prep
54.9	SG	Burrard Inlet, BC	COA	10-d	Highly toxic (23% emergence)	Corophium volutator (amphipod)	ADT	3.5		McLeay et al. 1991
54.9	SG	Burrard Inlet, BC	COA	10-d	Highly toxic (30.5% emergence)	Rhepoxynius abronius (amphipod)	ADT	3.5		McLeay et al. 1991
55.3 +/-21	SG	Mississippi Sound, MS	COA		Significantly toxic (12.2+/-4.42% mortality)	Mysidopsis bahia (mysid shrimp)		0.939+/-0.335	2.63+/-2.3	EMAP Louisiana Province 1991
56 +/-1.41	NE	Mississippi River, MS, LA	COA	10-d	Not significantly toxic (7.8+/-1.63% mortality)	Ampelisca abdita (amphipod)		1.15+/-1.04	2.31+/-0.651	EMAP Louisiana Province 1991
56 +/-18.2	SG	Galveston Bay, TX	COA		Significantly toxic (13.4+/-9.11% mortality)	Mysidopsis bahia (mysid shrimp)		0.778+/-0.482	1.21+/-0.778	EMAP Louisiana Province 1991
56.7	SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (22.3% mortality)	Menidia beryllina (silverside)		1.71	6562 ug/g	Windom In Prep
57.5 +/-15.2	NE	Galveston Bay, TX	COA	10-d	Not significantly toxic (1.35+/-1.45% mortality)	Ampelisca abdita (amphipod)		0.961+/-0.537	1.17+/-0.640	EMAP Louisiana Province 1991
57.9 +/-44.9	*	Tampa Bay, FL	COA	1-h	Most toxic (1.96+/-3.19% fertilization)	Arbacia punctulata (sea urchin)	GAM		3.95+/-5.94	Long 1993
58	NE	Palos Verdes, CA	COA		High abundance (208 N/0.1 sq.m.)	Echinoderms	VAR			Ferraro et al. 1991
58.6 +/-129	NE	Chesapeake Bay, MD, VI; Delaware Bay, DE	COA		Not significantly toxic (mean ET50; burrowing time 0.76+/-0.266 h)	Mya arenaria (clam)	1-2 cm			Phelps 1990
59	*	Puget Sound, WA	AETA		1986 Puget Sound AET	Benthic species		15		Bellar et al. 1986
59 +/-27.2	NC	Massachusetts Bay, MA	COA		Low density (7.14+/-4.23 N/0.1 sq.m.)	Rhynchocoela	VAR			Gilbert et al. 1976
59.9 +/-9.2	*	Brunswick Harbor Entrance, GA	COA	48-h	Significantly toxic (14.6+/-18.9% normal development)	Arbacia punctulata (sea urchin)		1.99+/-0.562	14009+/-13434 ug/g	Windom In Prep
60	*	Strait of Georgia, BC	COA	48-h	Significant increase in burrowing time	Macoma balthica (bivalve)		1.13		McGreer 1979
60	NE	Burrard Inlet, BC	SQO		Sediment Quality Objectives	Aquatic biota				Swain & Nijman 1991
60.4 +/-26.1	*	Massachusetts Bay, MA	COA		Low density (2.76+/-2.7 N/0.1 sq.m.)	Echinodermata	VAR			Gilbert et al. 1976
60.6 +/-27.3	SG	Massachusetts Bay, MA	COA		Low density (39.1+/-30.8 N/0.1 sq.m.)	Mollusca	VAR			Gilbert et al. 1976
60.8 +/-8.77	NE	Howe Sound, BC	COA	10-d	Not toxic (10.5+/-4.09% mortality)	Rhepoxynius abronius (amphipod)	ADT	3.4+/-4.39		McLeay et al. 1991
60.8 +/-8.77	NE	Howe Sound, BC	COA	10-d	Not toxic (5.83+/-5.48% emergence)	Rhepoxynius abronius (amphipod)	ADT	3.4+/-4.39		McLeay et al. 1991
60.8 +/-8.77	NE	Howe Sound, BC	COA	10-d	Not toxic (96.3+/-4.19% reburial)	Rhepoxynius abronius (amphipod)	ADT	3.4+/-4.39		McLeay et al. 1991
61.2 +/-25.9	*	Massachusetts Bay, MA	COA		Low density (61.1+/-36.6 N/0.1 sq.m.)	Arthropoda	VAR			Gilbert et al. 1976
62	NE	Palos Verdes, CA	COA		High density (4.4 N/0.1 sq.m.)	Echinoderm		0.9		Swartz et al. 1985a
62	NE	Palos Verdes, CA	COA		High density (88 N/0.1 sq.m.)	Foraminifera (sponge)		0.9		Swartz et al. 1985a
62	NE	Palos Verdes, CA	COA		High density (132 N/0.1 sq.m.)	Ophiuroidea (brittle star)		0.9		Swartz et al. 1985a
62 +/-139	NE	Southern California	COA		High species richness (96.3+/-22.3 S/0.1 sq.m.)	Benthic species				Word & Mearns 1979 (As cited in L&M 1990)
62 +/-25.7	*	Massachusetts Bay, MA	COA		Low species richness (57.2+/-12.2 S/0.1 sq.m.)	Benthic species	VAR			Gilbert et al. 1976
62.8 +/-63.7	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (16.5+/-9.19% mortality)	Streblospio benedicti (polychaete worm)		0.783+/-0.845	4.83+/-2.23	Hall et al. 1992
66 +/-36.4	NE	Mobile Bay, AL	COA		Not significantly toxic (1.07+/-1.85% mortality)	Mysidopsis bahia (mysid shrimp)		0.968+/-0.815	8.23+/-3.4	EMAP Louisiana Province 1991
66.5 +/-13.4	NE	Mississippi River, MS, LA	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		1.3+/-0.83	1.14+/-1	EMAP Louisiana Province 1991
67.5 +/-5.9	NE	Norwalk River, CT	COA	96-h	Not toxic (0% mortality)	Palaemonetes pugio (shrimp)				Lee & Mariani 1977
67.8 +/-36.4	NE	Gulf of Mexico	COA		Not toxic (3.21+/-0.239 diversity index)	Benthic species		0.464+/-0.143		Chapman et al. 1991
69.5 +/-20.5	SG	Mississippi River, MS, LA	COA		Significantly toxic (32.9+/-36.4% mortality)	Mysidopsis bahia (mysid shrimp)		1.07+/-0.924	1.41+/-1.93	EMAP Louisiana Province 1991
69.5 +/-37.9	NE	Gulf of Mexico	COA		Least toxic (6.32+/-3.68 TU/g)	Microtox (Photobacterium phosphoreum)		0.47+/-0.149		Chapman et al. 1991
70	NE	Massachusetts Bay, MA	COA		High density (22 N/0.1 sq.m.)	Rhynchocoela	VAR			Gilbert et al. 1976
73 +/-124	NE	Southern California	COA	10-d	Not significantly toxic (23.2% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
73.8 +/-19	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-7.99% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.14+/-0.352	6.09+/-5.38	Bricker et al. 1993
76.4 +/-19.3	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (25.9+/-5.01% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.21+/-0.444	2.41+/-2.32	Bricker et al. 1993
76.4 +/-44.3	NE	Gulf of Mexico	COA	10-d	Not significantly toxic (9+/-3.96% mortality)	Rhepoxynius abronius (amphipod)	ADT	0.471+/-0.18		Chapman et al. 1991
77.4 +/-45.8	*	Tampa Bay, FL	COA		Significantly toxic (EC50; 0.021+/-0.012 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)			6.13+/-8.06	Long 1993

Table 3. A summary of the available data on the biological effects associated with sediment-sorbed CHROMIUM (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Chromium Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
80 +/-5.66	SG	Mississippi River, MS, LA	COA	10-d	Significantly toxic (15.9+/-6.65% mortality)	Ampelisca abdita (amphipod)		1.22+/-0.717	0.235+/-0.276	EMAP Louisiana Province 1991
81.3 +/-46.4	SG	Gulf of Mexico	COA	10-d	Highly toxic (2.5+/-1.05% emergence/d)	Rhepoxynius abronius (amphipod)	ADT	0.5+/-0.155		Chapman et al. 1991
81.4 +/-88.5	SG	Southern California	COA	10-d	Significantly toxicity (51.7% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
81.9 +/-20.9	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.125+/-0.084 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.25+/-0.468	1.98+/-2.25	Bricker et al. 1993
83.5 +/-24.7	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (96+/-1.66% normal development)	Mulinia lateralis (bivalve)	LAR	2.52+/-0.997	35+/-42.9	Bricker et al. 1993
83.6 +/-22.1	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (6.48+/-10.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
83.6 +/-22.1	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99+/-0.862% normal development)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
83.8 +/-25.5	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-6.07% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.71+/-0.9	15.3+/-23.2	Bricker et al. 1993
84.3 +/-18.5	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (19.3+/-5.86% mortality)	Ampelisca abidta (amphipod)	SUB ADT	1.82+/-0.225	6.3+/-6.2	Bricker et al. 1993
85.3 +/-32.7	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.096+/-0.101 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.37+/-0.759	6.93+/-6.83	Bricker et al. 1993
85.6 +/-14.7	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.5+/-11.4% mortality)	Mulinia lateralis (bivalve)	LAR	2.33+/-0.364	26.8+/-9.42	Bricker et al. 1993
86	NE	San Francisco Bay, CA	COA	48-h	Least toxic (17.3% mortality)	Mussel	LAR	1.25		Chapman et al. 1987a
86 +/-6.7	NE	Stamford, CT	COA	96-h	Not toxic (10% mortality)	Palaemonetes pugio (shrimp)				Lee & Mariani 1977
86.9 +/-37.1	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.074+/-0.043 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.27+/-0.626	6.21+/-5.41	Bricker et al. 1993
87	NE	Mobile Bay, AL	COA	10-d	Not significantly toxic (0.5+/-0.778% mortality)	Ampelisca abdita (amphipod)		1.24+/-0.948	8.51+/-4.76	EMAP Louisiana Province 1991
87 +/-9.19	NG	San Francisco Bay, CA	COA	48-h	Moderately toxic (57.1+/-13.6% mortality)	Mussel	LAR	1.14+/-.33		Chapman et al. 1987a
87.3 +/-22.1	*	Fraser River Estuary, BC	COA		Sediments devoid of feral clams	Macoma balthica (bivalve)		1.95		McGreer 1982
87.4 +/-33.1	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99.3+/-0.827% normal development)	Mulinia lateralis (bivalve)	LAR	1.43+/-0.738	14.7+/-24	Bricker et al. 1993
87.5 +/-41.7	NE	Palos Verdes, CA	COA		High abundance (54.6+/-5.09 N/0.1 sq.m.)	Amphipods	VAR			Ferraro et al. 1991
87.5 +/-41.7	NE	Palos Verdes, CA	COA		High abundance (30.7+/-0.99 N/0.1 sq.m.)	Phoxocephalids	VAR			Ferraro et al. 1991
88.2 +/-82.7	NE	San Francisco Bay, CA	COA	48-h	Least toxic (23.3+/-7.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
89 +/-4.55	NE	San Francisco Bay, CA	COA	4-wk	Least toxic (116+/-4.3 young produced)	Tigriopus californicus (copepod)	ADT	1.23+/-.09		Chapman et al. 1987a
89.5 +/-34.6	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.008+/-0.001 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.19+/-1.27	12+/-11.3	Bricker et al. 1993
90	*	Strait of Georgia, BC	COA	24-h	Significantly toxic (avoidance)	Macoma balthica (bivalve)		3.09		McGreer 1979
90.1 +/-11.5	NE	San Francisco Bay, CA	COA	48-h	Least toxic (18+/-8.01% abnormal)	Mussel	LAR	1.2+/-.38		Chapman et al. 1987a
90.6 +/-15.8	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (39.5+/-18.2% mortality)	Ampelisca abidta (amphipod)	SUB ADT	2.06+/-0.523	20.1+/-13.9	Bricker et al. 1993
92.6 +/-15.5	NC	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.014+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.51+/-0.45	29.6+/-15.7	Bricker et al. 1993
93 +/-31.8	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (12.3+/-14.5% mortality)	Mulinia lateralis (bivalve)	LAR	1.53+/-0.743	15.7+/-23.2	Bricker et al. 1993
93.7 +/-35.8	*	Tampa Bay, FL	COA	10-d	Significantly toxic (32.1+/-16.9% mortality)	Ampelisca abdita (amphipod)	SUBADT		7.63+/-9.44	Long 1993
94	NE	Palos Verdes, CA	COA		High density (93.4 N/0.1 sq.m.)	Echinoderm		1.3+/-0.77		Swartz et al. 1986
94.2 +/-17.4	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.061+/-0.038 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.8+/-0.477	8.52+/-10.7	Bricker et al. 1993
94.7 +/-14.7	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.3+/-2.22% normal development)	Mulinia lateralis (bivalve)	LAR	2.18+/-0.531	19.1+/-12.5	Bricker et al. 1993
95 +/-13.2	SG	San Francisco Bay, CA	COA	48-h	Moderately toxic (25.1+/-6.61% abnormal)	Mussel	LAR	1.26+/-0.17		Chapman et al. 1987a
95.3 +/-23.6	NE	San Francisco Bay, CA	COA	10-d	Least toxic (13.6+/-7.76% mortality)	Amphipod	ADT	1.4 +/- 0.79		Chapman et al. 1987a
96 +/-52.3	SG	Gulf of Mexico	COA	48-h	Highly toxic (59.4+/-15.5% mortality)	Crassostrea gigas (oyster)	LAR	0.5+/-0.18		Chapman et al. 1991
97.1 +/-15.4	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (15.2+/-9.21% mortality)	Mulinia lateralis (bivalve)	LAR	2.17+/-0.663	18.4+/-19.9	Bricker et al. 1993
97.1 +/-22.5	NE	San Francisco Bay, CA	COA	10-d	Least Toxic (4.63+/-2.91% avoidance)	Amphipod	ADT	1.44+/-.74		Chapman et al. 1987a
97.5 +/-66.7	NC	San Francisco Bay, CA	COA	48-h	Highly toxic (92.4+/-4.5% abnormal)	Bivalve	LAR			Long & Morgan 1990
98.7 +/-31.1	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (17+/-16.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.99+/-1	21.6+/-24.5	Bricker et al. 1993
99.9 +/-32.8	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (30.5+/-16.4% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.62+/-0.777	17.7+/-26.3	Bricker et al. 1993
101 +/-21.8	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.167+/-0.198 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.59+/-1.09	4.67+/-6.99	Bricker et al. 1993
101 +/-33.7	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.1+/-2.78% normal development)	Mulinia lateralis (bivalve)	LAR	2.12+/-1.04	22.9+/-23.7	Bricker et al. 1993
107 +/-96.4	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (51.3+/-6.95% mortality)	Mulinia lateralis (bivalve)	LAR	1.8+/-1.71	29.6+/-46.3	Bricker et al. 1993
108	*	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29% mortality)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992

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Chromium Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
108	*	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (89.7% reburial)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
108	*	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
108	*	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	6.41	Hall et al. 1992
109 +/-36.2	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (34.9+/-15.7% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.23+/-1.04	25.4+/-25.5	Bricker et al. 1993
109 +/-7.78	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (21.5+/-6.36% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.35+/-1.05	10.5+/-13.4	Bricker et al. 1993
110 +/-53.5	*	Gulf of Mexico	COA	48-h	Significantly toxic (32.6+/-14.2% abnormality)	Crassostrea gigas (oyster)	LAR	0.567+/-0.153		Chapman et al. 1991
113 +/-44.4	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.016+/-0.007 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.26+/-0.936	43.4+/-35.6	Bricker et al. 1993
116 +/-23.5	NE	Pascagoula Mississippi Channel, MS	COA	10-d	Not significantly toxic (5.6+/-2.2% mortality)	Arenicola cristata (lugworm)	ADT			Parrish 1987c
116 +/-23.5	NE	Pascagoula Mississippi Channel, MS	COA	10-d	Not significantly toxic (6.5+/-5.14% mortality)	Penaeus duorarum (pink shrimp)	ADT			Parrish 1987c
116 +/-23.5	NE	Pascagoula Mississippi Channel, MS	COA	10-d	Not significantly toxic (0.7+/-0.82% mortality)	Crossostrea virginica (oyster)	ADT			Parrish 1987c
116 +/-27.1	SG	San Francisco Bay, CA	COA	10-d	Moderately toxic (28.3+/-7.51% mortality)	Amphipod	ADT	2.01+/-.98		Chapman et al. 1987a
117 +/-19.8	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (23+/-4.24% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.46+/-1.22	40+/-55.1	Bricker et al. 1993
117 +/-31.9	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.013+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.79+/-0.744	37.6+/-25.3	Bricker et al. 1993
117 +/-46.5	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.1+/-13.3% mortality)	Mulinia lateralis (bivalve)	LAR	2.68+/-0.955	31.8+/-24.4	Bricker et al. 1993
121 +/-25	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (29.8+/-13.9% mortality)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.07	32.1+/-28.4	Bricker et al. 1993
124 +/-55.4	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (91.5+/-7.28% normal development)	Mulinia lateralis (bivalve)	LAR	2.6+/-0.899	36.8+/-34.9	Bricker et al. 1993
128 +/-23.7	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (96.6+/-3.79% normal development)	Mulinia lateralis (bivalve)	LAR	2.87+/-0.94	35.1+/-25.9	Bricker et al. 1993
129 +/-24.3	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (38+/-13% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.92+/-0.937	34.6+/-23.9	Bricker et al. 1993
130 +/-18.3	SG	San Francisco Bay, CA	COA	48-h	Highly toxic (92.3+/-5.5% mortality)	Mussel	LAR	2.87+/-1.32		Chapman et al. 1987a
130 +/-18.3	SG	San Francisco Bay, CA	COA	4-wk	Moderately toxic (94.9+/-10.1 young produced)	Tigriopus californicus (copepod)	ADT	2.87+/-1.07		Chapman et al. 1987a
>130	-	Puget Sound, WA	AETA	10-d	1986 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT	15		Bellar et al. 1986
134	SG	San Francisco Bay, CA	COA	10-d	Most toxic (95% mortality)	Amphipod	ADT	4.03		Chapman et al. 1987a
134	SG	San Francisco Bay, CA	COA	10-d	Highly toxic (37% avoidance)	Amphipod	ADT	4.03		Chapman et al. 1987a
134 +/-94.2	NC	San Francisco Bay, CA	COA	48-h	Significantly toxic (55.7+/-22.7% abnormal)	Bivalve	LAR			Long & Morgan 1990
137 +/-17.4	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.011+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.28+/-0.363	45.3+/-21.4	Bricker et al. 1993
140	SG	San Francisco Bay, CA	COA	48-h	Highly toxic (66.8% abnormal)	Mussel	LAR	3.59		Chapman et al. 1987a
142 +/-43.9	NE	Palos Verdes, CA	COA		High density (20.9+/-0.23 N/0.1 sq.m.)	Amphipod		1.7+/-0.61		Swartz et al. 1986
142 +/-43.9	NE	Palos Verdes, CA	COA		High density (11.2+/-1.64 N/0.1 sq.m.)	Phoxocephalid		1.7+/-0.61		Swartz et al. 1986
142 +/-86.5	NC	San Francisco Bay, CA	COA	10-d	Highly toxic (67+/-11.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
143 +/-11.9	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (75.1+/-10.6% mortality)	Mulinia lateralis (bivalve)	LAR	3.32+/-0.317	42.3+/-19.2	Bricker et al. 1993
145 +/-88.6	NE	Hudson-Raritan Bay, NY	COA	14-d	Not toxic (increased growth rate)	Chromadorina germanica (nematode)				Tietjen & Lee 1984
146 +/-308	*	Southern California	COA		Low abundance (35.3+/-15.8 N/0.1 sq.m.)	Arthropods				Word & Mearns 1979 (As cited in L&M 1990)
150 +/-85.9	NE	San Francisco Bay, CA	COA	48-h	Not significantly toxic (31.9+/-15.5% abnormal)	Bivalve	LAR			Long & Morgan 1990
152 +/-55.1	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (88.5+/-8.39% normal development)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.05	38.1+/-38.9	Bricker et al. 1993
155 +/-102	NC	San Francisco Bay, CA	COA	10-d	Significantly toxic (42.9+/-19.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
156 +/-131	NE	Palos Verdes, CA	COA		High species richness (80.8+/-13.7 S/0.1 sq.m.)	Macro benthos		2.10+/-1.15		Swartz et al. 1985a
156 +/-131	NE	Palos Verdes, CA	COA		High density (54.5+/-9.91 N/0.1 sq.m.)	Amphipod		2.1+/-1.15		Swartz et al. 1985a
156 +/-131	NE	Palos Verdes, CA	COA		High density (34.3+/-5.67 N/0.1 sq.m.)	Phoxocephalid		2.1+/-1.15		Swartz et al. 1985a
156 +/-131	NE	Palos Verdes, CA	COA		High density (111+/-32 N/0.1 sq.m.)	Crustacea		2.1+/-1.15		Swartz et al. 1985a
157 +/-321	*	Southern California	COA		Low species richness (51.2+/-8.6 S/0.1 sq.m.)	Benthic species				Word & Mearns 1979 (As cited in L&M 1990)
160 +/-54.5	NE	Palos Verdes, CA	COA		High species richness (70.9+/-16.9 S/0.1 sq.m.)	Benthic species	VAR			Ferraro et al. 1991
160 +/-85.4	*	Hudson-Raritan Bay, NY	COA	14-d	Significantly toxic (reduced growth rate)	Chromadorina germanica (nematode)				Tietjen & Lee 1984
160		***PEL***								
163 +/-117	NC	San Francisco Bay, CA	COA	10-d	Moderately toxic (33.8+/-4.7% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990

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164 +/-91.4	NC	San Francisco Bay, CA	COA	48-h	Moderately toxic (59.4+/-11.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
183 +/-23.4	NE	Palos Verdes, CA	COA		High abundance (944+/-101 N/0.1 sq.m.)	Benthic species	VAR			Ferraro et al. 1991
192 +/-104	NE	Palos Verdes, CA	COA	10-d	Not significantly toxic (11.9+/-5.36% mortality)	Rhepoxynius abronius (amphipod)	VAR			Ferraro et al. 1991
195 +/-93.9	NE	San Francisco Bay, CA	COA	10-d	Least toxic (18+/-6.6% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
197 +/-136	SG	Palos Verdes, CA	COA		Low abundance (415+/-94.4 N/0.1 sq.m.)	Benthic species	VAR			Ferraro et al. 1991
201 +/-349	*	Southern California	COA		Low abundance (6.1+/-7.2 N/0.1 sq.m.)	Echinoderm				Word & Mearns 1979 (As cited in L&M 1990)
203 +/-97.3	NE	San Francisco Bay, CA	COA	10-d	Not significantly toxic (18.4+/-6.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
211 +/-95.5	*	Palos Verdes, CA	COA		Low abundance (2.4+/-5.65 N/0.1 sq.m.)	Echinoderms	VAR			Ferraro et al. 1991
227 +/-94.3	*	Palos Verdes, CA	COA		Low abundance (13.8+/-11.4 N/0.1 sq.m.)	Amphipods	VAR			Ferraro et al. 1991
227 +/-94.3	*	Palos Verdes, CA	COA		Low abundance (5.87+/-7.06 N/0.1 sq.m.)	Phoxocephalids	VAR			Ferraro et al. 1991
>240	-	Northern California	AETA	10-d	Northern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
>240	-	California	AETA	48-h	California AET Values	Mytilus edulis (bivalve)	LAR			Becker et al. 1990
>240	-	Northern California	AETA		Northern California AET Values	Benthic species				Becker et al. 1990
255	NE	San Diego Bay, CA	COA		Not toxic (<3% mortality)	M. elongata (mysid)				Salazar et al. 1980
260	*	Puget Sound, WA	AETA		1988 Puget Sound AET	Benthic community				PTI 1988
260	*	Puget Sound, WA	SQG		Chemical Criteria	Benthic community		1		WDE 1989
260 +/-58.5	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (23.3+/-6.14% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.738		Word et al. 1988
270	*	Puget Sound, WA	AETA	10-d	1988 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT			PTI 1988
270 +/-63.6	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (10.4+/-6.3% mortality)	Nephtys caecoides (polychaete)		1.63+/-0.657		Word et al. 1988
270 +/-63.6	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (0.2+/-0.6% mortality)	Macoma nasuta (clam)		1.63+/-0.657		Word et al. 1988
280	*	San Francisco Bay, CA	AETA	48-h	San Francisco Bay AET	Oyster; mussel	LAR			Long & Morgan 1990
293 +/-459	NE	Southern California	COA		High abundance (88.9+/-35.4 N/0.1 sq.m.)	Benthic species				Word & Mearns 1979 (As cited in L&M 1990)
297 +/-302	NE	Palos Verdes, CA	COA		High density (594+/-688 N/0.1 sq.m.)	Mollusca		2.53+/-1.27		Swartz et al. 1985a
297 +/-302	NE	Palos Verdes, CA	COA	10-d	Not significantly toxic (8+/-5.7% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.53+/-1.27		Swartz et al. 1985a
300	NE	San Diego Bay, CA	COA		Not toxic (<3% mortality)	Protothaca staminea (clam)				Salazar et al. 1980
300	NE	San Diego Bay, CA	COA		Not toxic (<3% mortality)	Citharichthys stigmaeus (sanddab)				Salazar et al. 1980
300	NE	San Diego Bay, CA	COA		Not toxic (<3% mortality)	Neanthes arenaceodentata (polychaete)				Salazar et al. 1980
300	NE	San Diego Bay, CA	COA		Not toxic (<3% mortality)	M. elongata (mysid)				Salazar et al. 1980
305	NE	Palos Verdes, CA	COA		High density (2177 N/0.1 sq.m.)	Polychaeta		3.2		Swartz et al. 1985a
308 +/-78.4	SG	Oakland Harbor, CA	COA	10-d	Significantly toxic (35.3+/-2.5% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.56+/-0.07		Word et al. 1988
310	*	California	AETA		California AET Values	Benthic species				Becker et al. 1990
310	*	Southern California	AETA		Southern California AET Values	Benthic species				Becker et al. 1990
335 +/-180	NE	Baltimore Harbor, MD	COA	48-h	Least toxic; TLm	Fundulus heteroclitus (mummichog)				Tsai et al. 1979
335 +/-180	NE	Baltimore Harbor, MD	COA	48-h	Least toxic; TLm	Leiostomus xanthurus (spot)				Tsai et al. 1979
335 +/-226	NE	Palos Verdes, CA	COA	10-d	Not significantly toxic (9.5+/-5.45% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.42+/-0.88		Swartz et al. 1986
369	*	Black Rock Harbor, CT	COA	14-d	Significantly toxic (100% mortality)	Nereis virens (sandworm)				Simmers et al. 1984
370	*	San Francisco Bay, CA	AETA	10-d	San Francisco Bay AET	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
383 +/-215	*	Palos Verdes, CA	COA		Low density (0.2+/-0.14 N/0.1 sq.m.)	Echinoderm		2.64+/-0.77		Swartz et al. 1986
416	*	Palos Verdes, CA	COA		Low species richness (19.2 S/0.1 sq.m.)	Benthic species	VAR			Ferraro et al. 1991
482 +/-330	SG	Palos Verdes, CA	COA		Low density (365+/-178 N/0.1 sq.m.)	Polychaeta		3.15+/-1.32		Swartz et al. 1985a
523 +/-279	*	Palos Verdes, CA	COA		Low density (0.03+/-0.08 N/0.1 sq.m.)	Echinoderm		3.53+/-0.742		Swartz et al. 1985a
523 +/-279	*	Palos Verdes, CA	COA		Low density (0.233+/-0.367 N/0.1 sq.m.)	Foraminifera (sponge)		3.53+/-0.742		Swartz et al. 1985a
523 +/-279	*	Palos Verdes, CA	COA		Low density (0.3+/-0.8 N/0.1 sq.m.)	Ophiuroidea (brittle star)		3.53+/-0.742		Swartz et al. 1985a
527 +/-120	*	Palos Verdes, CA	COA		Low density (5.3+/-3.7 N/0.1 sq.m.)	Amphipod		3.13+/-0.15		Swartz et al. 1986

Table 3. A summary of the available data on the biological effects associated with sediment-sorbed CHROMIUM (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Chromium Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
527 +/-120	*	Palos Verdes, CA	COA		Low density (0.13+/-0.23 N/0.1 sq.m.)	Phoxocephalid		3.13+/-0.15		Swartz et al. 1986
669 +/-173	*	Palos Verdes, CA	COA		Low density (21.5+/-11.6 N/0.1 sq.m.)	Mollusca		4+/-0.265		Swartz et al. 1985a
669 +/-173	*	Palos Verdes, CA	COA	10-d	Significantly toxic (21+/-6.3% mortality)	Rhepoxynius abronius (amphipod)	ADT	4+/-0.265		Swartz et al. 1985a
682 +/-144	*	Palos Verdes, CA	COA		Low species richness (26.0+/-11.5 S/0.1 sq.m.)	Macro benthos		3.95+/-0.238		Swartz et al. 1985a
682 +/-144	*	Palos Verdes, CA	COA		Low density (1.0+/-1.2 N/0.1 sq.m.)	Amphipod		3.95+/-0.238		Swartz et al. 1985a
682 +/-144	*	Palos Verdes, CA	COA		Low density (0 N/0.1 sq.m.)	Phoxocephalid		3.95+/-0.238		Swartz et al. 1985a
682 +/-144	*	Palos Verdes, CA	COA		Low density (8.7+/-6.01 N/0.1 sq.m.)	Crustacea		3.95+/-0.238		Swartz et al. 1985a
>820	-	California	AETA	10-d	California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
>820	-	Southern California	AETA	10-d	Southern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
1646 +/-1628	*	Baltimore Harbor, MD	COA	48-h	Most toxic; TLm	Fundulus heteroclitus (mummichog)				Tsai et al. 1979
1646 +/-1628	*	Baltimore Harbor, MD	COA	48-h	Most toxic; TLm	Leiostomus xanthurus (spot)				Tsai et al. 1979

Table 4. A summary of the available data on the biological effects associated with sediment-sorbed COPPER (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Copper	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.025		NE	Laboratory	SSBA		Not significantly toxic (ET50; initiation of burrowing 0.62 h)	Mya arenaria (clam)	17-25 mm			Phelps 1989
0.08		NE	Laboratory	SSBA		Not significantly toxic (ET50; initiation of burrowing 0.34 h)	Mya arenaria (clam)	17-25 mm			Phelps 1989
0.2		NE	Laboratory	SSBA		Not significantly toxic (ET50; initiation of burrowing 0.38 h)	Mya arenaria (clam)	17-25 mm			Phelps 1989
0.25		NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
0.5		NC	Mobile Bay, AL	COA		Significantly toxic (10% mortality)	Mysidopsis bahia (mysid shrimp)		0.009	0.004	EMAP Louisiana Province 1991
0.5		NE	Charleston Harbor, SC	COA		High species richness (14.9+/-2.04; SRUs)	Benthic species				Winn et al. 1989
0.5		NE	Charleston Harbor, SC	COA		High diversity (4.15+/-0.59; SDUs)	Benthic species				Winn et al. 1989
0.5		NG	Charleston Harbor, SC	COA		Low species richness (5.16; SRUs)	Benthic species				Winn et al. 1989
0.5		NG	Charleston Harbor, SC	COA		Low diversity (1.16; SDUs)	Benthic species				Winn et al. 1989
0.65	+/-0.071	NE	Apalachee Bay, FL	COA	10-d	Not significantly toxic (3.3+/-3.25% mortality)	Ampelisca abdita (amphipod)		0.643+/-0.455	0.390+/-0.410	EMAP Louisiana Province 1991
0.65	+/-0.61	NC	Charleston Harbor, SC	COA		Moderate species richness (9.05+/-1.33; SRUs)	Benthic species				Winn et al. 1989
0.7		NC	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (22% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
0.7		NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (28% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
0.7		NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.003 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
0.7	+/-0.082	NE	Apalachee Bay, FL	COA		Not significantly toxic (0.75+/-1.5% mortality)	Mysidopsis bahia (mysid shrimp)		0.540+/-0.385	0.405+/-0.417	EMAP Louisiana Province 1991
0.75	+/-0.071	SG	Apalachee Bay, FL	COA	10-d	Significantly toxic (15.6% mortality)	Ampelisca abdita (amphipod)		0.438+/-0.442	0.421+/-0.593	EMAP Louisiana Province 1991
0.9		NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (0% mortality)	Arbacia punctulata (sea urchin)		0.03	19 ug/g	Windom In Prep
0.923	+/-0.733	NE	Matagorda Ship Channel, TX	COA	10-d	Not toxic (7.2+/-2.77% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1985a
0.923	+/-0.733	NE	Matagorda Ship Channel, TX	COA	10-d	Not toxic (10.6+/-5.18% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1985a
0.923	+/-0.733	NE	Matagorda Ship Channel, TX	COA	10-d	Not toxic (0.2+/-0.447% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1985a
1	+/-1.12	*	Charleston Harbor, SC	COA		Moderate diversity (2.3+/-0.2; SDUs)	Benthic species				Winn et al. 1989
1.02		NE	Georgetown Harbor, SC	COA		Not toxic (species richness or abundance)	Benthic species		0.12		Van Dolah et al. 1984
1.2	+/-0.141	NC	Mississippi Sound, MS	COA	10-d	Significantly toxic (11.6+/-3.39% mortality)	Ampelisca abdita (amphipod)		0.111+/-0.045	0.03	EMAP Louisiana Province 1991
1.5		NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (18% mortality)	Ampelisca abdita (amphipod)		0.028	9 ug/g	Windom In Prep
1.9		NE	Massachusetts Bay, MA	COA		High density (24 N/0.1 sq.m.)	Echinodermata	VAR			Gilbert et al. 1976
1.98	+/-0.793	NE	Brunswick Harbor Entrance, GA	COA	48-h	Not significantly toxic (86.6+/-4.25% normal development)	Arbacia punctulata (sea urchin)		0.181+/-0.162	182+/-208 ug/g	Windom In Prep
2		NC	Chesapeake Bay, MD, VI; Delaware Bay, DE	COA		Significantly toxic (mean ET50; burrowing time 1.4 h)	Mya arenaria (clam)	1-2 cm			Phelps 1990
2.6	+/-0.89	NE	Chesapeake Bay, MD, VI; Delaware Bay, DE	COA		Not significantly toxic (mean ET50; burrowing time 0.704+/-0.17 h)	Mya arenaria (clam)	1-2 cm			Phelps 1990
2.71	+/-2.71	NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (55.0+/-19.5% mortality)	Streblospio benedicti (polychaete worm)		0.349+/-0.11	1.07+/-0.66	Hall et al. 1992
2.85	+/-2.77	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (27.5+/-10.6% mortality)	Mysidopsis bahia (mysid)		0.237+/-0.311	74.6+/-85.5 ug/g	Windom In Prep
2.88	+/-2.27	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (9.78+/-5.33% mortality)	Mysidopsis bahia (mysid)		0.24+/-0.247	91.9+/-73.4 ug/g	Windom In Prep
2.9	+/-2.42	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (4+/-2.83% mortality)	Menidia beryllina (silverside)		0.243+/-0.264	90.5+/-78.4 ug/g	Windom In Prep
2.9	+/-3.39	NC	Mobile Bay, AL	COA	10-d	Significantly toxic (46+/-49.3% mortality)	Ampelisca abdita (amphipod)		0.22+/-0.298	3.84+/-5.43	EMAP Louisiana Province 1991
2.93	+/-1.14	SG	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (28.3+/-6.11% mortality)	Mysidopsis bahia (mysid)		0.246+/-0.051	127+/-24 ug/g	Windom In Prep
3.05	+/-2.36	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (11.6+/-4.33% mortality)	Ampelisca abdita (amphipod)		0.267+/-0.25	102+/-71.1 ug/g	Windom In Prep
3.06	+/-4.59	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (15.3+/-11.0% mortality)	Hyalella azteca (amphipod)	JUV	0.648+/-0.641	1.74+/-1.39	Hall et al. 1992
3.1	+/-1.85	NE	Houston Ship Channel, TX	COA		Not significantly toxic (15+/-13.2% mortality)	Sheepshead minnow	ADT	0.05+/-0.0242		Crocker et al. 1991
3.18	+/-1.43	NE	Chandeleur Sound, LA	COA		Not significantly toxic (1.03+/-2.05% mortality)	Mysidopsis bahia (mysid shrimp)		0.824+/-0.915	1.69+/-0.920	EMAP Louisiana Province 1991
3.37	+/-2.35	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (91.3+/-2.91% normal development)	Arbacia punctulata (sea urchin)		0.299+/-0.251	114+/-68.4 ug/g	Windom In Prep
3.4	+/-2.12	NE	Massachusetts Bay, MA	COA		High density (299+/-40.3 N/0.1 sq.m.)	Arthropoda	VAR			Gilbert et al. 1976
3.6	+/-1.54	NE	Massachusetts Bay, MA	COA		High species richness (102+/-4.73 S/0.1 sq.m.)	Benthic species	VAR			Gilbert et al. 1976
3.6	+/-1.91	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (4.8+/-2.28% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1983a

Table 4. A summary of the available data on the biological effects associated with sediment-sorbed COPPER (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Copper Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
3.6 +/-1.91	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (15.8+/-4.21% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1983a
3.6 +/-1.91	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (1.2+/-.447% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1983a
3.78 +/-2.28	*	Savannah River Entrance Channel, GA	COA	48-h	Significantly toxic (25.4+/-7.66% mortality)	Arbacia punctulata (sea urchin)		0.344+/-0.242	129.5+/-59.3 ug/g	Windom In Prep
3.83 +/-1.51	NC	Chandeleur Sound, LA	COA	10-d	Significantly toxic (11.5+/-4.86% mortality)	Ampelisca abdita (amphipod)		0.811+/-0.711	1.87+/-0.973	EMAP Louisiana Province 1991
3.84 +/-3.44	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (7.2+/-1.92% mortality)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
3.84 +/-3.44	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.6+/-0.55% reburial)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
3.84 +/-3.44	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
3.84 +/-3.44	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
4	NE	Massachusetts Bay, MA	COA		High density (4135 N/0.1 sq.m.)	Annelida	VAR			Gilbert et al. 1976
4.4 +/-1.63	NE	Galveston Bay, TX	COA		High abundance (155+/-49.5 N/0.00203 sq.m.)	Oligochaeta		1.2+/-1.27	4.27+/-3.85	Carr 1992
4.87 +/-4.25	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (9.25+/-5.32% mortality)	Lepidactylus dytiscus (amphipod)		0.638+/-0.768	1.65+/-1.62	Hall et al. 1992
5.01 +/-5.66	NC	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29.8+/-11.1% mortality)	Streblospio benedicti (polychaete worm)		0.316+/-0.12	2.13+/-2.46	Hall et al. 1992
5.01 +/-5.66	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.003+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.316+/-0.120	2.13+/-2.46	Hall et al. 1992
5.24 +/-3.01	SG	Chandeleur Sound, LA	COA		Significantly toxic (7.6+/-1.32% mortality)	Mysidopsis bahia (mysid shrimp)		0.624+/-0.197	2.07+/-1.19	EMAP Louisiana Province 1991
5.3 +/-4.25	NE	Chandeleur Sound, LA	COA	10-d	Not significantly toxic (2.87+/-4.05% mortality)	Ampelisca abdita (amphipod)		0.517+/-0.166	2.02+/-1.38	EMAP Louisiana Province 1991
5.42 +/-0.669	NE	Galveston Bay, TX	COA		High abundance (27.3+/-10 N/0.00203 sq.m.)	Mollusca		1.64+/-0.4	1.39+/-0.17	Carr 1992
5.42 +/-2.32	NE	Freeport Harbor, TX	COA	10-d	Not toxic (2+/-1% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1985b
5.42 +/-2.32	NE	Freeport Harbor, TX	COA	10-d	Not toxic (9.6+/-4.22% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1985b
5.42 +/-2.32	NE	Freeport Harbor, TX	COA	10-d	Not toxic (0% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1985b
5.57 +/-4.00	NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.008+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.4	Hall et al. 1992
5.57 +/-4.00	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.1+/-0.865% reburial)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
5.57 +/-4.00	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<20% emergence)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
5.57 +/-4.00	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
5.57 +/-5.24	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (0.33+/-0.516% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
5.57 +/-5.24	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (2.33+/-1.03% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
5.57 +/-5.24	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.367+/-0.085 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
5.57 +/-5.24	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.0005 mg/day growth)	Streblospio benedicti (polychaete worm)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
5.7 +/-0.287	NE	Laboratory	SSBA		Not toxic (mean ET50; burrowing time 0.47+/-0.156 h)	Protothaca staminea (littleneck clam)		0.09		Phelps et al. 1985
5.8	NE	Curtis Creek, Baltimore, MD	COA	10-d	Not significantly toxic (11.3% mortality)	Leptocheirus plumulosus (amphipod)	JUV			McGee et al. 1993
5.83 +/-4.03	NE	Galveston Bay, TX	COA		High abundance (154+/-30.2 N/0.00203 sq.m.)	Benthic invertebrates		0.47+/-0.27	9.07+/-2.94	Carr 1992
5.94 +/-6.3	NC	Tampa Bay, FL	COA	1-h	Moderately toxic (44.5+/-17.8% fertilization)	Arbacia punctulata (sea urchin)	GAM		0.622+/-1.12	Long 1993
6.06 +/-1.42	NE	Pensacola Naval Air Station, FL	COA	10-d	Not significantly toxic (0% mortality)	Crossostrea virginica (oyster)	ADT	2.5+/-2.83		Parrish 1988a
6.06 +/-1.42	NE	Pensacola Naval Air Station, FL	COA	10-d	Not significantly toxic (5+/-1.41% mortality)	Penaeus duorarum (pink shrimp)	ADT	2.5+/-2.83		Parrish 1988a
6.06 +/-1.42	NE	Pensacola Naval Air Station, FL	COA	10-d	Not significantly toxic (8% mortality)	Arenicola cristata (lugworm)	ADT	2.5+/-2.83		Parrish 1988a
6.17 +/1.59	NE	Galveston Bay, TX	COA		High species richness (24.5+/-3.7 S/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
6.17 +/1.59	NE	Galveston Bay, TX	COA		High abundance (359+/-92.8 N/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
6.25 +/-3.93	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (22.3+/-7.37% mortality)	Hyalella azteca (amphipod)	JUV	0.788+/-0.866	2.04+/-1.75	Hall et al. 1992
6.63 +/-5.08	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.001+/-0.001 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.555+/-0.471	2.68+/-2.3	Hall et al. 1992
6.65 +/-2.16	NE	Galveston Bay, TX	COA		High abundance (156+/-22.9 N/0.00203 sq.m.)	Polychaeta		0.916+/-0.661	2.94+/-2.3	Carr 1992
6.73 +/-3.76	NE	Galveston Bay, TX	COA		Low species (11.2+/-1.94 S/0.00203 sq.m.)	Benthic species		0.642+/-0.356	13.4+/-8.65	Carr 1992
6.73 +/-9.83	NE	Tampa Bay, FL	COA	1-h	Least toxic (83+/-4.26% fertilization)	Arbacia punctulata (sea urchin)	GAM		0.131+/-0.169	Long 1993
7.44 +/-5.81	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1.83+/-1.6% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992

Table 4. A summary of the available data on the biological effects associated with sediment-sorbed COPPER (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Copper Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
7.44 +/-5.81	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (3.5+/-1.87% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
7.44 +/-5.81	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (-0.057+/-0.04 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
7.44 +/-5.81	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.001mg/day growth)	Streblospio benedicti (polychaete worm)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
7.5 +/-0.115	NE	Laboratory	SSBA		Not toxic (mean ET50; burrowing time 0.48+/-0.261 h)	Protothaca staminea (littleneck clam)		0.09		Phelps et al. 1985
7.51 +/-3.46	NE	Galveston Bay, TX	COA		High abundance (16.2+/-6.19 N/0.00203 sq.m.)	Copepoda		0.844+/-0.524	4.73+/-3.1	Carr 1992
7.59 +/-5.48	NE	Mississippi Sound, MS	COA		Not significantly toxic (0.789+/-1.59% mortality)	Mysidopsis bahia (mysid shrimp)		0.827+/-0.757	1.46+/-1.58	EMAP Louisiana Province 1991
7.91 +/-5.83	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (10.6+/-3.17% mortality)	Ampelisca abdita (amphipod)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
7.91 +/-5.83	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (8.00+/-2.92% mortality)	Mysidopsis bahia (mysid)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
8.08 +/-5.35	*	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (55.0+/-22.6% mortality)	Hyalella azteca (amphipod)	JUV	0.338+/-0.133	2.9+/-3.11	Hall et al. 1992
8.24 +/-6.16	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (5.43+/-3.21% mortality)	Mysidopsis bahia (mysid)		1.21+/-1.13	9096+/-13378 ug/g	Windom In Prep
8.24 +/-6.16	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (9.61+/-2.7% mortality)	Menidia beryllina (silverside)		1.22+/-1.13	9172+/-13363 ug/g	Windom In Prep
8.35	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1% mortality)	Streblospio benedicti (polychaete worm)		1.38	3.25	Hall et al. 1992
8.35	SG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.003 mg/day growth)	Lepidactylus dytiscus (amphipod)		1.38	3.25	Hall et al. 1992
8.49 +/-9.56	NE	Bayou Casotte, MS	COA	10-d	Not significantly toxic (5.3+/-3.06% mortality)	Penaeus duorarum (pink shrimp)	ADT	5.2+/-2.6		Parrish 1988b
8.49 +/-9.56	NE	Bayou Casotte, MS	COA	10-d	Not significantly toxic (8+/-6% mortality)	Arenicola cristata (lugworm)	ADT	5.2+/-2.6		Parrish 1988b
8.49 +/-9.56	NE	Bayou Casotte, MS	COA	10-d	Not significantly toxic (0% mortality)	Crossostrea virginica (oyster)	ADT	5.2+/-2.6		Parrish 1988b
8.5 +/-6.36	NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (9+/-1.73% mortality)	Nereis virens (polychaetes)	ADT			EG&G Bionomics 1980
8.5 +/-6.36	NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (13+/- 3.61% mortality)	Penaeus duorarum (pink shrimp)	ADT			EG&G Bionomics 1980
8.5 +/-6.36	NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (11.3+/-3.21% mortality)	Crassostrea virginica (oyster)	ADT			EG&G Bionomics 1980
8.53 +/-3.49	SG	Galveston Bay, TX	COA		Low abundance (53+/-33.9 N/0.00203 sq.m.)	Benthic invertebrates		0.985+/-0.247	22+/-11.2	Carr 1992
8.55 +/-7.19	NE	Galveston Bay, TX	COA	48-h	Not toxic (98.1+/-1.79% normal development)	Arbacia punctulata (sea urchin)	EMB	0.748+/-0.476	4.16+/-3.45	Carr 1992
8.62 +/-3.82	SG	Galveston Bay, TX	COA		Moderate abundance (58.3+/-16.2 N/0.00203 sq.m.)	Oligochaeta		0.632+/-0.274	7.93+/-5.6	Carr 1992
8.63 +/-8.05	SG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (63.0+/-24.3% mortality)	Hyalella azteca (amphipod)	JUV	0.317+/-0.228	2.57+/-2.67	Hall et al. 1992
8.65 +/-6.15	NE	Massachusetts Bay, MA	COA		High density (201+/-33.4 N/0.1 sq.m.)	Mollusca	VAR			Gilbert et al. 1976
8.68 +/-6.41	NE	Galveston Bay, TX	COA	1-h	Not toxic (92.5+/-6.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	0.77+/-0.448	6.37+/-6.58	Carr 1992
8.79 +/-5.35	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (8.8+/-7.12% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
8.79 +/-5.35	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (14+/-9.22% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
8.79 +/-5.35	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.005+/-0.0004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
9.08 +/-3.19	SG	Mississippi Sound, MS	COA		Significantly toxic (12.2+/-4.42% mortality)	Mysidopsis bahia (mysid shrimp)		0.939+/-0.335	2.63+/-2.3	EMAP Louisiana Province 1991
9.09 +/-4.16	NC	Galveston Bay, TX	COA		Low abundance (0.3+/-0.651 N/0.00203 sq.m.)	Amphipoda		0.859+/-0.487	7.67+/-8.12	Carr 1992
9.29 +/-4.08	NE	Mississippi Sound, MS	COA	10-d	Not significantly toxic (1.4+/-1.73% mortality)	Ampelisca abdita (amphipod)		0.998+/-0.602	2.01+/-1.82	EMAP Louisiana Province 1991
9.55 +/-0.778	NE	Mississippi River, MS, LA	COA	10-d	Not significantly toxic (7.8+/-1.63% mortality)	Ampelisca abdita (amphipod)		1.15+/-1.04	2.31+/-0.651	EMAP Louisiana Province 1991
9.6 +/-0.569	NE	Laboratory	SSBA		Not toxic (mean ET50; burrowing time 0.72+/-0.214 h)	Protothaca staminea (littleneck clam)		0.09		Phelps et al. 1985
10.3 +/-6.66	SG	Galveston Bay, TX	COA		Low abundance (1.86+/-2.59 N/0.00203 sq.m.)	Mollusca		0.784+/-0.421	8.29+/-8.13	Carr 1992
10.4 +/-10.5	NE	Houston Ship Channel, TX	COA	10-d	Not significantly toxic (4.7+/-4.29% mortality)	Amphipod	ADT	0.144+/-0.123		Crocker et al. 1991
10.4 +/-6.77	SG	Galveston Bay, TX	COA		Low species richness (10+/-3.73 S/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
10.4 +/-6.77	SG	Galveston Bay, TX	COA		Low abundance (89+/-60.7 N/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
10.6 +/-10.2	NC	Galveston Bay, TX	COA	10-d	Significantly toxic (15.8+/-3.89% mortality)	Ampelisca abdita (amphipod)		0.647+/-0.606	0.160+/-0.184	EMAP Louisiana Province 1991
10.7 +/-6.87	NE	Houston Ship Channel, TX	COA	10-d	Not significantly toxic (5.4+/-3.6% mortality)	Amphipod	ADT	0.129+/-0.054		Crocker et al. 1991
10.7 +/-7.07	*	Galveston Bay, TX	COA		Low abundance (4.21+/-5.66 N/0.00203 sq.m.)	Oligochaeta		0.895+/-0.453	7.85+/-8.8	Carr 1992
10.8 +/-6.19	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (5.8+/-3.7% mortality)	Rhepoxynius abronius (amphipod)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
10.8 +/-6.19	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (3.4+/-1.82% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992

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Copper	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
10.8	+/-6.19	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (11.2+/-3.7% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
10.8	+/-6.19	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (3.52+/-1.66% mortality)	Macoma nasuta (clam)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
11		NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (3% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
11		NE	Sidney Tar Pond, NS	COA	10-d	Not significantly toxic (3% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
11	+/-7.12	SG	Galveston Bay, TX	COA		Low abundance (41.7+/-21.8 N/0.00203 sq.m.)	Polychaeta		0.848+/-0.427	9.21+/-8.61	Carr 1992
11.3		SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (16% mortality)	Mysidopsis bahia (mysid)		1.8	7095 ug/g	Windom In Prep
11.3		SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (22.3% mortality)	Menidia beryllina (silverside)		1.71	6562 ug/g	Windom In Prep
11.3	+/-4.15	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (16.5+/-9.19% mortality)	Streblospio benedicti (polychaete worm)		0.783+/-0.845	4.83+/-2.23	Hall et al. 1992
11.3	+/-6.23	*	Massachusetts Bay, MA	COA		Low density (1316+/-768 N/0.1 sq.m.)	Annelida	VAR			Gilbert et al. 1976
11.5	+/-4.35	SG	Galveston Bay, TX	COA	48-h	Toxic (4.65+/-16.1% normal development)	Arbacia punctulata (sea urchin)	EMB	1.06+/-0.449	14.5+/-9.2	Carr 1992
11.5	+/-6.2	NE	Southern California	COA		High abundance (191+/-70.1 N/0.1 sq.m.)	Echinoderm				Word & Mearns 1979 (As cited in L&M 1990)
11.5	+/-7.61	SG	Galveston Bay, TX	COA		Low abundance (2.05+/-1.58 N/0.00203 sq.m.)	Copepoda		0.879+/-0.47	9.63+/-9.65	Carr 1992
11.9	+/-7.53	NE	Galveston Bay, TX	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		0.934+/-0.657	0.457+/-0.530	EMAP Louisiana Province 1991
12		NE	Laboratory	SSBA		Not toxic (burial time; ET50 - 0.25 h)	Protothaca stamina (littleneck clam)	15-25 mm	0.09		Phelps et al. 1983
12		NE	Laboratory	SSBA		Not toxic (reburial time; ET50 - 0.22 h)	Protothaca stamina (littleneck clam)	15-25 mm	0.09		Phelps et al. 1983
12		NE	Laboratory	SSBA		Not toxic (burial; ET50 - 0.32 h)	Protothaca stamina (littleneck clam)	25-35 mm	0.09		Phelps et al. 1983
12		NE	Laboratory	SSBA		Not toxic (reburial; ET50 - 0.4 h)	Protothaca stamina (littleneck clam)	25-35 mm	0.09		Phelps et al. 1983
12.2	+/-0.7	NE	Newport, RI	COA	96-h	Not toxic (0% mortality)	Palaemonetes pugio (shrimp)				Lee & Mariani 1977
12.3	+/-3.85	NE	Matagorda Bay, TX	COA		Not significantly toxic (1.58+/-1.82% mortality)	Mysidopsis bahia (mysid shrimp)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
12.3	+/-3.85	NE	Matagorda Bay, TX	COA	10-d	Not significantly toxic (2.33+/-4.65% mortality)	Ampelisca abdita (amphipod)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
12.6	+/-5.94	*	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (45.5+/-12% mortality)	Lepidactylus dytiscus (amphipod)		0.383+/-0.279	3.61+/-2.79	Hall et al. 1992
12.7	+/-2.04	*	Brunswick Harbor Entrance, GA	COA	48-h	Significantly toxic (14.6+/-18.9% normal development)	Arbacia punctulata (sea urchin)		1.99+/-0.562	14009+/-13434 ug/g	Windom In Prep
12.7	+/-21.9	NE	Tampa Bay, FL	COA		Not significantly toxic (EC50; 0.133+/-0.103 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)			1.23+/-1.96	Long 1993
13	+/-6.70	NE	Mobile Bay, AL	COA		Not significantly toxic (1.07+/-1.85% mortality)	Mysidopsis bahia (mysid shrimp)		0.968+/-0.815	8.23+/-3.4	EMAP Louisiana Province 1991
13.2		NE	Laboratory	SSBA		Not significantly toxic (ET50; initiation of burrowing 0.4 h)	Mya arenaria (clam)	17-25 mm			Phelps 1989
13.4	+/-1.50	NE	Galveston Harbor, TX	COA	10-d	Not toxic (2.4+/-1.52% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Grieco 1984
13.4	+/-1.50	NE	Galveston Harbor, TX	COA	10-d	Not toxic (0% mortality)	Mercenaria mercenaria (hard clams)	ADT			Grieco 1984
13.4	+/-1.50	NE	Galveston Harbor, TX	COA	10-d	Not toxic (2.8+/-2.17% mortality)	Nereis virens (sandworm)	ADT			Grieco 1984
13.4	+/-14.4	NC	Southern California	COA		Moderate abundance (56.2+/-23 N/0.1 sq.m.)	Echinoderm				Word & Mearns 1979 (As cited in L&M 1990)
13.5	+/-3.54	NE	Sidney Tar Pond, NS	COA	20-d	Not significantly toxic (8+/-5.66% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
13.6	+/-0.83	*	Laboratory	SSBA		Toxic (mean ET50; burrowing time 15.5+/-15.8 h)	Protothaca staminea (littleneck clam)		0.09		Phelps et al. 1985
13.7	+/-7.11	NC	Massachusetts Bay, MA	COA		Low density (7.14+/-4.23 N/0.1 sq.m.)	Rhynchocoela	VAR			Gilbert et al. 1976
13.8	+/-4.93	SG	Galveston Bay, TX	COA	1-h	Toxic (20.4+/-18.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	1.26+/-0.47	14.6+/-10.1	Carr 1992
13.8	+/-8.05	NE	Houston Ship Channel, TX	COA	7-d	Not significantly toxic (7.5+/-5% mortality)	Sheepshead minnow	ADT	0.137+/-0.056		Crocker et al. 1991
14	+/-5.85	SG	Galveston Bay, TX	COA		Significantly toxic (13.4+/-9.11% mortality)	Mysidopsis bahia (mysid shrimp)		0.778+/-0.482	1.21+/-0.778	EMAP Louisiana Province 1991
14	+/-6.87	*	Massachusetts Bay, MA	COA		Low density (2.76+/-2.7 N/0.1 sq.m.)	Echinodermata	VAR			Gilbert et al. 1976
14.1	+/-4.78	NE	Galveston Bay, TX	COA	10-d	Not significantly toxic (1.35+/-1.45% mortality)	Ampelisca abdita (amphipod)		0.961+/-0.537	1.17+/-0.640	EMAP Louisiana Province 1991
14.2	+/-6.8	*	Massachusetts Bay, MA	COA		Low density (61.1+/-36.6 N/0.1 sq.m.)	Arthropoda	VAR			Gilbert et al. 1976
14.2	+/-6.98	SG	Massachusetts Bay, MA	COA		Low density (39.1+/-30.8 N/0.1 sq.m.)	Mollusca	VAR			Gilbert et al. 1976
14.2		*	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29% mortality)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
14.2		*	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (89.7% reburial)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
14.2		*	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992

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Copper	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
14.2		*	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	6.41	Hall et al. 1992
14.3	+/-2.52	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (6+/-2.35% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1983b
14.3	+/-2.52	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (2.6+/-2.97% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1983b
14.3	+/-2.52	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (1.8+/-1.79% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1983b
14.4	+/-14.7	NE	Black Rock Beach, NS	COA	10-d	Not toxic (6.67+/-4.51% mortality)	Corophium volutator (amphipod)	ADT/JUV	0.24+/-0.18		Nicol & Doe 1990
14.4	+/-14.7	NE	Black Rock Beach, NS	COA	10-d	Not toxic (2.33+/-1.53% mortality)	Rhepoxynius abronius (amphipod)	ADT/JUV	0.24+/-0.18		Nicol & Doe 1990
14.4	+/-14.7	NE	Black Rock Beach, NS	COA	10-d	Not toxic (100% reburial)	Rhepoxynius abronius (amphipod)	ADT/JUV	0.24+/-0.18		Nicol & Doe 1990
14.5	+/-25.5	NE	Tampa Bay, FL	COA	10-d	Not significantly toxic (9.5+/-6.15% mortality)	Ampelisca abdita (amphipod)	SUBADT		1.56+/-2.73	Long 1993
14.5	+/-6.68	*	Massachusetts Bay, MA	COA		Low species richness (57.2+/-12.2 S/0.1 sq.m.)	Benthic species	VAR			Gilbert et al. 1976
14.7		NE	Laboratory	SSBA		Not toxic (burial time; ET50 - 0.24 h)	Protothaca staminea (littleneck clam)	15-25 mm	0.09		Phelps et al. 1983
14.7		NE	Laboratory	SSBA		Not toxic (reburial time; ET50 - 0.17 h)	Protothaca stamina (littleneck clam)	15-25 mm	0.09		Phelps et al. 1983
14.7		NE	Laboratory	SSBA		Not toxic (burial time; ET50 - 0.31 h)	Protothaca stamina (littleneck clam)	25-35 mm	0.09		Phelps et al. 1983
14.7		NE	Laboratory	SSBA		Not toxic (reburial; ET50 - 0.33 h)	Protothaca stamina (littleneck clam)	25-35 mm	0.09		Phelps et al. 1983
14.7	+/-15.3	NC	Southern California	COA		Moderate species richness (72+/-3.3 S/0.1 sq.m.)	Benthic species				Word & Mearns 1979 (As cited in L&M 1990)
14.9	+/-12.9	NE	Curtis Creek, Baltimore, MD	COA	20-d	Not significantly toxic (25.4+/-17.1% mortality)	Leptocheirus plumulosus (amphipod)	JUV			McGee et al. 1993
15.3	+/-5.86	NC	Chesapeake Bay, MD, VI; Delaware Bay, DE	COA		Significantly toxic (mean ET50; burrowing time 3.79+/-3.29 h)	Mya arenaria (clam)	1-2 cm			Phelps 1990
15.4	+/-18.1	NC	Southern California	COA		Moderate abundance (72.6+/-6.8 N/0.1 sq.m.)	Arthropods				Word & Mearns 1979 (As cited in L&M 1990)
15.9		NE	Massachusetts Bay, MA	COA		High density (22 N/0.1 sq.m.)	Rhynchocoela	VAR			Gilbert et al. 1976
16		NC	Sidney Tar Pond, NS	COA	10-d	Significantly toxic (100% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
16		SG	Sidney Tar Pond, NS	COA	10-d	Significantly toxic (100% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
16	+/-14.4	NE	Southern California	COA		High abundance (148+/-58 N/0.1 sq.m.)	Arthropods				Word & Mearns 1979 (As cited in L&M 1990)
16.8		*	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (82.9% reburial)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
16.8		*	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>20% emergence)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
16.8		*	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	5.58	Hall et al. 1992
16.8		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.016 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
16.9	+/-0.283	NE	Mobile Bay, AL	COA	10-d	Not significantly toxic (0.5+/-0.778% mortality)	Ampelisca abdita (amphipod)		1.24+/-0.948	8.51+/-4.76	EMAP Louisiana Province 1991
17.6	+/-12.2	NE	Mississippi River, MS, LA	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		1.3+/-0.83	1.14+/-1	EMAP Louisiana Province 1991
17.8		NE	Laboratory	SSBA		Not toxic (burial time; ET50 - 0.32 h)	Protothaca staminea (littleneck clam)	15-25 mm	0.09		Phelps et al. 1983
17.8		NE	Laboratory	SSBA		Not toxic (reburial time; ET50 - 1.16 h)	Protothaca stamina (littleneck clam)	15-25 mm	0.09		Phelps et al. 1983
17.8		NE	Laboratory	SSBA		Not toxic (burial; ET50 - 0.4 h)	Protothaca stamina (littleneck clam)	25-35 mm	0.09		Phelps et al. 1983
17.8		NE	Laboratory	SSBA		Not toxic (reburial; ET50 - 3.2 h)	Protothaca stamina (littleneck clam)	25-35 mm	0.09		Phelps et al. 1983
18		NE	Palos Verdes, CA	COA		High abundance (208 N/0.1 sq.m.)	Echinoderms	VAR			Ferraro et al. 1991
18.5	+/-2.12	SG	Houston Ship Channel, TX	COA	10-d	Significantly toxic (22.7+/-0.778% mortality)	Amphipod	ADT	0.248+/-0.132		Crocker et al. 1991
18.7			***TEL***								
18.8	+/-16.5	NE	Pascagoula Naval Station, MS	COA	10-d	Not significantly toxic (1+/-1.41% mortality)	Crossostrea virginica (oyster)	ADT	7.31+/-3.86		Parrish 1990
18.8	+/-16.5	NE	Pascagoula Naval Station, MS	COA	10-d	Not significantly toxic (4+/-2.83% mortality)	Penaeus duorarum (pink shrimp)	ADT	7.31+/-3.86		Parrish 1990
18.8	+/-16.5	NE	Pascagoula Naval Station, MS	COA	10-d	Not significantly toxic (5+/-1.41% mortality)	Nereis virens (polychaete)	ADT	7.31+/-3.86		Parrish 1990
19.2	+/-1.13	NE	Laboratory	SSBA	48-d	Not toxic (0% mortality)	Protothaca staminea (littleneck clam)	16-25 mm	0.09		Phelps et al. 1985
19.2	+/-1.13	NE	Laboratory	SSBA	48-d	Not toxic (5% mortality)	Protothaca staminea (littleneck clam)	26-35 mm	0.09		Phelps et al. 1985
19.5	+/-21.6	NC	Southern California	COA		Moderate abundance (75.6+/-12.7 N/0.1 sq.m.)	Benthic species				Word & Mearns 1979 (As cited in L&M 1990)
20.7	+/-9.69	NC	Tampa Bay, FL	COA	48-h	Significantly toxic (48.1+/-1.91% mortality)	Mulinaria lateralis (coot clam)	LAR		2.82+/-2.65	Long 1993
20.8	+/-38.6	NC	Southern California	COA		Low abundance (57.6+/-13.6 N/0.1 sq.m.)	Benthic species				Word & Mearns 1979 (As cited in L&M 1990)

Table 4. A summary of the available data on the biological effects associated with sediment-sorbed COPPER (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Copper Std Dev		Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
21.9	+/-16.7	SG	Mississippi River, MS, LA	COA		Significantly toxic (32.9+/-36.4% mortality)	Mysidopsis bahia (mysid shrimp)		1.07+/-0.924	1.41+/-1.93	EMAP Louisiana Province 1991
21.9	+/-22.4	NE	Galveston Bay, TX	COA		High Abundance (6+/-1.41 N/0.00203 sq.m.)	Amphipoda		0.955+/-0.629	7.21+/-8.2	Carr 1992
23		NE	Sidney Tar Pond, NS	COA	10-d	Not significantly toxic (4% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
23.4		*	Laboratory	SSBA		Toxic (reburial time; ET50 - 63.0 h)	Protothaca stamina (littleneck clam)	15-25 mm	0.09		Phelps et al. 1983
23.4		*	Laboratory	SSBA		Toxic (reburial; ET50 - 69 h)	Protothaca stamina (littleneck clam)	25-35 mm	0.09		Phelps et al. 1983
23.4		NE	Laboratory	SSBA		Not toxic (burial time; ET50 - 1.85 h)	Protothaca stamina (littleneck clam)	15-25 mm	0.09		Phelps et al. 1983
23.4		NE	Laboratory	SSBA		Not toxic (burial; ET50 - 1.46 h)	Protothaca stamina (littleneck clam)	25-35 mm	0.09		Phelps et al. 1983
27.5	+/-15.7	NE	Fraser River Estuary, BC	COA		Sediments populated by feral clams	Macoma balthica (bivalve)		0.45		McGreer 1982
30	+/-17	NE	Palos Verdes, CA	COA		High abundance (54.6+/-5.09 N/0.1 sq.m.)	Amphipods	VAR			Ferraro et al. 1991
30	+/-17	NE	Palos Verdes, CA	COA		High abundance (30.7+/-0.99 N/0.1 sq.m.)	Phoxocephalids	VAR			Ferraro et al. 1991
30	+/-5.30	*	Mississippi River, MS, LA	COA	10-d	Significantly toxic (15.9+/-6.65% mortality)	Ampelisca abdita (amphipod)		1.22+/-0.717	0.235+/-0.276	EMAP Louisiana Province 1991
30.8	+/-60.0	NE	Southern California	COA		High species richness (96.3+/-22.3 S/0.1 sq.m.)	Benthic species				Word & Mearns 1979 (As cited in L&M 1990)
32.4		*	Laboratory	SSBA		Toxic (burial time; ET50 - 25 h)	Protothaca stamina (littleneck clam)	15-25 mm	0.09		Phelps et al. 1983
32.4		*	Laboratory	SSBA		Toxic (reburial time; ET50 - 97 h)	Protothaca stamina (littleneck clam)	15-25 mm	0.09		Phelps et al. 1983
32.4		*	Laboratory	SSBA		Toxic (burial; ET50 - 101 h)	Protothaca stamina (littleneck clam)	25-35 mm	0.09		Phelps et al. 1983
32.4		*	Laboratory	SSBA		Toxic (reburial; ET50 - 300 h)	Protothaca stamina (littleneck clam)	25-35 mm	0.09		Phelps et al. 1983
34		*	United States	EqPA		EPA Chronic Marine EP Threshold	Aquatic biota		1		Lyman et al. 1987
34		*	United States	EqPA		Chronic Marine EqP Threshold	Aquatic biota		1		Bolton et al. 1985
34.5	+/-16.8	NE	San Francisco Bay, CA	COA	48-h	Least toxic (23.3+/-7.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
35.2	+/-30.2	NE	Curtis Creek, Baltimore, MD	COA	10-d	Not significantly toxic (15+/-7.21% mortality)	Hyalella azteca (amphipod)	JUV			McGee et al. 1993
37.3	+/-10.8	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (25.9+/-5.01% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.21+/-0.444	2.41+/-2.32	Bricker et al. 1993
37.6	+/-47	NE	Bayou La Batre, AB	COA	10-d	Not significantly toxic (46.7+/-11.4% mortality)	Nereis virens (polychaete)	ADT			Parrish 1987a
37.6	+/-47	NE	Bayou La Batre, AB	COA	10-d	Not significantly toxic (5.3+/-2.31% mortality)	Crossostrea virginica (oyster)	ADT			Parrish 1987a
37.6	+/-47	NE	Bayou La Batre, AB	COA	10-d	Not significantly toxic (14+/-9.17% mortality)	Penaeus duorarum (pink shrimp)	ADT			Parrish 1987a
38.2	+/-2.97	*	Laboratory	SSBA	48-d	Toxic (25% mortality)	Protothaca staminea (littleneck clam)	16-25 mm	0.09		Phelps et al. 1985
38.2	+/-2.97	*	Laboratory	SSBA	48-d	Toxic (15% mortality)	Protothaca staminea (littleneck clam)	26-35 mm	0.09		Phelps et al. 1985
39.7	+/-25.2	NE	Burrard Inlet, BC	COA	10-d	Not toxic (4.5+/-3.02% emergence)	Rhepoxynius abronius (amphipod)	ADT	2.66+/-2.15		McLeay et al. 1991
40.2	+/-12	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.125+/-0.084 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.25+/-0.468	1.98+/-2.25	Bricker et al. 1993
40.2	+/-97.3	NE	Chesapeake Bay, MD, VI; Delaware Bay, DE	COA		Not significantly toxic (mean ET50; burrowing time 0.76+/-0.266 h)	Mya arenaria (clam)	1-2 cm			Phelps 1990
41.9	+/-28.6	NE	Burrard Inlet, BC	COA	10-d	Not toxic (5.21+/-3.61% emergence)	Corophium volutator (amphipod)	ADT	3.18+/-2.1		McLeay et al. 1991
42.3	+/-6.24	NE	Puget Sound, WA	COA	15-min	Not significantly toxic (EC50; 0.283+/-0.168% extract)	Microtox (Photobacterium phosphoreum)		1.39+/-0.37		Pastorok & Becker 1990
42.8	+/-6.0	NE	Duwamish River, WA	COA	96-h	Not toxic (0-10% mortality)	Palaemonetes pugio (shrimp)				Lee & Mariani 1977
43	+/-9.63	NE	Pascagoula Mississippi Channel, MS	COA	10-d	Not significantly toxic (5.6+/-2.2% mortality)	Arenicola cristata (lugworm)	ADT			Parrish 1987c
43	+/-9.63	NE	Pascagoula Mississippi Channel, MS	COA	10-d	Not significantly toxic (6.5+/-5.14% mortality)	Penaeus duorarum (pink shrimp)	ADT			Parrish 1987c
43	+/-9.63	NE	Pascagoula Mississippi Channel, MS	COA	10-d	Not significantly toxic (0.7+/-0.82% mortality)	Crossostrea virginica (oyster)	ADT			Parrish 1987c
43		*	Sidney Tar Pond, NS	COA	20-d	Significantly toxic (52% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
43.8	+/-54.2	*	Tampa Bay, FL	COA	1-h	Most toxic (1.96+/-3.19% fertilization)	Arbacia punctulata (sea urchin)	GAM		3.95+/-5.94	Long 1993
44.3	+/-18.5	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (6.48+/-10.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
44.3	+/-18.5	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99+/-0.862% normal development)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
44.4	+/-9.04	NC	San Francisco Bay, CA	COA	48-h	Moderately toxic (57.1+/-13.6% mortality)	Mussel	LAR	1.14+/-.33		Chapman et al. 1987a
45		NE	Palos Verdes, CA	COA		High density (93.4 N/0.1 sq.m.)	Echinoderm		1.3+/-0.77		Swartz et al. 1986
45.3	+/-1.7	NE	Jetty Island Pier, Everett Marina, WA	COA	10-d	Not toxic (12.3+/-2.87% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.08+/-0.66		Hart Crowser & Associates Inc. 1986

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Copper	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
46.9	+/-25.9	NE	San Francisco Bay, CA	COA	48-h	Not significantly toxic (31.9+/-15.5% abnormal)	Bivalve	LAR			Long & Morgan 1990
47	+/-3.65	NE	San Francisco Bay, CA	COA	4-wk	Least toxic (116+/-4.3 young produced)	Tigriopus californicus (copepod)	ADT	1.23+/-.09		Chapman et al. 1987a
48.4	+/-11.5	NE	San Francisco Bay, CA	COA	48-h	Least toxic (18+/-8.01% abnormal)	Mussel	LAR	1.2+/-.38		Chapman et al. 1987a
49		NE	San Francisco Bay, CA	COA	48-h	Least toxic (17.3% mortality)	Mussel	LAR	1.25		Chapman et al. 1987a
51.4		*	Laboratory	SSBA		Significantly toxic (ET50; initiation of burrowing 1.21 h)	Mya arenaria (clam)	17-25 mm			Phelps 1989
51.9	+/-4.01	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-7.99% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.14+/-0.352	6.09+/-5.38	Bricker et al. 1993
52		NC	Puget Sound, WA	COA	10-d	Significantly toxic (56% mortality)	Panope generosa (geoduck)	JUV	2.1		Pastorok & Becker 1990
52		NE	Palos Verdes, CA	COA		High density (4.4 N/0.1 sq.m.)	Echinoderm		0.9		Swartz et al. 1985a
52		NE	Palos Verdes, CA	COA		High density (88 N/0.1 sq.m.)	Foraminifera (sponge)		0.9		Swartz et al. 1985a
52		NE	Palos Verdes, CA	COA		High density (132 N/0.1 sq.m.)	Ophiuroidea (brittle star)		0.9		Swartz et al. 1985a
52	+/-13.9	NC	San Francisco Bay, CA	COA	48-h	Moderately toxic (25.1+/-6.61% abnormal)	Mussel	LAR	1.26+/-0.17		Chapman et al. 1987a
52.7	+/-21.4	NE	San Francisco Bay, CA	COA	10-d	Least toxic (13.6+/-7.76% mortality)	Amphipod	ADT	1.4 +/- 0.79		Chapman et al. 1987a
54		*	United States	EqPA		EPA Acute Marine EP Threshold	Aquatic biota		1		Lyman et al. 1987
54	+/-41.5	NE	Burrard Inlet, BC	COA	10-d	Not toxic (8.9+/-2.99% mortality)	Corophium volutator (amphipod)	ADT	2.8+/-1.96		McLeay et al. 1991
54	+/-41.5	NE	Burrard Inlet, BC	COA	10-d	Not toxic (97.2+/-2.84% reburial)	Rhepoxynius abronius (amphipod)	ADT	2.8+/-1.96		McLeay et al. 1991
54.6	+/-20.5	NE	San Francisco Bay, CA	COA	10-d	Least Toxic (4.63+/-2.91% avoidance)	Amphipod	ADT	1.44+/-.74		Chapman et al. 1987a
56.7	+/-15.3	NE	Palos Verdes, CA	COA		High density (20.9+/-0.23 N/0.1 sq.m.)	Amphipod		1.7+/-0.61		Swartz et al. 1986
56.7	+/-15.3	NE	Palos Verdes, CA	COA		High density (11.2+/-1.64 N/0.1 sq.m.)	Phoxocephalid		1.7+/-0.61		Swartz et al. 1986
58.3	+/-44.8	NE	Burrard Inlet, BC	COA	10-d	Not toxic (7.9+/-5.12% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.64+/-2.14		McLeay et al. 1991
58.7	+/-36.8	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.008+/-0.001 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.19+/-1.27	12+/-11.3	Bricker et al. 1993
62.3	+/-78.4	NE	Southern California	COA	10-d	Not significantly toxic (23.2% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
63.9	+/-102	NE	Gulfport Mississippi Channel, MS	COA	10-d	Not significantly toxic (8+/-2% mortality)	Crossostrea virginica (oyster)	ADT	6.73+/-2.04		Parrish 1987b
63.9	+/-102	NE	Gulfport Mississippi Channel, MS	COA	10-d	Not significantly toxic (22+/-5.29% mortality)	Arenicola cristata (lugworm)	ADT	6.73+/-2.04		Parrish 1987b
63.9	+/-102	NE	Gulfport Mississippi Channel, MS	COA	10-d	Not significantly toxic (3.3+/-3.06% mortality)	Penaeus duorarum (pink shrimp)	ADT	6.73+/-2.04		Parrish 1987b
64	+/-40	NC	San Francisco Bay, CA	COA	10-d	Moderately toxic (33.8+/-4.7% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
64.6	+/-49.4	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.167+/-0.198 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.59+/-1.09	4.67+/-6.99	Bricker et al. 1993
66		*	California	AETA	48-h	California AET Values	Mytilus edulis (bivalve)	LAR			Becker et al. 1990
66		*	Northern California	AETA		Northern California AET Values	Benthic species				Becker et al. 1990
67		*	Strait of Georgia, BC	COA	48-h	Significant increase in burrowing time	Macoma balthica (bivalve)		1.13		McGreer 1979
68		NE	Puget Sound, WA	SBA		EPA/ACOE Puget Sound Interim Criteria	Aquatic biota				USACOE 1988
68.2	+/-48.1	*	San Francisco Bay, CA	COA	48-h	Significantly toxic (55.7+/-22.7% abnormal)	Bivalve	LAR			Long & Morgan 1990
68.7	+/-22.6	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (21.5+/-6.36% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.35+/-1.05	10.5+/-13.4	Bricker et al. 1993
69.8	+/-23.1	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.061+/-0.038 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.8+/-0.477	8.52+/-10.7	Bricker et al. 1993
70	+/-47	SG	San Francisco Bay, CA	COA	10-d	Significantly toxic (42.9+/-19.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
71	+/-155	*	Southern California	COA		Low abundance (35.3+/-15.8 N/0.1 sq.m.)	Arthropods				Word & Mearns 1979 (As cited in L&M 1990)
72	+/-64.2	*	Tampa Bay, FL	COA		Significantly toxic (EC50; 0.021+/-0.012 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)			6.13+/-8.06	Long 1993
72.2	+/-40.6	NE	San Francisco Bay, CA	COA	10-d	Least toxic (18+/-6.6% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
72.4	+/-35.1	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-6.07% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.71+/-0.9	15.3+/-23.2	Bricker et al. 1993
72.6	+/-74.7	NE	Commencement Bay, WA	COA	48-h	Least toxic (15.1+/-3.1% abnormality)	Oyster	LAR			Tetra Tech 1985
73	+/-22.9	SG	San Francisco Bay, CA	COA	10-d	Moderately toxic (28.3+/-7.51% mortality)	Amphipod	ADT	2.01+/-.98		Chapman et al. 1987a
73.2	+/-166	*	Southern California	COA		Low species richness (51.2+/-8.6 S/0.1 sq.m.)	Benthic species				Word & Mearns 1979 (As cited in L&M 1990)
73.4	+/-22.7	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (19.3+/-5.86% mortality)	Ampelisca abidta (amphipod)	SUB ADT	1.82+/-0.225	6.3+/-6.2	Bricker et al. 1993

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Copper Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
73.7 +/-78.4	NE	Howe Sound, BC	COA	10-d	Not toxic (10.5+/-4.09% mortality)	Rhepoxynius abronius (amphipod)	ADT	3.4+/-4.39		McLeay et al. 1991
73.7 +/-78.4	NE	Howe Sound, BC	COA	10-d	Not toxic (5.83+/-5.48% emergence)	Rhepoxynius abronius (amphipod)	ADT	3.4+/-4.39		McLeay et al. 1991
73.7 +/-78.4	NE	Howe Sound, BC	COA	10-d	Not toxic (96.3+/-4.19% reburial)	Rhepoxynius abronius (amphipod)	ADT	3.4+/-4.39		McLeay et al. 1991
74.6 +/-43.3	NE	San Francisco Bay, CA	COA	10-d	Not significantly toxic (18.4+/-6.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
74.9 +/-86.2	NE	Tampa Bay, FL	COA	48-h	Not significantly toxic (38.5+/-2.9% mortality)	Mulinaria lateralis (coot clam)	LAR		2.64+/-3.04	Long 1993
75 +/-32.6	NE	Palos Verdes, CA	COA		High species richness (70.9+/-16.9 S/0.1 sq.m.)	Benthic species	VAR			Ferraro et al. 1991
76	NC	Puget Sound, WA	COA	2-d	Significantly toxic (3.8% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.5		Pastorok & Becker 1990
76 +/-50.8	*	San Francisco Bay, CA	COA	48-h	Moderately toxic (59.4+/-11.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
76.8 +/-82.8	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (8.5+/-6.06% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
76.8 +/-84.5	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (6.8+/-7.31% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
76.8 +/-84.5	NE	Halifax Harbour, NS	COA	20-d	Not significantly toxic (0.7+/-1.63% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
76.9 +/-22	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (39.5+/-18.2% mortality)	Ampelisca abidta (amphipod)	SUB ADT	2.06+/-0.523	20.1+/-13.9	Bricker et al. 1993
81	NE	Puget Sound, WA	AETA		PSDDA Screening level concentration	Aquatic biota				USACOE 1988
81.2 +/-103	NE	Narragansett Bay, RI	COA	10-d	Not significantly toxic (5.28+/-3.04% mortality)	Ampelisca abdita (amphipod)	ADT			Munns et al. 1991
84.5 +/-36.1	SG	Jetty Island Pier, Everett Marina, WA	COA	10-d	Toxic (19.5+/-0.707% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.15+/-0.071		Hart Crowser & Associates Inc. 1986
84.6 +/-62.5	*	San Francisco Bay, CA	COA	10-d	Highly toxic (67+/-11.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
84.6 +/-76.3	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.096+/-0.101 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.37+/-0.759	6.93+/-6.83	Bricker et al. 1993
84.8 +/-24.8	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.3+/-2.22% normal development)	Mulinia lateralis (bivalve)	LAR	2.18+/-0.531	19.1+/-12.5	Bricker et al. 1993
85.1 +/-69.2	NE	Commencement Bay, WA	COA	10-d	Least toxic (12.5+/-4.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
86 +/-3	NE	Palos Verdes, CA	COA		High abundance (944+/-101 N/0.1 sq.m.)	Benthic species	VAR			Ferraro et al. 1991
86.1 +/-21.8	NG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.5+/-11.4% mortality)	Mulinia lateralis (bivalve)	LAR	2.33+/-0.364	26.8+/-9.42	Bricker et al. 1993
86.1 +/-27.8	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (15.2+/-9.21% mortality)	Mulinia lateralis (bivalve)	LAR	2.17+/-0.663	18.4+/-19.9	Bricker et al. 1993
87.7 +/-45.6	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (23.3+/-6.14% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.738		Word et al. 1988
87.8 +/-33.4	*	San Francisco Bay, CA	COA	48-h	Highly toxic (92.4+/-4.5% abnormal)	Bivalve	LAR			Long & Morgan 1990
90 +/-45.9	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (10.4+/-6.3% mortality)	Nephtys caecoides (polychaete)		1.63+/-0.657		Word et al. 1988
90 +/-45.9	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (0.2+/-0.6% mortality)	Macoma nasuta (clam)		1.63+/-0.657		Word et al. 1988
94.3 +/-70.1	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (12.3+/-14.5% mortality)	Mulinia lateralis (bivalve)	LAR	1.53+/-0.743	15.7+/-23.2	Bricker et al. 1993
94.8 +/-35.5	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (96+/-1.66% normal development)	Mulinia lateralis (bivalve)	LAR	2.52+/-0.997	35+/-42.9	Bricker et al. 1993
95.1 +/-86.5	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.074+/-0.043 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.27+/-0.626	6.21+/-5.41	Bricker et al. 1993
95.3 +/-78.2	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99.3+/-0.827% normal development)	Mulinia lateralis (bivalve)	LAR	1.43+/-0.738	14.7+/-24	Bricker et al. 1993
95.5 +/-78.8	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (6.67+/-8.07% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.51+/-0.330		Pastorok & Becker 1990
96.7 +/-177	*	Southern California	COA		Low abundance (6.1+/-7.2 N/0.1 sq.m.)	Echinoderm				Word & Mearns 1979 (As cited in L&M 1990)
97 +/-20.9	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.014+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.51+/-0.45	29.6+/-15.7	Bricker et al. 1993
97.9 +/-71.4	NE	Palos Verdes, CA	COA	10-d	Not significantly toxic (11.9+/-5.36% mortality)	Rhepoxynius abronius (amphipod)	VAR			Ferraro et al. 1991
98	*	Northern California	AETA	10-d	Northern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
98.7 +/-31	*	San Francisco Bay, CA	COA	48-h	Highly toxic (92.3+/-5.5% mortality)	Mussel	LAR	2.87+/-1.32		Chapman et al. 1987a
98.7 +/-31	SG	San Francisco Bay, CA	COA	4-wk	Moderately toxic (94.9+/-10.1 young produced)	Tigriopus californicus (copepod)	ADT	2.87+/-1.07		Chapman et al. 1987a
98.7 +/-62.1	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (17+/-16.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.99+/-1	21.6+/-24.5	Bricker et al. 1993
99.3 +/-53.2	SG	Oakland Harbor, CA	COA	10-d	Significantly toxic (35.3+/-2.5% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.56+/-0.07		Word et al. 1988
100	NE	Burrard Inlet, BC	SQO		Sediment Quality Objectives	Aquatic biota				Swain & Nijman 1991
103 +/-58.9	*	Tampa Bay, FL	COA	10-d	Significantly toxic (32.1+/-16.9% mortality)	Ampelisca abdita (amphipod)	SUBADT		7.63+/-9.44	Long 1993
105 +/-93.5	SG	Palos Verdes, CA	COA		Low abundance (415+/-94.4 N/0.1 sq.m.)	Benthic species	VAR			Ferraro et al. 1991

Table 4. A summary of the available data on the biological effects associated with sediment-sorbed COPPER (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Copper Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
106 +/-76	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (23+/-4.24% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.46+/-1.22	40+/-55.1	Bricker et al. 1993
106 +/-93	*	Commencement Bay, WA	COA	48-h	Moderately toxic (23+/-2.3% abnormality)	Oyster	LAR			Tetra Tech 1985
108 +/-67.9	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.1+/-2.78% normal development)	Mulinia lateralis (bivalve)	LAR	2.12+/-1.04	22.9+/-23.7	Bricker et al. 1993
108		***PEL***								
109 +/-68.8	*	Palos Verdes, CA	COA		Low abundance (2.4+/-5.65 N/0.1 sq.m.)	Echinoderms	VAR			Ferraro et al. 1991
110	*	San Francisco Bay, CA	AETA	48-h	San Francisco Bay AET	Oyster; mussel	LAR			Long & Morgan 1990
111 +/-72.7	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (13.8+/-4.09% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.47+/-0.306		Pastorok & Becker 1990
114	*	San Francisco Bay, CA	COA	48-h	Highly toxic (66.8% abnormal)	Mussel	LAR	3.59		Chapman et al. 1987a
117 +/-83.1	*	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (30.5+/-16.4% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.62+/-0.777	17.7+/-26.3	Bricker et al. 1993
118 +/-98.1	*	Commencement Bay, WA	COA	10-d	Moderately toxic (26+/-5.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
120 +/-58.2	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (29.8+/-13.9% mortality)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.07	32.1+/-28.4	Bricker et al. 1993
121 +/-68	*	Palos Verdes, CA	COA		Low abundance (13.8+/-11.4 N/0.1 sq.m.)	Amphipods	VAR			Ferraro et al. 1991
121 +/-68.0	*	Palos Verdes, CA	COA		Low abundance (5.87+/-7.06 N/0.1 sq.m.)	Phoxocephalids	VAR			Ferraro et al. 1991
122 +/-76.7	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (34.9+/-15.7% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.23+/-1.04	25.4+/-25.5	Bricker et al. 1993
124 +/-160	*	Curtis Creek, Baltimore, MD	COA	10-d	Significantly toxic (82.8+/-22.2% mortality)	Leptocheirus plumulosus (amphipod)	JUV			McGee et al. 1993
125	*	Burrard Inlet, BC	COA	10-d	Highly toxic (23% emergence)	Corophium volutator (amphipod)	ADT	3.5		McLeay et al. 1991
125	*	Burrard Inlet, BC	COA	10-d	Highly toxic (30.5% emergence)	Rhepoxynius abronius (amphipod)	ADT	3.5		McLeay et al. 1991
129 +/-169	NE	Puget Sound, WA	COA	20-d	Not significantly toxic (5+/-3.86% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.46+/-0.26		Pastorok & Becker 1990
130	*	San Francisco Bay, CA	COA	10-d	Most toxic (95% mortality)	Amphipod	ADT	4.03		Chapman et al. 1987a
130	*	San Francisco Bay, CA	COA	10-d	Highly toxic (37% avoidance)	Amphipod	ADT	4.03		Chapman et al. 1987a
131 +/-86.1	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.016+/-0.007 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.26+/-0.936	43.4+/-35.6	Bricker et al. 1993
133 +/-108	NE	Miami River, FL	COA	10-d	Not toxic (18.6+/-7.27% mortality)	Pennaeus aztecus aztecus (brown shrimp)	ADT			ERCO 1985
133 +/-108	NE	Miami River, FL	COA	10-d	Not toxic (1.2+/-.837% mortality)	Mercenaria mercenaria (atlantic quahog)	ADT			ERCO 1985
133 +/-108	NE	Miami River, FL	COA	10-d	Not toxic (3.6+/-1.67% mortality)	Nereis virens (sandworm)	ADT			ERCO 1985
133 +/-59.1	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.013+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.79+/-0.744	37.6+/-25.3	Bricker et al. 1993
135 +/-57.4	*	Fraser River Estuary, BC	COA		Sediments devoid of feral clams	Macoma balthica (bivalve)		1.95		McGreer 1982
141 +/-59.6	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (96.6+/-3.79% normal development)	Mulinia lateralis (bivalve)	LAR	2.87+/-0.94	35.1+/-25.9	Bricker et al. 1993
144 +/-59	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (38+/-13% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.92+/-0.937	34.6+/-23.9	Bricker et al. 1993
147 +/-176	NE	Halifax Harbour, NS	COA	20-d	Not significantly toxic (1+/-2% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
147 +/-232	NE	Southern California	COA		High abundance (88.9+/-35.4 N/0.1 sq.m.)	Benthic species				Word & Mearns 1979 (As cited in L&M 1990)
147 +/-9.8	*	Los Angeles, CA	COA	96-h	Highly toxic (>50% mortality)	Palaemonetes pugio (shrimp)				Lee & Mariani 1977
150 +/-173	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (5.2+/-3.5% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
150	*	Strait of Georgia, BC	COA	24-h	Significantly toxic (avoidance)	Macoma balthica (bivalve)		3.09		McGreer 1979
151 +/-102	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (91.5+/-7.28% normal development)	Mulinia lateralis (bivalve)	LAR	2.6+/-0.899	36.8+/-34.9	Bricker et al. 1993
152 +/-137	NE	Palos Verdes, CA	COA		High species richness (80.8+/-13.7 S/0.1 sq.m.)	Macro benthos		2.10+/-1.15		Swartz et al. 1985a
152 +/-137	NE	Palos Verdes, CA	COA		High density (54.5+/-9.91 N/0.1 sq.m.)	Amphipod		2.1+/-1.15		Swartz et al. 1985a
152 +/-137	NE	Palos Verdes, CA	COA		High density (34.3+/-5.67 N/0.1 sq.m.)	Phoxocephalid		2.1+/-1.15		Swartz et al. 1985a
152 +/-137	NE	Palos Verdes, CA	COA		High density (111+/-32 N/0.1 sq.m.)	Crustacea		2.1+/-1.15		Swartz et al. 1985a
153 +/-83.5	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.1+/-13.3% mortality)	Mulinia lateralis (bivalve)	LAR	2.68+/-0.955	31.8+/-24.4	Bricker et al. 1993
157 +/-178	*	Curtis Creek, Baltimore, MD	COA	20-d	Significantly toxic (94.6+/-9.35% mortality)	Leptocheirus plumulosus (amphipod)	JUV			McGee et al. 1993
158 +/-28.7	NE	Baltimore Harbor, MD	COA	48-h	Least toxic; TLm	Fundulus heteroclitus (mummichog)				Tsai et al. 1979
158 +/-28.7	NE	Baltimore Harbor, MD	COA	48-h	Least toxic; TLm	Leiostomus xanthurus (spot)				Tsai et al. 1979

Table 4. A summary of the available data on the biological effects associated with sediment-sorbed COPPER (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Copper	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
164	+/-122	NE	Palos Verdes, CA	COA	10-d	Not significantly toxic (9.5+/-5.45% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.42+/-0.88		Swartz et al. 1986
164	+/-39.4	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.011+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.28+/-0.363	45.3+/-21.4	Bricker et al. 1993
179	+/-222	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (4.43+/-2.1% mortality)	Panope generosa (geoduck)	JUV	1.51+/-0.261		Pastorok & Becker 1990
180		*	San Francisco Bay, CA	AETA	10-d	San Francisco Bay AET	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
181	+/-173	*	Southern California	COA	10-d	Significantly toxicity (51.7% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
182	+/-38.2	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (75.1+/-10.6% mortality)	Mulinia lateralis (bivalve)	LAR	3.32+/-0.317	42.3+/-19.2	Bricker et al. 1993
187	+/-120	*	Palos Verdes, CA	COA		Low density (0.2+/-0.14 N/0.1 sq.m.)	Echinoderm		2.64+/-0.77		Swartz et al. 1986
188	+/-122	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (88.5+/-8.39% normal development)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.05	38.1+/-38.9	Bricker et al. 1993
192	+/-185	*	Halifax Harbour, NS	COA	10-d	Significantly toxic (61.7+/-12.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
194	+/-238	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (2.09+/-1.73% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.56+/-0.329		Pastorok & Becker 1990
196	+/-163	*	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (51.3+/-6.95% mortality)	Mulinia lateralis (bivalve)	LAR	1.8+/-1.71	29.6+/-46.3	Bricker et al. 1993
202	+/-232	*	Puget Sound, WA	COA	15-min	Significantly toxic (EC50; 0.065+/-0.043% extract)	Microtox (Photobacterium phosphoreum)		1.58+/-0.255		Pastorok & Becker 1990
210		NE	San Diego Bay, CA	COA	96-h	Not significantly toxic (4% mortality)	Citharichthys stigmaeus (sanddab)				Salazar & Salazar 1985
210		NE	San Diego Bay, CA	COA	10-d	Not significantly toxic (14% mortality)	Acanthomysis sculpta (mysid)				Salazar & Salazar 1985
210		NE	San Diego Bay, CA	COA	20-d	Not significantly toxic (13% mortality)	Neanthes arenaceodentata (polycheate)				Salazar & Salazar 1985
210		NE	San Diego Bay, CA	COA	20-d	Not significantly toxic (1% mortality)	Macoma nasuta (clam)				Salazar & Salazar 1985
210		NE	San Diego Bay, CA	COA	96-h	Not significantly toxic (0% mortality)	Acanthomysis sculpta (mysid)				Salazar & Salazar 1985
210		NE	San Diego Bay, CA	COA	96-h	Not significantly toxic (18% mortality)	Acartia tonsa (copepod)				Salazar & Salazar 1985
218	+/-23.6	NE	Stamford, CT	COA	96-h	Not toxic (10% mortality)	Palaemonetes pugio (shrimp)				Lee & Mariani 1977
220	+/-267	*	Puget Sound, WA	COA	2-d	Significantly toxic (60.4+/-46.5% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.57+/-0.287		Pastorok & Becker 1990
224	+/-6	NE	Norwalk River, CT	COA	96-h	Not toxic (0% mortality)	Palaemonetes pugio (shrimp)				Lee & Mariani 1977
251	+/-227	NE	Palos Verdes, CA	COA		High density (594+/-688 N/0.1 sq.m.)	Mollusca		2.53+/-1.27		Swartz et al. 1985a
251	+/-227	NE	Palos Verdes, CA	COA	10-d	Not significantly toxic (8+/-5.7% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.53+/-1.27		Swartz et al. 1985a
251	+/-232	NE	Hudson-Raritan Bay, NY	COA	14-d	Not toxic (increased growth rate)	Chromadorina germanica (nematode)				Tietjen & Lee 1984
258		*	Palos Verdes, CA	COA		Low species richness (19.2 S/0.1 sq.m.)	Benthic species	VAR			Ferraro et al. 1991
259	+/-327	*	Puget Sound, WA	COA	10-d	Significantly toxic (80.8+/-30.6% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.266		Pastorok & Becker 1990
270	+/-50.4	*	Palos Verdes, CA	COA		Low density (5.3+/-3.7 N/0.1 sq.m.)	Amphipod		3.13+/-0.15		Swartz et al. 1986
270	+/-50.4	*	Palos Verdes, CA	COA		Low density (0.13+/-0.23 N/0.1 sq.m.)	Phoxocephalid		3.13+/-0.15		Swartz et al. 1986
309		NE	Palos Verdes, CA	COA		High density (2177 N/0.1 sq.m.)	Polychaeta		3.2		Swartz et al. 1985a
310		*	Puget Sound, WA	AETA		1986 Puget Sound AET	Benthic species		15		Bellar et al. 1986
310		*	California	AETA		California AET Values	Benthic species				Becker et al. 1990
310		*	Southern California	AETA		Southern California AET Values	Benthic species				Becker et al. 1990
312		NE	San Diego Bay, CA	COA		Not toxic (<3% mortality)	M. elongata (mysid)				Salazar et al. 1980
337	+/-344	*	Puget Sound, WA	COA	20-d	Significantly toxic (37.3+/-22% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.87+/-0.208		Pastorok & Becker 1990
361		*	Curtis Creek, Baltimore, MD	COA	10-d	Significantly toxic (55% mortality)	Hyalella azteca (amphipod)	JUV			McGee et al. 1993
390		*	Puget Sound, WA	AETA	15-min	1988 Puget Sound AET	Microtox (Photobacterium phosphoreum)				PTI 1988
390		*	Puget Sound, WA	AETA	48-h	1988 Puget Sound AET	Crassostrea gigas (oyster)	LAR			PTI 1988
390		*	Puget Sound, WA	AETA	15-min	1986 Puget Sound AET	Microtox (Photobacterium phosphoreum)		15		Bellar et al. 1986
390		*	Puget Sound, WA	AETA	48-h	1986 Puget Sound AET	Crassostrea gigas (oyster)	LAR	15		Bellar et al. 1986
390		*	Puget Sound, WA	SQG		Chemical Criteria	Benthic community		1		WDE 1989
412	+/-274	*	Palos Verdes, CA	COA		Low density (365+/-178 N/0.1 sq.m.)	Polychaeta		3.15+/-1.32		Swartz et al. 1985a
453	+/-311	SG	Hudson-Raritan Bay, NY	COA	14-d	Significantly toxic (reduced growth rate)	Chromadorina germanica (nematode)				Tietjen & Lee 1984

Table 4. A summary of the available data on the biological effects associated with sediment-sorbed COPPER (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Copper	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
455	+/-222	*	Palos Verdes, CA	COA		Low density (0.03+/-0.08 N/0.1 sq.m.)	Echinoderm		3.53+/-0.742		Swartz et al. 1985a
455	+/-222	*	Palos Verdes, CA	COA		Low density (0.233+/-0.367 N/0.1 sq.m.)	Foraminifera (sponge)		3.53+/-0.742		Swartz et al. 1985a
455	+/-222	*	Palos Verdes, CA	COA		Low density (0.3+/-0.8 N/0.1 sq.m.)	Ophiuroidea (brittle star)		3.53+/-0.742		Swartz et al. 1985a
530		*	Puget Sound, WA	AETA		1988 Puget Sound AET	Benthic community				PTI 1988
581	+/-105	*	Palos Verdes, CA	COA		Low species richness (26.0+/-11.5 S/0.1 sq.m.)	Macro benthos		3.95+/-0.238		Swartz et al. 1985a
581	+/-105	*	Palos Verdes, CA	COA		Low density (1.0+/-1.2 N/0.1 sq.m.)	Amphipod		3.95+/-0.238		Swartz et al. 1985a
581	+/-105	*	Palos Verdes, CA	COA		Low density (0 N/0.1 sq.m.)	Phoxocephalid		3.95+/-0.238		Swartz et al. 1985a
581	+/-105	*	Palos Verdes, CA	COA		Low density (8.7+/-6.01 N/0.1 sq.m.)	Crustacea		3.95+/-0.238		Swartz et al. 1985a
592	+/-126	*	Palos Verdes, CA	COA		Low density (21.5+/-11.6 N/0.1 sq.m.)	Mollusca		4+/-0.265		Swartz et al. 1985a
592	+/-126	*	Palos Verdes, CA	COA	10-d	Significantly toxic (21+/-6.3% mortality)	Rhepoxynius abronius (amphipod)	ADT	4+/-0.265		Swartz et al. 1985a
612		*	Black Rock Harbor, CT	COA	14-d	Significantly toxic (100% mortality)	Nereis virens (sandworm)				Simmers et al. 1984
>690		-	California	AETA	10-d	California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
>690		-	Southern California	AETA	10-d	Southern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
800		*	Puget Sound, WA	AETA	10-d	1986 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT	15		Bellar et al. 1986
810		*	Puget Sound, WA	AETA		PSDDA Maximum Level Criteria	Aquatic biota				USACOE 1988
918	+/-2750	*	Commencement Bay, WA	COA	48-h	Highly toxic (44.5+/-19% abnormality)	Oyster	LAR			Tetra Tech 1985
995		NE	San Diego Bay, CA	COA		Not toxic (<3% mortality)	Protothaca staminea (clam)				Salazar et al. 1980
995		NE	San Diego Bay, CA	COA		Not toxic (<3% mortality)	Citharichthys stigmaeus (sanddab)				Salazar et al. 1980
995		NE	San Diego Bay, CA	COA		Not toxic (<3% mortality)	Neanthes arenaceodentata (polychaete)				Salazar et al. 1980
995		NE	San Diego Bay, CA	COA		Not toxic (<3% mortality)	M. elongata (mysid)				Salazar et al. 1980
1071	+/-946	*	Baltimore Harbor, MD	COA	48-h	Most toxic; TLm	Fundulus heteroclitus (mummichog)				Tsai et al. 1979
1071	+/-946	*	Baltimore Harbor, MD	COA	48-h	Most toxic; TLm	Leiostomus xanthurus (spot)				Tsai et al. 1979
1300		*	Puget Sound, WA	AETA	10-d	1988 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT			PTI 1988
2820	+/-4881	*	Commencement Bay, WA	COA	10-d	Highly toxic (78.5+/-19.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985

Table 5. A summary of the available data on the biological effects associated with sediment-sorbed LEAD (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Lead	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
<0.5		NE	Georgetown Harbor, SC	COA		Not toxic (species richness or abundance)	Benthic species		0.12		Van Dolah et al. 1984
0.7		NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
0.7		NC	Mobile Bay, AL	COA		Significantly toxic (10% mortality)	Mysidopsis bahia (mysid shrimp)		0.009	0.004	EMAP Louisiana Province 1991
0.9	+/-0.283	NC	Apalachee Bay, FL	COA	10-d	Significantly toxic (15.6% mortality)	Ampelisca abdita (amphipod)		0.438+/-0.442	0.421+/-0.593	EMAP Louisiana Province 1991
<1		NE	Newport, RI	COA	96-h	Not toxic (0% mortality)	Palaemonetes pugio (shrimp)				Lee & Mariani 1977
1		NC	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (22% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
1		NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (28% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
1		NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.003 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
1.38	+/-0.727	NE	Apalachee Bay, FL	COA		Not significantly toxic (0.75+/-1.5% mortality)	Mysidopsis bahia (mysid shrimp)		0.540+/-0.385	0.405+/-0.417	EMAP Louisiana Province 1991
1.5		NC	Charleston Harbor, SC	COA		Low species richness (5.16; SRUs)	Benthic species				Winn et al. 1989
1.5		NC	Charleston Harbor, SC	COA		Moderate diversity (2.3+/-0.2; SDUs)	Benthic species				Winn et al. 1989
1.5		NC	Charleston Harbor, SC	COA		Low diversity (1.16; SDUs)	Benthic species				Winn et al. 1989
1.55	+/- 1.81	NE	Matagorda Ship Channel, TX	COA	10-d	Not toxic (0.2+/-0.447% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1985a
1.55	+/-1.81	NE	Matagorda Ship Channel, TX	COA	10-d	Not toxic (10.6+/-5.18% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1985a
1.55	+/-1.81	NE	Matagorda Ship Channel, TX	COA	10-d	Not toxic (7.2+/-2.77% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1985a
1.59	+/-0.36	NC	Charleston Harbor, SC	COA		Moderate species richness (9.05+/-1.33; SRUs)	Benthic species				Winn et al. 1989
1.81	+/-0.68	NE	Charleston Harbor, SC	COA		High diversity (4.15+/-0.59; SDUs)	Benthic species				Winn et al. 1989
1.85	+/-0.778	NE	Apalachee Bay, FL	COA	10-d	Not significantly toxic (3.3+/-3.25% mortality)	Ampelisca abdita (amphipod)		0.643+/-0.455	0.390+/-0.410	EMAP Louisiana Province 1991
2.38	+/-1.03	NE	Charleston Harbor, SC	COA		High species richness (14.9+/-2.04; SRUs)	Benthic species				Winn et al. 1989
2.5		NE	Freeport Harbor, TX	COA	10-d	Not toxic (2+/-1% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1985b
2.5		NE	Freeport Harbor, TX	COA	10-d	Not toxic (9.6+/-4.22% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1985b
2.5		NE	Freeport Harbor, TX	COA	10-d	Not toxic (0% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1985b
3.05	+/-2.76	NC	Mississippi Sound, MS	COA	10-d	Significantly toxic (11.6+/-3.39% mortality)	Ampelisca abdita (amphipod)		0.111+/-0.045	0.03	EMAP Louisiana Province 1991
4.7	+/-5.66	NC	Mobile Bay, AL	COA	10-d	Significantly toxic (46+/-49.3% mortality)	Ampelisca abdita (amphipod)		0.22+/-0.298	3.84+/-5.43	EMAP Louisiana Province 1991
4.7		NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (0% mortality)	Arbacia punctulata (sea urchin)		0.03	19 ug/g	Windom In Prep
5		NE	Jetty Island Pier, Everett Marina, WA	COA	10-d	Not toxic (12.3+/-2.87% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.08+/-0.66		Hart Crowser & Associates Inc. 1986
5.17	+/-0.737	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (4.8+/-2.28% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1983a
5.17	+/-0.737	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (15.8+/-4.21% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1983a
5.17	+/-0.737	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (1.2+/-.447% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1983a
5.5	+/-4.24	NE	Galveston Bay, TX	COA		High abundance (155+/-49.5 N/0.00203 sq.m.)	Oligochaeta		1.2+/-1.27	4.27+/-3.85	Carr 1992
5.8	+/-1.79	NE	Chesapeake Bay, MD, VI; Delaware Bay, DE	COA		Not significantly toxic (mean ET50; burrowing time 0.704+/-0.17 h)	Mya arenaria (clam)	1-2 cm			Phelps 1990
5.97	+/-4.26	NE	Tampa Bay, FL	COA	1-h	Least toxic (83+/-4.26% fertilization)	Arbacia punctulata (sea urchin)	GAM		0.131+/-0.169	Long 1993
6		NE	Massachusetts Bay, MA	COA		High density (24 N/0.1 sq.m.)	Echinodermata	VAR			Gilbert et al. 1976
6		SG	Chesapeake Bay, MD, VI; Delaware Bay, DE	COA		Significantly toxic (mean ET50; burrowing time 1.4 h)	Mya arenaria (clam)	1-2 cm			Phelps 1990
6.45	+/-5.37	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (9.25+/-5.32% mortality)	Lepidactylus dytiscus (amphipod)		0.638+/-0.768	1.65+/-1.62	Hall et al. 1992
6.67	+/-1.53	NE	Houston Ship Channel, TX	COA		Not significantly toxic (15+/-13.2% mortality)	Sheepshead minnow	ADT	0.05+/-0.0242		Crocker et al. 1991
6.8		NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (18% mortality)	Ampelisca abdita (amphipod)		0.028	9 ug/g	Windom In Prep
7.12	+/-3.28	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (27.5+/-10.6% mortality)	Mysidopsis bahia (mysid)		0.237+/-0.311	74.6+/-85.5 ug/g	Windom In Prep
7.26	+/-2.65	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (9.78+/-5.33% mortality)	Mysidopsis bahia (mysid)		0.24+/-0.247	91.9+/-73.4 ug/g	Windom In Prep
7.28	+/-5.00	NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.008+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.4	Hall et al. 1992
7.28	+/-5.00	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.1+/-0.865% reburial)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
7.28	+/-5.00	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<20% emergence)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992

Table 5. A summary of the available data on the biological effects associated with sediment-sorbed LEAD (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Lead Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
7.28 +/-5.00	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
7.31 +/-2.83	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (11.6+/-4.33% mortality)	Ampelisca abdita (amphipod)		0.267+/-0.25	102+/-71.1 ug/g	Windom In Prep
7.36 +/-2.81	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (4+/-2.83% mortality)	Menidia beryllina (silverside)		0.243+/-0.264	90.5+/-78.4 ug/g	Windom In Prep
7.53 +/-1.04	SG	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (28.3+/-6.11% mortality)	Mysidopsis bahia (mysid)		0.246+/-0.051	127+/-24 ug/g	Windom In Prep
7.65 +/-7.28	NC	Galveston Bay, TX	COA		Low abundance (53+/-33.9 N/0.00203 sq.m.)	Benthic invertebrates		0.985+/-0.247	22+/-11.2	Carr 1992
7.7 +/-2.82	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (91.3+/-2.91% normal development)	Arbacia punctulata (sea urchin)		0.299+/-0.251	114+/-68.4 ug/g	Windom In Prep
8.2 +/-2.72	SG	Savannah River Entrance Channel, GA	COA	48-h	Significantly toxic (25.4+/-7.66% mortality)	Arbacia punctulata (sea urchin)		0.344+/-0.242	129.5+/-59.3 ug/g	Windom In Prep
8.27 +/-4.83	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (22.3+/-7.37% mortality)	Hyalella azteca (amphipod)	JUV	0.788+/-0.866	2.04+/-1.75	Hall et al. 1992
8.32 +/-13.1	NE	Gulfport Mississippi Channel, MS	COA	10-d	Not significantly toxic (8+/-2% mortality)	Crossostrea virginica (oyster)	ADT	6.73+/-2.04		Parrish 1987b
8.32 +/-13.1	NE	Gulfport Mississippi Channel, MS	COA	10-d	Not significantly toxic (22+/-5.29% mortality)	Arenicola cristata (lugworm)	ADT	6.73+/-2.04		Parrish 1987b
8.32 +/-13.1	NE	Gulfport Mississippi Channel, MS	COA	10-d	Not significantly toxic (3.3+/-3.06% mortality)	Penaeus duorarum (pink shrimp)	ADT	6.73+/-2.04		Parrish 1987b
8.49 +/-7.03	NE	Galveston Bay, TX	COA		High abundance (156+/-22.9 N/0.00203 sq.m.)	Polychaeta		0.916+/-0.661	2.94+/-2.3	Carr 1992
9 +/-4.24	NE	Massachusetts Bay, MA	COA		High density (299+/-40.3 N/0.1 sq.m.)	Arthropoda	VAR			Gilbert et al. 1976
9.23 +/-5.51	NE	Galveston Bay, TX	COA		Low species (11.2+/-1.94 S/0.00203 sq.m.)	Benthic species		0.642+/-0.356	13.4+/-8.65	Carr 1992
9.5 +/-8.9	NC	Southern California	COA		Moderate abundance (56.2+/-23 N/0.1 sq.m.)	Echinoderm				Word & Mearns 1979 (As cited in L&M 1990)
9.55 +/-0.545	NE	Chandeleur Sound, LA	COA		Not significantly toxic (1.03+/-2.05% mortality)	Mysidopsis bahia (mysid shrimp)		0.824+/-0.915	1.69+/-0.920	EMAP Louisiana Province 1991
9.83 +/-5.82	NE	Galveston Bay, TX	COA		High abundance (16.2+/-6.19 N/0.00203 sq.m.)	Copepoda		0.844+/-0.524	4.73+/-3.1	Carr 1992
9.85 +/-4.49	NE	Brunswick Harbor Entrance, GA	COA	48-h	Not significantly toxic (86.6+/-4.25% normal development)	Arbacia punctulata (sea urchin)		0.181+/-0.162	182+/-208 ug/g	Windom In Prep
10 +/-12.2	*	Tampa Bay, FL	COA	1-h	Moderately toxic (44.5+/-17.8% fertilization)	Arbacia punctulata (sea urchin)	GAM		0.622+/-1.12	Long 1993
10 +/-5.52	NE	Galveston Bay, TX	COA		High abundance (154+/-30.2 N/0.00203 sq.m.)	Benthic invertebrates		0.47+/-0.27	9.07+/-2.94	Carr 1992
10.2 +/-1.06	NC	Chandeleur Sound, LA	COA	10-d	Significantly toxic (11.5+/-4.86% mortality)	Ampelisca abdita (amphipod)		0.811+/-0.711	1.87+/-0.973	EMAP Louisiana Province 1991
10.7 +/-4.16	NE	Massachusetts Bay, MA	COA		High species richness (102+/-4.73 S/0.1 sq.m.)	Benthic species	VAR			Gilbert et al. 1976
11.1 +/-10.4	NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (55.0+/-19.5% mortality)	Streblospio benedicti (polychaete worm)		0.349+/-0.11	1.07+/-0.66	Hall et al. 1992
11.2 +/-9.01	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (7.2+/-1.92% mortality)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
11.2 +/-9.01	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.6+/-0.55% reburial)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
11.2 +/-9.01	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
11.2 +/-9.01	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
11.3 +/-8.2	NC	Southern California	COA		Moderate species richness (72+/-3.3 S/0.1 sq.m.)	Benthic species				Word & Mearns 1979 (As cited in L&M 1990)
11.7	NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.003 mg/day growth)	Lepidactylus dytiscus (amphipod)		1.38	3.25	Hall et al. 1992
11.7	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1% mortality)	Streblospio benedicti (polychaete worm)		1.38	3.25	Hall et al. 1992
11.7 +/-13.4	NE	Southern California	COA		High abundance (191+/-70.1 N/0.1 sq.m.)	Echinoderm				Word & Mearns 1979 (As cited in L&M 1990)
11.8 +/-7.96	NC	Galveston Bay, TX	COA		Low abundance (0.3+/-0.651 N/0.00203 sq.m.)	Amphipoda		0.859+/-0.487	7.67+/-8.12	Carr 1992
11.9 +/-8.63	NE	Galveston Bay, TX	COA		High abundance (27.3+/-10 N/0.00203 sq.m.)	Mollusca		1.64+/-0.4	1.39+/-0.17	Carr 1992
12.2 +/-2.72	SG	Chandeleur Sound, LA	COA		Significantly toxic (7.6+/-1.32% mortality)	Mysidopsis bahia (mysid shrimp)		0.624+/-0.197	2.07+/-1.19	EMAP Louisiana Province 1991
12.3 +/-3.92	*	Galveston Bay, TX	COA		Moderate abundance (58.3+/-16.2 N/0.00203 sq.m.)	Oligochaeta		0.632+/-0.274	7.93+/-5.6	Carr 1992
12.4	NE	Curtis Creek, Baltimore, MD	COA	10-d	Not significantly toxic (11.3% mortality)	Leptocheirus plumulosus (amphipod)	JUV			McGee et al. 1993
12.4 +/-13.2	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1.83+/-1.6% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
12.4 +/-13.2	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (3.5+/-1.87% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
12.4 +/-13.2	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (-0.057+/-0.04 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
12.4 +/-13.2	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.001mg/day growth)	Streblospio benedicti (polychaete worm)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
12.4 +/-9.3	NE	Southern California	COA		High abundance (148+/-58 N/0.1 sq.m.)	Arthropods				Word & Mearns 1979 (As cited in L&M 1990)
12.5 +/-9.6	NC	Southern California	COA		Moderate abundance (72.6+/-6.8 N/0.1 sq.m.)	Arthropods				Word & Mearns 1979 (As cited in L&M 1990)

Table 5. A summary of the available data on the biological effects associated with sediment-sorbed LEAD (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Lead Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
12.6 +/-10.0	NC	Southern California	COA		Moderate abundance (75.6+/-12.7 N/0.1 sq.m.)	Benthic species				Word & Mearns 1979 (As cited in L&M 1990)
12.6 +/-12.4	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (15.3+/-11.0% mortality)	Hyalella azteca (amphipod)	JUV	0.648+/-0.641	1.74+/-1.39	Hall et al. 1992
12.8 +/-3.66	NE	Chandeleur Sound, LA	COA	10-d	Not significantly toxic (2.87+/-4.05% mortality)	Ampelisca abdita (amphipod)		0.517+/-0.166	2.02+/-1.38	EMAP Louisiana Province 1991
12.8 +/-9.65	NC	Galveston Bay, TX	COA	48-h	Toxic (4.65+/-16.1% normal development)	Arbacia punctulata (sea urchin)	EMB	1.06+/-0.449	14.5+/-9.2	Carr 1992
12.9 +/-7.33	NE	Galveston Bay, TX	COA		High species richness (24.5+/-3.7 S/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
12.9 +/-7.33	NE	Galveston Bay, TX	COA		High abundance (359+/-92.8 N/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
13.2 +/-9.38	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (0.33+/-0.516% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
13.2 +/-9.38	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (2.33+/-1.03% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
13.2 +/-9.38	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.367+/-0.085 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
13.2 +/-9.38	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.0005 mg/day growth)	Streblospio benedicti (polychaete worm)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
13.3 +/-6.65	NE	Pensacola Naval Air Station, FL	COA	10-d	Not significantly toxic (0% mortality)	Crossostrea virginica (oyster)	ADT	2.5+/-2.83		Parrish 1988a
13.3 +/-6.65	NE	Pensacola Naval Air Station, FL	COA	10-d	Not significantly toxic (5+/-1.41% mortality)	Penaeus duorarum (pink shrimp)	ADT	2.5+/-2.83		Parrish 1988a
13.3 +/-6.65	NE	Pensacola Naval Air Station, FL	COA	10-d	Not significantly toxic (8% mortality)	Arenicola cristata (lugworm)	ADT	2.5+/-2.83		Parrish 1988a
13.5 +/-10.5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.003+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.316+/-0.120	2.13+/-2.46	Hall et al. 1992
13.5 +/-10.5	SG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29.8+/-11.1% mortality)	Streblospio benedicti (polychaete worm)		0.316+/-0.12	2.13+/-2.46	Hall et al. 1992
13.8 +/-8.13	SG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (55.0+/-22.6% mortality)	Hyalella azteca (amphipod)	JUV	0.338+/-0.133	2.9+/-3.11	Hall et al. 1992
13.8 +/-8.55	NE	Mississippi Sound, MS	COA		Not significantly toxic (0.789+/-1.59% mortality)	Mysidopsis bahia (mysid shrimp)		0.827+/-0.757	1.46+/-1.58	EMAP Louisiana Province 1991
14	NE	Massachusetts Bay, MA	COA		High density (4135 N/0.1 sq.m.)	Annelida	VAR			Gilbert et al. 1976
14 +/-9	NE	Fraser River Estuary, BC	COA		Sediments populated by feral clams	Macoma balthica (bivalve)		0.45		McGreer 1982
14.6 +/-13.4	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (8.8+/-7.12% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
14.6 +/-13.4	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (14+/-9.22% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
14.6 +/-13.4	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.005+/-0.0004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
14.6 +/-22.1	NE	Bayou Casotte, MS	COA	10-d	Not significantly toxic (5.3+/-3.06% mortality)	Penaeus duorarum (pink shrimp)	ADT	5.2+/-2.6		Parrish 1988b
14.6 +/-22.1	NE	Bayou Casotte, MS	COA	10-d	Not significantly toxic (8+/-6% mortality)	Arenicola cristata (lugworm)	ADT	5.2+/-2.6		Parrish 1988b
14.6 +/-22.1	NE	Bayou Casotte, MS	COA	10-d	Not significantly toxic (0% mortality)	Crossostrea virginica (oyster)	ADT	5.2+/-2.6		Parrish 1988b
15 +/-12.7	NE	Houston Ship Channel, TX	COA	10-d	Not significantly toxic (4.7+/-4.29% mortality)	Amphipod	ADT	0.144+/-0.123		Crocker et al. 1991
15.3 +/-26.7	NE	Galveston Bay, TX	COA	1-h	Not toxic (92.5+/-6.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	0.77+/-0.448	6.37+/-6.58	Carr 1992
15.7 +/-7.96	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.001+/-0.001 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.555+/-0.471	2.68+/-2.3	Hall et al. 1992
15.8 +/-7.07	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (5.8+/-3.7% mortality)	Rhepoxynius abronius (amphipod)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
15.8 +/-7.07	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (3.4+/-1.82% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
15.8 +/-7.07	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (11.2+/-3.7% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
15.8 +/-7.07	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (3.52+/-1.66% mortality)	Macoma nasuta (clam)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
16 +/- 4.36	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (6+/-2.35% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1983b
16 +/-4.36	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (2.6+/-2.97% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1983b
16 +/-4.36	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (1.8+/-1.79% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1983b
16.3 +/-10.3	NC	Galveston Bay, TX	COA	10-d	Significantly toxic (15.8+/-3.89% mortality)	Ampelisca abdita (amphipod)		0.647+/-0.606	0.160+/-0.184	EMAP Louisiana Province 1991
16.5 +/-0.849	NE	Mississippi River, MS, LA	COA	10-d	Not significantly toxic (7.8+/-1.63% mortality)	Ampelisca abdita (amphipod)		1.15+/-1.04	2.31+/-0.651	EMAP Louisiana Province 1991
16.5 +/-19.1	SG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (63.0+/-24.3% mortality)	Hyalella azteca (amphipod)	JUV	0.317+/-0.228	2.57+/-2.67	Hall et al. 1992
16.6 +/-23.7	NC	Southern California	COA		Low abundance (57.6+/-13.6 N/0.1 sq.m.)	Benthic species				Word & Mearns 1979 (As cited in L&M 1990)
16.6 +/-7.11	SG	Mississippi Sound, MS	COA		Significantly toxic (12.2+/-4.42% mortality)	Mysidopsis bahia (mysid shrimp)		0.939+/-0.335	2.63+/-2.3	EMAP Louisiana Province 1991
16.8 +/-26.3	SG	Galveston Bay, TX	COA		Low abundance (1.86+/-2.59 N/0.00203 sq.m.)	Mollusca		0.784+/-0.421	8.29+/-8.13	Carr 1992
16.8 +/-26.8	SG	Galveston Bay, TX	COA		Low species richness (10+/-3.73 S/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992

Table 5. A summary of the available data on the biological effects associated with sediment-sorbed LEAD (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Lead Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
16.8 +/-26.8	SG	Galveston Bay, TX	COA		Low abundance (89+/-60.7 N/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
16.8 +/-6.56	NE	Mississippi Sound, MS	COA	10-d	Not significantly toxic (1.4+/-1.73% mortality)	Ampelisca abdita (amphipod)		0.998+/-0.602	2.01+/-1.82	EMAP Louisiana Province 1991
17.2 +/-23.5	NE	Pascagoula Naval Station, MS	COA	10-d	Not significantly toxic (1+/-1.41% mortality)	Crossostrea virginica (oyster)	ADT	7.31+/-3.86		Parrish 1990
17.2 +/-23.5	NE	Pascagoula Naval Station, MS	COA	10-d	Not significantly toxic (4+/-2.83% mortality)	Penaeus duorarum (pink shrimp)	ADT	7.31+/-3.86		Parrish 1990
17.2 +/-23.5	NE	Pascagoula Naval Station, MS	COA	10-d	Not significantly toxic (5+/-1.41% mortality)	Nereis virens (polychaete)	ADT	7.31+/-3.86		Parrish 1990
17.2 +/-9.59	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (10.6+/-3.17% mortality)	Ampelisca abdita (amphipod)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
17.2 +/-9.59	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (8.00+/-2.92% mortality)	Mysidopsis bahia (mysid)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
17.3 +/-10.9	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (5.43+/-3.21% mortality)	Mysidopsis bahia (mysid)		1.21+/-1.13	9096+/-13378 ug/g	Windom In Prep
17.3 +/-29.8	NE	Galveston Bay, TX	COA	48-h	Not toxic (98.1+/-1.79% normal development)	Arbacia punctulata (sea urchin)	EMB	0.748+/-0.476	4.16+/-3.45	Carr 1992
17.4 +/-7.99	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (16.5+/-9.19% mortality)	Streblospio benedicti (polychaete worm)		0.783+/-0.845	4.83+/-2.23	Hall et al. 1992
17.5 +/-10.9	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (9.61+/-2.7% mortality)	Menidia beryllina (silverside)		1.22+/-1.13	9172+/-13363 ug/g	Windom In Prep
17.5 +/-7.59	NE	Galveston Bay, TX	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		0.934+/-0.657	0.457+/-0.530	EMAP Louisiana Province 1991
17.7 +/-9.72	SG	Galveston Bay, TX	COA	1-h	Toxic (20.4+/-18.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	1.26+/-0.47	14.6+/-10.1	Carr 1992
17.8 +/-3.59	NE	Matagorda Bay, TX	COA		Not significantly toxic (1.58+/-1.82% mortality)	Mysidopsis bahia (mysid shrimp)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
17.8 +/-3.59	NE	Matagorda Bay, TX	COA	10-d	Not significantly toxic (2.33+/-4.65% mortality)	Ampelisca abdita (amphipod)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
18 +/-8.72	NC	Chesapeake Bay, MD, VI; Delaware Bay, DE	COA		Significantly toxic (mean ET50; burrowing time 3.79+/-3.29 h)	Mya arenaria (clam)	1-2 cm			Phelps 1990
18.1 +/-10.5	NE	Houston Ship Channel, TX	COA	10-d	Not significantly toxic (5.4+/-3.6% mortality)	Amphipod	ADT	0.129+/-0.054		Crocker et al. 1991
18.2 +/-28.8	*	Galveston Bay, TX	COA		Low abundance (4.21+/-5.66 N/0.00203 sq.m.)	Oligochaeta		0.895+/-0.453	7.85+/-8.8	Carr 1992
18.9 +/-28.4	SG	Galveston Bay, TX	COA		Low abundance (41.7+/-21.8 N/0.00203 sq.m.)	Polychaeta		0.848+/-0.427	9.21+/-8.61	Carr 1992
19	SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (22.3% mortality)	Menidia beryllina (silverside)		1.71	6562 ug/g	Windom In Prep
19.1 +/-4.45	NE	Mississippi River, MS, LA	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		1.3+/-0.83	1.14+/-1	EMAP Louisiana Province 1991
19.2 +/-9.2	NE	Mobile Bay, AL	COA		Not significantly toxic (1.07+/-1.85% mortality)	Mysidopsis bahia (mysid shrimp)		0.968+/-0.815	8.23+/-3.4	EMAP Louisiana Province 1991
19.8 +/-2.66	NE	Galveston Harbor, TX	COA	10-d	Not toxic (2.4+/-1.52% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Grieco 1984
19.8 +/-2.66	NE	Galveston Harbor, TX	COA	10-d	Not toxic (0% mortality)	Mercenaria mercenaria (hard clams)	ADT			Grieco 1984
19.8 +/-2.66	NE	Galveston Harbor, TX	COA	10-d	Not toxic (2.8+/-2.17% mortality)	Nereis virens (sandworm)	ADT			Grieco 1984
19.8 +/-33.6	NE	Southern California	COA		High species richness (96.3+/-22.3 S/0.1 sq.m.)	Benthic species				Word & Mearns 1979 (As cited in L&M 1990)
20	NE	Palos Verdes, CA	COA		High abundance (208 N/0.1 sq.m.)	Echinoderms	VAR			Ferraro et al. 1991
20.2	SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (16% mortality)	Mysidopsis bahia (mysid)		1.8	7095 ug/g	Windom In Prep
20.8 +/-31.8	*	Galveston Bay, TX	COA		Low abundance (2.05+/-1.58 N/0.00203 sq.m.)	Copepoda		0.879+/-0.47	9.63+/-9.65	Carr 1992
21	NE	San Francisco Bay, CA	COA	48-h	Least toxic (17.3% mortality)	Mussel	LAR	1.25		Chapman et al. 1987a
21.7 +/-13.2	NE	Curtis Creek, Baltimore, MD	COA	20-d	Not significantly toxic (25.4+/-17.1% mortality)	Leptocheirus plumulosus (amphipod)	JUV			McGee et al. 1993
22.3 +/-13.1	NE	Houston Ship Channel, TX	COA	7-d	Not significantly toxic (7.5+/-5% mortality)	Sheepshead minnow	ADT	0.137+/-0.056		Crocker et al. 1991
23	*	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29% mortality)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
23	*	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (89.7% reburial)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
23	*	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
23	*	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	6.41	Hall et al. 1992
23.1 +/-8.46	*	Brunswick Harbor Entrance, GA	COA	48-h	Significantly toxic (14.6+/-18.9% normal development)	Arbacia punctulata (sea urchin)		1.99+/-0.562	14009+/-13434 ug/g	Windom In Prep
24 +/-9.16	NE	Galveston Bay, TX	COA	10-d	Not significantly toxic (1.35+/-1.45% mortality)	Ampelisca abdita (amphipod)		0.961+/-0.537	1.17+/-0.640	EMAP Louisiana Province 1991
24.2 +/-19.2	*	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (45.5+/-12% mortality)	Lepidactylus dytiscus (amphipod)		0.383+/-0.279	3.61+/-2.79	Hall et al. 1992
24.4 +/-2.26	NE	Mobile Bay, AL	COA	10-d	Not significantly toxic (0.5+/-0.778% mortality)	Ampelisca abdita (amphipod)		1.24+/-0.948	8.51+/-4.76	EMAP Louisiana Province 1991
24.6 +/-51.5	NE	Tampa Bay, FL	COA	10-d	Not significantly toxic (9.5+/-6.15% mortality)	Ampelisca abdita (amphipod)	SUBADT		1.56+/-2.73	Long 1993
25.2 +/-17.4	NE	San Francisco Bay, CA	COA	48-h	Least toxic (23.3+/-7.3% abnormal)	Bivalve	LAR			Long & Morgan 1990

Table 5. A summary of the available data on the biological effects associated with sediment-sorbed LEAD (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Lead Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
25.2 +/-63.6	NE	Tampa Bay, FL	COA		Not significantly toxic (EC50; 0.133+/-0.103 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)			1.23+/-1.96	Long 1993
25.4 +/-10.7	SG	Galveston Bay, TX	COA		Significantly toxic (13.4+/-9.11% mortality)	Mysidopsis bahia (mysid shrimp)		0.778+/-0.482	1.21+/-0.778	EMAP Louisiana Province 1991
26 +/-8.49	NE	Palos Verdes, CA	COA		High abundance (54.6+/-5.09 N/0.1 sq.m.)	Amphipods	VAR			Ferraro et al. 1991
26 +/-8.49	NE	Palos Verdes, CA	COA		High abundance (30.7+/-0.99 N/0.1 sq.m.)	Phoxocephalids	VAR			Ferraro et al. 1991
26.4 +/-13.2	SG	Mississippi River, MS, LA	COA		Significantly toxic (32.9+/-36.4% mortality)	Mysidopsis bahia (mysid shrimp)		1.07+/-0.924	1.41+/-1.93	EMAP Louisiana Province 1991
26.4 +/-22.9	NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (9+/-1.73% mortality)	Nereis virens (polychaetes)	ADT			EG&G Bionomics 1980
26.4 +/-22.9	NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (13+/- 3.61% mortality)	Penaeus duorarum (pink shrimp)	ADT			EG&G Bionomics 1980
26.4 +/-22.9	NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (11.3+/-3.21% mortality)	Crassostrea virginica (oyster)	ADT			EG&G Bionomics 1980
26.9 +/-14.6	NC	Tampa Bay, FL	COA	48-h	Significantly toxic (48.1+/-1.91% mortality)	Mulinaria lateralis (coot clam)	LAR		2.82+/-2.65	Long 1993
27 +/-5.79	SG	San Francisco Bay, CA	COA	48-h	Moderately toxic (57.1+/-13.6% mortality)	Mussel	LAR	1.14+/-.33		Chapman et al. 1987a
27	NE	Palos Verdes, CA	COA		High density (4.4 N/0.1 sq.m.)	Echinoderm		0.9		Swartz et al. 1985a
27	NE	Palos Verdes, CA	COA		High density (88 N/0.1 sq.m.)	Foraminifera (sponge)		0.9		Swartz et al. 1985a
27	NE	Palos Verdes, CA	COA		High density (132 N/0.1 sq.m.)	Ophiuroidea (brittle star)		0.9		Swartz et al. 1985a
27.1 +/-1.7	NE	Duwamish River, WA	COA	96-h	Not toxic (0-10% mortality)	Palaemonetes pugio (shrimp)				Lee & Mariani 1977
28 +/-24	*	Jetty Island Pier, Everett Marina, WA	COA	10-d	Toxic (19.5+/-0.707% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.15+/-0.071		Hart Crowser & Associates Inc. 1986
28.3 +/-5.12	NE	San Francisco Bay, CA	COA	4-wk	Least toxic (116+/-4.3 young produced)	Tigriopus californicus (copepod)	ADT	1.23+/-.09		Chapman et al. 1987a
29 +/-9.55	SG	Mississippi River, MS, LA	COA	10-d	Significantly toxic (15.9+/-6.65% mortality)	Ampelisca abdita (amphipod)		1.22+/-0.717	0.235+/-0.276	EMAP Louisiana Province 1991
29.3 +/-10.1	NE	San Francisco Bay, CA	COA	48-h	Least toxic (18+/-8.01% abnormal)	Mussel	LAR	1.2+/-.38		Chapman et al. 1987a
30	NE	Burrard Inlet, BC	SQO		Sediment Quality Objectives	Aquatic biota				Swain & Nijman 1991
30	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (3% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
30	NE	Sidney Tar Pond, NS	COA	10-d	Not significantly toxic (3% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
30.2		***TEL***								
30.8 +/-15.2	NE	Massachusetts Bay, MA	COA		High density (201+/-33.4 N/0.1 sq.m.)	Mollusca	VAR			Gilbert et al. 1976
32 +/-2.83	SG	Houston Ship Channel, TX	COA	10-d	Significantly toxic (22.7+/-0.778% mortality)	Amphipod	ADT	0.248+/-0.132		Crocker et al. 1991
32	*	Strait of Georgia, BC	COA	48-h	Significant increase in burrowing time	Macoma balthica (bivalve)		1.13		McGreer 1979
33	*	United States	EqPA		EPA Chronic Marine EP Threshold	Aquatic biota		1		Lyman et al. 1987
33	*	United States	EqPA		Chronic Marine EqP Threshold	Aquatic biota		1		Bolton et al. 1985
33	NC	Puget Sound, WA	COA	10-d	Significantly toxic (56% mortality)	Panope generosa (geoduck)	JUV	2.1		Pastorok & Becker 1990
33	NE	Puget Sound, WA	SBA		EPA/ACOE Puget Sound Interim Criteria	Aquatic biota				USACOE 1988
33.7 +/-8.18	NE	Puget Sound, WA	COA	15-min	Not significantly toxic (EC50; 0.283+/-0.168% extract)	Microtox (Photobacterium phosphoreum)		1.39+/-0.37		Pastorok & Becker 1990
36 +/-11.3	SG	San Francisco Bay, CA	COA	48-h	Moderately toxic (25.1+/-6.61% abnormal)	Mussel	LAR	1.26+/-0.17		Chapman et al. 1987a
37.8	*	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (82.9% reburial)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
37.8	*	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>20% emergence)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
37.8	*	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	5.58	Hall et al. 1992
37.8	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.016 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
38.4 +/-21.1	NE	Howe Sound, BC	COA	10-d	Not toxic (10.5+/-4.09% mortality)	Rhepoxynius abronius (amphipod)	ADT	3.4+/-4.39		McLeay et al. 1991
38.4 +/-21.1	NE	Howe Sound, BC	COA	10-d	Not toxic (5.83+/-5.48% emergence)	Rhepoxynius abronius (amphipod)	ADT	3.4+/-4.39		McLeay et al. 1991
38.4 +/-21.1	NE	Howe Sound, BC	COA	10-d	Not toxic (96.3+/-4.19% reburial)	Rhepoxynius abronius (amphipod)	ADT	3.4+/-4.39		McLeay et al. 1991
38.7 +/-34	NE	San Francisco Bay, CA	COA	10-d	Least toxic (13.6+/-7.76% mortality)	Amphipod	ADT	1.4 +/- 0.79		Chapman et al. 1987a
39 +/-10.3	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (25.9+/-5.01% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.21+/-0.444	2.41+/-2.32	Bricker et al. 1993
40 +/-31.7	NE	San Francisco Bay, CA	COA	10-d	Least Toxic (4.63+/-2.91% avoidance)	Amphipod	ADT	1.44+/-.74		Chapman et al. 1987a
40	NE	Sidney Tar Pond, NS	COA	10-d	Not significantly toxic (4% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990

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Lead Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
40.5 +/-26.4	NC	Massachusetts Bay, MA	COA		Low density (7.14+/-4.23 N/0.1 sq.m.)	Rhynchocoela	VAR			Gilbert et al. 1976
40.6 +/-7.24	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-7.99% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.14+/-0.352	6.09+/-5.38	Bricker et al. 1993
41 +/-8.72	NE	Palos Verdes, CA	COA		High density (20.9+/-0.23 N/0.1 sq.m.)	Amphipod		1.7+/-0.61		Swartz et al. 1986
41 +/-8.72	NE	Palos Verdes, CA	COA		High density (11.2+/-1.64 N/0.1 sq.m.)	Phoxocephalid		1.7+/-0.61		Swartz et al. 1986
41	*	Northern California	AETA		Northern California AET Values	Benthic species				Becker et al. 1990
41.3 +/-25.5	*	Massachusetts Bay, MA	COA		Low density (1316+/-768 N/0.1 sq.m.)	Annelida	VAR			Gilbert et al. 1976
41.3 +/-8.3	*	Los Angeles, CA	COA	96-h	Highly toxic (>50% mortality)	Palaemonetes pugio (shrimp)				Lee & Mariani 1977
41.6 +/-25.9	*	Massachusetts Bay, MA	COA		Low density (2.76+/-2.7 N/0.1 sq.m.)	Echinodermata	VAR			Gilbert et al. 1976
41.8 +/-10.9	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.125+/-0.084 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.25+/-0.468	1.98+/-2.25	Bricker et al. 1993
41.8 +/-26.9	SG	Massachusetts Bay, MA	COA		Low density (39.1+/-30.8 N/0.1 sq.m.)	Mollusca	VAR			Gilbert et al. 1976
42.1 +/-26.5	*	San Francisco Bay, CA	COA	10-d	Moderately toxic (33.8+/-4.7% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
42.4 +/-25.7	*	Massachusetts Bay, MA	COA		Low density (61.1+/-36.6 N/0.1 sq.m.)	Arthropoda	VAR			Gilbert et al. 1976
43.1 +/-25.7	*	Massachusetts Bay, MA	COA		Low species richness (57.2+/-12.2 S/0.1 sq.m.)	Benthic species	VAR			Gilbert et al. 1976
43.1 +/-33.4	NE	San Francisco Bay, CA	COA	48-h	Not significantly toxic (31.9+/-15.5% abnormal)	Bivalve	LAR			Long & Morgan 1990
44 +/-19.8	NE	Sidney Tar Pond, NS	COA	20-d	Not significantly toxic (8+/-5.66% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
45.7 +/-59.0	NE	Southern California	COA	10-d	Not significantly toxic (23.2% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
45.9 +/-17.8	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.074+/-0.043 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.27+/-0.626	6.21+/-5.41	Bricker et al. 1993
47	NE	Palos Verdes, CA	COA		High density (93.4 N/0.1 sq.m.)	Echinoderm		1.3+/-0.77		Swartz et al. 1986
48 +/-103	*	Southern California	COA		Low abundance (35.3+/-15.8 N/0.1 sq.m.)	Arthropods				Word & Mearns 1979 (As cited in L&M 1990)
48.1 +/-24.6	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (6.48+/-10.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
48.1 +/-24.6	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99+/-0.862% normal development)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
49.2 +/-54.5	NE	Narragansett Bay, RI	COA	10-d	Not significantly toxic (5.28+/-3.04% mortality)	Ampelisca abdita (amphipod)	ADT			Munns et al. 1991
49.4 +/-20.6	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99.3+/-0.827% normal development)	Mulinia lateralis (bivalve)	LAR	1.43+/-0.738	14.7+/-24	Bricker et al. 1993
50 +/-25	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.096+/-0.101 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.37+/-0.759	6.93+/-6.83	Bricker et al. 1993
<=50	*	San Francisco Bay, CA	SQAV	SQTA	Significantly Toxic Triad Minimum Bioeffects	Benthic species				Chapman et al. 1987b
51 +/-111	*	Southern California	COA		Low species richness (51.2+/-8.6 S/0.1 sq.m.)	Benthic species				Word & Mearns 1979 (As cited in L&M 1990)
51 +/-34	NE	San Francisco Bay, CA	COA	10-d	Least toxic (18+/-6.6% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
51.1 +/-18.3	NE	Palos Verdes, CA	COA		High species richness (70.9+/-16.9 S/0.1 sq.m.)	Benthic species	VAR			Ferraro et al. 1991
52	NE	Massachusetts Bay, MA	COA		High density (22 N/0.1 sq.m.)	Rhynchocoela	VAR			Gilbert et al. 1976
52.1 +/-21.7	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (12.3+/-14.5% mortality)	Mulinia lateralis (bivalve)	LAR	1.53+/-0.743	15.7+/-23.2	Bricker et al. 1993
54.4 +/-35.5	NE	San Francisco Bay, CA	COA	10-d	Not significantly toxic (18.4+/-6.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
55.5 +/-146	NE	Chesapeake Bay, MD, VI; Delaware Bay, DE	COA		Not significantly toxic (mean ET50; burrowing time 0.76+/-0.266 h)	Mya arenaria (clam)	1-2 cm			Phelps 1990
56.1 +/-23.7	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (30.5+/-16.4% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.62+/-0.777	17.7+/-26.3	Bricker et al. 1993
56.7 +/-1.53	NE	Palos Verdes, CA	COA		High abundance (944+/-101 N/0.1 sq.m.)	Benthic species	VAR			Ferraro et al. 1991
58	SG	Sidney Tar Pond, NS	COA	10-d	Significantly toxic (100% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
58	SG	Sidney Tar Pond, NS	COA	10-d	Significantly toxic (100% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
58.3 +/-60.9	SG	San Francisco Bay, CA	COA	10-d	Significantly toxic (42.9+/-19.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
58.9 +/-63.4	*	San Francisco Bay, CA	COA	48-h	Significantly toxic (55.7+/-22.7% abnormal)	Bivalve	LAR			Long & Morgan 1990
59.1 +/-8.8	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (19.3+/-5.86% mortality)	Ampelisca abidta (amphipod)	SUB ADT	1.82+/-0.225	6.3+/-6.2	Bricker et al. 1993
59.3 +/-35.2	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (23.3+/-6.14% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.738		Word et al. 1988
61.3 +/-32.8	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (10.4+/-6.3% mortality)	Nephtys caecoides (polychaete)		1.63+/-0.657		Word et al. 1988
61.3 +/-32.8	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (0.2+/-0.6% mortality)	Macoma nasuta (clam)		1.63+/-0.657		Word et al. 1988

Table 5. A summary of the available data on the biological effects associated with sediment-sorbed LEAD (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Lead Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
61.6 +/-15.6	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.061+/-0.038 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.8+/-0.477	8.52+/-10.7	Bricker et al. 1993
61.6 +/-50.8	NE	Curtis Creek, Baltimore, MD	COA	10-d	Not significantly toxic (15+/-7.21% mortality)	Hyalella azteca (amphipod)	JUV			McGee et al. 1993
61.8 +/-61.7	NE	Black Rock Beach, NS	COA	10-d	Not toxic (6.67+/-4.51% mortality)	Corophium volutator (amphipod)	ADT/JUV	0.24+/-0.18		Nicol & Doe 1990
61.8 +/-61.7	NE	Black Rock Beach, NS	COA	10-d	Not toxic (2.33+/-1.53% mortality)	Rhepoxynius abronius (amphipod)	ADT/JUV	0.24+/-0.18		Nicol & Doe 1990
61.8 +/-61.7	NE	Black Rock Beach, NS	COA	10-d	Not toxic (100% reburial)	Rhepoxynius abronius (amphipod)	ADT/JUV	0.24+/-0.18		Nicol & Doe 1990
62.4 +/- 60.5	NE	Miami River/Seybold Canal, FL	COA	10-d	Not significantly toxic (6.7+/-2.31% mortality)	Pennaeus aztecus aztecus (brown shrimp)	ADT			Vittor & Associates 1988
62.6 +/-36.6	NE	Palos Verdes, CA	COA	10-d	Not significantly toxic (11.9+/-5.36% mortality)	Rhepoxynius abronius (amphipod)	VAR			Ferraro et al. 1991
63 +/-46.6	SG	San Francisco Bay, CA	COA	10-d	Moderately toxic (28.3+/-7.51% mortality)	Amphipod	ADT	2.01+/-.98		Chapman et al. 1987a
63.4 +/-63.0	*	San Francisco Bay, CA	COA	48-h	Moderately toxic (59.4+/-11.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
64 +/-118.0	*	Southern California	COA		Low abundance (6.1+/-7.2 N/0.1 sq.m.)	Echinoderm				Word & Mearns 1979 (As cited in L&M 1990)
64.2 +/-14.5	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (39.5+/-18.2% mortality)	Ampelisca abidta (amphipod)	SUB ADT	2.06+/-0.523	20.1+/-13.9	Bricker et al. 1993
64.8 +/-40.6	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.167+/-0.198 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.59+/-1.09	4.67+/-6.99	Bricker et al. 1993
65.2 +/-44.6	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-6.07% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.71+/-0.9	15.3+/-23.2	Bricker et al. 1993
66	NE	Puget Sound, WA	AETA		PSDDA Screening level concentration	Aquatic biota				USACOE 1988
66.2 +/-48.0	SG	Palos Verdes, CA	COA		Low abundance (415+/-94.4 N/0.1 sq.m.)	Benthic species	VAR			Ferraro et al. 1991
66.5 +/-13	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.5+/-11.4% mortality)	Mulinia lateralis (bivalve)	LAR	2.33+/-0.364	26.8+/-9.42	Bricker et al. 1993
67.8 +/-14.7	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.3+/-2.22% normal development)	Mulinia lateralis (bivalve)	LAR	2.18+/-0.531	19.1+/-12.5	Bricker et al. 1993
68.7 +/-34.9	*	Palos Verdes, CA	COA		Low abundance (2.4+/-5.65 N/0.1 sq.m.)	Echinoderms	VAR			Ferraro et al. 1991
69.3 +/-57	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (51.3+/-6.95% mortality)	Mulinia lateralis (bivalve)	LAR	1.8+/-1.71	29.6+/-46.3	Bricker et al. 1993
69.5 +/-22.4	SG	Oakland Harbor, CA	COA	10-d	Significantly toxic (35.3+/-2.5% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.56+/-0.07		Word et al. 1988
70.1 +/-53.7	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.008+/-0.001 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.19+/-1.27	12+/-11.3	Bricker et al. 1993
70.8 +/-18.7	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (15.2+/-9.21% mortality)	Mulinia lateralis (bivalve)	LAR	2.17+/-0.663	18.4+/-19.9	Bricker et al. 1993
71	*	California	AETA	48-h	California AET Values	Mytilus edulis (bivalve)	LAR			Becker et al. 1990
72.1 +/-42.4	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (17+/-16.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.99+/-1	21.6+/-24.5	Bricker et al. 1993
73.1 +/-42.5	SG	Southern California	COA	10-d	Significantly toxicity (51.7% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
73.4 +/-34.2	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.016+/-0.007 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.26+/-0.936	43.4+/-35.6	Bricker et al. 1993
73.6 +/-102	*	Tampa Bay, FL	COA	1-h	Most toxic (1.96+/-3.19% fertilization)	Arbacia punctulata (sea urchin)	GAM		3.95+/-5.94	Long 1993
74	*	Strait of Georgia, BC	COA	24-h	Significantly toxic (avoidance)	Macoma balthica (bivalve)		3.09		McGreer 1979
74.5 +/-16.1	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.014+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.51+/-0.45	29.6+/-15.7	Bricker et al. 1993
74.8 +/-33.9	*	Palos Verdes, CA	COA		Low abundance (13.8+/-11.4 N/0.1 sq.m.)	Amphipods	VAR			Ferraro et al. 1991
74.8 +/-33.9	*	Palos Verdes, CA	COA		Low abundance (5.87+/-7.06 N/0.1 sq.m.)	Phoxocephalids	VAR			Ferraro et al. 1991
77.6 +/-75.4	NE	Commencement Bay, WA	COA	10-d	Least toxic (12.5+/-4.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
78 +/-64.1	NE	Palos Verdes, CA	COA		High species richness (80.8+/-13.7 S/0.1 sq.m.)	Macro benthos		2.10+/-1.15		Swartz et al. 1985a
78 +/-64.1	NE	Palos Verdes, CA	COA		High density (54.5+/-9.91 N/0.1 sq.m.)	Amphipod		2.1+/-1.15		Swartz et al. 1985a
78 +/-64.1	NE	Palos Verdes, CA	COA		High density (34.3+/-5.67 N/0.1 sq.m.)	Phoxocephalid		2.1+/-1.15		Swartz et al. 1985a
78 +/-64.1	NE	Palos Verdes, CA	COA		High density (111+/-32 N/0.1 sq.m.)	Crustacea		2.1+/-1.15		Swartz et al. 1985a
79.3 +/-32.8	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (96+/-1.66% normal development)	Mulinia lateralis (bivalve)	LAR	2.52+/-0.997	35+/-42.9	Bricker et al. 1993
80.1 +/-39.6	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (21.5+/-6.36% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.35+/-1.05	10.5+/-13.4	Bricker et al. 1993
81.7 +/-49.3	*	Fraser River Estuary, BC	COA		Sediments devoid of feral clams	Macoma balthica (bivalve)		1.95		McGreer 1982
81.8 +/-52.3	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.1+/-2.78% normal development)	Mulinia lateralis (bivalve)	LAR	2.12+/-1.04	22.9+/-23.7	Bricker et al. 1993
84.4 +/-88.6	NE	Galveston Bay, TX	COA		High Abundance (6+/-1.41 N/0.00203 sq.m.)	Amphipoda		0.955+/-0.629	7.21+/-8.2	Carr 1992
86.6 +/-34.9	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (91.5+/-7.28% normal development)	Mulinia lateralis (bivalve)	LAR	2.6+/-0.899	36.8+/-34.9	Bricker et al. 1993

Table 5. A summary of the available data on the biological effects associated with sediment-sorbed LEAD (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Lead Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
87.2 +/-53.9	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (34.9+/-15.7% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.23+/-1.04	25.4+/-25.5	Bricker et al. 1993
88.9 +/-43.6	NE	Burrard Inlet, BC	COA	10-d	Not toxic (5.21+/-3.61% emergence)	Corophium volutator (amphipod)	ADT	3.18+/-2.1		McLeay et al. 1991
89.6	*	Black Rock Harbor, CT	COA	14-d	Significantly toxic (100% mortality)	Nereis virens (sandworm)				Simmers et al. 1984
90.3 +/-78.4	NE	Puget Sound, WA	COA	20-d	Not significantly toxic (5+/-3.86% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.46+/-0.26		Pastorok & Becker 1990
91.5 +/-42.5	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (88.5+/-8.39% normal development)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.05	38.1+/-38.9	Bricker et al. 1993
94.9 +/-154	NE	Southern California	COA		High abundance (88.9+/-35.4 N/0.1 sq.m.)	Benthic species				Word & Mearns 1979 (As cited in L&M 1990)
95.8 +/-92.7	*	San Francisco Bay, CA	COA	10-d	Highly toxic (67+/-11.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
96.8 +/-83.7	NE	Miami River/Seybold Canal, FL	COA	10-d	Not significantly toxic (2.3+/-1.51% mortality)	Mercenaria mercenaria (atlantic quahog)	ADT			Vittor & Associates 1988
96.8 +/-83.7	NE	Miami River/Seybold Canal, FL	COA	10-d	Not significantly toxic (7.7+/-3.02% mortality)	Nereis virens (sandworm)	ADT			Vittor & Associates 1988
97.7 +/-42.6	NE	Burrard Inlet, BC	COA	10-d	Not toxic (4.5+/-3.02% emergence)	Rhepoxynius abronius (amphipod)	ADT	2.66+/-2.15		McLeay et al. 1991
101 +/-12.3	NE	Bayou La Batre, AB	COA	10-d	Not significantly toxic (46.7+/-11.4% mortality)	Nereis virens (polychaete)	ADT			Parrish 1987a
101 +/-12.3	NE	Bayou La Batre, AB	COA	10-d	Not significantly toxic (5.3+/-2.31% mortality)	Crossostrea virginica (oyster)	ADT			Parrish 1987a
101 +/-12.3	NE	Bayou La Batre, AB	COA	10-d	Not significantly toxic (14+/-9.17% mortality)	Penaeus duorarum (pink shrimp)	ADT			Parrish 1987a
101 +/-67.9	NE	Palos Verdes, CA	COA	10-d	Not significantly toxic (9.5+/-5.45% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.42+/-0.88		Swartz et al. 1986
105 +/-173	NE	Commencement Bay, WA	COA	48-h	Least toxic (15.1+/-3.1% abnormality)	Oyster	LAR			Tetra Tech 1985
105 +/-86.9	*	San Francisco Bay, CA	COA	48-h	Highly toxic (92.4+/-4.5% abnormal)	Bivalve	LAR			Long & Morgan 1990
108 +/-104	*	Tampa Bay, FL	COA		Significantly toxic (EC50; 0.021+/-0.012 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)			6.13+/-8.06	Long 1993
108 +/-52	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.013+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.79+/-0.744	37.6+/-25.3	Bricker et al. 1993
109 +/-52.4	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (29.8+/-13.9% mortality)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.07	32.1+/-28.4	Bricker et al. 1993
111 +/-70	*	Palos Verdes, CA	COA		Low density (0.2+/-0.14 N/0.1 sq.m.)	Echinoderm		2.64+/-0.77		Swartz et al. 1986
112		***PEL***								
113 +/-123	*	Commencement Bay, WA	COA	48-h	Moderately toxic (23+/-2.3% abnormality)	Oyster	LAR			Tetra Tech 1985
114 +/-63.2	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.1+/-13.3% mortality)	Mulinia lateralis (bivalve)	LAR	2.68+/-0.955	31.8+/-24.4	Bricker et al. 1993
114 +/-86.9	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (23+/-4.24% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.46+/-1.22	40+/-55.1	Bricker et al. 1993
116 +/-140	NE	Tampa Bay, FL	COA	48-h	Not significantly toxic (38.5+/-2.9% mortality)	Mulinaria lateralis (coot clam)	LAR		2.64+/-3.04	Long 1993
120	*	San Francisco Bay, CA	AETA	10-d	San Francisco Bay AET	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
120	*	Northern California	AETA	10-d	Northern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
120	NC	Puget Sound, WA	COA	2-d	Significantly toxic (3.8% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.5		Pastorok & Becker 1990
122 +/-102	NE	Palos Verdes, CA	COA		High density (594+/-688 N/0.1 sq.m.)	Mollusca		2.53+/-1.27		Swartz et al. 1985a
122 +/-102	NE	Palos Verdes, CA	COA	10-d	Not significantly toxic (8+/-5.7% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.53+/-1.27		Swartz et al. 1985a
123 +/-13.8	NE	Stamford, CT	COA	96-h	Not toxic (10% mortality)	Palaemonetes pugio (shrimp)				Lee & Mariani 1977
123 +/-98.9	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (6.8+/-7.31% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
123 +/-98.9	NE	Halifax Harbour, NS	COA	20-d	Not significantly toxic (0.7+/-1.63% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
124 +/-74.7	NE	Burrard Inlet, BC	COA	10-d	Not toxic (8.9+/-2.99% mortality)	Corophium volutator (amphipod)	ADT	2.8+/-1.96		McLeay et al. 1991
124 +/-74.7	NE	Burrard Inlet, BC	COA	10-d	Not toxic (97.2+/-2.84% reburial)	Rhepoxynius abronius (amphipod)	ADT	2.8+/-1.96		McLeay et al. 1991
124 +/-97.1	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (8.5+/-6.06% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
129 +/-56.2	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (96.6+/-3.79% normal development)	Mulinia lateralis (bivalve)	LAR	2.87+/-0.94	35.1+/-25.9	Bricker et al. 1993
129 +/-87.8	*	San Francisco Bay, CA	COA	48-h	Highly toxic (92.3+/-5.5% mortality)	Mussel	LAR	2.87+/-1.32		Chapman et al. 1987a
129 +/-87.8	*	San Francisco Bay, CA	COA	4-wk	Moderately toxic (94.9+/-10.1 young produced)	Tigriopus californicus (copepod)	ADT	2.87+/-1.07		Chapman et al. 1987a
130 +/-55.3	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (38+/-13% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.92+/-0.937	34.6+/-23.9	Bricker et al. 1993
=130	*	San Francisco Bay, CA	SQAV	SQTA	Significantly Toxic Triad Significant Bioeffects	Benthic species				Chapman et al. 1987b
131 +/- 102	*	Miami River/Seybold Canal, FL	COA	10-d	Significantly toxic (24.7+/-15% mortality)	Pennaeus aztecus (brown shrimp)	ADT			Vittor & Associates 1988

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131 +/-155	NC	Puget Sound, WA	COA	2-d	Significantly toxic (60.4+/-46.5% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.57+/-0.287		Pastorok & Becker 1990
132 +/-80.4	NE	Burrard Inlet, BC	COA	10-d	Not toxic (7.9+/-5.12% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.64+/-2.14		McLeay et al. 1991
137 +/-124	*	Curtis Creek, Baltimore, MD	COA	10-d	Significantly toxic (82.8+/-22.2% mortality)	Leptocheirus plumulosus (amphipod)	JUV			McGee et al. 1993
140 +/-183	NC	Puget Sound, WA	COA	10-d	Significantly toxic (80.8+/-30.6% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.266		Pastorok & Becker 1990
140	*	San Francisco Bay, CA	AETA	48-h	San Francisco Bay AET	Oyster; mussel	LAR			Long & Morgan 1990
142 +/-158	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (13.8+/-4.09% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.47+/-0.306		Pastorok & Becker 1990
143	*	Palos Verdes, CA	COA		Low species richness (19.2 S/0.1 sq.m.)	Benthic species	VAR			Ferraro et al. 1991
145 +/-132	NE	Hudson-Raritan Bay, NY	COA	14-d	Not toxic (increased growth rate)	Chromadorina germanica (nematode)				Tietjen & Lee 1984
149 +/-165	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (4.43+/-2.1% mortality)	Panope generosa (geoduck)	JUV	1.51+/-0.261		Pastorok & Becker 1990
149 +/-44.5	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.011+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.28+/-0.363	45.3+/-21.4	Bricker et al. 1993
150	*	California	AETA		California AET Values	Benthic species				Becker et al. 1990
150	*	Southern California	AETA		Southern California AET Values	Benthic species				Becker et al. 1990
150	NE	Palos Verdes, CA	COA		High density (2177 N/0.1 sq.m.)	Polychaeta		3.2		Swartz et al. 1985a
157 +/-187	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (6.67+/-8.07% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.51+/-0.330		Pastorok & Becker 1990
159 +/-177	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (2.09+/-1.73% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.56+/-0.329		Pastorok & Becker 1990
160 +/-28.8	*	Palos Verdes, CA	COA		Low density (5.3+/-3.7 N/0.1 sq.m.)	Amphipod		3.13+/-0.15		Swartz et al. 1986
160 +/-28.8	*	Palos Verdes, CA	COA		Low density (0.13+/-0.23 N/0.1 sq.m.)	Phoxocephalid		3.13+/-0.15		Swartz et al. 1986
167 +/-122	*	Tampa Bay, FL	COA	10-d	Significantly toxic (32.1+/-16.9% mortality)	Ampelisca abdita (amphipod)	SUBADT		7.63+/-9.44	Long 1993
168 +/-172	*	Puget Sound, WA	COA	15-min	Significantly toxic (EC50; 0.065+/-0.043% extract)	Microtox (Photobacterium phosphoreum)		1.58+/-0.255		Pastorok & Becker 1990
168 +/-43.2	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (75.1+/-10.6% mortality)	Mulinia lateralis (bivalve)	LAR	3.32+/-0.317	42.3+/-19.2	Bricker et al. 1993
169	*	San Francisco Bay, CA	COA	48-h	Highly toxic (66.8% abnormal)	Mussel	LAR	3.59		Chapman et al. 1987a
170 +/-102	NE	Pascagoula Mississippi Channel, MS	COA	10-d	Not significantly toxic (5.6+/-2.2% mortality)	Arenicola cristata (lugworm)	ADT			Parrish 1987c
170 +/-102	NE	Pascagoula Mississippi Channel, MS	COA	10-d	Not significantly toxic (6.5+/-5.14% mortality)	Penaeus duorarum (pink shrimp)	ADT			Parrish 1987c
170 +/-102	NE	Pascagoula Mississippi Channel, MS	COA	10-d	Not significantly toxic (0.7+/-0.82% mortality)	Crossostrea virginica (oyster)	ADT			Parrish 1987c
171 +/-192	*	Commencement Bay, WA	COA	10-d	Moderately toxic (26+/-5.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
172 +/-125	*	Curtis Creek, Baltimore, MD	COA	20-d	Significantly toxic (94.6+/-9.35% mortality)	Leptocheirus plumulosus (amphipod)	JUV			McGee et al. 1993
179 +/-120	NE	Halifax Harbour, NS	COA	20-d	Not significantly toxic (1+/-2% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
182 +/-116	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (5.2+/-3.5% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
205	NE	Sidney Tar Pond, NS	COA	20-d	Significantly toxic (52% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
212 +/-135	SG	Palos Verdes, CA	COA		Low density (365+/-178 N/0.1 sq.m.)	Polychaeta		3.15+/-1.32		Swartz et al. 1985a
213 +/-131	NE	Baltimore Harbor, MD	COA	48-h	Least toxic; TLm	Fundulus heteroclitus (mummichog)				Tsai et al. 1979
213 +/-131	NE	Baltimore Harbor, MD	COA	48-h	Least toxic; TLm	Leiostomus xanthurus (spot)				Tsai et al. 1979
223	*	San Francisco Bay, CA	COA	10-d	Most toxic (95% mortality)	Amphipod	ADT	4.03		Chapman et al. 1987a
223	*	San Francisco Bay, CA	COA	10-d	Highly toxic (37% avoidance)	Amphipod	ADT	4.03		Chapman et al. 1987a
229 +/-83.1	*	Halifax Harbour, NS	COA	10-d	Significantly toxic (61.7+/-12.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
233 +/-108	*	Palos Verdes, CA	COA		Low density (0.03+/-0.08 N/0.1 sq.m.)	Echinoderm		3.53+/-0.742		Swartz et al. 1985a
233 +/-108	*	Palos Verdes, CA	COA		Low density (0.233+/-0.367 N/0.1 sq.m.)	Foraminifera (sponge)		3.53+/-0.742		Swartz et al. 1985a
233 +/-108	*	Palos Verdes, CA	COA		Low density (0.3+/-0.8 N/0.1 sq.m.)	Ophiuroidea (brittle star)		3.53+/-0.742		Swartz et al. 1985a
255	*	Burrard Inlet, BC	COA	10-d	Highly toxic (23% emergence)	Corophium volutator (amphipod)	ADT	3.5		McLeay et al. 1991
255	*	Burrard Inlet, BC	COA	10-d	Highly toxic (30.5% emergence)	Rhepoxynius abronius (amphipod)	ADT	3.5		McLeay et al. 1991
277 +/-11	NE	Norwalk River, CT	COA	96-h	Not toxic (0% mortality)	Palaemonetes pugio (shrimp)				Lee & Mariani 1977
297 +/-35.6	*	Palos Verdes, CA	COA		Low species richness (26.0+/-11.5 S/0.1 sq.m.)	Macro benthos		3.95+/-0.238		Swartz et al. 1985a

Table 5. A summary of the available data on the biological effects associated with sediment-sorbed LEAD (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Lead	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
297	+/-35.6	*	Palos Verdes, CA	COA		Low density (1.0+/-1.2 N/0.1 sq.m.)	Amphipod		3.95+/-0.238		Swartz et al. 1985a
297	+/-35.6	*	Palos Verdes, CA	COA		Low density (0 N/0.1 sq.m.)	Phoxocephalid		3.95+/-0.238		Swartz et al. 1985a
297	+/-35.6	*	Palos Verdes, CA	COA		Low density (8.7+/-6.01 N/0.1 sq.m.)	Crustacea		3.95+/-0.238		Swartz et al. 1985a
300		*	Puget Sound, WA	AETA		1986 Puget Sound AET	Benthic species		15		Bellar et al. 1986
312	+/-23.2	*	Palos Verdes, CA	COA		Low density (21.5+/-11.6 N/0.1 sq.m.)	Mollusca		4+/-0.265		Swartz et al. 1985a
312	+/-23.2	*	Palos Verdes, CA	COA	10-d	Significantly toxic (21+/-6.3% mortality)	Rhepoxynius abronius (amphipod)	ADT	4+/-0.265		Swartz et al. 1985a
314		*	Curtis Creek, Baltimore, MD	COA	10-d	Significantly toxic (55% mortality)	Hyalella azteca (amphipod)	JUV			McGee et al. 1993
321	+/-195	*	Hudson-Raritan Bay, NY	COA	14-d	Significantly toxic (reduced growth rate)	Chromadorina germanica (nematode)				Tietjen & Lee 1984
>340		-	California	AETA	10-d	California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
>340		-	Southern California	AETA	10-d	Southern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
344	+/-270	*	Puget Sound, WA	COA	20-d	Significantly toxic (37.3+/-22% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.87+/-0.208		Pastorok & Becker 1990
450		*	Puget Sound, WA	AETA		1988 Puget Sound AET	Benthic community				PTI 1988
450		*	Puget Sound, WA	SQG		Chemical Criteria	Benthic community		1		WDE 1989
512	+/-231	*	Baltimore Harbor, MD	COA	48-h	Most toxic; TLm	Fundulus heteroclitus (mummichog)				Tsai et al. 1979
512	+/-231	*	Baltimore Harbor, MD	COA	48-h	Most toxic; TLm	Leiostomus xanthurus (spot)				Tsai et al. 1979
530		*	Puget Sound, WA	AETA	15-min	1988 Puget Sound AET	Microtox (Photobacterium phosphoreum)				PTI 1988
530		*	Puget Sound, WA	AETA	15-min	1986 Puget Sound AET	Microtox (Photobacterium phosphoreum)		15		Bellar et al. 1986
561	+/-637	NE	Miami River, FL	COA	10-d	Not toxic (18.6+/-7.27% mortality)	Pennaeus aztecus aztecus (brown shrimp)	ADT			ERCO 1985
561	+/-637	NE	Miami River, FL	COA	10-d	Not toxic (1.2+/-.837% mortality)	Mercenaria mercenaria (atlantic quahog)	ADT			ERCO 1985
561	+/-637	NE	Miami River, FL	COA	10-d	Not toxic (3.6+/-1.67% mortality)	Nereis virens (sandworm)	ADT			ERCO 1985
570	+/-1489	*	Commencement Bay, WA	COA	48-h	Highly toxic (44.5+/-19% abnormality)	Oyster	LAR			Tetra Tech 1985
660		*	Puget Sound, WA	AETA	48-h	1988 Puget Sound AET	Crassostrea gigas (oyster)	LAR			PTI 1988
660		*	Puget Sound, WA	AETA	10-d	1988 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT			PTI 1988
660		*	Puget Sound, WA	AETA		PSDDA Maximum Level Criteria	Aquatic biota				USACOE 1988
660		*	Puget Sound, WA	AETA	48-h	1986 Puget Sound AET	Crassostrea gigas (oyster)	LAR	15		Bellar et al. 1986
700		*	Puget Sound, WA	AETA	10-d	1986 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT	15		Bellar et al. 1986
840		*	United States	EqPA		EPA Acute Marine EP Threshold	Aquatic biota		1		Lyman et al. 1987
1613	+/-2628	*	Commencement Bay, WA	COA	10-d	Highly toxic (78.5+/-19.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985

Table 6. A summary of the available data on the biological effects associated with sediment-sorbed MERCURY (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Mercury Std Dev		Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.003		NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.003 mg/day growth)	Lepidactylus dytiscus (amphipod)		1.38	3.25	Hall et al. 1992
0.003		NC	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (22% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
0.003		NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (28% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
0.003		NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.003 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
0.003		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1% mortality)	Streblospio benedicti (polychaete worm)		1.38	3.25	Hall et al. 1992
0.004		NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (18% mortality)	Ampelisca abdita (amphipod)		0.028	9 ug/g	Windom In Prep
0.004		NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (0% mortality)	Arbacia punctulata (sea urchin)		0.03	19 ug/g	Windom In Prep
0.005		NE	Massachusetts Bay, MA	COA		High density (24 N/0.1 sq.m.)	Echinodermata	VAR			Gilbert et al. 1976
0.005	+/-0.003	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (27.5+/-10.6% mortality)	Mysidopsis bahia (mysid)		0.237+/-0.311	74.6+/-85.5 ug/g	Windom In Prep
0.005	+/-0.004	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (15.3+/-11.0% mortality)	Hyalella azteca (amphipod)	JUV	0.648+/-0.641	1.74+/-1.39	Hall et al. 1992
0.007	+/-0.006	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (16.5+/-9.19% mortality)	Streblospio benedicti (polychaete worm)		0.783+/-0.845	4.83+/-2.23	Hall et al. 1992
0.007	+/-0.008	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (9.78+/-5.33% mortality)	Mysidopsis bahia (mysid)		0.24+/-0.247	91.9+/-73.4 ug/g	Windom In Prep
0.008	+/-0.008	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (11.6+/-4.33% mortality)	Ampelisca abdita (amphipod)		0.267+/-0.25	102+/-71.1 ug/g	Windom In Prep
0.008	+/-0.008	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (4+/-2.83% mortality)	Menidia beryllina (silverside)		0.243+/-0.264	90.5+/-78.4 ug/g	Windom In Prep
0.008	+/-0.009	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (91.3+/-2.91% normal development)	Arbacia punctulata (sea urchin)		0.299+/-0.251	114+/-68.4 ug/g	Windom In Prep
0.009	+/-0.009	*	Savannah River Entrance Channel, GA	COA	48-h	Significantly toxic (25.4+/-7.66% mortality)	Arbacia punctulata (sea urchin)		0.344+/-0.242	129.5+/-59.3 ug/g	Windom In Prep
0.01		*	United States	EqPA		EPA Chronic Marine EP Threshold	Aquatic biota		1		Lyman et al. 1987
0.01		NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
0.01	+/-0.004	NE	Brunswick Harbor Entrance, GA	COA	48-h	Not significantly toxic (86.6+/-4.25% normal development)	Arbacia punctulata (sea urchin)		0.181+/-0.162	182+/-208 ug/g	Windom In Prep
0.01	+/-0.01	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (7.2+/-1.92% mortality)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
0.01	+/-0.01	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.6+/-0.55% reburial)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
0.01	+/-0.01	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
0.01	+/-0.01	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
0.01	+/-0.01	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.001+/-0.001 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.555+/-0.471	2.68+/-2.3	Hall et al. 1992
0.01	+/-0.05	NE	Fraser River Estuary, BC	COA		Sediments populated by feral clams	Macoma balthica (bivalve)		0.45		McGreer 1982
0.011	+/-0.009	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (0.33+/-0.516% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
0.011	+/-0.009	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (2.33+/-1.03% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
0.011	+/-0.009	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.367+/-0.085 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
0.011	+/-0.009	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.0005 mg/day growth)	Streblospio benedicti (polychaete worm)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
0.011	+/-0.014	*	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (28.3+/-6.11% mortality)	Mysidopsis bahia (mysid)		0.246+/-0.051	127+/-24 ug/g	Windom In Prep
0.011		SG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29% mortality)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
0.011		SG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (89.7% reburial)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
0.011		SG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
0.011		SG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	6.41	Hall et al. 1992
0.012	+/-0.004	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (5.43+/-3.21% mortality)	Mysidopsis bahia (mysid)		1.21+/-1.13	9096+/-13378 ug/g	Windom In Prep
0.012	+/-0.009	*	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29.8+/-11.1% mortality)	Streblospio benedicti (polychaete worm)		0.316+/-0.12	2.13+/-2.46	Hall et al. 1992
0.012	+/-0.009	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.003+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.316+/-0.120	2.13+/-2.46	Hall et al. 1992
0.013	+/-0.01	SG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (55.0+/-19.5% mortality)	Streblospio benedicti (polychaete worm)		0.349+/-0.11	1.07+/-0.66	Hall et al. 1992
0.014	+/-0.012	NE	Massachusetts Bay, MA	COA		High density (299+/-40.3 N/0.1 sq.m.)	Arthropoda	VAR			Gilbert et al. 1976
0.015	+/-0.011	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (10.6+/-3.17% mortality)	Ampelisca abdita (amphipod)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep

Table 6. A summary of the available data on the biological effects associated with sediment-sorbed MERCURY (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Mercury Std Dev		Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.015	+/-0.011	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (8.00+/-2.92% mortality)	Mysidopsis bahia (mysid)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
0.016	+/-0.009	*	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (55.0+/-22.6% mortality)	Hyalella azteca (amphipod)	JUV	0.338+/-0.133	2.9+/-3.11	Hall et al. 1992
0.016	+/-0.013	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (9.61+/-2.7% mortality)	Menidia beryllina (silverside)		1.22+/-1.13	9172+/-13363 ug/g	Windom In Prep
0.019	+/-0.014	*	Brunswick Harbor Entrance, GA	COA	48-h	Significantly toxic (14.6+/-18.9% normal development)	Arbacia punctulata (sea urchin)		1.99+/-0.562	14009+/-13434 ug/g	Windom In Prep
0.019	+/-0.016	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (9.25+/-5.32% mortality)	Lepidactylus dytiscus (amphipod)		0.638+/-0.768	1.65+/-1.62	Hall et al. 1992
0.02		SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (22.3% mortality)	Menidia beryllina (silverside)		1.71	6562 ug/g	Windom In Prep
0.021	+/-0.017	NC	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (63.0+/-24.3% mortality)	Hyalella azteca (amphipod)	JUV	0.317+/-0.228	2.57+/-2.67	Hall et al. 1992
0.022	+/-0.014	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1.83+/-1.6% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
0.022	+/-0.014	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (3.5+/-1.87% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
0.022	+/-0.014	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.001mg/day growth)	Streblospio benedicti (polychaete worm)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
0.022	+/-0.014	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (-0.057+/-0.04 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
0.022	+/-0.016	NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.008+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.4	Hall et al. 1992
0.022	+/-0.016	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.1+/-0.865% reburial)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
0.022	+/-0.016	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<20% emergence)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
0.022	+/-0.016	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
0.024	+/-0.014	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (22.3+/-7.37% mortality)	Hyalella azteca (amphipod)	JUV	0.788+/-0.866	2.04+/-1.75	Hall et al. 1992
0.024		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.016 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
0.024		SG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (82.9% reburial)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
0.024		SG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>20% emergence)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
0.024		SG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	5.58	Hall et al. 1992
0.025		NE	Charleston Harbor, SC	COA		High species richness (14.9+/-2.04; SRUs)	Benthic species				Winn et al. 1989
0.025		NE	Charleston Harbor, SC	COA		High diversity (4.15+/-0.59; SDUs)	Benthic species				Winn et al. 1989
0.025		NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (3% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
0.025		NE	Sidney Tar Pond, NS	COA	10-d	Not significantly toxic (4% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
0.025		NG	Charleston Harbor, SC	COA		Moderate species richness (9.05+/-1.33; SRUs)	Benthic species				Winn et al. 1989
0.025		NG	Charleston Harbor, SC	COA		Low species richness (5.16; SRUs)	Benthic species				Winn et al. 1989
0.025		NG	Charleston Harbor, SC	COA		Moderate diversity (2.3+/-0.2; SDUs)	Benthic species				Winn et al. 1989
0.025		NG	Charleston Harbor, SC	COA		Low diversity (1.16; SDUs)	Benthic species				Winn et al. 1989
0.026	+/-0.011	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (8.8+/-7.12% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
0.026	+/-0.011	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (14+/-9.22% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
0.026	+/-0.011	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.005+/-0.0004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
0.028	+/-0.027	NE	Massachusetts Bay, MA	COA		High species richness (102+/-4.73 S/0.1 sq.m.)	Benthic species	VAR			Gilbert et al. 1976
0.03		NE	Newport, RI	COA	96-h	Not toxic (0% mortality)	Palaemonetes pugio (shrimp)				Lee & Mariani 1977
0.03	+/-.008	SG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (45.5+/-12% mortality)	Lepidactylus dytiscus (amphipod)		0.383+/-0.279	3.61+/-2.79	Hall et al. 1992
0.039	+/-0.01	NE	Gulf of Mexico	COA	10-d	Not toxic (0.36+/-0.261% emergence/d)	Rhepoxynius abronius (amphipod)	ADT	0.42+/-0.13		Chapman et al. 1991
0.04		NE	Sidney Tar Pond, NS	COA	10-d	Not significantly toxic (3% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
0.043		*	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (16% mortality)	Mysidopsis bahia (mysid)		1.8	7095 ug/g	Windom In Prep
0.044	+/-0.019	NE	Gulf of Mexico	COA	10-d	Not significantly toxic (9+/-3.96% mortality)	Rhepoxynius abronius (amphipod)	ADT	0.471+/-0.18		Chapman et al. 1991
0.045	+/-0.031	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (5.8+/-3.7% mortality)	Rhepoxynius abronius (amphipod)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
0.045	+/-0.031	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (3.4+/-1.82% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992

Table 6. A summary of the available data on the biological effects associated with sediment-sorbed MERCURY (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Mercury Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.045 +/-0.031	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (11.2+/-3.7% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
0.045 +/-0.031	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (3.52+/-1.66% mortality)	Macoma nasuta (clam)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
0.048 +/-0.029	NE	Gulf of Mexico	COA	48-h	Not significantly toxic (7.76+/-1.89% abnormality)	Crassostrea gigas (oyster)	LAR	0.425+/-0.128		Chapman et al. 1991
0.05	NE	Galveston Harbor, TX	COA	10-d	Not toxic (2.4+/-1.52% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Grieco 1984
0.05	NE	Galveston Harbor, TX	COA	10-d	Not toxic (0% mortality)	Mercenaria mercenaria (hard clams)	ADT			Grieco 1984
0.05	NE	Galveston Harbor, TX	COA	10-d	Not toxic (2.8+/-2.17% mortality)	Nereis virens (sandworm)	ADT			Grieco 1984
0.05	NE	Freeport Harbor, TX	COA	10-d	Not toxic (2+/-1% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1985b
0.05	NE	Freeport Harbor, TX	COA	10-d	Not toxic (9.6+/-4.22% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1985b
0.05	NE	Freeport Harbor, TX	COA	10-d	Not toxic (0% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1985b
0.05	NE	Matagorda Ship Channel, TX	COA	10-d	Not toxic (7.2+/-2.77% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1985a
0.05	NE	Matagorda Ship Channel, TX	COA	10-d	Not toxic (10.6+/-5.18% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1985a
0.05	NE	Matagorda Ship Channel, TX	COA	10-d	Not toxic (0.2+/-0.447% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1985a
0.05	NE	Houston Ship Channel, TX	COA		Not significantly toxic (15+/-13.2% mortality)	Sheepshead minnow	ADT	0.05+/-0.0242		Crocker et al. 1991
0.05	NE	Galveston Bay, TX	COA	1-h	Not toxic (92.5+/-6.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	0.77+/-0.448	6.37+/-6.58	Carr 1992
0.05	NE	Galveston Bay, TX	COA	48-h	Not toxic (98.1+/-1.79% normal development)	Arbacia punctulata (sea urchin)	EMB	0.748+/-0.476	4.16+/-3.45	Carr 1992
0.05	NE	Galveston Bay, TX	COA		High species richness (24.5+/-3.7 S/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
0.05	NE	Galveston Bay, TX	COA		High abundance (359+/-92.8 N/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
0.05	NE	Galveston Bay, TX	COA		High abundance (156+/-22.9 N/0.00203 sq.m.)	Polychaeta		0.916+/-0.661	2.94+/-2.3	Carr 1992
0.05	NE	Galveston Bay, TX	COA		High abundance (155+/-49.5 N/0.00203 sq.m.)	Oligochaeta		1.2+/-1.27	4.27+/-3.85	Carr 1992
0.05	NE	Galveston Bay, TX	COA		High abundance (27.3+/-10 N/0.00203 sq.m.)	Mollusca		1.64+/-0.4	1.39+/-0.17	Carr 1992
0.05	NE	Galveston Bay, TX	COA		High Abundance (6+/-1.41 N/0.00203 sq.m.)	Amphipoda		0.955+/-0.629	7.21+/-8.2	Carr 1992
0.05	NE	Curtis Creek, Baltimore, MD	COA	10-d	Not significantly toxic (11.3% mortality)	Leptocheirus plumulosus (amphipod)	JUV			McGee et al. 1993
0.05	NE	Curtis Creek, Baltimore, MD	COA	20-d	Not significantly toxic (25.4+/-17.1% mortality)	Leptocheirus plumulosus (amphipod)	JUV			McGee et al. 1993
0.05	NE	Galveston Bay, TX	COA		Low species (11.2+/-1.94 S/0.00203 sq.m.)	Benthic species		0.642+/-0.356	13.4+/-8.65	Carr 1992
0.05	NE	Galveston Bay, TX	COA		High abundance (154+/-30.2 N/0.00203 sq.m.)	Benthic invertebrates		0.47+/-0.27	9.07+/-2.94	Carr 1992
0.05	NG	Galveston Bay, TX	COA		Moderate abundance (58.3+/-16.2 N/0.00203 sq.m.)	Oligochaeta		0.632+/-0.274	7.93+/-5.6	Carr 1992
0.05	NG	Galveston Bay, TX	COA		Low abundance (53+/-33.9 N/0.00203 sq.m.)	Benthic invertebrates		0.985+/-0.247	22+/-11.2	Carr 1992
0.05 +/-0.06	NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (9+/-1.73% mortality)	Nereis virens (polychaetes)	ADT			EG&G Bionomics 1980
0.05 +/-0.06	NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (13+/- 3.61% mortality)	Penaeus duorarum (pink shrimp)	ADT			EG&G Bionomics 1980
0.05 +/-0.06	NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (11.3+/-3.21% mortality)	Crassostrea virginica (oyster)	ADT			EG&G Bionomics 1980
0.051 +/-0.027	NE	Gulf of Mexico	COA		Least toxic (6.32+/-3.68 TU/g)	Microtox (Photobacterium phosphoreum)		0.47+/-0.149		Chapman et al. 1991
0.052 +/-0.029	NE	Gulf of Mexico	COA	48-h	Not toxic (4.54+/-5.37% mortality)	Crassostrea gigas (oyster)	LAR	0.443+/-0.127		Chapman et al. 1991
0.053 +/-0.039	NE	Sidney Tar Pond, NS	COA	20-d	Not significantly toxic (8+/-5.66% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
0.057	NE	Massachusetts Bay, MA	COA		High density (4135 N/0.1 sq.m.)	Annelida	VAR			Gilbert et al. 1976
0.057 +/-0.026	NE	Galveston Bay, TX	COA		High abundance (16.2+/-6.19 N/0.00203 sq.m.)	Copepoda		0.844+/-0.524	4.73+/-3.1	Carr 1992
0.059 +/-0.038	NE	Gulf of Mexico	COA		Not toxic (3.21+/-0.239 diversity index)	Benthic species		0.464+/-0.143		Chapman et al. 1991
0.06 +/-0.05	SG	Galveston Bay, TX	COA		Low abundance (1.86+/-2.59 N/0.00203 sq.m.)	Mollusca		0.784+/-0.421	8.29+/-8.13	Carr 1992
0.063 +/-0.046	SG	Galveston Bay, TX	COA		Low abundance (0.3+/-0.651 N/0.00203 sq.m.)	Amphipoda		0.859+/-0.487	7.67+/-8.12	Carr 1992
0.064 +/-0.047	SG	Galveston Bay, TX	COA		Low species richness (10+/-3.73 S/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
0.064 +/-0.047	SG	Galveston Bay, TX	COA		Low abundance (89+/-60.7 N/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992

Table 6. A summary of the available data on the biological effects associated with sediment-sorbed MERCURY (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Mercury Std Dev		Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.066	+/-0.054	SG	Galveston Bay, TX	COA		Low abundance (2.05+/-1.58 N/0.00203 sq.m.)	Copepoda		0.879+/-0.47	9.63+/-9.65	Carr 1992
0.067	+/-0.051	SG	Galveston Bay, TX	COA		Low abundance (4.21+/-5.66 N/0.00203 sq.m.)	Oligochaeta		0.895+/-0.453	7.85+/-8.8	Carr 1992
0.067	+/-0.051	SG	Galveston Bay, TX	COA		Low abundance (41.7+/-21.8 N/0.00203 sq.m.)	Polychaeta		0.848+/-0.427	9.21+/-8.61	Carr 1992
0.071	+/-0.054	SG	Gulf of Mexico	COA	48-h	Highly toxic (59.4+/-15.5% mortality)	Crassostrea gigas (oyster)	LAR	0.5+/-0.18		Chapman et al. 1991
0.072	+/-0.204	NE	Narragansett Bay, RI	COA	10-d	Not significantly toxic (5.28+/-3.04% mortality)	Ampelisca abdita (amphipod)	ADT			Munns et al. 1991
0.076	+/-0.046	SG	Gulf of Mexico	COA	10-d	Highly toxic (2.5+/-1.05% emergence/d)	Rhepoxynius abronius (amphipod)	ADT	0.5+/-0.155		Chapman et al. 1991
0.08		*	Sidney Tar Pond, NS	COA	10-d	Significantly toxic (100% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
0.08		*	Sidney Tar Pond, NS	COA	10-d	Significantly toxic (100% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
0.083	+/-0.069	SG	Galveston Bay, TX	COA	48-h	Toxic (4.65+/-16.1% normal development)	Arbacia punctulata (sea urchin)	EMB	1.06+/-0.449	14.5+/-9.2	Carr 1992
0.087	+/-0.051	SG	Gulf of Mexico	COA	10-d	Significantly toxic (41.75+/-38.9% mortality)	Rhepoxynius abronius (amphipod)	ADT	0.45+/-0.058		Chapman et al. 1991
0.088	+/-0.075	NE	Curtis Creek, Baltimore, MD	COA	10-d	Not significantly toxic (15+/-7.21% mortality)	Hyalella azteca (amphipod)	JUV			McGee et al. 1993
0.089	+/-0.049	SG	Gulf of Mexico	COA	48-h	Significantly toxic (32.6+/-14.2% abnormality)	Crassostrea gigas (oyster)	LAR	0.567+/-0.153		Chapman et al. 1991
0.093	+/-0.045	NE	Houston Ship Channel, TX	COA	10-d	Not significantly toxic (5.4+/-3.6% mortality)	Amphipod	ADT	0.129+/-0.054		Crocker et al. 1991
0.094	+/-0.028	NE	Massachusetts Bay, MA	COA		High density (201+/-33.4 N/0.1 sq.m.)	Mollusca	VAR			Gilbert et al. 1976
0.1		NE	Duwamish River, WA	COA	96-h	Not toxic (0-10% mortality)	Palaemonetes pugio (shrimp)				Lee & Mariani 1977
0.1		NE	Jetty Island Pier, Everett Marina, WA	COA	10-d	Not toxic (12.3+/-2.87% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.08+/-0.66		Hart Crowser & Associates Inc. 1986
0.1	+/-0.083	NE	Houston Ship Channel, TX	COA	10-d	Not significantly toxic (4.7+/-4.29% mortality)	Amphipod	ADT	0.144+/-0.123		Crocker et al. 1991
0.103	+/-0.092	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (6+/-2.35% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1983b
0.103	+/-0.092	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (2.6+/-2.97% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1983b
0.103	+/-0.092	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (1.8+/-1.79% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1983b
0.117	+/-0.088	*	Galveston Bay, TX	COA	1-h	Toxic (20.4+/-18.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	1.26+/-0.47	14.6+/-10.1	Carr 1992
0.124	+/-0.087	*	Massachusetts Bay, MA	COA		Low density (1316+/-768 N/0.1 sq.m.)	Annelida	VAR			Gilbert et al. 1976
0.130			***TEL***								
0.136	+/-0.103	NC	Massachusetts Bay, MA	COA		Low density (7.14+/-4.23 N/0.1 sq.m.)	Rhynchocoela	VAR			Gilbert et al. 1976
0.137	+/-0.06	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (25.9+/-5.01% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.21+/-0.444	2.41+/-2.32	Bricker et al. 1993
0.144	+/-0.105	*	Massachusetts Bay, MA	COA		Low density (2.76+/-2.7 N/0.1 sq.m.)	Echinodermata	VAR			Gilbert et al. 1976
0.145		*	Gulf of Mexico	COA		Most toxic (100 TU/g)	Microtox (Photobacterium phosphoreum)		0.4		Chapman et al. 1991
0.145	+/-0.11	SG	Massachusetts Bay, MA	COA		Low density (39.1+/-30.8 N/0.1 sq.m.)	Mollusca	VAR			Gilbert et al. 1976
0.147	+/-0.105	*	Massachusetts Bay, MA	COA		Low density (61.1+/-36.6 N/0.1 sq.m.)	Arthropoda	VAR			Gilbert et al. 1976
0.148	+/-0.118	*	Curtis Creek, Baltimore, MD	COA	10-d	Significantly toxic (82.8+/-22.2% mortality)	Leptocheirus plumulosus (amphipod)	JUV			McGee et al. 1993
0.149	+/-0.105	*	Massachusetts Bay, MA	COA		Low species richness (57.2+/-12.2 S/0.1 sq.m.)	Benthic species	VAR			Gilbert et al. 1976
0.15		*	United States	EqPA		EPA Acute Marine EP Threshold	Aquatic biota		1		Lyman et al. 1987
0.15		*	Los Angeles, CA	COA	96-h	Highly toxic (>50% mortality)	Palaemonetes pugio (shrimp)				Lee & Mariani 1977
0.15		NE	Puget Sound, WA	SBA		EPA/ACOE Puget Sound Interim Criteria	Aquatic biota				USACOE 1988
0.15		NE	Burrard Inlet, BC	SQO		Sediment Quality Objectives	Aquatic biota				Swain & Nijman 1991
0.152	+/-0.061	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.125+/-0.084 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.25+/-0.468	1.98+/-2.25	Bricker et al. 1993
0.16	+/-0.004	NE	Stamford, CT	COA	96-h	Not toxic (10% mortality)	Palaemonetes pugio (shrimp)				Lee & Mariani 1977
0.162	+/-0.033	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-7.99% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.14+/-0.352	6.09+/-5.38	Bricker et al. 1993
0.174	+/-0.105	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (6.48+/-10.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
0.174	+/-0.105	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99+/-0.862% normal development)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993

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Mercury Std Dev		Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.18		*	Strait of Georgia, BC	COA	48-h	Significant increase in burrowing time	Macoma balthica (bivalve)		1.13		McGreer 1979
0.18	+/-0.121	*	Curtis Creek, Baltimore, MD	COA	20-d	Significantly toxic (94.6+/-9.35% mortality)	Leptocheirus plumulosus (amphipod)	JUV			McGee et al. 1993
0.181	+/-0.09	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.074+/-0.043 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.27+/-0.626	6.21+/-5.41	Bricker et al. 1993
0.2		*	United States	EqPA		Chronic Marine EqP Threshold	Aquatic biota		1		Bolton et al. 1985
0.2	+/-0.1	NE	Commencement Bay, WA	COA	48-h	Least toxic (15.1+/-3.1% abnormality)	Oyster	LAR			Tetra Tech 1985
0.2	+/-0.1	NE	Commencement Bay, WA	COA	10-d	Least toxic (12.5+/-4.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
0.2	+/-0.1	NG	Commencement Bay, WA	COA	48-h	Moderately toxic (23+/-2.3% abnormality)	Oyster	LAR			Tetra Tech 1985
0.208	+/-0.161	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.096+/-0.101 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.37+/-0.759	6.93+/-6.83	Bricker et al. 1993
0.21		NE	Puget Sound, WA	AETA		PSDDA Screening level concentration	Aquatic biota				USACOE 1988
0.213	+/-0.197	NE	Houston Ship Channel, TX	COA	7-d	Not significantly toxic (7.5+/-5% mortality)	Sheepshead minnow	ADT	0.137+/-0.056		Crocker et al. 1991
0.223	+/-0.086	NE	Puget Sound, WA	COA	15-min	Not significantly toxic (EC50; 0.283+/-0.168% extract)	Microtox (Photobacterium phosphoreum)		1.39+/-0.37		Pastorok & Becker 1990
0.229	+/-0.052	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (19.3+/-5.86% mortality)	Ampelisca abidta (amphipod)	SUB ADT	1.82+/-0.225	6.3+/-6.2	Bricker et al. 1993
0.24		NE	San Francisco Bay, CA	COA	48-h	Least toxic (17.3% mortality)	Mussel	LAR	1.25		Chapman et al. 1987a
0.24	+/-0.09	NG	San Francisco Bay, CA	COA	48-h	Moderately toxic (57.1+/-13.6% mortality)	Mussel	LAR	1.14+/-.33		Chapman et al. 1987a
0.247	+/-0.242	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99.3+/-0.827% normal development)	Mulinia lateralis (bivalve)	LAR	1.43+/-0.738	14.7+/-24	Bricker et al. 1993
0.25	+/-0.069	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (96+/-1.66% normal development)	Mulinia lateralis (bivalve)	LAR	2.52+/-0.997	35+/-42.9	Bricker et al. 1993
0.252	+/-0.088	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.061+/-0.038 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.8+/-0.477	8.52+/-10.7	Bricker et al. 1993
0.254	+/-0.221	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.008+/-0.001 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.19+/-1.27	12+/-11.3	Bricker et al. 1993
0.256	+/-0.089	NE	San Francisco Bay, CA	COA	48-h	Least toxic (18+/-8.01% abnormal)	Mussel	LAR	1.2+/-.38		Chapman et al. 1987a
0.258	+/-0.079	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (39.5+/-18.2% mortality)	Ampelisca abidta (amphipod)	SUB ADT	2.06+/-0.523	20.1+/-13.9	Bricker et al. 1993
0.26	+/-0.04	NE	San Francisco Bay, CA	COA	4-wk	Least toxic (116+/-4.3 young produced)	Tigriopus californicus (copepod)	ADT	1.23+/-.09		Chapman et al. 1987a
0.263	+/-0.073	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.5+/-11.4% mortality)	Mulinia lateralis (bivalve)	LAR	2.33+/-0.364	26.8+/-9.42	Bricker et al. 1993
0.264	+/-0.239	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (12.3+/-14.5% mortality)	Mulinia lateralis (bivalve)	LAR	1.53+/-0.743	15.7+/-23.2	Bricker et al. 1993
0.274	+/-0.073	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (15.2+/-9.21% mortality)	Mulinia lateralis (bivalve)	LAR	2.17+/-0.663	18.4+/-19.9	Bricker et al. 1993
0.274	+/-0.073	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.3+/-2.22% normal development)	Mulinia lateralis (bivalve)	LAR	2.18+/-0.531	19.1+/-12.5	Bricker et al. 1993
0.283	+/-0.058	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.014+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.51+/-0.45	29.6+/-15.7	Bricker et al. 1993
0.283	+/-0.103	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (6.67+/-8.07% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.51+/-0.330		Pastorok & Becker 1990
0.29		*	Curtis Creek, Baltimore, MD	COA	10-d	Significantly toxic (55% mortality)	Hyalella azteca (amphipod)	JUV			McGee et al. 1993
0.29	+/-0.08	SG	San Francisco Bay, CA	COA	48-h	Moderately toxic (25.1+/-6.61% abnormal)	Mussel	LAR	1.26+/-0.17		Chapman et al. 1987a
0.294	+/-0.269	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (30.5+/-16.4% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.62+/-0.777	17.7+/-26.3	Bricker et al. 1993
0.3	+/-0.1	NG	Southern California	COA	10-d	Significantly toxicity (51.7% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
0.3	+/-0.2	NE	San Francisco Bay, CA	COA	48-h	Least toxic (23.3+/-7.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
0.3	+/-0.2	NG	Commencement Bay, WA	COA	10-d	Moderately toxic (26+/-5.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
0.3	+/-0.283	*	Houston Ship Channel, TX	COA	10-d	Significantly toxic (22.7+/-0.778% mortality)	Amphipod	ADT	0.248+/-0.132		Crocker et al. 1991
0.3	+/-0.34	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (51.3+/-6.95% mortality)	Mulinia lateralis (bivalve)	LAR	1.8+/-1.71	29.6+/-46.3	Bricker et al. 1993
0.304	+/-0.15	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (21.5+/-6.36% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.35+/-1.05	10.5+/-13.4	Bricker et al. 1993
0.304	+/-0.314	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-6.07% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.71+/-0.9	15.3+/-23.2	Bricker et al. 1993
0.31	+/-0.03	NE	Norwalk River, CT	COA	96-h	Not toxic (0% mortality)	Palaemonetes pugio (shrimp)				Lee & Mariani 1977
0.312	+/-0.314	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.167+/-0.198 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.59+/-1.09	4.67+/-6.99	Bricker et al. 1993
0.32		NC	Puget Sound, WA	COA	2-d	Significantly toxic (3.8% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.5		Pastorok & Becker 1990

Table 6. A summary of the available data on the biological effects associated with sediment-sorbed MERCURY (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Mercury Std Dev		Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.34	+/-0.02	NE	Southern California	COA	10-d	Not significantly toxic (23.2% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
0.341		NE	Massachusetts Bay, MA	COA		High density (22 N/0.1 sq.m.)	Rhynchocoela	VAR			Gilbert et al. 1976
0.35		NC	Puget Sound, WA	COA	10-d	Significantly toxic (56% mortality)	Panope generosa (geoduck)	JUV	2.1		Pastorok & Becker 1990
0.35	+/-0.251	NE	Miami River/Seybold Canal, FL	COA	10-d	Not significantly toxic (6.7+/-2.31% mortality)	Pennaeus aztecus aztecus (brown shrimp)	ADT			Vittor & Associates 1988
0.362	+/-0.321	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (17+/-16.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.99+/-1	21.6+/-24.5	Bricker et al. 1993
0.363	+/-0.195	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (91.5+/-7.28% normal development)	Mulinia lateralis (bivalve)	LAR	2.6+/-0.899	36.8+/-34.9	Bricker et al. 1993
0.37	+/-0.34	NE	San Francisco Bay, CA	COA	10-d	Least Toxic (4.63+/-2.91% avoidance)	Amphipod	ADT	1.44+/-.74		Chapman et al. 1987a
0.37	+/-0.37	NE	San Francisco Bay, CA	COA	10-d	Least toxic (13.6+/-7.76% mortality)	Amphipod	ADT	1.4 +/- 0.79		Chapman et al. 1987a
0.38	+/-0.1	NE	Baltimore Harbor, MD	COA	48-h	Least toxic; TLm	Fundulus heteroclitus (mummichog)				Tsai et al. 1979
0.38	+/-0.1	NE	Baltimore Harbor, MD	COA	48-h	Least toxic; TLm	Leiostomus xanthurus (spot)				Tsai et al. 1979
0.4		*	Sidney Tar Pond, NS	COA	20-d	Significantly toxic (52% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
0.4	+/-0.283	*	Jetty Island Pier, Everett Marina, WA	COA	10-d	Toxic (19.5+/-0.707% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.15+/-0.071		Hart Crowser & Associates Inc. 1986
0.41		*	Puget Sound, WA	AETA	15-min	1988 Puget Sound AET	Microtox (Photobacterium phosphoreum)				PTI 1988
0.41		*	Puget Sound, WA	AETA	15-min	1986 Puget Sound AET	Microtox (Photobacterium phosphoreum)		15		Bellar et al. 1986
0.41		*	Puget Sound, WA	SQG		Chemical Criteria	Benthic community		1		WDE 1989
0.42	+/-0.179	NE	Miami River/Seybold Canal, FL	COA	10-d	Not significantly toxic (2.3+/-1.51% mortality)	Mercenaria mercenaria (atlantic quahog)	ADT			Vittor & Associates 1988
0.42	+/-0.179	NE	Miami River/Seybold Canal, FL	COA	10-d	Not significantly toxic (7.7+/-3.02% mortality)	Nereis virens (sandworm)	ADT			Vittor & Associates 1988
0.42	+/-0.24	*	Fraser River Estuary, BC	COA		Sediments devoid of feral clams	Macoma balthica (bivalve)		1.95		McGreer 1982
0.438	+/-0.229	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (88.5+/-8.39% normal development)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.05	38.1+/-38.9	Bricker et al. 1993
0.442	+/-0.406	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.1+/-2.78% normal development)	Mulinia lateralis (bivalve)	LAR	2.12+/-1.04	22.9+/-23.7	Bricker et al. 1993
0.45	+/-0.352	NE	Miami River, FL	COA	10-d	Not toxic (18.6+/-7.27% mortality)	Pennaeus aztecus aztecus (brown shrimp)	ADT			ERCO 1985
0.45	+/-0.352	NE	Miami River, FL	COA	10-d	Not toxic (1.2+/-.837% mortality)	Mercenaria mercenaria (atlantic quahog)	ADT			ERCO 1985
0.45	+/-0.352	NE	Miami River, FL	COA	10-d	Not toxic (3.6+/-1.67% mortality)	Nereis virens (sandworm)	ADT			ERCO 1985
0.46		*	Strait of Georgia, BC	COA	24-h	Significantly toxic (avoidance)	Macoma balthica (bivalve)		3.09		McGreer 1979
0.47	+/-0.367	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (13.8+/-4.09% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.47+/-0.306		Pastorok & Becker 1990
0.474	+/-0.364	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.016+/-0.007 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.26+/-0.936	43.4+/-35.6	Bricker et al. 1993
0.486	+/-0.421	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (34.9+/-15.7% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.23+/-1.04	25.4+/-25.5	Bricker et al. 1993
0.49	+/-0.044	SG	Miami River/Seybold Canal, FL	COA	10-d	Significantly toxic (24.7+/-15% mortality)	Pennaeus aztecus (brown shrimp)	ADT			Vittor & Associates 1988
0.5	+/-0.14	NE	Pensacola Naval Air Station, FL	COA	10-d	Not significantly toxic (0% mortality)	Crossostrea virginica (oyster)	ADT	2.5+/-2.83		Parrish 1988a
0.5	+/-0.14	NE	Pensacola Naval Air Station, FL	COA	10-d	Not significantly toxic (5+/-1.41% mortality)	Penaeus duorarum (pink shrimp)	ADT	2.5+/-2.83		Parrish 1988a
0.5	+/-0.14	NE	Pensacola Naval Air Station, FL	COA	10-d	Not significantly toxic (8% mortality)	Arenicola cristata (lugworm)	ADT	2.5+/-2.83		Parrish 1988a
0.5	+/-0.3	NE	San Francisco Bay, CA	COA	48-h	Not significantly toxic (31.9+/-15.5% abnormal)	Bivalve	LAR			Long & Morgan 1990
0.5	+/-0.4	NE	San Francisco Bay, CA	COA	10-d	Least toxic (18+/-6.6% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
0.51		*	California	AETA	48-h	California AET Values	Mytilus edulis (bivalve)	LAR			Becker et al. 1990
0.51		*	California	AETA		California AET Values	Benthic species				Becker et al. 1990
0.51		*	Northern California	AETA		Northern California AET Values	Benthic species				Becker et al. 1990
0.57		SG	San Francisco Bay, CA	COA	10-d	Most toxic (95% mortality)	Amphipod	ADT	4.03		Chapman et al. 1987a
0.57		SG	San Francisco Bay, CA	COA	10-d	Highly toxic (37% avoidance)	Amphipod	ADT	4.03		Chapman et al. 1987a
0.59		*	Puget Sound, WA	AETA	48-h	1988 Puget Sound AET	Crassostrea gigas (oyster)	LAR			PTI 1988
0.59		*	Puget Sound, WA	AETA	48-h	1986 Puget Sound AET	Crassostrea gigas (oyster)	LAR	15		Bellar et al. 1986

Table 6. A summary of the available data on the biological effects associated with sediment-sorbed MERCURY (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Mercury Std Dev		Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.6	+/-0.4	NC	San Francisco Bay, CA	COA	48-h	Highly toxic (92.4+/-4.5% abnormal)	Bivalve	LAR			Long & Morgan 1990
0.6	+/-0.4	NE	San Francisco Bay, CA	COA	10-d	Not significantly toxic (18.4+/-6.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
0.609	+/-0.409	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (29.8+/-13.9% mortality)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.07	32.1+/-28.4	Bricker et al. 1993
0.61	+/-0.61	NE	Georgetown Harbor, SC	COA		Not toxic (species richness or abundance)	Benthic species		0.12		Van Dolah et al. 1984
0.61	+/-0.705	NE	Puget Sound, WA	COA	20-d	Not significantly toxic (5+/-3.86% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.46+/-0.26		Pastorok & Becker 1990
0.618	+/-0.429	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.013+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.79+/-0.744	37.6+/-25.3	Bricker et al. 1993
0.63	+/-0.5	SG	San Francisco Bay, CA	COA	10-d	Moderately toxic (28.3+/-7.51% mortality)	Amphipod	ADT	2.01+/-.98		Chapman et al. 1987a
0.637	+/-0.408	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (23.3+/-6.14% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.738		Word et al. 1988
0.65	+/-0.15	NE	Bayou Casotte, MS	COA	10-d	Not significantly toxic (5.3+/-3.06% mortality)	Penaeus duorarum (pink shrimp)	ADT	5.2+/-2.6		Parrish 1988b
0.65	+/-0.15	NE	Bayou Casotte, MS	COA	10-d	Not significantly toxic (8+/-6% mortality)	Arenicola cristata (lugworm)	ADT	5.2+/-2.6		Parrish 1988b
0.65	+/-0.15	NE	Bayou Casotte, MS	COA	10-d	Not significantly toxic (0% mortality)	Crossostrea virginica (oyster)	ADT	5.2+/-2.6		Parrish 1988b
0.671	+/-0.51	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.1+/-13.3% mortality)	Mulinia lateralis (bivalve)	LAR	2.68+/-0.955	31.8+/-24.4	Bricker et al. 1993
0.681	+/-0.683	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (23+/-4.24% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.46+/-1.22	40+/-55.1	Bricker et al. 1993
0.696			***PEL***								
0.7	+/-0.8	NG	San Francisco Bay, CA	COA	10-d	Significantly toxic (42.9+/-19.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
0.7	+/-0.8	NG	San Francisco Bay, CA	COA	10-d	Moderately toxic (33.8+/-4.7% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
0.7	+/-0.9	NG	San Francisco Bay, CA	COA	48-h	Significantly toxic (55.7+/-22.7% abnormal)	Bivalve	LAR			Long & Morgan 1990
0.703	+/-0.08	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (4.8+/-2.28% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1983a
0.703	+/-0.08	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (15.8+/-4.21% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1983a
0.703	+/-0.08	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (1.2+/-.447% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1983a
0.707	+/-0.463	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (10.4+/-6.3% mortality)	Nephtys caecoides (polychaete)		1.63+/-0.657		Word et al. 1988
0.707	+/-0.463	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (0.2+/-0.6% mortality)	Macoma nasuta (clam)		1.63+/-0.657		Word et al. 1988
0.71	+/-0.43	*	San Francisco Bay, CA	COA	48-h	Highly toxic (92.3+/-5.5% mortality)	Mussel	LAR	2.87+/-1.32		Chapman et al. 1987a
0.713	+/-0.433	*	San Francisco Bay, CA	COA	4-wk	Moderately toxic (94.9+/-10.1 young produced)	Tigriopus californicus (copepod)	ADT	2.87+/-1.07		Chapman et al. 1987a
0.779	+/-0.454	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (96.6+/-3.79% normal development)	Mulinia lateralis (bivalve)	LAR	2.87+/-0.94	35.1+/-25.9	Bricker et al. 1993
0.789	+/-0.449	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (38+/-13% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.92+/-0.937	34.6+/-23.9	Bricker et al. 1993
0.82	+/-0.21	NE	Pascagoula Naval Station, MS	COA	10-d	Not significantly toxic (1+/-1.41% mortality)	Crossostrea virginica (oyster)	ADT	7.31+/-3.86		Parrish 1990
0.82	+/-0.21	NE	Pascagoula Naval Station, MS	COA	10-d	Not significantly toxic (4+/-2.83% mortality)	Penaeus duorarum (pink shrimp)	ADT	7.31+/-3.86		Parrish 1990
0.82	+/-0.21	NE	Pascagoula Naval Station, MS	COA	10-d	Not significantly toxic (5+/-1.41% mortality)	Nereis virens (polychaete)	ADT	7.31+/-3.86		Parrish 1990
0.821	+/-0.899	NE	Halifax Harbour, NS	COA	20-d	Not significantly toxic (1+/-2% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
0.825	+/-0.895	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (5.2+/-3.5% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
0.88		*	Puget Sound, WA	AETA		1986 Puget Sound AET	Benthic species		15		Bellar et al. 1986
0.89		*	San Francisco Bay, CA	COA	48-h	Highly toxic (66.8% abnormal)	Mussel	LAR	3.59		Chapman et al. 1987a
0.9	+/-1.0	*	San Francisco Bay, CA	COA	48-h	Moderately toxic (59.4+/-11.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
0.925	+/-0.391	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.011+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.28+/-0.363	45.3+/-21.4	Bricker et al. 1993
0.95	+/-0.99	*	San Francisco Bay, CA	COA	10-d	Highly toxic (67+/-11.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
0.987	+/-0.629	SG	Oakland Harbor, CA	COA	10-d	Significantly toxic (35.3+/-2.5% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.56+/-0.07		Word et al. 1988
1.02	+/-1.73	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (4.43+/-2.1% mortality)	Panope generosa (geoduck)	JUV	1.51+/-0.261		Pastorok & Becker 1990
1.03	+/-0.14	NE	Gulfport Mississippi Channel, MS	COA	10-d	Not significantly toxic (8+/-2% mortality)	Crossostrea virginica (oyster)	ADT	6.73+/-2.04		Parrish 1987b
1.03	+/-0.14	NE	Gulfport Mississippi Channel, MS	COA	10-d	Not significantly toxic (22+/-5.29% mortality)	Arenicola cristata (lugworm)	ADT	6.73+/-2.04		Parrish 1987b

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Mercury Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
1.03 +/-0.14	NE	Gulfport Mississippi Channel, MS	COA	10-d	Not significantly toxic (3.3+/-3.06% mortality)	Penaeus duorarum (pink shrimp)	ADT	6.73+/-2.04		Parrish 1987b
1.08 +/-1.87	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (2.09+/-1.73% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.56+/-0.329		Pastorok & Becker 1990
1.09 +/-0.889	*	Halifax Harbour, NS	COA	10-d	Significantly toxic (61.7+/-12.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
1.12 +/-0.348	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (75.1+/-10.6% mortality)	Mulinia lateralis (bivalve)	LAR	3.32+/-0.317	42.3+/-19.2	Bricker et al. 1993
1.17 +/-1.84	*	Puget Sound, WA	COA	15-min	Significantly toxic (EC50; 0.065+/-0.043% extract)	Microtox (Photobacterium phosphoreum)		1.58+/-0.255		Pastorok & Becker 1990
1.2	*	Northern California	AETA	10-d	Northern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
1.2	*	California	AETA	10-d	California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
1.3	*	San Francisco Bay, CA	AETA	10-d	San Francisco Bay AET	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
1.44 +/-2.08	*	Puget Sound, WA	COA	2-d	Significantly toxic (60.4+/-46.5% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.57+/-0.287		Pastorok & Becker 1990
1.5	*	San Francisco Bay, CA	AETA	48-h	San Francisco Bay AET	Oyster; mussel	LAR			Long & Morgan 1990
1.6 +/-1.05	*	Baltimore Harbor, MD	COA	48-h	Most toxic; TLm	Fundulus heteroclitus (mummichog)				Tsai et al. 1979
1.6 +/-1.05	*	Baltimore Harbor, MD	COA	48-h	Most toxic; TLm	Leiostomus xanthurus (spot)				Tsai et al. 1979
1.74 +/-2.55	*	Puget Sound, WA	COA	10-d	Significantly toxic (80.8+/-30.6% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.266		Pastorok & Becker 1990
2.1	*	Puget Sound, WA	AETA		1988 Puget Sound AET	Benthic community				PTI 1988
2.1	*	Puget Sound, WA	AETA	10-d	1988 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT			PTI 1988
2.1	*	Puget Sound, WA	AETA		PSDDA Maximum Level Criteria	Aquatic biota				USACOE 1988
2.1	*	Puget Sound, WA	AETA	10-d	1986 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT	15		Bellar et al. 1986
2.46 +/-3.59	*	Puget Sound, WA	COA	20-d	Significantly toxic (37.3+/-22% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.87+/-0.208		Pastorok & Becker 1990
2.7	NE	San Diego Bay, CA	COA	96-h	Not significantly toxic (4% mortality)	Citharichthys stigmaeus (sanddab)				Salazar & Salazar 1985
2.7	NE	San Diego Bay, CA	COA	10-d	Not significantly toxic (14% mortality)	Acanthomysis sculpta (mysid)				Salazar & Salazar 1985
2.7	NE	San Diego Bay, CA	COA	20-d	Not significantly toxic (13% mortality)	Neanthes arenaceodentata (polycheate)				Salazar & Salazar 1985
2.7	NE	San Diego Bay, CA	COA	20-d	Not significantly toxic (1% mortality)	Macoma nasuta (clam)				Salazar & Salazar 1985
2.7	NE	San Diego Bay, CA	COA	96-h	Not significantly toxic (0% mortality)	Acanthomysis sculpta (mysid)				Salazar & Salazar 1985
2.7	NE	San Diego Bay, CA	COA	96-h	Not significantly toxic (18% mortality)	Acartia tonsa (copepod)				Salazar & Salazar 1985
3.5 +/-12.5	*	Commencement Bay, WA	COA	48-h	Highly toxic (44.5+/-19% abnormality)	Oyster	LAR			Tetra Tech 1985
4.15 +/-9.19	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (6.8+/-7.31% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
4.15 +/-9.19	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (8.5+/-6.06% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
4.15 +/-9.19	NE	Halifax Harbour, NS	COA	20-d	Not significantly toxic (0.7+/-1.63% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
5 +/-6.7	NE	Hudson-Raritan Bay, NY	COA	14-d	Not toxic (increased growth rate)	Chromadorina germanica (nematode)				Tietjen & Lee 1984
8.9 +/-7.5	SG	Hudson-Raritan Bay, NY	COA	14-d	Significantly toxic (reduced growth rate)	Chromadorina germanica (nematode)				Tietjen & Lee 1984
11.2 +/-22.8	*	Commencement Bay, WA	COA	10-d	Highly toxic (78.5+/-19.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
11.4	*	Laboratory	SSBA	10-d	LC10	Rhepoxynius abronius (amphipod)	ADT	0.25		Swartz et al. 1988
13.1	*	Laboratory	SSBA	10-d	LC50	Rhepoxynius abronius (amphipod)	ADT	0.25		Swartz et al. 1988
34.9	NE	New York Harbor, NY	COA	100-d	Not toxic (<10% mortality)	Nereis virens (sandworm)	ADT			Rubinstein et al. 1983
34.9	NE	New York Harbor, NY	COA	100-d	Not toxic (<10% mortality)	Mercenaria mercenaria (hard clam)	ADT			Rubinstein et al. 1983
34.9	NE	New York Harbor, NY	COA	100-d	Not toxic (<10% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Rubinstein et al. 1983
35.3 +/-6.74	NE	Bayou La Batre, AB	COA	10-d	Not significantly toxic (46.7+/-11.4% mortality)	Nereis virens (polychaete)	ADT			Parrish 1987a
35.3 +/-6.74	NE	Bayou La Batre, AB	COA	10-d	Not significantly toxic (5.3+/-2.31% mortality)	Crossostrea virginica (oyster)	ADT			Parrish 1987a
35.3 +/-6.74	NE	Bayou La Batre, AB	COA	10-d	Not significantly toxic (14+/-9.17% mortality)	Penaeus duorarum (pink shrimp)	ADT			Parrish 1987a
36.5 +/-25.5	NE	Tampa Bay, FL	COA	1-h	Least toxic (83+/-4.26% fertilization)	Arbacia punctulata (sea urchin)	GAM		0.131+/-0.169	Long 1993

Table 6. A summary of the available data on the biological effects associated with sediment-sorbed MERCURY (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Mercury Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
56.8 +/-49	SG	Tampa Bay, FL	COA	1-h	Moderately toxic (44.5+/-17.8% fertilization)	Arbacia punctulata (sea urchin)	GAM		0.622+/-1.12	Long 1993
58.2	NE	San Diego Bay, CA	COA		Not toxic (<3% mortality)	M. elongata (mysid)				Salazar et al. 1980
65.4 +/-58.9	NE	Tampa Bay, FL	COA		Not significantly toxic (EC50; 0.133+/-0.103 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)			1.23+/-1.96	Long 1993
66.5	NE	San Diego Bay, CA	COA		Not toxic (<3% mortality)	Protothaca staminea (clam)				Salazar et al. 1980
77.1 +/-80.6	NE	Tampa Bay, FL	COA	10-d	Not significantly toxic (9.5+/-6.15% mortality)	Ampelisca abdita (amphipod)	SUBADT		1.56+/-2.73	Long 1993
138 +/-120	*	Tampa Bay, FL	COA	1-h	Most toxic (1.96+/-3.19% fertilization)	Arbacia punctulata (sea urchin)	GAM		3.95+/-5.94	Long 1993
182 +/-72.1	NC	Tampa Bay, FL	COA	48-h	Significantly toxic (48.1+/-1.91% mortality)	Mulinaria lateralis (coot clam)	LAR		2.82+/-2.65	Long 1993
186 +/-175	NE	Tampa Bay, FL	COA	48-h	Not significantly toxic (38.5+/-2.9% mortality)	Mulinaria lateralis (coot clam)	LAR		2.64+/-3.04	Long 1993
205 +/-136	*	Tampa Bay, FL	COA		Significantly toxic (EC50; 0.021+/-0.012 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)			6.13+/-8.06	Long 1993
234 +/-126	*	Tampa Bay, FL	COA	10-d	Significantly toxic (32.1+/-16.9% mortality)	Ampelisca abdita (amphipod)	SUBADT		7.63+/-9.44	Long 1993
254	NE	San Diego Bay, CA	COA		Not toxic (<3% mortality)	Citharichthys stigmaeus (sanddab)				Salazar et al. 1980
254	NE	San Diego Bay, CA	COA		Not toxic (<3% mortality)	Neanthes arenaceodentata (polychaete)				Salazar et al. 1980
254	NE	San Diego Bay, CA	COA		Not toxic (<3% mortality)	M. elongata (mysid)				Salazar et al. 1980

Table 7. A summary of the available data on the biological effects associated with sediment-sorbed NICKEL (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Nickel Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.1	NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
0.3	NC	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (22% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
0.3	NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (28% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
0.3	NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.003 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
0.41 +/-0.11	NE	Pascagoula Naval Station, MS	COA	10-d	Not significantly toxic (1+/-1.41% mortality)	Crossostrea virginica (oyster)	ADT	7.31+/-3.86		Parrish 1990
0.41 +/-0.11	NE	Pascagoula Naval Station, MS	COA	10-d	Not significantly toxic (4+/-2.83% mortality)	Penaeus duorarum (pink shrimp)	ADT	7.31+/-3.86		Parrish 1990
0.41 +/-0.11	NE	Pascagoula Naval Station, MS	COA	10-d	Not significantly toxic (5+/-1.41% mortality)	Nereis virens (polychaete)	ADT	7.31+/-3.86		Parrish 1990
0.7	NC	Mobile Bay, AL	COA		Significantly toxic (10% mortality)	Mysidopsis bahia (mysid shrimp)		0.009	0.004	EMAP Louisiana Province 1991
0.7	NE	Apalachee Bay, FL	COA	10-d	Not significantly toxic (3.3+/-3.25% mortality)	Ampelisca abdita (amphipod)		0.643+/-0.455	0.390+/-0.410	EMAP Louisiana Province 1991
0.783 +/-0.491	NE	Matagorda Ship Channel, TX	COA	10-d	Not toxic (7.2+/-2.77% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1985a
0.783 +/-0.491	NE	Matagorda Ship Channel, TX	COA	10-d	Not toxic (10.6+/-5.18% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1985a
0.783 +/-0.491	NE	Matagorda Ship Channel, TX	COA	10-d	Not toxic (0.2+/-0.447% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1985a
0.825 +/-0.25	NE	Apalachee Bay, FL	COA		Not significantly toxic (0.75+/-1.5% mortality)	Mysidopsis bahia (mysid shrimp)		0.540+/-0.385	0.405+/-0.417	EMAP Louisiana Province 1991
0.95 +/-0.354	SG	Apalachee Bay, FL	COA	10-d	Significantly toxic (15.6% mortality)	Ampelisca abdita (amphipod)		0.438+/-0.442	0.421+/-0.593	EMAP Louisiana Province 1991
1	NE	Charleston Harbor, SC	COA		High species richness (14.9+/-2.04; SRUs)	Benthic species				Winn et al. 1989
1	NG	Charleston Harbor, SC	COA		Low species richness (5.16; SRUs)	Benthic species				Winn et al. 1989
1	NG	Charleston Harbor, SC	COA		Low diversity (1.16; SDUs)	Benthic species				Winn et al. 1989
1.5 +/-0.61	SG	Charleston Harbor, SC	COA		Moderate species richness (9.05+/-1.33; SRUs)	Benthic species				Winn et al. 1989
1.5 +/-1.12	SG	Charleston Harbor, SC	COA		Moderate diversity (2.3+/-0.2; SDUs)	Benthic species				Winn et al. 1989
1.7	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (18% mortality)	Ampelisca abdita (amphipod)		0.028	9 ug/g	Windom In Prep
1.7	NC	Mississippi Sound, MS	COA	10-d	Significantly toxic (11.6+/-3.39% mortality)	Ampelisca abdita (amphipod)		0.111+/-0.045	0.03	EMAP Louisiana Province 1991
1.8	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (0% mortality)	Arbacia punctulata (sea urchin)		0.03	19 ug/g	Windom In Prep
3.1 +/-3.03	NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (55.0+/-19.5% mortality)	Streblospio benedicti (polychaete worm)		0.349+/-0.11	1.07+/-0.66	Hall et al. 1992
3.1 +/-2.54	NE	Houston Ship Channel, TX	COA		Not significantly toxic (15+/-13.2% mortality)	Sheepshead minnow	ADT	0.05+/-0.0242		Crocker et al. 1991
3.32 +/-2.67	NC	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29.8+/-11.1% mortality)	Streblospio benedicti (polychaete worm)		0.316+/-0.12	2.13+/-2.46	Hall et al. 1992
3.32 +/-2.67	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.003+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.316+/-0.120	2.13+/-2.46	Hall et al. 1992
3.33 +/-4.76	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (15.3+/-11.0% mortality)	Hyalella azteca (amphipod)	JUV	0.648+/-0.641	1.74+/-1.39	Hall et al. 1992
3.43 +/-2.07	NE	Tampa Bay, FL	COA	1-h	Least toxic (83+/-4.26% fertilization)	Arbacia punctulata (sea urchin)	GAM		0.131+/-0.169	Long 1993
4.15 +/-4.88	NC	Mobile Bay, AL	COA	10-d	Significantly toxic (46+/-49.3% mortality)	Ampelisca abdita (amphipod)		0.22+/-0.298	3.84+/-5.43	EMAP Louisiana Province 1991
4.17 +/-3.59	NC	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (63.0+/-24.3% mortality)	Hyalella azteca (amphipod)	JUV	0.317+/-0.228	2.57+/-2.67	Hall et al. 1992
4.2	NC	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29% mortality)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
4.2	NC	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (89.7% reburial)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
4.2	NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
4.2	NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	6.41	Hall et al. 1992
4.2	NE	Charleston Harbor, SC	COA		High diversity (4.15+/-0.59; SDUs)	Benthic species				Winn et al. 1989
4.23 +/-3.27	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (0.33+/-0.516% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
4.23 +/-3.27	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (2.33+/-1.03% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
4.23 +/-3.27	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.367+/-0.085 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
4.23 +/-3.27	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.0005 mg/day growth)	Streblospio benedicti (polychaete worm)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
4.24 +/-3.66	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (7.2+/-1.92% mortality)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
4.24 +/-3.66	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.6+/-0.55% reburial)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
4.24 +/-3.66	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992

Table 7. A summary of the available data on the biological effects associated with sediment-sorbed NICKEL (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Nickel Std Dev		Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
4.24	+/-3.66	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
4.5	+/-4.12	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (9.25+/-5.32% mortality)	Lepidactylus dytiscus (amphipod)		0.638+/-0.768	1.65+/-1.62	Hall et al. 1992
4.8		NC	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (82.9% reburial)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
4.8		NC	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>20% emergence)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
4.8		NC	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	5.58	Hall et al. 1992
4.8		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.016 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
4.98		NE	Curtis Creek, Baltimore, MD	COA	10-d	Not significantly toxic (11.3% mortality)	Leptocheirus plumulosus (amphipod)	JUV			McGee et al. 1993
4.98	+/-0.017	NE	Curtis Creek, Baltimore, MD	COA	10-d	Not significantly toxic (15+/-7.21% mortality)	Hyalella azteca (amphipod)	JUV			McGee et al. 1993
4.99	+/-0.014	NE	Curtis Creek, Baltimore, MD	COA	20-d	Not significantly toxic (25.4+/-17.1% mortality)	Leptocheirus plumulosus (amphipod)	JUV			McGee et al. 1993
5		*	United States	EqPA		Chronic Marine EqP Threshold	Aquatic biota		1		Bolton et al. 1985
5.03	+/-3.4	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1.83+/-1.6% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
5.03	+/-3.4	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (3.5+/-1.87% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
5.03	+/-3.4	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (-0.057+/-0.04 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
5.03	+/-3.4	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.001mg/day growth)	Streblospio benedicti (polychaete worm)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
5.06	+/-2.87	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.001+/-0.001 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.555+/-0.471	2.68+/-2.3	Hall et al. 1992
5.08	+/-3.80	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.1+/-0.865% reburial)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
5.08	+/-3.80	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<20% emergence)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
5.08	+/-3.80	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
5.08	+/-3.8	SG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.008+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.4	Hall et al. 1992
5.13	+/-1.29	SG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (55.0+/-22.6% mortality)	Hyalella azteca (amphipod)	JUV	0.338+/-0.133	2.9+/-3.11	Hall et al. 1992
5.23	+/-2.5	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (28.3+/-6.11% mortality)	Mysidopsis bahia (mysid)		0.246+/-0.051	127+/-24 ug/g	Windom In Prep
5.43	+/-4.55	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (4+/-2.83% mortality)	Menidia beryllina (silverside)		0.243+/-0.264	90.5+/-78.4 ug/g	Windom In Prep
5.56	+/-6.03	SG	Tampa Bay, FL	COA	1-h	Moderately toxic (44.5+/-17.8% fertilization)	Arbacia punctulata (sea urchin)	GAM		0.622+/-1.12	Long 1993
5.59	+/-4.87	NE	Houston Ship Channel, TX	COA	10-d	Not significantly toxic (5.4+/-3.6% mortality)	Amphipod	ADT	0.129+/-0.054		Crocker et al. 1991
5.89		NE	Georgetown Harbor, SC	COA		Not toxic (species richness or abundance)	Benthic species		0.12		Van Dolah et al. 1984
5.9	+/-3.7	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (22.3+/-7.37% mortality)	Hyalella azteca (amphipod)	JUV	0.788+/-0.866	2.04+/-1.75	Hall et al. 1992
5.91	+/-4.5	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (9.78+/-5.33% mortality)	Mysidopsis bahia (mysid)		0.24+/-0.247	91.9+/-73.4 ug/g	Windom In Prep
5.98	+/-2.78	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (8.8+/-7.12% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
5.98	+/-2.78	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (14+/-9.22% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
5.98	+/-2.78	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.005+/-0.0004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
6.1		NE	Massachusetts Bay, MA	COA		High density (24 N/0.1 sq.m.)	Echinodermata	VAR			Gilbert et al. 1976
6.1	+/-1.84	SG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (45.5+/-12% mortality)	Lepidactylus dytiscus (amphipod)		0.383+/-0.279	3.61+/-2.79	Hall et al. 1992
6.25	+/-5.43	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (27.5+/-10.6% mortality)	Mysidopsis bahia (mysid)		0.237+/-0.311	74.6+/-85.5 ug/g	Windom In Prep
6.44	+/-4.51	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (11.6+/-4.33% mortality)	Ampelisca abdita (amphipod)		0.267+/-0.25	102+/-71.1 ug/g	Windom In Prep
6.5	+/-3.25	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (16.5+/-9.19% mortality)	Streblospio benedicti (polychaete worm)		0.783+/-0.845	4.83+/-2.23	Hall et al. 1992
6.6	+/-6.24	NE	Tampa Bay, FL	COA		Not significantly toxic (EC50; 0.133+/-0.103 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)			1.23+/-1.96	Long 1993
6.85	+/-4.07	NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (9+/-1.73% mortality)	Nereis virens (polychaetes)	ADT			EG&G Bionomics 1980
6.85	+/-4.07	NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (13+/- 3.61% mortality)	Penaeus duorarum (pink shrimp)	ADT			EG&G Bionomics 1980
6.85	+/-4.07	NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (11.3+/-3.21% mortality)	Crassostrea virginica (oyster)	ADT			EG&G Bionomics 1980
6.99	+/-4.01	SG	Curtis Creek, Baltimore, MD	COA	10-d	Significantly toxic (82.8+/-22.2% mortality)	Leptocheirus plumulosus (amphipod)	JUV			McGee et al. 1993
7.11	+/-4.41	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (91.3+/-2.91% normal development)	Arbacia punctulata (sea urchin)		0.299+/-0.251	114+/-68.4 ug/g	Windom In Prep
7.12	+/-6.75	NE	Tampa Bay, FL	COA	10-d	Not significantly toxic (9.5+/-6.15% mortality)	Ampelisca abdita (amphipod)	SUBADT		1.56+/-2.73	Long 1993

Table 7. A summary of the available data on the biological effects associated with sediment-sorbed NICKEL (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Nickel Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
7.5 +/-6.15	NE	Brunswick Harbor Entrance, GA	COA	48-h	Not significantly toxic (86.6+/-4.25% normal development)	Arbacia punctulata (sea urchin)		0.181+/-0.162	182+/-208 ug/g	Windom In Prep
7.65 +/-4.63	SG	Curtis Creek, Baltimore, MD	COA	20-d	Significantly toxic (94.6+/-9.35% mortality)	Leptocheirus plumulosus (amphipod)	JUV			McGee et al. 1993
7.8 +/-4.11	NE	Freeport Harbor, TX	COA	10-d	Not toxic (2+/-1% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1985b
7.8 +/-4.11	NE	Freeport Harbor, TX	COA	10-d	Not toxic (9.6+/-4.22% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1985b
7.8 +/-4.11	NE	Freeport Harbor, TX	COA	10-d	Not toxic (0% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1985b
7.98 +/-5.4	NE	Houston Ship Channel, TX	COA	7-d	Not significantly toxic (7.5+/-5% mortality)	Sheepshead minnow	ADT	0.137+/-0.056		Crocker et al. 1991
8 +/-4.09	*	Savannah River Entrance Channel, GA	COA	48-h	Significantly toxic (25.4+/-7.66% mortality)	Arbacia punctulata (sea urchin)		0.344+/-0.242	129.5+/-59.3 ug/g	Windom In Prep
8 +/-1.87	NE	Chesapeake Bay, MD, VI; Delaware Bay, DE	COA		Not significantly toxic (mean ET50; burrowing time 0.704+/-0.17 h)	Mya arenaria (clam)	1-2 cm			Phelps 1990
8 +/-2.69	NE	Massachusetts Bay, MA	COA		High density (299+/-40.3 N/0.1 sq.m.)	Arthropoda	VAR			Gilbert et al. 1976
8	NG	Chesapeake Bay, MD, VI; Delaware Bay, DE	COA		Significantly toxic (mean ET50; burrowing time 1.4 h)	Mya arenaria (clam)	1-2 cm			Phelps 1990
8.74 +/-7.2	NE	Houston Ship Channel, TX	COA	10-d	Not significantly toxic (4.7+/-4.29% mortality)	Amphipod	ADT	0.144+/-0.123		Crocker et al. 1991
8.8	*	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.003 mg/day growth)	Lepidactylus dytiscus (amphipod)		1.38	3.25	Hall et al. 1992
8.8	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1% mortality)	Streblospio benedicti (polychaete worm)		1.38	3.25	Hall et al. 1992
8.87 +/-2.42	NE	Massachusetts Bay, MA	COA		High species richness (102+/-4.73 S/0.1 sq.m.)	Benthic species	VAR			Gilbert et al. 1976
8.95 +/-3.89	NC	Tampa Bay, FL	COA	48-h	Significantly toxic (48.1+/-1.91% mortality)	Mulinaria lateralis (coot clam)	LAR		2.82+/-2.65	Long 1993
9.47 +/-4.03	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (4.8+/-2.28% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1983a
9.47 +/-4.03	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (15.8+/-4.21% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1983a
9.47 +/-4.03	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (1.2+/-.447% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1983a
9.5 +/-3.2	NE	Newport, RI	COA	96-h	Not toxic (0% mortality)	Palaemonetes pugio (shrimp)				Lee & Mariani 1977
9.9 +/-2.28	NE	Pensacola Naval Air Station, FL	COA	10-d	Not significantly toxic (0% mortality)	Crossostrea virginica (oyster)	ADT	2.5+/-2.83		Parrish 1988a
9.9 +/-2.28	NE	Pensacola Naval Air Station, FL	COA	10-d	Not significantly toxic (5+/-1.41% mortality)	Penaeus duorarum (pink shrimp)	ADT	2.5+/-2.83		Parrish 1988a
9.9 +/-2.28	NE	Pensacola Naval Air Station, FL	COA	10-d	Not significantly toxic (8% mortality)	Arenicola cristata (lugworm)	ADT	2.5+/-2.83		Parrish 1988a
9.93 +/-6.86	NE	Galveston Bay, TX	COA		High abundance (154+/-30.2 N/0.00203 sq.m.)	Benthic invertebrates		0.47+/-0.27	9.07+/-2.94	Carr 1992
10.3 +/-5.75	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (9.61+/-2.7% mortality)	Menidia beryllina (silverside)		1.22+/-1.13	9172+/-13363 ug/g	Windom In Prep
10.5 +/-5.85	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (5.43+/-3.21% mortality)	Mysidopsis bahia (mysid)		1.21+/-1.13	9096+/-13378 ug/g	Windom In Prep
10.6	NE	Massachusetts Bay, MA	COA		High density (4135 N/0.1 sq.m.)	Annelida	VAR			Gilbert et al. 1976
10.7 +/-0.862	NE	Chandeleur Sound, LA	COA		Not significantly toxic (1.03+/-2.05% mortality)	Mysidopsis bahia (mysid shrimp)		0.824+/-0.915	1.69+/-0.920	EMAP Louisiana Province 1991
11 +/-0.85	NC	Chandeleur Sound, LA	COA	10-d	Significantly toxic (11.5+/-4.86% mortality)	Ampelisca abdita (amphipod)		0.811+/-0.711	1.87+/-0.973	EMAP Louisiana Province 1991
11 +/-2.83	SG	Houston Ship Channel, TX	COA	10-d	Significantly toxic (22.7+/-0.778% mortality)	Amphipod	ADT	0.248+/-0.132		Crocker et al. 1991
11.1 +/-7.51	NE	Chandeleur Sound, LA	COA	10-d	Not significantly toxic (2.87+/-4.05% mortality)	Ampelisca abdita (amphipod)		0.517+/-0.166	2.02+/-1.38	EMAP Louisiana Province 1991
11.3 +/-5.32	SG	Chandeleur Sound, LA	COA		Significantly toxic (7.6+/-1.32% mortality)	Mysidopsis bahia (mysid shrimp)		0.624+/-0.197	2.07+/-1.19	EMAP Louisiana Province 1991
11.4 +/-5.43	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (10.6+/-3.17% mortality)	Ampelisca abdita (amphipod)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
11.4 +/-5.43	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (8.00+/-2.92% mortality)	Mysidopsis bahia (mysid)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
11.7 +/-6.53	NE	Galveston Bay, TX	COA		Low species (11.2+/-1.94 S/0.00203 sq.m.)	Benthic species		0.642+/-0.356	13.4+/-8.65	Carr 1992
11.7 +/-6.78	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (5.8+/-3.7% mortality)	Rhepoxynius abronius (amphipod)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
11.7 +/-6.78	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (3.4+/-1.82% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
11.7 +/-6.78	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (11.2+/-3.7% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
11.7 +/-6.78	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (3.52+/-1.66% mortality)	Macoma nasuta (clam)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
12.2 +/-8.9	NE	Galveston Bay, TX	COA		High abundance (155+/-49.5 N/0.00203 sq.m.)	Oligochaeta		1.2+/-1.27	4.27+/-3.85	Carr 1992
12.3 +/-3.0	NE	Commencement Bay, WA	COA	48-h	Least toxic (15.1+/-3.1% abnormality)	Oyster	LAR			Tetra Tech 1985
12.4 +/-8.91	*	Tampa Bay, FL	COA	1-h	Most toxic (1.96+/-3.19% fertilization)	Arbacia punctulata (sea urchin)	GAM		3.95+/-5.94	Long 1993
12.5 +/-4.5	NE	Galveston Bay, TX	COA		High abundance (16.2+/-6.19 N/0.00203 sq.m.)	Copepoda		0.844+/-0.524	4.73+/-3.1	Carr 1992

Table 7. A summary of the available data on the biological effects associated with sediment-sorbed NICKEL (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Nickel Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
12.6 +/-5.24	NE	Galveston Bay, TX	COA	48-h	Not toxic (98.1+/-1.79% normal development)	Arbacia punctulata (sea urchin)	EMB	0.748+/-0.476	4.16+/-3.45	Carr 1992
12.8 +/-10.3	NE	Mississippi Sound, MS	COA		Not significantly toxic (0.789+/-1.59% mortality)	Mysidopsis bahia (mysid shrimp)		0.827+/-0.757	1.46+/-1.58	EMAP Louisiana Province 1991
12.8	SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (16% mortality)	Mysidopsis bahia (mysid)		1.8	7095 ug/g	Windom In Prep
12.9 +/-3.97	NE	Galveston Bay, TX	COA		High abundance (156+/-22.9 N/0.00203 sq.m.)	Polychaeta		0.916+/-0.661	2.94+/-2.3	Carr 1992
13	*	Curtis Creek, Baltimore, MD	COA	10-d	Significantly toxic (55% mortality)	Hyalella azteca (amphipod)	JUV			McGee et al. 1993
13 +/-11.8	NE	Tampa Bay, FL	COA	48-h	Not significantly toxic (38.5+/-2.9% mortality)	Mulinaria lateralis (coot clam)	LAR		2.64+/-3.04	Long 1993
13 +/-4.89	NE	Galveston Bay, TX	COA	1-h	Not toxic (92.5+/-6.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	0.77+/-0.448	6.37+/-6.58	Carr 1992
13.2 +/-5.23	SG	Galveston Bay, TX	COA		Moderate abundance (58.3+/-16.2 N/0.00203 sq.m.)	Oligochaeta		0.632+/-0.274	7.93+/-5.6	Carr 1992
14	SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (22.3% mortality)	Menidia beryllina (silverside)		1.71	6562 ug/g	Windom In Prep
14.2 +/-5.38	NC	Galveston Bay, TX	COA		Low abundance (1.86+/-2.59 N/0.00203 sq.m.)	Mollusca		0.784+/-0.421	8.29+/-8.13	Carr 1992
14.2 +/-5.48	NC	Galveston Bay, TX	COA		Low species richness (10+/-3.73 S/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
14.2 +/-5.48	NC	Galveston Bay, TX	COA		Low abundance (89+/-60.7 N/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
14.4 +/-5.35	NC	Galveston Bay, TX	COA		Low abundance (0.3+/-0.651 N/0.00203 sq.m.)	Amphipoda		0.859+/-0.487	7.67+/-8.12	Carr 1992
14.5 +/-1.9	SG	Brunswick Harbor Entrance, GA	COA	48-h	Significantly toxic (14.6+/-18.9% normal development)	Arbacia punctulata (sea urchin)		1.99+/-0.562	14009+/-13434 ug/g	Windom In Prep
14.6 +/-1.56	NE	Galveston Bay, TX	COA		High Abundance (6+/-1.41 N/0.00203 sq.m.)	Amphipoda		0.955+/-0.629	7.21+/-8.2	Carr 1992
14.6 +/-4.75	NE	Bayou La Batre, AB	COA	10-d	Not significantly toxic (46.7+/-11.4% mortality)	Nereis virens (polychaete)	ADT			Parrish 1987a
14.6 +/-4.75	NE	Bayou La Batre, AB	COA	10-d	Not significantly toxic (5.3+/-2.31% mortality)	Crossostrea virginica (oyster)	ADT			Parrish 1987a
14.6 +/-4.75	NE	Bayou La Batre, AB	COA	10-d	Not significantly toxic (14+/-9.17% mortality)	Penaeus duorarum (pink shrimp)	ADT			Parrish 1987a
14.9 +/-5.07	SG	Galveston Bay, TX	COA		Low abundance (4.21+/-5.66 N/0.00203 sq.m.)	Oligochaeta		0.895+/-0.453	7.85+/-8.8	Carr 1992
14.9 +/-5.5	SG	Galveston Bay, TX	COA		Low abundance (41.7+/-21.8 N/0.00203 sq.m.)	Polychaeta		0.848+/-0.427	9.21+/-8.61	Carr 1992
15.3 +/-5.8	SG	Galveston Bay, TX	COA		Low abundance (53+/-33.9 N/0.00203 sq.m.)	Benthic invertebrates		0.985+/-0.247	22+/-11.2	Carr 1992
15.4 +/-8.72	NE	Massachusetts Bay, MA	COA		High density (201+/-33.4 N/0.1 sq.m.)	Mollusca	VAR			Gilbert et al. 1976
15.7	NE	Massachusetts Bay, MA	COA		High density (22 N/0.1 sq.m.)	Rhynchocoela	VAR			Gilbert et al. 1976
15.7 +/-7.3	NE	Commencement Bay, WA	COA	10-d	Least toxic (12.5+/-4.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
15.7 +/-5.31	SG	Galveston Bay, TX	COA		Low abundance (2.05+/-1.58 N/0.00203 sq.m.)	Copepoda		0.879+/-0.47	9.63+/-9.65	Carr 1992
15.9		***TEL***								
16 +/-0.3	NE	Galveston Harbor, TX	COA	10-d	Not toxic (2.4+/-1.52% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Grieco 1984
16 +/-0.3	NE	Galveston Harbor, TX	COA	10-d	Not toxic (0% mortality)	Mercenaria mercenaria (hard clams)	ADT			Grieco 1984
16 +/-0.3	NE	Galveston Harbor, TX	COA	10-d	Not toxic (2.8+/-2.17% mortality)	Nereis virens (sandworm)	ADT			Grieco 1984
16.1 +/-1.71	NE	Galveston Bay, TX	COA		High species richness (24.5+/-3.7 S/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
16.1 +/-1.71	NE	Galveston Bay, TX	COA		High abundance (359+/-92.8 N/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
16.1 +/-3.39	NE	Mississippi River, MS, LA	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		1.3+/-0.83	1.14+/-1	EMAP Louisiana Province 1991
16.4 +/-18	NE	Narragansett Bay, RI	COA	10-d	Not significantly toxic (5.28+/-3.04% mortality)	Ampelisca abdita (amphipod)	ADT			Munns et al. 1991
16.5 +/-3.46	NC	Galveston Bay, TX	COA	10-d	Significantly toxic (15.8+/-3.89% mortality)	Ampelisca abdita (amphipod)		0.647+/-0.606	0.160+/-0.184	EMAP Louisiana Province 1991
16.5	NE	Southern California	COA		High abundance (148+/-58 N/0.1 sq.m.)	Arthropods				Word & Mearns 1979 (As cited in L&M 1990)
16.5 +/-12.3	SG	Massachusetts Bay, MA	COA		Low density (1316+/-768 N/0.1 sq.m.)	Annelida	VAR			Gilbert et al. 1976
16.6 +/-1.65	NE	Galveston Bay, TX	COA		High abundance (27.3+/-10 N/0.00203 sq.m.)	Mollusca		1.64+/-0.4	1.39+/-0.17	Carr 1992
16.8	NE	Southern California	COA		High abundance (191+/-70.1 N/0.1 sq.m.)	Echinoderm				Word & Mearns 1979 (As cited in L&M 1990)
16.8 +/-4.21	SG	Galveston Bay, TX	COA	48-h	Toxic (4.65+/-16.1% normal development)	Arbacia punctulata (sea urchin)	EMB	1.06+/-0.449	14.5+/-9.2	Carr 1992
17 +/-9.15	*	Tampa Bay, FL	COA		Significantly toxic (EC50; 0.021+/-0.012 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)			6.13+/-8.06	Long 1993
17.2 +/-8.34	NE	Mississippi Sound, MS	COA	10-d	Not significantly toxic (1.4+/-1.73% mortality)	Ampelisca abdita (amphipod)		0.998+/-0.602	2.01+/-1.82	EMAP Louisiana Province 1991
17.5	NE	Duwamish River, WA	COA	96-h	Not toxic (0-10% mortality)	Palaemonetes pugio (shrimp)				Lee & Mariani 1977

Table 7. A summary of the available data on the biological effects associated with sediment-sorbed NICKEL (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Nickel Std Dev		Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
17.7	+/-7.6	SG	Commencement Bay, WA	COA	48-h	Moderately toxic (23+/-2.3% abnormality)	Oyster	LAR			Tetra Tech 1985
17.8	+/-3.35	NE	Galveston Bay, TX	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		0.934+/-0.657	0.457+/-0.530	EMAP Louisiana Province 1991
17.9	+/-0.849	NE	Mississippi River, MS, LA	COA	10-d	Not significantly toxic (7.8+/-1.63% mortality)	Ampelisca abdita (amphipod)		1.15+/-1.04	2.31+/-0.651	EMAP Louisiana Province 1991
18		SG	Southern California	COA		Moderate abundance (72.6+/-6.8 N/0.1 sq.m.)	Arthropods				Word & Mearns 1979 (As cited in L&M 1990)
19.2	+/-3.94	SG	Galveston Bay, TX	COA	1-h	Toxic (20.4+/-18.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	1.26+/-0.47	14.6+/-10.1	Carr 1992
19.4	+/-6.48	SG	Mississippi Sound, MS	COA		Significantly toxic (12.2+/-4.42% mortality)	Mysidopsis bahia (mysid shrimp)		0.939+/-0.335	2.63+/-2.3	EMAP Louisiana Province 1991
19.6	+/-12.8	SG	Commencement Bay, WA	COA	10-d	Moderately toxic (26+/-5.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
19.7	+/-15.1	NE	Southern California	COA	10-d	Not significantly toxic (23.2% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
19.8	+/-1.65	NE	Gulfport Mississippi Channel, MS	COA	10-d	Not significantly toxic (8+/-2% mortality)	Crossostrea virginica (oyster)	ADT	6.73+/-2.04		Parrish 1987b
19.8	+/-1.65	NE	Gulfport Mississippi Channel, MS	COA	10-d	Not significantly toxic (22+/-5.29% mortality)	Arenicola cristata (lugworm)	ADT	6.73+/-2.04		Parrish 1987b
19.8	+/-1.65	NE	Gulfport Mississippi Channel, MS	COA	10-d	Not significantly toxic (3.3+/-3.06% mortality)	Penaeus duorarum (pink shrimp)	ADT	6.73+/-2.04		Parrish 1987b
20.2		SG	Southern California	COA		Low abundance (6.1+/-7.2 N/0.1 sq.m.)	Echinoderm				Word & Mearns 1979 (As cited in L&M 1990)
20.5		SG	Southern California	COA		Moderate abundance (56.2+/-23 N/0.1 sq.m.)	Echinoderm				Word & Mearns 1979 (As cited in L&M 1990)
21	+/-6.86	*	Tampa Bay, FL	COA	10-d	Significantly toxic (32.1+/-16.9% mortality)	Ampelisca abdita (amphipod)	SUBADT		7.63+/-9.44	Long 1993
21.4	+/-12.1	SG	Massachusetts Bay, MA	COA		Low density (7.14+/-4.23 N/0.1 sq.m.)	Rhynchocoela	VAR			Gilbert et al. 1976
21.6	+/-11.8	*	Massachusetts Bay, MA	COA		Low density (2.76+/-2.7 N/0.1 sq.m.)	Echinodermata	VAR			Gilbert et al. 1976
21.8	+/-12.1	SG	Massachusetts Bay, MA	COA		Low density (39.1+/-30.8 N/0.1 sq.m.)	Mollusca	VAR			Gilbert et al. 1976
21.9	+/-11.8	*	Massachusetts Bay, MA	COA		Low density (61.1+/-36.6 N/0.1 sq.m.)	Arthropoda	VAR			Gilbert et al. 1976
22.1	+/-12.6	NE	Mobile Bay, AL	COA		Not significantly toxic (1.07+/-1.85% mortality)	Mysidopsis bahia (mysid shrimp)		0.968+/-0.815	8.23+/-3.4	EMAP Louisiana Province 1991
22.2	+/-11.9	*	Massachusetts Bay, MA	COA		Low species richness (57.2+/-12.2 S/0.1 sq.m.)	Benthic species	VAR			Gilbert et al. 1976
22.6		SG	Southern California	COA		Low abundance (35.3+/-15.8 N/0.1 sq.m.)	Arthropods				Word & Mearns 1979 (As cited in L&M 1990)
24.2	+/-22.1	SG	Southern California	COA	10-d	Significantly toxicity (51.7% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
24.3	+/-10.7	NE	Black Rock Beach, NS	COA	10-d	Not toxic (6.67+/-4.51% mortality)	Corophium volutator (amphipod)	ADT/JUV	0.24+/-0.18		Nicol & Doe 1990
24.3	+/-10.7	NE	Black Rock Beach, NS	COA	10-d	Not toxic (2.33+/-1.53% mortality)	Rhepoxynius abronius (amphipod)	ADT/JUV	0.24+/-0.18		Nicol & Doe 1990
24.3	+/-10.7	NE	Black Rock Beach, NS	COA	10-d	Not toxic (100% reburial)	Rhepoxynius abronius (amphipod)	ADT/JUV	0.24+/-0.18		Nicol & Doe 1990
24.5	+/-13.9	NE	Matagorda Bay, TX	COA		Not significantly toxic (1.58+/-1.82% mortality)	Mysidopsis bahia (mysid shrimp)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
24.5	+/-13.9	NE	Matagorda Bay, TX	COA	10-d	Not significantly toxic (2.33+/-4.65% mortality)	Ampelisca abdita (amphipod)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
24.7	+/-13.8	NE	Galveston Bay, TX	COA	10-d	Not significantly toxic (1.35+/-1.45% mortality)	Ampelisca abdita (amphipod)		0.961+/-0.537	1.17+/-0.640	EMAP Louisiana Province 1991
25	+/-5.51	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-7.99% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.14+/-0.352	6.09+/-5.38	Bricker et al. 1993
25.3	+/-6.51	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (6+/-2.35% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1983b
25.3	+/-6.51	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (2.6+/-2.97% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1983b
25.3	+/-6.51	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (1.8+/-1.79% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1983b
25.8	+/-14.5	NE	Bayou Casotte, MS	COA	10-d	Not significantly toxic (5.3+/-3.06% mortality)	Penaeus duorarum (pink shrimp)	ADT	5.2+/-2.6		Parrish 1988b
25.8	+/-14.5	NE	Bayou Casotte, MS	COA	10-d	Not significantly toxic (8+/-6% mortality)	Arenicola cristata (lugworm)	ADT	5.2+/-2.6		Parrish 1988b
25.8	+/-14.5	NE	Bayou Casotte, MS	COA	10-d	Not significantly toxic (0% mortality)	Crossostrea virginica (oyster)	ADT	5.2+/-2.6		Parrish 1988b
26.2	+/-16.5	SG	Galveston Bay, TX	COA		Significantly toxic (13.4+/-9.11% mortality)	Mysidopsis bahia (mysid shrimp)		0.778+/-0.482	1.21+/-0.778	EMAP Louisiana Province 1991
26.4	+/-8.21	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.074+/-0.043 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.27+/-0.626	6.21+/-5.41	Bricker et al. 1993
26.8	+/-8	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99.3+/-0.827% normal development)	Mulinia lateralis (bivalve)	LAR	1.43+/-0.738	14.7+/-24	Bricker et al. 1993
26.9	+/-5.4	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (19.3+/-5.86% mortality)	Ampelisca abidta (amphipod)	SUB ADT	1.82+/-0.225	6.3+/-6.2	Bricker et al. 1993
27		NE	Palos Verdes, CA	COA		High abundance (208 N/0.1 sq.m.)	Echinoderms	VAR			Ferraro et al. 1991
27.4	+/-8.6	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.096+/-0.101 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.37+/-0.759	6.93+/-6.83	Bricker et al. 1993
27.5	+/-18.6	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (51.3+/-6.95% mortality)	Mulinia lateralis (bivalve)	LAR	1.8+/-1.71	29.6+/-46.3	Bricker et al. 1993

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Nickel Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
28	*	Puget Sound, WA	AETA	15-min	1986 Puget Sound AET	Microtox (Photobacterium phosphoreum)		15		Bellar et al. 1986
28	NE	Puget Sound, WA	AETA		PSDDA Screening level concentration	Aquatic biota				USACOE 1988
28 +/-7.1	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (12.3+/-14.5% mortality)	Mulinia lateralis (bivalve)	LAR	1.53+/-0.743	15.7+/-23.2	Bricker et al. 1993
28.3 +/-8.73	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-6.07% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.71+/-0.9	15.3+/-23.2	Bricker et al. 1993
29 +/-13.1	NC	Chesapeake Bay, MD, VI; Delaware Bay, DE	COA		Significantly toxic (mean ET50; burrowing time 3.79+/-3.29 h)	Mya arenaria (clam)	1-2 cm			Phelps 1990
29.2 +/-6.66	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.5+/-11.4% mortality)	Mulinia lateralis (bivalve)	LAR	2.33+/-0.364	26.8+/-9.42	Bricker et al. 1993
29.3 +/-1.27	NE	Mobile Bay, AL	COA	10-d	Not significantly toxic (0.5+/-0.778% mortality)	Ampelisca abdita (amphipod)		1.24+/-0.948	8.51+/-4.76	EMAP Louisiana Province 1991
29.3 +/-7.38	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (30.5+/-16.4% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.62+/-0.777	17.7+/-26.3	Bricker et al. 1993
29.6 +/-22.5	SG	Mississippi River, MS, LA	COA	10-d	Significantly toxic (15.9+/-6.65% mortality)	Ampelisca abdita (amphipod)		1.22+/-0.717	0.235+/-0.276	EMAP Louisiana Province 1991
29.7 +/-21.7	*	Commencement Bay, WA	COA	48-h	Highly toxic (44.5+/-19% abnormality)	Oyster	LAR			Tetra Tech 1985
30.3 +/-7.37	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (25.9+/-5.01% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.21+/-0.444	2.41+/-2.32	Bricker et al. 1993
30.3 +/-9.72	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.167+/-0.198 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.59+/-1.09	4.67+/-6.99	Bricker et al. 1993
30.4 +/-8.56	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (96+/-1.66% normal development)	Mulinia lateralis (bivalve)	LAR	2.52+/-0.997	35+/-42.9	Bricker et al. 1993
30.5	*	Los Angeles, CA	COA	96-h	Highly toxic (>50% mortality)	Palaemonetes pugio (shrimp)				Lee & Mariani 1977
30.5 +/-4.95	NE	Palos Verdes, CA	COA		High abundance (54.6+/-5.09 N/0.1 sq.m.)	Amphipods	VAR			Ferraro et al. 1991
30.5 +/-4.95	NE	Palos Verdes, CA	COA		High abundance (30.7+/-0.99 N/0.1 sq.m.)	Phoxocephalids	VAR			Ferraro et al. 1991
30.9 +/-6.45	NC	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.014+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.51+/-0.45	29.6+/-15.7	Bricker et al. 1993
31 +/-7.36	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.125+/-0.084 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.25+/-0.468	1.98+/-2.25	Bricker et al. 1993
31.1 +/-5.91	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (39.5+/-18.2% mortality)	Ampelisca abidta (amphipod)	SUB ADT	2.06+/-0.523	20.1+/-13.9	Bricker et al. 1993
31.4 +/-19.9	SG	Mississippi River, MS, LA	COA		Significantly toxic (32.9+/-36.4% mortality)	Mysidopsis bahia (mysid shrimp)		1.07+/-0.924	1.41+/-1.93	EMAP Louisiana Province 1991
31.6 +/-5.48	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.3+/-2.22% normal development)	Mulinia lateralis (bivalve)	LAR	2.18+/-0.531	19.1+/-12.5	Bricker et al. 1993
31.6 +/-8.38	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.016+/-0.007 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.26+/-0.936	43.4+/-35.6	Bricker et al. 1993
31.7 +/-8.76	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (17+/-16.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.99+/-1	21.6+/-24.5	Bricker et al. 1993
32.2 +/-4.4	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.061+/-0.038 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.8+/-0.477	8.52+/-10.7	Bricker et al. 1993
32.2 +/-7.85	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (6.48+/-10.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
32.2 +/-7.85	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99+/-0.862% normal development)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
32.4 +/-9.66	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.1+/-2.78% normal development)	Mulinia lateralis (bivalve)	LAR	2.12+/-1.04	22.9+/-23.7	Bricker et al. 1993
32.5 +/-4.99	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (15.2+/-9.21% mortality)	Mulinia lateralis (bivalve)	LAR	2.17+/-0.663	18.4+/-19.9	Bricker et al. 1993
34 +/-4.0	NE	Fraser River Estuary, BC	COA		Sediments populated by feral clams	Macoma balthica (bivalve)		0.45		McGreer 1982
34 +/-9.17	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (34.9+/-15.7% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.23+/-1.04	25.4+/-25.5	Bricker et al. 1993
34.2 +/-5.13	NE	Burrard Inlet, BC	COA	10-d	Not toxic (4.5+/-3.02% emergence)	Rhepoxynius abronius (amphipod)	ADT	2.66+/-2.15		McLeay et al. 1991
34.3 +/-7.74	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (91.5+/-7.28% normal development)	Mulinia lateralis (bivalve)	LAR	2.6+/-0.899	36.8+/-34.9	Bricker et al. 1993
35.1 +/-5.37	NE	Burrard Inlet, BC	COA	10-d	Not toxic (5.21+/-3.61% emergence)	Corophium volutator (amphipod)	ADT	3.18+/-2.1		McLeay et al. 1991
35.5 +/-5.69	NE	Burrard Inlet, BC	COA	10-d	Not toxic (8.9+/-2.99% mortality)	Corophium volutator (amphipod)	ADT	2.8+/-1.96		McLeay et al. 1991
35.5 +/-5.69	NE	Burrard Inlet, BC	COA	10-d	Not toxic (97.2+/-2.84% reburial)	Rhepoxynius abronius (amphipod)	ADT	2.8+/-1.96		McLeay et al. 1991
35.6 +/-11.3	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.1+/-13.3% mortality)	Mulinia lateralis (bivalve)	LAR	2.68+/-0.955	31.8+/-24.4	Bricker et al. 1993
36.1 +/-11.3	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.008+/-0.001 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.19+/-1.27	12+/-11.3	Bricker et al. 1993
36.7 +/-5.47	NE	Burrard Inlet, BC	COA	10-d	Not toxic (7.9+/-5.12% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.64+/-2.14		McLeay et al. 1991
36.8 +/-8.06	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.013+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.79+/-0.744	37.6+/-25.3	Bricker et al. 1993
36.9 +/-7.59	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (88.5+/-8.39% normal development)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.05	38.1+/-38.9	Bricker et al. 1993
37	NC	Puget Sound, WA	COA	2-d	Significantly toxic (3.8% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.5		Pastorok & Becker 1990
37.3 +/-6.01	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (23+/-4.24% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.46+/-1.22	40+/-55.1	Bricker et al. 1993

Table 7. A summary of the available data on the biological effects associated with sediment-sorbed NICKEL (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Nickel Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
37.7 +/-7.51	NE	Palos Verdes, CA	COA		High density (20.9+/-0.23 N/0.1 sq.m.)	Amphipod		1.7+/-0.61		Swartz et al. 1986
37.7 +/-7.51	NE	Palos Verdes, CA	COA		High density (11.2+/-1.64 N/0.1 sq.m.)	Phoxocephalid		1.7+/-0.61		Swartz et al. 1986
37.8 +/-9.1	NE	Stamford, CT	COA	96-h	Not toxic (10% mortality)	Palaemonetes pugio (shrimp)				Lee & Mariani 1977
37.9 +/-8.36	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (29.8+/-13.9% mortality)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.07	32.1+/-28.4	Bricker et al. 1993
38.6 +/-7.81	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (21.5+/-6.36% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.35+/-1.05	10.5+/-13.4	Bricker et al. 1993
39	*	Puget Sound, WA	AETA	48-h	1986 Puget Sound AET	Crassostrea gigas (oyster)	LAR	15		Bellar et al. 1986
39	NC	Puget Sound, WA	COA	10-d	Significantly toxic (56% mortality)	Panope generosa (geoduck)	JUV	2.1		Pastorok & Becker 1990
39.3 +/-1.7	NE	Puget Sound, WA	COA	15-min	Not significantly toxic (EC50; 0.283+/-0.168% extract)	Microtox (Photobacterium phosphoreum)		1.39+/-0.37		Pastorok & Becker 1990
39.8 +/-7.49	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (96.6+/-3.79% normal development)	Mulinia lateralis (bivalve)	LAR	2.87+/-0.94	35.1+/-25.9	Bricker et al. 1993
40 +/-7.72	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (38+/-13% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.92+/-0.937	34.6+/-23.9	Bricker et al. 1993
40.6 +/-15.6	NC	Puget Sound, WA	COA	2-d	Significantly toxic (60.4+/-46.5% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.57+/-0.287		Pastorok & Becker 1990
40.7 +/-32.2	*	Commencement Bay, WA	COA	10-d	Highly toxic (78.5+/-19.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
41.3 +/-19.6	NC	Puget Sound, WA	COA	10-d	Significantly toxic (80.8+/-30.6% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.266		Pastorok & Becker 1990
42	NE	Palos Verdes, CA	COA		High density (93.4 N/0.1 sq.m.)	Echinoderm		1.3+/-0.77		Swartz et al. 1986
42.2 +/-17.6	NE	Howe Sound, BC	COA	10-d	Not toxic (10.5+/-4.09% mortality)	Rhepoxynius abronius (amphipod)	ADT	3.4+/-4.39		McLeay et al. 1991
42.2 +/-17.6	NE	Howe Sound, BC	COA	10-d	Not toxic (5.83+/-5.48% emergence)	Rhepoxynius abronius (amphipod)	ADT	3.4+/-4.39		McLeay et al. 1991
42.2 +/-17.6	NE	Howe Sound, BC	COA	10-d	Not toxic (96.3+/-4.19% reburial)	Rhepoxynius abronius (amphipod)	ADT	3.4+/-4.39		McLeay et al. 1991
42.4	SG	Burrard Inlet, BC	COA	10-d	Highly toxic (23% emergence)	Corophium volutator (amphipod)	ADT	3.5		McLeay et al. 1991
42.4	SG	Burrard Inlet, BC	COA	10-d	Highly toxic (30.5% emergence)	Rhepoxynius abronius (amphipod)	ADT	3.5		McLeay et al. 1991
42.8		***PEL***								
42.8 +/-3.18	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.011+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.28+/-0.363	45.3+/-21.4	Bricker et al. 1993
43.1 +/-4.8	NE	Norwalk River, CT	COA	96-h	Not toxic (0% mortality)	Palaemonetes pugio (shrimp)				Lee & Mariani 1977
43.3 +/-9.05	NE	Palos Verdes, CA	COA		High species richness (70.9+/-16.9 S/0.1 sq.m.)	Benthic species	VAR			Ferraro et al. 1991
43.7 +/-3.03	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (75.1+/-10.6% mortality)	Mulinia lateralis (bivalve)	LAR	3.32+/-0.317	42.3+/-19.2	Bricker et al. 1993
44.4 +/-3.4	SG	Fraser River Estuary, BC	COA		Sediments devoid of feral clams	Macoma balthica (bivalve)		1.95		McGreer 1982
45	NE	Burrard Inlet, BC	SQO		Sediment Quality Objectives	Aquatic biota				Swain & Nijman 1991
45.6 +/-15.9	NC	Palos Verdes, CA	COA		Low abundance (415+/-94.4 N/0.1 sq.m.)	Benthic species	VAR			Ferraro et al. 1991
46.4 +/-12.1	NE	Palos Verdes, CA	COA	10-d	Not significantly toxic (11.9+/-5.36% mortality)	Rhepoxynius abronius (amphipod)	VAR			Ferraro et al. 1991
47.7 +/-1.53	NE	Palos Verdes, CA	COA		High abundance (944+/-101 N/0.1 sq.m.)	Benthic species	VAR			Ferraro et al. 1991
48 +/-9.73	NE	Pascagoula Mississippi Channel, MS	COA	10-d	Not significantly toxic (5.6+/-2.2% mortality)	Arenicola cristata (lugworm)	ADT			Parrish 1987c
48 +/-9.73	NE	Pascagoula Mississippi Channel, MS	COA	10-d	Not significantly toxic (6.5+/-5.14% mortality)	Penaeus duorarum (pink shrimp)	ADT			Parrish 1987c
48 +/-9.73	NE	Pascagoula Mississippi Channel, MS	COA	10-d	Not significantly toxic (0.7+/-0.82% mortality)	Crossostrea virginica (oyster)	ADT			Parrish 1987c
48.7 +/-24	NC	Puget Sound, WA	COA	20-d	Significantly toxic (37.3+/-22% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.87+/-0.208		Pastorok & Becker 1990
49	*	Puget Sound, WA	AETA		1986 Puget Sound AET	Benthic species		15		Bellar et al. 1986
49.1 +/-9.97	SG	Palos Verdes, CA	COA		Low abundance (2.4+/-5.65 N/0.1 sq.m.)	Echinoderms	VAR			Ferraro et al. 1991
49.3 +/-20.2	NE	Palos Verdes, CA	COA		High species richness (80.8+/-13.7 S/0.1 sq.m.)	Macro benthos		2.10+/-1.15		Swartz et al. 1985a
49.3 +/-20.2	NE	Palos Verdes, CA	COA		High density (54.5+/-9.91 N/0.1 sq.m.)	Amphipod		2.1+/-1.15		Swartz et al. 1985a
49.3 +/-20.2	NE	Palos Verdes, CA	COA		High density (34.3+/-5.67 N/0.1 sq.m.)	Phoxocephalid		2.1+/-1.15		Swartz et al. 1985a
49.3 +/-20.2	NE	Palos Verdes, CA	COA		High density (111+/-32 N/0.1 sq.m.)	Crustacea		2.1+/-1.15		Swartz et al. 1985a
51.6	*	Black Rock Harbor, CT	COA	14-d	Significantly toxic (100% mortality)	Nereis virens (sandworm)				Simmers et al. 1984
51.7 +/-8.12	SG	Palos Verdes, CA	COA		Low abundance (13.8+/-11.4 N/0.1 sq.m.)	Amphipods	VAR			Ferraro et al. 1991
51.7 +/-8.12	SG	Palos Verdes, CA	COA		Low abundance (5.87+/-7.06 N/0.1 sq.m.)	Phoxocephalids	VAR			Ferraro et al. 1991

Table 7. A summary of the available data on the biological effects associated with sediment-sorbed NICKEL (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Nickel Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
53.7 +/-18.6	NE	Palos Verdes, CA	COA	10-d	Not significantly toxic (9.5+/-5.45% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.42+/-0.88		Swartz et al. 1986
53.8 +/-123	NE	Chesapeake Bay, MD, VI; Delaware Bay, DE	COA		Not significantly toxic (mean ET50; burrowing time 0.76+/-0.266 h)	Mya arenaria (clam)	1-2 cm			Phelps 1990
56 +/-19.8	SG	Palos Verdes, CA	COA		Low density (0.2+/-0.14 N/0.1 sq.m.)	Echinoderm		2.64+/-0.77		Swartz et al. 1986
58.3 +/-24.3	NE	Palos Verdes, CA	COA		High density (594+/-688 N/0.1 sq.m.)	Mollusca		2.53+/-1.27		Swartz et al. 1985a
58.3 +/-24.3	NE	Palos Verdes, CA	COA	10-d	Not significantly toxic (8+/-5.7% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.53+/-1.27		Swartz et al. 1985a
61	*	Southern California	AETA		Southern California AET Values	Benthic species				Becker et al. 1990
61	NE	Palos Verdes, CA	COA		High density (4.4 N/0.1 sq.m.)	Echinoderm		0.9		Swartz et al. 1985a
61	NE	Palos Verdes, CA	COA		High density (88 N/0.1 sq.m.)	Foraminifera (sponge)		0.9		Swartz et al. 1985a
61	NE	Palos Verdes, CA	COA		High density (132 N/0.1 sq.m.)	Ophiuroidea (brittle star)		0.9		Swartz et al. 1985a
61	NE	Palos Verdes, CA	COA		High density (2177 N/0.1 sq.m.)	Polychaeta		3.2		Swartz et al. 1985a
61.6 +/-84	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (4.43+/-2.1% mortality)	Panope generosa (geoduck)	JUV	1.51+/-0.261		Pastorok & Becker 1990
62.9 +/-90.7	NE	Puget Sound, WA	COA	20-d	Not significantly toxic (5+/-3.86% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.46+/-0.26		Pastorok & Becker 1990
65.3 +/-90.7	SG	Puget Sound, WA	COA	15-min	Significantly toxic (EC50; 0.065+/-0.043% extract)	Microtox (Photobacterium phosphoreum)		1.58+/-0.255		Pastorok & Becker 1990
65.6 +/-90.6	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (2.09+/-1.73% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.56+/-0.329		Pastorok & Becker 1990
68	SG	Palos Verdes, CA	COA		Low species richness (19.2 S/0.1 sq.m.)	Benthic species	VAR			Ferraro et al. 1991
69.7 +/-13.7	NE	Baltimore Harbor, MD	COA	48-h	Least toxic; TLm	Fundulus heteroclitus (mummichog)				Tsai et al. 1979
69.7 +/-13.7	NE	Baltimore Harbor, MD	COA	48-h	Least toxic; TLm	Leiostomus xanthurus (spot)				Tsai et al. 1979
69.7 +/-6.51	SG	Palos Verdes, CA	COA		Low density (5.3+/-3.7 N/0.1 sq.m.)	Amphipod		3.13+/-0.15		Swartz et al. 1986
69.7 +/-6.51	SG	Palos Verdes, CA	COA		Low density (0.13+/-0.23 N/0.1 sq.m.)	Phoxocephalid		3.13+/-0.15		Swartz et al. 1986
72.6 +/-104	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (13.8+/-4.09% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.47+/-0.306		Pastorok & Becker 1990
75.8 +/-27.8	SG	Palos Verdes, CA	COA		Low density (0.03+/-0.08 N/0.1 sq.m.)	Echinoderm		3.53+/-0.742		Swartz et al. 1985a
75.8 +/-27.8	SG	Palos Verdes, CA	COA		Low density (0.233+/-0.367 N/0.1 sq.m.)	Foraminifera (sponge)		3.53+/-0.742		Swartz et al. 1985a
75.8 +/-27.8	SG	Palos Verdes, CA	COA		Low density (0.3+/-0.8 N/0.1 sq.m.)	Ophiuroidea (brittle star)		3.53+/-0.742		Swartz et al. 1985a
75.8 +/-27.8	SG	Palos Verdes, CA	COA		Low density (365+/-178 N/0.1 sq.m.)	Polychaeta		3.15+/-1.32		Swartz et al. 1985a
77.5 +/-42.2	NE	San Francisco Bay, CA	COA	48-h	Least toxic (23.3+/-7.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
78.6 +/-5.64	NC	San Francisco Bay, CA	COA	48-h	Moderately toxic (57.1+/-13.6% mortality)	Mussel	LAR	1.14+/-.33		Chapman et al. 1987a
78.7 +/-8.33	NC	San Francisco Bay, CA	COA	48-h	Moderately toxic (25.1+/-6.61% abnormal)	Mussel	LAR	1.26+/-0.17		Chapman et al. 1987a
78.8 +/-5.74	NE	San Francisco Bay, CA	COA	4-wk	Least toxic (116+/-4.3 young produced)	Tigriopus californicus (copepod)	ADT	1.23+/-.09		Chapman et al. 1987a
80.6 +/-5.88	NE	San Francisco Bay, CA	COA	48-h	Least toxic (18+/-8.01% abnormal)	Mussel	LAR	1.2+/-.38		Chapman et al. 1987a
81.7 +/-7.97	NE	San Francisco Bay, CA	COA	10-d	Least toxic (13.6+/-7.76% mortality)	Amphipod	ADT	1.4 +/- 0.79		Chapman et al. 1987a
82.5 +/-7.71	NE	San Francisco Bay, CA	COA	10-d	Least Toxic (4.63+/-2.91% avoidance)	Amphipod	ADT	1.44+/-.74		Chapman et al. 1987a
83	NE	San Francisco Bay, CA	COA	48-h	Least toxic (17.3% mortality)	Mussel	LAR	1.25		Chapman et al. 1987a
89.3 +/-128	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (6.67+/-8.07% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.51+/-0.330		Pastorok & Becker 1990
89.7 +/-5.69	SG	San Francisco Bay, CA	COA	10-d	Moderately toxic (28.3+/-7.51% mortality)	Amphipod	ADT	2.01+/-.98		Chapman et al. 1987a
92 +/-6.22	SG	Palos Verdes, CA	COA		Low species richness (26.0+/-11.5 S/0.1 sq.m.)	Macro benthos		3.95+/-0.238		Swartz et al. 1985a
92 +/-6.22	SG	Palos Verdes, CA	COA		Low density (1.0+/-1.2 N/0.1 sq.m.)	Amphipod		3.95+/-0.238		Swartz et al. 1985a
92 +/-6.22	SG	Palos Verdes, CA	COA		Low density (0 N/0.1 sq.m.)	Phoxocephalid		3.95+/-0.238		Swartz et al. 1985a
92 +/-6.22	SG	Palos Verdes, CA	COA		Low density (8.7+/-6.01 N/0.1 sq.m.)	Crustacea		3.95+/-0.238		Swartz et al. 1985a
92.7 +/-4.16	SG	San Francisco Bay, CA	COA	48-h	Highly toxic (92.3+/-5.5% mortality)	Mussel	LAR	2.87+/-1.32		Chapman et al. 1987a
92.7 +/-4.16	SG	San Francisco Bay, CA	COA	4-wk	Moderately toxic (94.9+/-10.1 young produced)	Tigriopus californicus (copepod)	ADT	2.87+/-1.07		Chapman et al. 1987a
92.8 +/-3.4	SG	San Francisco Bay, CA	COA	48-h	Highly toxic (92.4+/-4.5% abnormal)	Bivalve	LAR			Long & Morgan 1990
94	SG	San Francisco Bay, CA	COA	10-d	Most toxic (95% mortality)	Amphipod	ADT	4.03		Chapman et al. 1987a

Table 7. A summary of the available data on the biological effects associated with sediment-sorbed NICKEL (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Nickel Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
94	SG	San Francisco Bay, CA	COA	10-d	Highly toxic (37% avoidance)	Amphipod	ADT	4.03		Chapman et al. 1987a
94.3 +/-5.03	SG	Palos Verdes, CA	COA		Low density (21.5+/-11.6 N/0.1 sq.m.)	Mollusca		4+/-0.265		Swartz et al. 1985a
94.3 +/-5.03	SG	Palos Verdes, CA	COA	10-d	Significantly toxic (21+/-6.3% mortality)	Rhepoxynius abronius (amphipod)	ADT	4+/-0.265		Swartz et al. 1985a
95	SG	San Francisco Bay, CA	COA	48-h	Highly toxic (66.8% abnormal)	Mussel	LAR	3.59		Chapman et al. 1987a
97.4 +/-53.3	*	Baltimore Harbor, MD	COA	48-h	Most toxic; TLm	Fundulus heteroclitus (mummichog)				Tsai et al. 1979
97.4 +/-53.3	*	Baltimore Harbor, MD	COA	48-h	Most toxic; TLm	Leiostomus xanthurus (spot)				Tsai et al. 1979
>99	-	Southern California	AETA	10-d	Southern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
99.3 +/-34.5	NG	San Francisco Bay, CA	COA	10-d	Moderately toxic (33.8+/-4.7% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
99.6 +/-35.2	NG	San Francisco Bay, CA	COA	48-h	Significantly toxic (55.7+/-22.7% abnormal)	Bivalve	LAR			Long & Morgan 1990
102 +/-44.3	NE	San Francisco Bay, CA	COA	48-h	Not significantly toxic (31.9+/-15.5% abnormal)	Bivalve	LAR			Long & Morgan 1990
105 +/-35.8	NG	San Francisco Bay, CA	COA	10-d	Significantly toxic (42.9+/-19.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
108 +/-25.1	NE	San Francisco Bay, CA	COA	10-d	Least toxic (18+/-6.6% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
108 +/-26.9	NE	San Francisco Bay, CA	COA	10-d	Not significantly toxic (18.4+/-6.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
112 +/-30.9	NC	San Francisco Bay, CA	COA	48-h	Moderately toxic (59.4+/-11.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
113 +/-30.2	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (23.3+/-6.14% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.738		Word et al. 1988
113 +/-42.3	SG	San Francisco Bay, CA	COA	10-d	Highly toxic (67+/-11.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
117 +/-28.5	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (10.4+/-6.3% mortality)	Nephtys caecoides (polychaete)		1.63+/-0.657		Word et al. 1988
117 +/-28.5	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (0.2+/-0.6% mortality)	Macoma nasuta (clam)		1.63+/-0.657		Word et al. 1988
120	*	Puget Sound, WA	AETA		PSDDA Maximum Level Criteria	Aquatic biota				USACOE 1988
>120	-	Puget Sound, WA	AETA	10-d	1986 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT	15		Bellar et al. 1986
131 +/-16.3	SG	Oakland Harbor, CA	COA	10-d	Significantly toxic (35.3+/-2.5% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.56+/-0.07		Word et al. 1988
>140	-	Puget Sound, WA	AETA		1988 Puget Sound AET	Benthic community				PTI 1988
>140	-	Puget Sound, WA	AETA	10-d	1988 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT			PTI 1988
170	*	San Francisco Bay, CA	AETA	10-d	San Francisco Bay AET	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
170	*	San Francisco Bay, CA	AETA	48-h	San Francisco Bay AET	Oyster; mussel	LAR			Long & Morgan 1990
>170	-	Northern California	AETA	10-d	Northern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
>170	-	California	AETA	10-d	California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
>170	-	California	AETA	48-h	California AET Values	Mytilus edulis (bivalve)	LAR			Becker et al. 1990
>170	-	California	AETA		California AET Values	Benthic species				Becker et al. 1990
>170	-	Northern California	AETA		Northern California AET Values	Benthic species				Becker et al. 1990

Table 8. A summary of the available data on the biological effects associated with sediment-sorbed SILVER (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Silver	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.021		NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (18% mortality)	Ampelisca abdita (amphipod)		0.028	9 ug/g	Windom In Prep
0.023		NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (0% mortality)	Arbacia punctulata (sea urchin)		0.03	19 ug/g	Windom In Prep
0.025	+/-0.007	NC	Mississippi Sound, MS	COA	10-d	Significantly toxic (11.6+/-3.39% mortality)	Ampelisca abdita (amphipod)		0.111+/-0.045	0.03	EMAP Louisiana Province 1991
0.025	+/-0.006	NE	Apalachee Bay, FL	COA		Not significantly toxic (0.75+/-1.5% mortality)	Mysidopsis bahia (mysid shrimp)		0.540+/-0.385	0.405+/-0.417	EMAP Louisiana Province 1991
0.025	+/-0.007	NE	Apalachee Bay, FL	COA	10-d	Not significantly toxic (3.3+/-3.25% mortality)	Ampelisca abdita (amphipod)		0.643+/-0.455	0.390+/-0.410	EMAP Louisiana Province 1991
0.025	+/-0.007	NG	Apalachee Bay, FL	COA	10-d	Significantly toxic (15.6% mortality)	Ampelisca abdita (amphipod)		0.438+/-0.442	0.421+/-0.593	EMAP Louisiana Province 1991
0.04		NC	Mobile Bay, AL	COA		Significantly toxic (10% mortality)	Mysidopsis bahia (mysid shrimp)		0.009	0.004	EMAP Louisiana Province 1991
0.05	+/-0.014	NC	Mobile Bay, AL	COA	10-d	Significantly toxic (46+/-49.3% mortality)	Ampelisca abdita (amphipod)		0.22+/-0.298	3.84+/-5.43	EMAP Louisiana Province 1991
0.055	+/-0.026	NE	Brunswick Harbor Entrance, GA	COA	48-h	Not significantly toxic (86.6+/-4.25% normal development)	Arbacia punctulata (sea urchin)		0.181+/-0.162	182+/-208 ug/g	Windom In Prep
0.055	+/-0.038	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (5.8+/-3.7% mortality)	Rhepoxynius abronius (amphipod)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
0.055	+/-0.038	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (3.4+/-1.82% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
0.055	+/-0.038	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (11.2+/-3.7% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
0.055	+/-0.038	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (3.52+/-1.66% mortality)	Macoma nasuta (clam)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
>0.056		-	Puget Sound, WA	AETA	48-h	1986 Puget Sound AET	Crassostrea gigas (oyster)	LAR	15		Bellar et al. 1986
0.062	+/-0.026	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (28.3+/-6.11% mortality)	Mysidopsis bahia (mysid)		0.246+/-0.051	127+/-24 ug/g	Windom In Prep
0.064	+/-0.09	NE	Tampa Bay, FL	COA	1-h	Least toxic (83+/-4.26% fertilization)	Arbacia punctulata (sea urchin)	GAM		0.131+/-0.169	Long 1993
0.066	+/-0.063	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (9.78+/-5.33% mortality)	Mysidopsis bahia (mysid)		0.24+/-0.247	91.9+/-73.4 ug/g	Windom In Prep
0.068	+/-0.067	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (4+/-2.83% mortality)	Menidia beryllina (silverside)		0.243+/-0.264	90.5+/-78.4 ug/g	Windom In Prep
0.068	+/-0.078	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (27.5+/-10.6% mortality)	Mysidopsis bahia (mysid)		0.237+/-0.311	74.6+/-85.5 ug/g	Windom In Prep
0.071	+/-0.065	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (11.6+/-4.33% mortality)	Ampelisca abdita (amphipod)		0.267+/-0.25	102+/-71.1 ug/g	Windom In Prep
0.079	+/-0.066	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (91.3+/-2.91% normal development)	Arbacia punctulata (sea urchin)		0.299+/-0.251	114+/-68.4 ug/g	Windom In Prep
0.08	+/-0.022	NC	Mississippi Sound, MS	COA		Significantly toxic (12.2+/-4.42% mortality)	Mysidopsis bahia (mysid shrimp)		0.939+/-0.335	2.63+/-2.3	EMAP Louisiana Province 1991
0.088	+/-0.067	*	Savannah River Entrance Channel, GA	COA	48-h	Significantly toxic (25.4+/-7.66% mortality)	Arbacia punctulata (sea urchin)		0.344+/-0.242	129.5+/-59.3 ug/g	Windom In Prep
0.093	+/-0.056	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (9.61+/-2.7% mortality)	Menidia beryllina (silverside)		1.22+/-1.13	9172+/-13363 ug/g	Windom In Prep
0.098	+/-0.017	NC	Chandeleur Sound, LA	COA	10-d	Significantly toxic (11.5+/-4.86% mortality)	Ampelisca abdita (amphipod)		0.811+/-0.711	1.87+/-0.973	EMAP Louisiana Province 1991
0.098	+/-0.021	NE	Chandeleur Sound, LA	COA		Not significantly toxic (1.03+/-2.05% mortality)	Mysidopsis bahia (mysid shrimp)		0.824+/-0.915	1.69+/-0.920	EMAP Louisiana Province 1991
0.101	+/-0.055	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (10.6+/-3.17% mortality)	Ampelisca abdita (amphipod)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
0.101	+/-0.055	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (8.00+/-2.92% mortality)	Mysidopsis bahia (mysid)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
0.101	+/-0.063	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (5.43+/-3.21% mortality)	Mysidopsis bahia (mysid)		1.21+/-1.13	9096+/-13378 ug/g	Windom In Prep
0.109		SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (16% mortality)	Mysidopsis bahia (mysid)		1.8	7095 ug/g	Windom In Prep
0.128	+/-0.024	NE	Matagorda Bay, TX	COA		Not significantly toxic (1.58+/-1.82% mortality)	Mysidopsis bahia (mysid shrimp)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
0.128	+/-0.024	NE	Matagorda Bay, TX	COA	10-d	Not significantly toxic (2.33+/-4.65% mortality)	Ampelisca abdita (amphipod)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
0.128	+/-0.087	NE	Mississippi Sound, MS	COA		Not significantly toxic (0.789+/-1.59% mortality)	Mysidopsis bahia (mysid shrimp)		0.827+/-0.757	1.46+/-1.58	EMAP Louisiana Province 1991
0.129	+/-0.07	NE	Mississippi Sound, MS	COA	10-d	Not significantly toxic (1.4+/-1.73% mortality)	Ampelisca abdita (amphipod)		0.998+/-0.602	2.01+/-1.82	EMAP Louisiana Province 1991
0.13	+/-0.062	NE	Mobile Bay, AL	COA		Not significantly toxic (1.07+/-1.85% mortality)	Mysidopsis bahia (mysid shrimp)		0.968+/-0.815	8.23+/-3.4	EMAP Louisiana Province 1991
0.135	+/-0.049	NE	Mississippi River, MS, LA	COA	10-d	Not significantly toxic (7.8+/-1.63% mortality)	Ampelisca abdita (amphipod)		1.15+/-1.04	2.31+/-0.651	EMAP Louisiana Province 1991
0.137	+/-0.042	*	Brunswick Harbor Entrance, GA	COA	48-h	Significantly toxic (14.6+/-18.9% normal development)	Arbacia punctulata (sea urchin)		1.99+/-0.562	14009+/-13434 ug/g	Windom In Prep
0.14	+/-0.042	NE	Mississippi River, MS, LA	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		1.3+/-0.83	1.14+/-1	EMAP Louisiana Province 1991
0.165	+/-0.021	NE	Mobile Bay, AL	COA	10-d	Not significantly toxic (0.5+/-0.778% mortality)	Ampelisca abdita (amphipod)		1.24+/-0.948	8.51+/-4.76	EMAP Louisiana Province 1991
0.167		SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (22.3% mortality)	Menidia beryllina (silverside)		1.71	6562 ug/g	Windom In Prep
0.17	+/-0.087	NC	Galveston Bay, TX	COA		Significantly toxic (13.4+/-9.11% mortality)	Mysidopsis bahia (mysid shrimp)		0.778+/-0.482	1.21+/-0.778	EMAP Louisiana Province 1991
0.17	+/-0.071	NE	Galveston Bay, TX	COA	10-d	Not significantly toxic (1.35+/-1.45% mortality)	Ampelisca abdita (amphipod)		0.961+/-0.537	1.17+/-0.640	EMAP Louisiana Province 1991

Table 8. A summary of the available data on the biological effects associated with sediment-sorbed SILVER (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Silver	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.172	+/-0.28	*	Tampa Bay, FL	COA	1-h	Moderately toxic (44.5+/-17.8% fertilization)	Arbacia punctulata (sea urchin)	GAM		0.622+/-1.12	Long 1993
0.175	+/-0.106	SG	Mississippi River, MS, LA	COA		Significantly toxic (32.9+/-36.4% mortality)	Mysidopsis bahia (mysid shrimp)		1.07+/-0.924	1.41+/-1.93	EMAP Louisiana Province 1991
0.18	+/-0.099	SG	Mississippi River, MS, LA	COA	10-d	Significantly toxic (15.9+/-6.65% mortality)	Ampelisca abdita (amphipod)		1.22+/-0.717	0.235+/-0.276	EMAP Louisiana Province 1991
0.2	+/-0.1	NG	Commencement Bay, WA	COA	10-d	Highly toxic (78.5+/-19.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
0.208	+/-0.305	NE	Tampa Bay, FL	COA		Not significantly toxic (EC50; 0.133+/-0.103 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)			1.23+/-1.96	Long 1993
0.217	+/-0.146	NE	Galveston Bay, TX	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		0.934+/-0.657	0.457+/-0.530	EMAP Louisiana Province 1991
0.22	+/-0.246	*	Chandeleur Sound, LA	COA		Significantly toxic (7.6+/-1.32% mortality)	Mysidopsis bahia (mysid shrimp)		0.624+/-0.197	2.07+/-1.19	EMAP Louisiana Province 1991
0.236	+/-0.327	NE	Tampa Bay, FL	COA	10-d	Not significantly toxic (9.5+/-6.15% mortality)	Ampelisca abdita (amphipod)	SUBADT		1.56+/-2.73	Long 1993
0.24	+/-0.198	SG	Galveston Bay, TX	COA	10-d	Significantly toxic (15.8+/-3.89% mortality)	Ampelisca abdita (amphipod)		0.647+/-0.606	0.160+/-0.184	EMAP Louisiana Province 1991
0.3	+/-0.1	NE	Commencement Bay, WA	COA	48-h	Least toxic (15.1+/-3.1% abnormality)	Oyster	LAR			Tetra Tech 1985
0.3	+/-0.1	NE	Commencement Bay, WA	COA	10-d	Least toxic (12.5+/-4.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
0.3	+/-0.312	NE	Chandeleur Sound, LA	COA	10-d	Not significantly toxic (2.87+/-4.05% mortality)	Ampelisca abdita (amphipod)		0.517+/-0.166	2.02+/-1.38	EMAP Louisiana Province 1991
0.3	+/-0.1	NG	Commencement Bay, WA	COA	48-h	Highly toxic (44.5+/-19% abnormality)	Oyster	LAR			Tetra Tech 1985
0.3	+/-0.1	NG	Commencement Bay, WA	COA	48-h	Moderately toxic (23+/-2.3% abnormality)	Oyster	LAR			Tetra Tech 1985
0.3	+/-0.1	NG	Commencement Bay, WA	COA	10-d	Moderately toxic (26+/-5.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
0.37	+/-0.054	NE	Puget Sound, WA	COA	15-min	Not significantly toxic (EC50; 0.283+/-0.168% extract)	Microtox (Photobacterium phosphoreum)		1.39+/-0.37		Pastorok & Becker 1990
0.457	+/-0.431	*	Tampa Bay, FL	COA	1-h	Most toxic (1.96+/-3.19% fertilization)	Arbacia punctulata (sea urchin)	GAM		3.95+/-5.94	Long 1993
0.47		NC	Puget Sound, WA	COA	10-d	Significantly toxic (56% mortality)	Panope generosa (geoduck)	JUV	2.1		Pastorok & Becker 1990
0.5		NE	Charleston Harbor, SC	COA		High species richness (14.9+/-2.04; SRUs)	Benthic species				Winn et al. 1989
0.5		NE	Charleston Harbor, SC	COA		High diversity (4.15+/-0.59; SDUs)	Benthic species				Winn et al. 1989
0.5		NE	Miami River/Seybold Canal, FL	COA	10-d	Not significantly toxic (2.3+/-1.51% mortality)	Mercenaria mercenaria (atlantic quahog)	ADT			Vittor & Associates 1988
0.5		NE	Miami River/Seybold Canal, FL	COA	10-d	Not significantly toxic (7.7+/-3.02% mortality)	Nereis virens (sandworm)	ADT			Vittor & Associates 1988
0.5		NE	Miami River/Seybold Canal, FL	COA	10-d	Not significantly toxic (6.7+/-2.31% mortality)	Pennaeus aztecus aztecus (brown shrimp)	ADT			Vittor & Associates 1988
0.5		NG	Charleston Harbor, SC	COA		Moderate species richness (9.05+/-1.33; SRUs)	Benthic species				Winn et al. 1989
0.5		NG	Charleston Harbor, SC	COA		Low species richness (5.16; SRUs)	Benthic species				Winn et al. 1989
0.5		NG	Charleston Harbor, SC	COA		Moderate diversity (2.3+/-0.2; SDUs)	Benthic species				Winn et al. 1989
0.5		NG	Charleston Harbor, SC	COA		Low diversity (1.16; SDUs)	Benthic species				Winn et al. 1989
0.5		NG	Miami River/Seybold Canal, FL	COA	10-d	Significantly toxic (24.7+/-15% mortality)	Pennaeus aztecus (brown shrimp)	ADT			Vittor & Associates 1988
0.5	+/-0.4	NE	San Francisco Bay, CA	COA	48-h	Least toxic (23.3+/-7.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
0.55	+/-0.498	NE	Tampa Bay, FL	COA	48-h	Not significantly toxic (38.5+/-2.9% mortality)	Mulinaria lateralis (coot clam)	LAR		2.64+/-3.04	Long 1993
>0.56		-	Puget Sound, WA	AETA	15-min	1988 Puget Sound AET	Microtox (Photobacterium phosphoreum)				PTI 1988
>0.56		-	Puget Sound, WA	AETA	15-min	1986 Puget Sound AET	Microtox (Photobacterium phosphoreum)		15		Bellar et al. 1986
>0.56		-	Puget Sound, WA	AETA	48-h	1988 Puget Sound AET	Crassostrea gigas (oyster)	LAR			PTI 1988
0.563	+/-0.159	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (25.9+/-5.01% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.21+/-0.444	2.41+/-2.32	Bricker et al. 1993
0.58	+/-0.167	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.125+/-0.084 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.25+/-0.468	1.98+/-2.25	Bricker et al. 1993
0.6	+/-0.087	NE	Houston Ship Channel, TX	COA		Not significantly toxic (15+/-13.2% mortality)	Sheepshead minnow	ADT	0.05+/-0.0242		Crocker et al. 1991
0.6	+/-0.5	NE	San Francisco Bay, CA	COA	48-h	Not significantly toxic (31.9+/-15.5% abnormal)	Bivalve	LAR			Long & Morgan 1990
0.6	+/-0.8	NE	Southern California	COA		High abundance (191+/-70.1 N/0.1 sq.m.)	Echinoderm				Word & Mearns 1979 (As cited in L&M 1990)
0.6	+/-0.7	NG	Southern California	COA		Moderate abundance (56.2+/-23 N/0.1 sq.m.)	Echinoderm				Word & Mearns 1979 (As cited in L&M 1990)
0.615	+/-0.111	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (19.3+/-5.86% mortality)	Ampelisca abidta (amphipod)	SUB ADT	1.82+/-0.225	6.3+/-6.2	Bricker et al. 1993
0.633	+/-0.358	NC	Puget Sound, WA	COA	2-d	Significantly toxic (60.4+/-46.5% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.57+/-0.287		Pastorok & Becker 1990
0.645	+/-0.262	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (23.3+/-6.14% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.738		Word et al. 1988

Table 8. A summary of the available data on the biological effects associated with sediment-sorbed SILVER (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Silver	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.66	+/-0.382	NC	Puget Sound, WA	COA	10-d	Significantly toxic (80.8+/-30.6% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.266		Pastorok & Becker 1990
0.66	+/-0.396	SG	Tampa Bay, FL	COA	48-h	Significantly toxic (48.1+/-1.91% mortality)	Mulinaria lateralis (coot clam)	LAR		2.82+/-2.65	Long 1993
0.661	+/-0.241	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (10.4+/-6.3% mortality)	Nephtys caecoides (polychaete)		1.63+/-0.657		Word et al. 1988
0.661	+/-0.241	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (0.2+/-0.6% mortality)	Macoma nasuta (clam)		1.63+/-0.657		Word et al. 1988
0.662	+/-0.287	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (6.48+/-10.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
0.662	+/-0.287	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99+/-0.862% normal development)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
0.666	+/-0.433	*	Tampa Bay, FL	COA		Significantly toxic (EC50; 0.021+/-0.012 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)			6.13+/-8.06	Long 1993
0.7	+/-0.8	NC	Southern California	COA		Moderate species richness (72+/-3.3 S/0.1 sq.m.)	Benthic species				Word & Mearns 1979 (As cited in L&M 1990)
0.7	+/-1.0	NC	Southern California	COA		Moderate abundance (72.6+/-6.8 N/0.1 sq.m.)	Arthropods				Word & Mearns 1979 (As cited in L&M 1990)
0.725	+/-0.137	SG	Oakland Harbor, CA	COA	10-d	Significantly toxic (35.3+/-2.5% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.56+/-0.07		Word et al. 1988
0.728	+/-0.146	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.061+/-0.038 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.8+/-0.477	8.52+/-10.7	Bricker et al. 1993
0.733			***TEL***								
0.737	+/-0.645	NE	Puget Sound, WA	COA	20-d	Not significantly toxic (5+/-3.86% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.46+/-0.26		Pastorok & Becker 1990
0.8		NE	San Diego Bay, CA	COA	96-h	Not significantly toxic (4% mortality)	Citharichthys stigmaeus (sanddab)				Salazar & Salazar 1985
0.8		NE	San Diego Bay, CA	COA	10-d	Not significantly toxic (14% mortality)	Acanthomysis sculpta (mysid)				Salazar & Salazar 1985
0.8		NE	San Diego Bay, CA	COA	20-d	Not significantly toxic (13% mortality)	Neanthes arenaceodentata (polycheate)				Salazar & Salazar 1985
0.8		NE	San Diego Bay, CA	COA	20-d	Not significantly toxic (1% mortality)	Macoma nasuta (clam)				Salazar & Salazar 1985
0.8		NE	San Diego Bay, CA	COA	96-h	Not significantly toxic (0% mortality)	Acanthomysis sculpta (mysid)				Salazar & Salazar 1985
0.8		NE	San Diego Bay, CA	COA	96-h	Not significantly toxic (18% mortality)	Acartia tonsa (copepod)				Salazar & Salazar 1985
0.8	+/-0.6	NE	Fraser River Estuary, BC	COA		Sediments populated by feral clams	Macoma balthica (bivalve)		.45		McGreer 1982
0.812	+/-0.393	*	Tampa Bay, FL	COA	10-d	Significantly toxic (32.1+/-16.9% mortality)	Ampelisca abdita (amphipod)	SUBADT		7.63+/-9.44	Long 1993
0.832	+/-0.238	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (96+/-1.66% normal development)	Mulinia lateralis (bivalve)	LAR	2.52+/-0.997	35+/-42.9	Bricker et al. 1993
0.861	+/-0.323	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (15.2+/-9.21% mortality)	Mulinia lateralis (bivalve)	LAR	2.17+/-0.663	18.4+/-19.9	Bricker et al. 1993
0.869	+/-0.377	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-7.99% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.14+/-0.352	6.09+/-5.38	Bricker et al. 1993
0.871	+/-0.912	NE	Narragansett Bay, RI	COA	10-d	Not significantly toxic (5.28+/-3.04% mortality))	Ampelisca abdita (amphipod)	ADT			Munns et al. 1991
0.9	+/-0.9	NC	San Francisco Bay, CA	COA	10-d	Moderately toxic (33.8+/-4.7% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
0.9	+/-0.391	NE	Houston Ship Channel, TX	COA	10-d	Not significantly toxic (5.4+/-3.6% mortality)	Amphipod	ADT	0.129+/-0.054		Crocker et al. 1991
0.9	+/-1.6	NE	Southern California	COA		High abundance (148+/-58 N/0.1 sq.m.)	Arthropods				Word & Mearns 1979 (As cited in L&M 1990)
0.9	+/-2.1	NE	Southern California	COA		High species richness (96.3+/-22.3 S/0.1 sq.m.)	Benthic species				Word & Mearns 1979 (As cited in L&M 1990)
0.913	+/-0.303	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (39.5+/-18.2% mortality)	Ampelisca abidta (amphipod)	SUB ADT	2.06+/-0.523	20.1+/-13.9	Bricker et al. 1993
0.922	+/-0.404	NE	Houston Ship Channel, TX	COA	10-d	Not significantly toxic (4.7+/-4.29% mortality)	Amphipod	ADT	0.144+/-0.123		Crocker et al. 1991
0.925	+/-0.389	SG	Houston Ship Channel, TX	COA	10-d	Significantly toxic (22.7+/-0.778% mortality)	Amphipod	ADT	0.248+/-0.132		Crocker et al. 1991
0.947	+/-0.53	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.008+/-0.001 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.19+/-1.27	12+/-11.3	Bricker et al. 1993
0.961	+/-0.344	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.3+/-2.22% normal development)	Mulinia lateralis (bivalve)	LAR	2.18+/-0.531	19.1+/-12.5	Bricker et al. 1993
0.961	+/-0.876	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.074+/-0.043 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.27+/-0.626	6.21+/-5.41	Bricker et al. 1993
0.968	+/-0.703	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99.3+/-0.827% normal development)	Mulinia lateralis (bivalve)	LAR	1.43+/-0.738	14.7+/-24	Bricker et al. 1993
0.984	+/-0.992	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.096+/-0.101 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.37+/-0.759	6.93+/-6.83	Bricker et al. 1993
1		*	Strait of Georgia, BC	COA	24-h	Significantly toxic (avoidance)	Macoma balthica (bivalve)		3.09		McGreer 1979
1		NE	Howe Sound, BC	COA	10-d	Not toxic (10.5+/-4.09% mortality)	Rhepoxynius abronius (amphipod)	ADT	3.4+/-4.39		McLeay et al. 1991
1		NE	Howe Sound, BC	COA	10-d	Not toxic (5.83+/-5.48% emergence)	Rhepoxynius abronius (amphipod)	ADT	3.4+/-4.39		McLeay et al. 1991
1		NE	Howe Sound, BC	COA	10-d	Not toxic (96.3+/-4.19% reburial)	Rhepoxynius abronius (amphipod)	ADT	3.4+/-4.39		McLeay et al. 1991
1	+/-0.6	*	San Francisco Bay, CA	COA	48-h	Moderately toxic (59.4+/-11.3% abnormal)	Bivalve	LAR			Long & Morgan 1990

Table 8. A summary of the available data on the biological effects associated with sediment-sorbed SILVER (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Silver Std Dev		Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
1	+/-2.0	NC	Southern California	COA		Moderate abundance (75.6+/-12.7 N/0.1 sq.m.)	Benthic species				Word & Mearns 1979 (As cited in L&M 1990)
1.01	+/-0.444	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (21.5+/-6.36% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.35+/-1.05	10.5+/-13.4	Bricker et al. 1993
1.02	+/-1.06	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (4.43+/-2.1% mortality)	Panope generosa (geoduck)	JUV	1.51+/-0.261		Pastorok & Becker 1990
1.05	+/-1.12	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (2.09+/-1.73% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.56+/-0.329		Pastorok & Becker 1990
1.06	+/-0.411	NE	Houston Ship Channel, TX	COA	7-d	Not significantly toxic (7.5+/-5% mortality)	Sheepshead minnow	ADT	0.137+/-0.056		Crocker et al. 1991
1.09	+/-0.342	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.014+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.51+/-0.45	29.6+/-15.7	Bricker et al. 1993
1.1		*	San Francisco Bay, CA	AETA	48-h	San Francisco Bay AET	Oyster; mussel	LAR			Long & Morgan 1990
1.1		NE	San Francisco Bay, CA	COA	48-h	Least toxic (17.3% mortality)	Mussel	LAR	1.25		Chapman et al. 1987a
1.1	+/-0.98	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (51.3+/-6.95% mortality)	Mulinia lateralis (bivalve)	LAR	1.8+/-1.71	29.6+/-46.3	Bricker et al. 1993
1.11	+/-0.302	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.5+/-11.4% mortality)	Mulinia lateralis (bivalve)	LAR	2.33+/-0.364	26.8+/-9.42	Bricker et al. 1993
1.13	+/-1.11	*	Puget Sound, WA	COA	15-min	Significantly toxic (EC50; 0.065+/-0.043% extract)	Microtox (Photobacterium phosphoreum)		1.58+/-0.255		Pastorok & Becker 1990
1.13	+/-1.94	NE	Southern California	COA	10-d	Not significantly toxic (23.2% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
1.14	+/-0.946	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (12.3+/-14.5% mortality)	Mulinia lateralis (bivalve)	LAR	1.53+/-0.743	15.7+/-23.2	Bricker et al. 1993
1.17	+/-1.07	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-6.07% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.71+/-0.9	15.3+/-23.2	Bricker et al. 1993
1.19	+/-1.28	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (13.8+/-4.09% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.47+/-0.306		Pastorok & Becker 1990
1.2		NE	Puget Sound, WA	AETA		PSDDA Screening level concentration	Aquatic biota				USACOE 1988
1.2	+/-1.7	NC	San Francisco Bay, CA	COA	10-d	Significantly toxic (42.9+/-19.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
1.23	+/-1.06	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (30.5+/-16.4% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.62+/-0.777	17.7+/-26.3	Bricker et al. 1993
1.28	+/-1.42	SG	Southern California	COA	10-d	Significantly toxicity (51.7% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
1.3	+/-1.8	NC	Southern California	COA		Low abundance (57.6+/-13.6 N/0.1 sq.m.)	Benthic species				Word & Mearns 1979 (As cited in L&M 1990)
1.3	+/-1.8	NE	San Francisco Bay, CA	COA	10-d	Least toxic (18+/-6.6% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
1.31	+/-1.7	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.167+/-0.198 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.59+/-1.09	4.67+/-6.99	Bricker et al. 1993
1.4		SG	Puget Sound, WA	COA	2-d	Significantly toxic (3.8% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.5		Pastorok & Becker 1990
1.4	+/-1.85	NE	San Francisco Bay, CA	COA	10-d	Not significantly toxic (18.4+/-6.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
1.5	+/-1.28	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (17+/-16.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.99+/-1	21.6+/-24.5	Bricker et al. 1993
1.5	+/-1.49	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (6.67+/-8.07% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.51+/-0.330		Pastorok & Becker 1990
1.54	+/-0.988	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.016+/-0.007 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.26+/-0.936	43.4+/-35.6	Bricker et al. 1993
1.68	+/-1.37	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.1+/-2.78% normal development)	Mulinia lateralis (bivalve)	LAR	2.12+/-1.04	22.9+/-23.7	Bricker et al. 1993
1.7	+/-2.2	*	San Francisco Bay, CA	COA	48-h	Significantly toxic (55.7+/-22.7% abnormal)	Bivalve	LAR			Long & Morgan 1990
1.7	+/-2.6	NC	San Francisco Bay, CA	COA	10-d	Highly toxic (67+/-11.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
1.72	+/-0.554	SG	San Francisco Bay, CA	COA	48-h	Moderately toxic (57.1+/-13.6% mortality)	Mussel	LAR	1.14+/-.33		Chapman et al. 1987a
1.77			***PEL***								
1.8	+/-0.55	NE	San Francisco Bay, CA	COA	4-wk	Least toxic (116+/-4.3 young produced)	Tigriopus californicus (copepod)	ADT	1.23+/-.09		Chapman et al. 1987a
1.8	+/-1.46	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (91.5+/-7.28% normal development)	Mulinia lateralis (bivalve)	LAR	2.6+/-0.899	36.8+/-34.9	Bricker et al. 1993
1.88	+/-1.46	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (34.9+/-15.7% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.23+/-1.04	25.4+/-25.5	Bricker et al. 1993
1.96	+/-1.83	*	Puget Sound, WA	COA	20-d	Significantly toxic (37.3+/-22% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.87+/-0.208		Pastorok & Becker 1990
1.96	+/-1.03	NE	San Francisco Bay, CA	COA	48-h	Least toxic (18+/-8.01% abnormal)	Mussel	LAR	1.2+/-.38		Chapman et al. 1987a
2.1	+/-1.3	*	Fraser River Estuary, BC	COA		Sediments devoid of feral clams	Macoma balthica (bivalve)		1.95		McGreer 1982
2.2	+/-3.9	*	Southern California	COA		Low abundance (35.3+/-15.8 N/0.1 sq.m.)	Arthropods				Word & Mearns 1979 (As cited in L&M 1990)
2.25	+/-1.38	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.013+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.79+/-0.744	37.6+/-25.3	Bricker et al. 1993
2.29	+/-1.51	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.1+/-13.3% mortality)	Mulinia lateralis (bivalve)	LAR	2.68+/-0.955	31.8+/-24.4	Bricker et al. 1993
2.3		*	California	AETA	48-h	California AET Values	Mytilus edulis (bivalve)	LAR			Becker et al. 1990

Table 8. A summary of the available data on the biological effects associated with sediment-sorbed SILVER (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Silver Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
2.37 +/-2.36	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (23+/-4.24% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.46+/-1.22	40+/-55.1	Bricker et al. 1993
2.4	*	Northern California	AETA		Northern California AET Values	Benthic species				Becker et al. 1990
2.44 +/-1.63	*	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (88.5+/-8.39% normal development)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.05	38.1+/-38.9	Bricker et al. 1993
2.5 +/-4.1	*	Southern California	COA		Low species richness (51.2+/-8.6 S/0.1 sq.m.)	Benthic species				Word & Mearns 1979 (As cited in L&M 1990)
2.57 +/-1.58	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (29.8+/-13.9% mortality)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.07	32.1+/-28.4	Bricker et al. 1993
2.6	*	Strait of Georgia, BC	COA	48-h	Significant increase in burrowing time	Macoma balthica (bivalve)		1.13		McGreer 1979
2.61 +/-2.69	NE	San Francisco Bay, CA	COA	10-d	Least toxic (13.6+/-7.76% mortality)	Amphipod	ADT	1.4 +/- 0.79		Chapman et al. 1987a
2.7 +/-1.18	SG	San Francisco Bay, CA	COA	48-h	Moderately toxic (25.1+/-6.61% abnormal)	Mussel	LAR	1.26+/-0.17		Chapman et al. 1987a
2.79 +/-2.54	NE	San Francisco Bay, CA	COA	10-d	Least Toxic (4.63+/-2.91% avoidance)	Amphipod	ADT	1.44+/-.74		Chapman et al. 1987a
2.92 +/-1.47	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (96.6+/-3.79% normal development)	Mulinia lateralis (bivalve)	LAR	2.87+/-0.94	35.1+/-25.9	Bricker et al. 1993
2.98 +/-1.43	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (38+/-13% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.92+/-0.937	34.6+/-23.9	Bricker et al. 1993
3.1 +/-4.5	*	Southern California	COA		Low abundance (6.1+/-7.2 N/0.1 sq.m.)	Echinoderm				Word & Mearns 1979 (As cited in L&M 1990)
3.2 +/-5.6	NE	Southern California	COA		High abundance (88.9+/-35.4 N/0.1 sq.m.)	Benthic species				Word & Mearns 1979 (As cited in L&M 1990)
3.43 +/-0.993	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.011+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.28+/-0.363	45.3+/-21.4	Bricker et al. 1993
3.63 +/-0.968	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (75.1+/-10.6% mortality)	Mulinia lateralis (bivalve)	LAR	3.32+/-0.317	42.3+/-19.2	Bricker et al. 1993
3.7	*	California	AETA		California AET Values	Benthic species				Becker et al. 1990
3.7	*	Southern California	AETA		Southern California AET Values	Benthic species				Becker et al. 1990
>3.7	-	Puget Sound, WA	AETA	10-d	1986 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT	15		Bellar et al. 1986
4.73 +/-3.56	SG	San Francisco Bay, CA	COA	10-d	Moderately toxic (28.3+/-7.51% mortality)	Amphipod	ADT	2.01+/-.98		Chapman et al. 1987a
5.2	*	Puget Sound, WA	AETA		PSDDA Maximum Level Criteria	Aquatic biota				USACOE 1988
5.2	*	Puget Sound, WA	AETA		1986 Puget Sound AET	Benthic species		15		Bellar et al. 1986
6.1	*	Puget Sound, WA	AETA	10-d	1988 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT			PTI 1988
6.1	*	Puget Sound, WA	SQG		Chemical Criteria	Benthic community		1		WDE 1989
>6.1	-	Puget Sound, WA	AETA		1988 Puget Sound AET	Benthic community				PTI 1988
6.9 +/-2.5	*	San Francisco Bay, CA	COA	48-h	Highly toxic (92.4+/-4.5% abnormal)	Bivalve	LAR			Long & Morgan 1990
6.9 +/-2.52	*	San Francisco Bay, CA	COA	48-h	Highly toxic (92.3+/-5.5% mortality)	Mussel	LAR	2.87+/-1.32		Chapman et al. 1987a
6.9 +/-2.52	*	San Francisco Bay, CA	COA	4-wk	Moderately toxic (94.9+/-10.1 young produced)	Tigriopus californicus (copepod)	ADT	2.87+/-1.07		Chapman et al. 1987a
8.1	*	San Francisco Bay, CA	COA	10-d	Most toxic (95% mortality)	Amphipod	ADT	4.03		Chapman et al. 1987a
8.1	*	San Francisco Bay, CA	COA	10-d	Highly toxic (37% avoidance)	Amphipod	ADT	4.03		Chapman et al. 1987a
8.35	*	San Francisco Bay, CA	COA	48-h	Highly toxic (66.8% abnormal)	Mussel	LAR	3.59		Chapman et al. 1987a
>8.6	-	San Francisco Bay, CA	AETA	10-d	San Francisco Bay AET	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
>8.6	-	Northern California	AETA	10-d	Northern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
>11	-	California	AETA	10-d	California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
>11	-	Southern California	AETA	10-d	Southern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990

Table 9. A summary of the available data on the biological effects associated with sediment-sorbed TRIBUTYLTIN (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Tributyltin Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.05 +/-0.03	NE	Narragansett Bay, RI	COA	10-d	Not significantly toxic (5.28+/-3.04% mortality))	Ampelisca abdita (amphipod)	ADT			Munns et al. 1991
0.78	NE	San Diego Bay, CA	COA	96-h	Not significantly toxic (4% mortality)	Citharichthys stigmaeus (sanddab)				Salazar & Salazar 1985
0.78	NE	San Diego Bay, CA	COA	10-d	Not significantly toxic (14% mortality)	Acanthomysis sculpta (mysid)				Salazar & Salazar 1985
0.78	NE	San Diego Bay, CA	COA	20-d	Not significantly toxic (13% mortality)	Neanthes arenaceodentata (polycheate)				Salazar & Salazar 1985
0.78	NE	San Diego Bay, CA	COA	20-d	Not significantly toxic (1% mortality)	Macoma nasuta (clam)				Salazar & Salazar 1985
0.78	NE	San Diego Bay, CA	COA	96-h	Not significantly toxic (0% mortality)	Acanthomysis sculpta (mysid)				Salazar & Salazar 1985
0.78	NE	San Diego Bay, CA	COA	96-h	Not significantly toxic (18% mortality)	Acartia tonsa (copepod)				Salazar & Salazar 1985
1	NE	Laboratory	SSBA	96-h ST	Not toxic (0% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Clark et al. 1987
1	NE	Laboratory	SSBA	10-d ST	Not toxic (0% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Clark et al. 1987
1.53 +/-0.198	NE	Mississippi Sound, MS	COA		Not significantly toxic (0.789+/-1.59% mortality)	Mysidopsis bahia (mysid shrimp)		0.827+/-0.757	1.46+/-1.58	EMAP Louisiana Province 1991
1.54 +/-0.179	NE	Mississippi Sound, MS	COA	10-d	Not significantly toxic (1.4+/-1.73% mortality)	Ampelisca abdita (amphipod)		0.998+/-0.602	2.01+/-1.82	EMAP Louisiana Province 1991
1.59	NC	Mobile Bay, AL	COA		Significantly toxic (10% mortality)	Mysidopsis bahia (mysid shrimp)		0.009	0.004	EMAP Louisiana Province 1991
1.6	NC	Apalachee Bay, FL	COA	10-d	Significantly toxic (15.6% mortality)	Ampelisca abdita (amphipod)		0.438+/-0.442	0.421+/-0.593	EMAP Louisiana Province 1991
1.6	NE	Chandeleur Sound, LA	COA		Not significantly toxic (1.03+/-2.05% mortality)	Mysidopsis bahia (mysid shrimp)		0.824+/-0.915	1.69+/-0.920	EMAP Louisiana Province 1991
1.6	NG	Chandeleur Sound, LA	COA		Significantly toxic (7.6+/-1.32% mortality)	Mysidopsis bahia (mysid shrimp)		0.624+/-0.197	2.07+/-1.19	EMAP Louisiana Province 1991
1.6	NE	Chandeleur Sound, LA	COA	10-d	Not significantly toxic (2.87+/-4.05% mortality)	Ampelisca abdita (amphipod)		0.517+/-0.166	2.02+/-1.38	EMAP Louisiana Province 1991
1.6	NG	Chandeleur Sound, LA	COA	10-d	Significantly toxic (11.5+/-4.86% mortality)	Ampelisca abdita (amphipod)		0.811+/-0.711	1.87+/-0.973	EMAP Louisiana Province 1991
1.6	NE	Mississippi River, MS, LA	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		1.3+/-0.83	1.14+/-1	EMAP Louisiana Province 1991
1.6	NE	Mississippi River, MS, LA	COA	10-d	Not significantly toxic (7.8+/-1.63% mortality)	Ampelisca abdita (amphipod)		1.15+/-1.04	2.31+/-0.651	EMAP Louisiana Province 1991
1.6	SG	Mississippi Sound, MS	COA		Significantly toxic (12.2+/-4.42% mortality)	Mysidopsis bahia (mysid shrimp)		0.939+/-0.335	2.63+/-2.3	EMAP Louisiana Province 1991
1.6	SG	Mississippi Sound, MS	COA	10-d	Significantly toxic (11.6+/-3.39% mortality)	Ampelisca abdita (amphipod)		0.111+/-0.045	0.03	EMAP Louisiana Province 1991
1.6	NE	Mobile Bay, AL	COA		Not significantly toxic (1.07+/-1.85% mortality)	Mysidopsis bahia (mysid shrimp)		0.968+/-0.815	8.23+/-3.4	EMAP Louisiana Province 1991
1.6	NE	Mobile Bay, AL	COA	10-d	Not significantly toxic (0.5+/-0.778% mortality)	Ampelisca abdita (amphipod)		1.24+/-0.948	8.51+/-4.76	EMAP Louisiana Province 1991
1.6	NG	Mobile Bay, AL	COA	10-d	Significantly toxic (46+/-49.3% mortality)	Ampelisca abdita (amphipod)		0.22+/-0.298	3.84+/-5.43	EMAP Louisiana Province 1991
1.7 +/-0.203	NE	Apalachee Bay, FL	COA		Not significantly toxic (0.75+/-1.5% mortality)	Mysidopsis bahia (mysid shrimp)		0.540+/-0.385	0.405+/-0.417	EMAP Louisiana Province 1991
1.8 +/-0.286	NE	Apalachee Bay, FL	COA	10-d	Not significantly toxic (3.3+/-3.25% mortality)	Ampelisca abdita (amphipod)		0.643+/-0.455	0.390+/-0.410	EMAP Louisiana Province 1991
1.8 +/-0.286	SG	Mississippi River, MS, LA	COA		Significantly toxic (32.9+/-36.4% mortality)	Mysidopsis bahia (mysid shrimp)		1.07+/-0.924	1.41+/-1.93	EMAP Louisiana Province 1991
1.8 +/-0.286	SG	Mississippi River, MS, LA	COA	10-d	Significantly toxic (15.9+/-6.65% mortality)	Ampelisca abdita (amphipod)		1.22+/-0.717	0.235+/-0.276	EMAP Louisiana Province 1991
2.5	NC	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (16% mortality)	Mysidopsis bahia (mysid)		1.8	7095 ug/g	Windom In Prep
2.5	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (18% mortality)	Ampelisca abdita (amphipod)		0.028	9 ug/g	Windom In Prep
2.5	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (27.5+/-10.6% mortality)	Mysidopsis bahia (mysid)		0.237+/-0.311	74.6+/-85.5 ug/g	Windom In Prep
2.5	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (0% mortality)	Arbacia punctulata (sea urchin)		0.03	19 ug/g	Windom In Prep
3.33 +/-2.5	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (9.78+/-5.33% mortality)	Mysidopsis bahia (mysid)		0.24+/-0.247	91.9+/-73.4 ug/g	Windom In Prep
3.44 +/-2.65	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (11.6+/-4.33% mortality)	Ampelisca abdita (amphipod)		0.267+/-0.25	102+/-71.1 ug/g	Windom In Prep
3.44 +/-2.65	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (4+/-2.83% mortality)	Menidia beryllina (silverside)		0.243+/-0.264	90.5+/-78.4 ug/g	Windom In Prep
3.57 +/-2.83	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (91.3+/-2.91% normal development)	Arbacia punctulata (sea urchin)		0.299+/-0.251	114+/-68.4 ug/g	Windom In Prep
3.7 +/-3.51	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (5.8+/-3.7% mortality)	Rhepoxynius abronius (amphipod)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
3.7 +/-3.51	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (3.4+/-1.82% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
3.7 +/-3.51	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (11.2+/-3.7% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992

Table 9. A summary of the available data on the biological effects associated with sediment-sorbed TRIBUTYLTIN (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Tributyltin Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
3.7 +/-3.51	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (3.52+/-1.66% mortality)	Macoma nasuta (clam)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
3.75 +/-3.06	SG	Savannah River Entrance Channel, GA	COA	48-h	Significantly toxic (25.4+/-7.66% mortality)	Arbacia punctulata (sea urchin)		0.344+/-0.242	129.5+/-59.3 ug/g	Windom In Prep
5 +/-4.33	*	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (28.3+/-6.11% mortality)	Mysidopsis bahia (mysid)		0.246+/-0.051	127+/-24 ug/g	Windom In Prep
6	NE	Tampa Bay, FL	COA	10-d	Not significantly toxic (14.6+/-7.67% mortality)	Ampelisca abdita (amphipod)	SUBADT	1.63+/-0.596		Long 1993
6	NG	Tampa Bay, FL	COA	1-h	Moderately toxic (15.3+/-10.6% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.94+/-0.908		Long 1993
6	NE	Tampa Bay, FL	COA	1-h	Least toxic (79.4+/-9.9% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.45+/-0.587		Long 1993
6	NE	Tampa Bay, FL	COA		Not significantly toxic (EC50; 0.066+/-0.033 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.89+/-0.902		Long 1993
6.53 +/-9.07	NC	Galveston Bay, TX	COA		Significantly toxic (13.4+/-9.11% mortality)	Mysidopsis bahia (mysid shrimp)		0.778+/-0.482	1.21+/-0.778	EMAP Louisiana Province 1991
9 +/-7.52	SG	Tampa Bay, FL	COA	1-h	Most toxic (0.091+/-0.187% fertilization)	Arbacia punctulata (sea urchin)	GAM	2.96+/-1.49		Long 1993
10	*	Laboratory	SSBA	96-h ST	Highly toxic (100% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Clark et al. 1987
10	NE	Laboratory	SSBA	96-h FT	Not toxic (0% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Clark et al. 1987
10.1 +/-8.69	SG	Tampa Bay, FL	COA	10-d	Significantly toxic (35.2+/-17.5% mortality)	Ampelisca abdita (amphipod)	SUBADT	3.53+/-1.35		Long 1993
10.4 +/-10.7	NE	Galveston Bay, TX	COA	10-d	Not significantly toxic (1.35+/-1.45% mortality)	Ampelisca abdita (amphipod)		0.961+/-0.537	1.17+/-0.640	EMAP Louisiana Province 1991
10.7 +/-9.21	SG	Tampa Bay, FL	COA		Significantly toxic (EC50; 0.017+/-0.012 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.47+/-1.49		Long 1993
11.5 +/-16.3	NE	Matagorda Bay, TX	COA		Not significantly toxic (1.58+/-1.82% mortality)	Mysidopsis bahia (mysid shrimp)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
11.5 +/-16.3	NE	Matagorda Bay, TX	COA	10-d	Not significantly toxic (2.33+/-4.65% mortality)	Ampelisca abdita (amphipod)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
12.1 +/-9.2	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (9.61+/-2.7% mortality)	Menidia beryllina (silverside)		1.22+/-1.13	9172+/-13363 ug/g	Windom In Prep
12.2 +/-14.3	NC	Brunswick Harbor Entrance, GA	COA	48-h	Significantly toxic (14.6+/-18.9% normal development)	Arbacia punctulata (sea urchin)		1.99+/-0.562	14009+/-13434 ug/g	Windom In Prep
<13	NE	Laboratory	SSBA	10-d FT	Not toxic (0% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Clark et al. 1987
13 +/-7.07	SG	Galveston Bay, TX	COA	10-d	Significantly toxic (15.8+/-3.89% mortality)	Ampelisca abdita (amphipod)		0.647+/-0.606	0.160+/-0.184	EMAP Louisiana Province 1991
13.5 +/-11.6	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (10.6+/-3.17% mortality)	Ampelisca abdita (amphipod)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
13.5 +/-11.6	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (8.00+/-2.92% mortality)	Mysidopsis bahia (mysid)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
15 +/-8.88	NE	Brunswick Harbor Entrance, GA	COA	48-h	Not significantly toxic (86.6+/-4.25% normal development)	Arbacia punctulata (sea urchin)		0.181+/-0.162	182+/-208 ug/g	Windom In Prep
16 +/-7.21	NE	Galveston Bay, TX	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		0.934+/-0.657	0.457+/-0.530	EMAP Louisiana Province 1991
16.6 +/-11.3	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (5.43+/-3.21% mortality)	Mysidopsis bahia (mysid)		1.21+/-1.13	9096+/-13378 ug/g	Windom In Prep
31	*	Laboratory	SSBA	10-d FT	LC50	Palaemonetes pugio (grass shrimp)	ADT			Clark et al. 1987
34.2	*	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (22.3% mortality)	Menidia beryllina (silverside)		1.71	6562 ug/g	Windom In Prep
100	*	Laboratory	SSBA	96-h FT	Highly toxic (100% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Clark et al. 1987
100	*	Laboratory	SSBA	10-d FT	Highly toxic (100% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Clark et al. 1987
223 +/-259	NC	Oakland Harbor, CA	COA	10-d	Significantly toxic (35.3+/-2.5% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.56+/-0.07		Word et al. 1988
294 +/-576	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (10.4+/-6.3% mortality)	Nephtys caecoides (polychaete)		1.63+/-0.657		Word et al. 1988
294 +/-576	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (0.2+/-0.6% mortality)	Macoma nasuta (clam)		1.63+/-0.657		Word et al. 1988
312 +/-637	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (23.3+/-6.14% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.738		Word et al. 1988

Table 10. A summary of the available data on the biological effects associated with sediment-sorbed ZINC (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Zinc	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
1		NC	Apalachee Bay, FL	COA	10-d	Significantly toxic (15.6% mortality)	Ampelisca abdita (amphipod)		0.438+/-0.442	0.421+/-0.593	EMAP Louisiana Province 1991
2		NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
2.5	+/-1.91	NE	Apalachee Bay, FL	COA		Not significantly toxic (0.75+/-1.5% mortality)	Mysidopsis bahia (mysid shrimp)		0.540+/-0.385	0.405+/-0.417	EMAP Louisiana Province 1991
3		NC	Mobile Bay, AL	COA		Significantly toxic (10% mortality)	Mysidopsis bahia (mysid shrimp)		0.009	0.004	EMAP Louisiana Province 1991
3.2		NC	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (22% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
3.2		NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (28% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
3.2		NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.003 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
3.56	+/- 2.69	NE	Matagorda Ship Channel, TX	COA	10-d	Not toxic (7.2+/-2.77% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1985a
3.56	+/- 2.69	NE	Matagorda Ship Channel, TX	COA	10-d	Not toxic (10.6+/-5.18% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1985a
3.56	+/- 2.69	NE	Matagorda Ship Channel, TX	COA	10-d	Not toxic (0.2+/-0.447% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1985a
3.98	+/-2.53	NE	Charleston Harbor, SC	COA		High species richness (14.9+/-2.04; SRUs)	Benthic species				Winn et al. 1989
4	+/-1.41	NE	Apalachee Bay, FL	COA	10-d	Not significantly toxic (3.3+/-3.25% mortality)	Ampelisca abdita (amphipod)		0.643+/-0.455	0.390+/-0.410	EMAP Louisiana Province 1991
4.6		NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (0% mortality)	Arbacia punctulata (sea urchin)		0.03	19 ug/g	Windom In Prep
5.8		NC	Charleston Harbor, SC	COA		Low diversity (1.16; SDUs)	Benthic species				Winn et al. 1989
5.83	+/-2.57	NE	Charleston Harbor, SC	COA		High diversity (4.15+/-0.59; SDUs)	Benthic species				Winn et al. 1989
6		SG	Charleston Harbor, SC	COA		Low species richness (5.16; SRUs)	Benthic species				Winn et al. 1989
7.11	+/-3.11	SG	Charleston Harbor, SC	COA		Moderate species richness (9.05+/-1.33; SRUs)	Benthic species				Winn et al. 1989
7.5	+/-4.95	NC	Mississippi Sound, MS	COA	10-d	Significantly toxic (11.6+/-3.39% mortality)	Ampelisca abdita (amphipod)		0.111+/-0.045	0.03	EMAP Louisiana Province 1991
8.3		NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (18% mortality)	Ampelisca abdita (amphipod)		0.028	9 ug/g	Windom In Prep
8.72	+/-4.32	SG	Charleston Harbor, SC	COA		Moderate diversity (2.3+/-0.2; SDUs)	Benthic species				Winn et al. 1989
10.2	+/-4.25	NE	Brunswick Harbor Entrance, GA	COA	48-h	Not significantly toxic (86.6+/-4.25% normal development)	Arbacia punctulata (sea urchin)		0.181+/-0.162	182+/-208 ug/g	Windom In Prep
11	+/-9.76	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (27.5+/-10.6% mortality)	Mysidopsis bahia (mysid)		0.237+/-0.311	74.6+/-85.5 ug/g	Windom In Prep
11.1		NE	Georgetown Harbor, SC	COA		Not toxic (species richness or abundance)	Benthic species		0.12		Van Dolah et al. 1984
11.3	+/-7.91	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (9.78+/-5.33% mortality)	Mysidopsis bahia (mysid)		0.24+/-0.247	91.9+/-73.4 ug/g	Windom In Prep
11.6	+/-8.42	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (4+/-2.83% mortality)	Menidia beryllina (silverside)		0.243+/-0.264	90.5+/-78.4 ug/g	Windom In Prep
11.7	+/-8.37	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (11.6+/-4.33% mortality)	Ampelisca abdita (amphipod)		0.267+/-0.25	102+/-71.1 ug/g	Windom In Prep
11.9	+/-3.36	SG	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (28.3+/-6.11% mortality)	Mysidopsis bahia (mysid)		0.246+/-0.051	127+/-24 ug/g	Windom In Prep
12.8	+/-8.39	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (91.3+/-2.91% normal development)	Arbacia punctulata (sea urchin)		0.299+/-0.251	114+/-68.4 ug/g	Windom In Prep
14.1	+/-8.3	*	Savannah River Entrance Channel, GA	COA	48-h	Significantly toxic (25.4+/-7.66% mortality)	Arbacia punctulata (sea urchin)		0.344+/-0.242	129.5+/-59.3 ug/g	Windom In Prep
17.6	+/-14.3	NE	Tampa Bay, FL	COA	1-h	Least toxic (83+/-4.26% fertilization)	Arbacia punctulata (sea urchin)	GAM		0.131+/-0.169	Long 1993
21.5	+/-26.2	NC	Mobile Bay, AL	COA	10-d	Significantly toxic (46+/-49.3% mortality)	Ampelisca abdita (amphipod)		0.22+/-0.298	3.84+/-5.43	EMAP Louisiana Province 1991
22.3	+/-29.7	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (15.3+/-11.0% mortality)	Hyalella azteca (amphipod)	JUV	0.648+/-0.641	1.74+/-1.39	Hall et al. 1992
23.1	+/-21.5	NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (55.0+/-19.5% mortality)	Streblospio benedicti (polychaete worm)		0.349+/-0.11	1.07+/-0.66	Hall et al. 1992
24.3	+/-6.24	NE	Chandeleur Sound, LA	COA		Not significantly toxic (1.03+/-2.05% mortality)	Mysidopsis bahia (mysid shrimp)		0.824+/-0.915	1.69+/-0.920	EMAP Louisiana Province 1991
26		NE	Massachusetts Bay, MA	COA		High density (24 N/0.1 sq.m.)	Echinodermata	VAR			Gilbert et al. 1976
26.7	+/-15.5	NE	Houston Ship Channel, TX	COA		Not significantly toxic (15+/-13.2% mortality)	Sheepshead minnow	ADT	0.05+/-0.0242		Crocker et al. 1991
27	+/-1.41	NE	Massachusetts Bay, MA	COA		High density (299+/-40.3 N/0.1 sq.m.)	Arthropoda	VAR			Gilbert et al. 1976
27	+/-23.7	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (9.25+/-5.32% mortality)	Lepidactylus dytiscus (amphipod)		0.638+/-0.768	1.65+/-1.62	Hall et al. 1992
28	+/-7.56	NC	Chandeleur Sound, LA	COA	10-d	Significantly toxic (11.5+/-4.86% mortality)	Ampelisca abdita (amphipod)		0.811+/-0.711	1.87+/-0.973	EMAP Louisiana Province 1991
28.9	+/-10.5	NE	Galveston Bay, TX	COA		High abundance (155+/-49.5 N/0.00203 sq.m.)	Oligochaeta		1.2+/-1.27	4.27+/-3.85	Carr 1992
29		NE	Massachusetts Bay, MA	COA		High density (22 N/0.1 sq.m.)	Rhynchocoela	VAR			Gilbert et al. 1976
29.7	+/-23.8	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (7.2+/-1.92% mortality)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992

Table 10. A summary of the available data on the biological effects associated with sediment-sorbed ZINC (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Zinc Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
29.7 +/-23.8	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.6+/-0.55% reburial)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
29.7 +/-23.8	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
29.7 +/-23.8	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
29.7 +/-8.08	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (4.8+/-2.28% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1983a
29.7 +/-8.08	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (15.8+/-4.21% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1983a
29.7 +/-8.08	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (1.2+/-.447% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1983a
30.2 +/-1.68	NE	Freeport Harbor, TX	COA	10-d	Not toxic (2+/-1% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1985b
30.2 +/-1.68	NE	Freeport Harbor, TX	COA	10-d	Not toxic (9.6+/-4.22% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1985b
30.2 +/-1.68	NE	Freeport Harbor, TX	COA	10-d	Not toxic (0% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1985b
30.8 +/-22.3	NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.008+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.4	Hall et al. 1992
30.8 +/-22.3	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.1+/-0.865% reburial)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
30.8 +/-22.3	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<20% emergence)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
30.8 +/-22.3	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
31.7 +/-8.14	NE	Massachusetts Bay, MA	COA		High species richness (102+/-4.73 S/0.1 sq.m.)	Benthic species	VAR			Gilbert et al. 1976
32.5 +/-32.5	SG	Tampa Bay, FL	COA	1-h	Moderately toxic (44.5+/-17.8% fertilization)	Arbacia punctulata (sea urchin)	GAM		0.622+/-1.12	Long 1993
32.8 +/-11	NE	Chesapeake Bay, MD, VI; Delaware Bay, DE	COA		Not significantly toxic (mean ET50; burrowing time 0.704+/-0.17 h)	Mya arenaria (clam)	1-2 cm			Phelps 1990
33 +/-24.3	NE	Chandeleur Sound, LA	COA	10-d	Not significantly toxic (2.87+/-4.05% mortality)	Ampelisca abdita (amphipod)		0.517+/-0.166	2.02+/-1.38	EMAP Louisiana Province 1991
34 +/-23.1	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (10.6+/-3.17% mortality)	Ampelisca abdita (amphipod)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
34 +/-23.1	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (8.00+/-2.92% mortality)	Mysidopsis bahia (mysid)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
34 +/-17.3	SG	Chandeleur Sound, LA	COA		Significantly toxic (7.6+/-1.32% mortality)	Mysidopsis bahia (mysid shrimp)		0.624+/-0.197	2.07+/-1.19	EMAP Louisiana Province 1991
34.7 +/-23.5	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (9.61+/-2.7% mortality)	Menidia beryllina (silverside)		1.22+/-1.13	9172+/-13363 ug/g	Windom In Prep
34.9 +/-21.6	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (22.3+/-7.37% mortality)	Hyalella azteca (amphipod)	JUV	0.788+/-0.866	2.04+/-1.75	Hall et al. 1992
35.3 +/-23.9	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (5.43+/-3.21% mortality)	Mysidopsis bahia (mysid)		1.21+/-1.13	9096+/-13378 ug/g	Windom In Prep
35.5	NE	Curtis Creek, Baltimore, MD	COA	10-d	Not significantly toxic (11.3% mortality)	Leptocheirus plumulosus (amphipod)	JUV			McGee et al. 1993
35.6 +/-18.5	NE	Black Rock Beach, NS	COA	10-d	Not toxic (6.67+/-4.51% mortality)	Corophium volutator (amphipod)	ADT/JUV	0.24+/-0.18		Nicol & Doe 1990
35.6 +/-18.5	NE	Black Rock Beach, NS	COA	10-d	Not toxic (2.33+/-1.53% mortality)	Rhepoxynius abronius (amphipod)	ADT/JUV	0.24+/-0.18		Nicol & Doe 1990
35.6 +/-18.5	NE	Black Rock Beach, NS	COA	10-d	Not toxic (100% reburial)	Rhepoxynius abronius (amphipod)	ADT/JUV	0.24+/-0.18		Nicol & Doe 1990
35.6 +/-4.74	NE	Galveston Bay, TX	COA		High abundance (27.3+/-10 N/0.00203 sq.m.)	Mollusca		1.64+/-0.4	1.39+/-0.17	Carr 1992
38.5 +/-28.6	NE	Galveston Bay, TX	COA		High abundance (154+/-30.2 N/0.00203 sq.m.)	Benthic invertebrates		0.47+/-0.27	9.07+/-2.94	Carr 1992
40	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (3% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
40	NG	Sidney Tar Pond, NS	COA	10-d	Not significantly toxic (3% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
41	NE	Massachusetts Bay, MA	COA		High density (4135 N/0.1 sq.m.)	Annelida	VAR			Gilbert et al. 1976
41.2 +/-40.3	NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (9+/-1.73% mortality)	Nereis virens (polychaetes)	ADT			EG&G Bionomics 1980
41.2 +/-40.3	NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (13+/- 3.61% mortality)	Penaeus duorarum (pink shrimp)	ADT			EG&G Bionomics 1980
41.2 +/-40.3	NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (11.3+/-3.21% mortality)	Crassostrea virginica (oyster)	ADT			EG&G Bionomics 1980
43.1 +/-15.5	NE	Galveston Bay, TX	COA		High species richness (24.5+/-3.7 S/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
43.1 +/-15.5	NE	Galveston Bay, TX	COA		High abundance (359+/-92.8 N/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
43.3 +/-11.6	NE	Galveston Bay, TX	COA		High abundance (156+/-22.9 N/0.00203 sq.m.)	Polychaeta		0.916+/-0.661	2.94+/-2.3	Carr 1992
44	SG	Chesapeake Bay, MD, VI; Delaware Bay, DE	COA		Significantly toxic (mean ET50; burrowing time 1.4 h)	Mya arenaria (clam)	1-2 cm			Phelps 1990
45.2 +/-27.5	NE	Galveston Bay, TX	COA		Low species (11.2+/-1.94 S/0.00203 sq.m.)	Benthic species		0.642+/-0.356	13.4+/-8.65	Carr 1992
45.6 +/-18.5	NE	Galveston Bay, TX	COA		High abundance (16.2+/-6.19 N/0.00203 sq.m.)	Copepoda		0.844+/-0.524	4.73+/-3.1	Carr 1992
47 +/-38.2	NC	Galveston Bay, TX	COA	10-d	Significantly toxic (15.8+/-3.89% mortality)	Ampelisca abdita (amphipod)		0.647+/-0.606	0.160+/-0.184	EMAP Louisiana Province 1991

Table 10. A summary of the available data on the biological effects associated with sediment-sorbed ZINC (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Zinc	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
49		SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (16% mortality)	Mysidopsis bahia (mysid)		1.8	7095 ug/g	Windom In Prep
49.9	+/-12.8	NE	Southern California	COA		High abundance (191+/-70.1 N/0.1 sq.m.)	Echinoderm				Word & Mearns 1979 (As cited in L&M 1990)
50.1	+/-22.2	NC	Southern California	COA		Moderate species richness (72+/-3.3 S/0.1 sq.m.)	Benthic species				Word & Mearns 1979 (As cited in L&M 1990)
50.7	+/-23.5	NE	Southern California	COA		High abundance (148+/-58 N/0.1 sq.m.)	Arthropods				Word & Mearns 1979 (As cited in L&M 1990)
50.8	+/-21.6	NE	Curtis Creek, Baltimore, MD	COA	20-d	Not significantly toxic (25.4+/-17.1% mortality)	Leptocheirus plumulosus (amphipod)	JUV			McGee et al. 1993
51.6	+/-27.7	NC	Southern California	COA		Moderate abundance (72.6+/-6.8 N/0.1 sq.m.)	Arthropods				Word & Mearns 1979 (As cited in L&M 1990)
52		NE	Sidney Tar Pond, NS	COA	10-d	Not significantly toxic (4% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
52.6	+/-23.1	SG	Galveston Bay, TX	COA		Moderate abundance (58.3+/-16.2 N/0.00203 sq.m.)	Oligochaeta		0.632+/-0.274	7.93+/-5.6	Carr 1992
53		SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (22.3% mortality)	Menidia beryllina (silverside)		1.71	6562 ug/g	Windom In Prep
53.1	+/-5.51	*	Brunswick Harbor Entrance, GA	COA	48-h	Significantly toxic (14.6+/-18.9% normal development)	Arbacia punctulata (sea urchin)		1.99+/-0.562	14009+/-13434 ug/g	Windom In Prep
53.1	+/-27.5	NC	Southern California	COA		Moderate abundance (75.6+/-12.7 N/0.1 sq.m.)	Benthic species				Word & Mearns 1979 (As cited in L&M 1990)
53.1	+/-35.1	NE	Galveston Bay, TX	COA	48-h	Not toxic (98.1+/-1.79% normal development)	Arbacia punctulata (sea urchin)	EMB	0.748+/-0.476	4.16+/-3.45	Carr 1992
53.4	+/-21.5	NC	Tampa Bay, FL	COA	48-h	Significantly toxic (48.1+/-1.91% mortality)	Mulinaria lateralis (coot clam)	LAR		2.82+/-2.65	Long 1993
54.3	+/-31.7	NE	Galveston Bay, TX	COA	1-h	Not toxic (92.5+/-6.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	0.77+/-0.448	6.37+/-6.58	Carr 1992
54.9	+/-34.2	NC	Southern California	COA		Moderate abundance (56.2+/-23 N/0.1 sq.m.)	Echinoderm				Word & Mearns 1979 (As cited in L&M 1990)
55.3	+/-3	NE	Newport, RI	COA	96-h	Not toxic (0% mortality)	Palaemonetes pugio (shrimp)				Lee & Mariani 1977
55.7	+/-30.9	NE	Galveston Bay, TX	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		0.934+/-0.657	0.457+/-0.530	EMAP Louisiana Province 1991
55.9	+/-52.3	NE	Mississippi Sound, MS	COA		Not significantly toxic (0.789+/-1.59% mortality)	Mysidopsis bahia (mysid shrimp)		0.827+/-0.757	1.46+/-1.58	EMAP Louisiana Province 1991
56.4		NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.003 mg/day growth)	Lepidactylus dytiscus (amphipod)		1.38	3.25	Hall et al. 1992
56.4		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1% mortality)	Streblospio benedicti (polychaete worm)		1.38	3.25	Hall et al. 1992
58.6	+/-27.9	SG	Galveston Bay, TX	COA		Low abundance (53+/-33.9 N/0.00203 sq.m.)	Benthic invertebrates		0.985+/-0.247	22+/-11.2	Carr 1992
59.1	+/-99.4	NE	Tampa Bay, FL	COA	10-d	Not significantly toxic (9.5+/-6.15% mortality)	Ampelisca abdita (amphipod)	SUBADT		1.56+/-2.73	Long 1993
60.1	+/-120	NE	Tampa Bay, FL	COA		Not significantly toxic (EC50; 0.133+/-0.103 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)			1.23+/-1.96	Long 1993
60.6	+/-32.2	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (5.8+/-3.7% mortality)	Rhepoxynius abronius (amphipod)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
60.6	+/-32.2	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (3.4+/-1.82% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
60.6	+/-32.2	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (11.2+/-3.7% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
60.6	+/-32.2	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (3.52+/-1.66% mortality)	Macoma nasuta (clam)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
60.8	+/-18.9	NE	Matagorda Bay, TX	COA		Not significantly toxic (1.58+/-1.82% mortality)	Mysidopsis bahia (mysid shrimp)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
60.8	+/-18.9	NE	Matagorda Bay, TX	COA	10-d	Not significantly toxic (2.33+/-4.65% mortality)	Ampelisca abdita (amphipod)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
62.2	+/-53.8	NE	Houston Ship Channel, TX	COA	10-d	Not significantly toxic (4.7+/-4.29% mortality)	Amphipod	ADT	0.144+/-0.123		Crocker et al. 1991
63.1	+/-38.9	NC	Galveston Bay, TX	COA		Low abundance (0.3+/-0.651 N/0.00203 sq.m.)	Amphipoda		0.859+/-0.487	7.67+/-8.12	Carr 1992
65	+/-19	NE	Fraser River Estuary, BC	COA		Sediments populated by feral clams	Macoma balthica (bivalve)		0.45		McGreer 1982
66	+/-4.24	NE	Mississippi River, MS, LA	COA	10-d	Not significantly toxic (7.8+/-1.63% mortality)	Ampelisca abdita (amphipod)		1.15+/-1.04	2.31+/-0.651	EMAP Louisiana Province 1991
66	+/-26.8	SG	Mississippi Sound, MS	COA		Significantly toxic (12.2+/-4.42% mortality)	Mysidopsis bahia (mysid shrimp)		0.939+/-0.335	2.63+/-2.3	EMAP Louisiana Province 1991
67.8	+/-5.4	NE	Jetty Island Pier, Everett Marina, WA	COA	10-d	Not toxic (12.3+/-2.87% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.08+/-0.66		Hart Crowser & Associates Inc. 1986
67.9	+/- 6.05	NE	Galveston Harbor, TX	COA	10-d	Not toxic (2.4+/-1.52% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Grieco 1984
67.9	+/- 6.05	NE	Galveston Harbor, TX	COA	10-d	Not toxic (0% mortality)	Mercenaria mercenaria (hard clams)	ADT			Grieco 1984
67.9	+/- 6.05	NE	Galveston Harbor, TX	COA	10-d	Not toxic (2.8+/-2.17% mortality)	Nereis virens (sandworm)	ADT			Grieco 1984
68.4	+/-42.5	NE	Mississippi Sound, MS	COA	10-d	Not significantly toxic (1.4+/-1.73% mortality)	Ampelisca abdita (amphipod)		0.998+/-0.602	2.01+/-1.82	EMAP Louisiana Province 1991
68.7	+/-42.9	SG	Galveston Bay, TX	COA		Low abundance (1.86+/-2.59 N/0.00203 sq.m.)	Mollusca		0.784+/-0.421	8.29+/-8.13	Carr 1992
68.8	+/-43.7	SG	Galveston Bay, TX	COA		Low species richness (10+/-3.73 S/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
68.8	+/-43.7	SG	Galveston Bay, TX	COA		Low abundance (89+/-60.7 N/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992

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Zinc	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
71.3	+/-106	NE	Southern California	COA		High species richness (96.3+/-22.3 S/0.1 sq.m.)	Benthic species				Word & Mearns 1979 (As cited in L&M 1990)
71.7	+/-16.8	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (6+/-2.35% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1983b
71.7	+/-16.8	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (2.6+/-2.97% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1983b
71.7	+/-16.8	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (1.8+/-1.79% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1983b
71.9	+/-45.3	*	Galveston Bay, TX	COA		Low abundance (4.21+/-5.66 N/0.00203 sq.m.)	Oligochaeta		0.895+/-0.453	7.85+/-8.8	Carr 1992
71.9	+/-6.2	NE	Duwamish River, WA	COA	96-h	Not toxic (0-10% mortality)	Palaemonetes pugio (shrimp)				Lee & Mariani 1977
72	+/-70.1	NE	Bayou Casotte, MS	COA	10-d	Not significantly toxic (5.3+/-3.06% mortality)	Penaeus duorarum (pink shrimp)	ADT	5.2+/-2.6		Parrish 1988b
72	+/-70.1	NE	Bayou Casotte, MS	COA	10-d	Not significantly toxic (8+/-6% mortality)	Arenicola cristata (lugworm)	ADT	5.2+/-2.6		Parrish 1988b
72	+/-70.1	NE	Bayou Casotte, MS	COA	10-d	Not significantly toxic (0% mortality)	Crossostrea virginica (oyster)	ADT	5.2+/-2.6		Parrish 1988b
73	+/-45.8	SG	Galveston Bay, TX	COA		Low abundance (41.7+/-21.8 N/0.00203 sq.m.)	Polychaeta		0.848+/-0.427	9.21+/-8.61	Carr 1992
73.4	+/-80.5	NC	Southern California	COA		Low abundance (57.6+/-13.6 N/0.1 sq.m.)	Benthic species				Word & Mearns 1979 (As cited in L&M 1990)
76		NE	Laboratory	SSBA	72-h	LC08	Eohaustorius sencillus (amphipod)				Oakden et al. 1984b
78.4	+/-39.1	NE	Curtis Creek, Baltimore, MD	COA	10-d	Not significantly toxic (15+/-7.21% mortality)	Hyalella azteca (amphipod)	JUV			McGee et al. 1993
79		NE	Laboratory	SSBA	72-h	LC05	Rhepoxynius abronius (amphipod)				Oakden et al. 1984b
79	+/-14.1	NE	Mississippi River, MS, LA	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		1.3+/-0.83	1.14+/-1	EMAP Louisiana Province 1991
79.2	+/-48.1	SG	Galveston Bay, TX	COA		Low abundance (2.05+/-1.58 N/0.00203 sq.m.)	Copepoda		0.879+/-0.47	9.63+/-9.65	Carr 1992
79.8	+/-15.8	NE	Gulf of Mexico	COA	10-d	Not toxic (0.36+/-0.261% emergence/d)	Rhepoxynius abronius (amphipod)	ADT	0.42+/-0.13		Chapman et al. 1991
80	+/-22.2	NE	Galveston Bay, TX	COA	10-d	Not significantly toxic (1.35+/-1.45% mortality)	Ampelisca abdita (amphipod)		0.961+/-0.537	1.17+/-0.640	EMAP Louisiana Province 1991
80.1	+/-52.4	NE	Burrard Inlet, BC	COA	10-d	Not toxic (4.5+/-3.02% emergence)	Rhepoxynius abronius (amphipod)	ADT	2.66+/-2.15		McLeay et al. 1991
81.8	+/-110	NE	Massachusetts Bay, MA	COA		High density (201+/-33.4 N/0.1 sq.m.)	Mollusca	VAR			Gilbert et al. 1976
82		NE	Palos Verdes, CA	COA		High abundance (208 N/0.1 sq.m.)	Echinoderms	VAR			Ferraro et al. 1991
82.3	+/-26.6	SG	Galveston Bay, TX	COA		Significantly toxic (13.4+/-9.11% mortality)	Mysidopsis bahia (mysid shrimp)		0.778+/-0.482	1.21+/-0.778	EMAP Louisiana Province 1991
82.5	+/-47.1	SG	Galveston Bay, TX	COA	48-h	Toxic (4.65+/-16.1% normal development)	Arbacia punctulata (sea urchin)	EMB	1.06+/-0.449	14.5+/-9.2	Carr 1992
83	+/-60.8	NE	Sidney Tar Pond, NS	COA	20-d	Not significantly toxic (8+/-5.66% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
85.9	+/-58.7	NE	Burrard Inlet, BC	COA	10-d	Not toxic (5.21+/-3.61% emergence)	Corophium volutator (amphipod)	ADT	3.18+/-2.1		McLeay et al. 1991
87.1	+/-88.2	*	Massachusetts Bay, MA	COA		Low density (1316+/-768 N/0.1 sq.m.)	Annelida	VAR			Gilbert et al. 1976
87.9	+/-59.3	SG	Massachusetts Bay, MA	COA		Low density (39.1+/-30.8 N/0.1 sq.m.)	Mollusca	VAR			Gilbert et al. 1976
88.5	+/-146	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (0.33+/-0.516% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
88.5	+/-146	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (2.33+/-1.03% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
88.5	+/-146	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.367+/-0.085 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
88.5	+/-146	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.0005 mg/day growth)	Streblospio benedicti (polychaete worm)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
88.7	+/-63.7	*	Massachusetts Bay, MA	COA		Low density (7.14+/-4.23 N/0.1 sq.m.)	Rhynchocoela	VAR			Gilbert et al. 1976
88.8	+/-63.6	*	Massachusetts Bay, MA	COA		Low density (2.76+/-2.7 N/0.1 sq.m.)	Echinodermata	VAR			Gilbert et al. 1976
89.3	+/-40.6	NE	San Francisco Bay, CA	COA	48-h	Least toxic (23.3+/-7.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
90.3	+/-63.6	*	Massachusetts Bay, MA	COA		Low density (61.1+/-36.6 N/0.1 sq.m.)	Arthropoda	VAR			Gilbert et al. 1976
91.5	+/-64	*	Massachusetts Bay, MA	COA		Low species richness (57.2+/-12.2 S/0.1 sq.m.)	Benthic species	VAR			Gilbert et al. 1976
95		NE	Palos Verdes, CA	COA		High density (4.4 N/0.1 sq.m.)	Echinoderm		0.9		Swartz et al. 1985a
95		NE	Palos Verdes, CA	COA		High density (88 N/0.1 sq.m.)	Foraminifera (sponge)		0.9		Swartz et al. 1985a
95		NE	Palos Verdes, CA	COA		High density (132 N/0.1 sq.m.)	Ophiuroidea (brittle star)		0.9		Swartz et al. 1985a
95	+/-162	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.003+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.316+/-0.120	2.13+/-2.46	Hall et al. 1992
95	+/-162	SG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29.8+/-11.1% mortality)	Streblospio benedicti (polychaete worm)		0.316+/-0.12	2.13+/-2.46	Hall et al. 1992
97	+/-57.2	NC	Chesapeake Bay, MD, VI; Delaware Bay, DE	COA		Significantly toxic (mean ET50; burrowing time 3.79+/-3.29 h)	Mya arenaria (clam)	1-2 cm			Phelps 1990

Table 10. A summary of the available data on the biological effects associated with sediment-sorbed ZINC (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Zinc Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
97.3 +/-51.3	NE	Mobile Bay, AL	COA		Not significantly toxic (1.07+/-1.85% mortality)	Mysidopsis bahia (mysid shrimp)		0.968+/-0.815	8.23+/-3.4	EMAP Louisiana Province 1991
98.5 +/-23.3	NE	Palos Verdes, CA	COA		High abundance (54.6+/-5.09 N/0.1 sq.m.)	Amphipods	VAR			Ferraro et al. 1991
98.5 +/-23.3	NE	Palos Verdes, CA	COA		High abundance (30.7+/-0.99 N/0.1 sq.m.)	Phoxocephalids	VAR			Ferraro et al. 1991
99.6 +/-48.8	NE	Howe Sound, BC	COA	10-d	Not toxic (10.5+/-4.09% mortality)	Rhepoxynius abronius (amphipod)	ADT	3.4+/-4.39		McLeay et al. 1991
99.6 +/-48.8	NE	Howe Sound, BC	COA	10-d	Not toxic (5.83+/-5.48% emergence)	Rhepoxynius abronius (amphipod)	ADT	3.4+/-4.39		McLeay et al. 1991
99.6 +/-48.8	NE	Howe Sound, BC	COA	10-d	Not toxic (96.3+/-4.19% reburial)	Rhepoxynius abronius (amphipod)	ADT	3.4+/-4.39		McLeay et al. 1991
100	NC	Puget Sound, WA	COA	10-d	Significantly toxic (56% mortality)	Panope generosa (geoduck)	JUV	2.1		Pastorok & Becker 1990
102 +/-174	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1.83+/-1.6% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
102 +/-174	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (3.5+/-1.87% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
102 +/-174	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (-0.057+/-0.04 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
102 +/-174	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.001mg/day growth)	Streblospio benedicti (polychaete worm)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
102 +/-88.5	NE	Galveston Bay, TX	COA		High Abundance (6+/-1.41 N/0.00203 sq.m.)	Amphipoda		0.955+/-0.629	7.21+/-8.2	Carr 1992
103 +/-9.9	NE	Puget Sound, WA	COA	15-min	Not significantly toxic (EC50; 0.283+/-0.168% extract)	Microtox (Photobacterium phosphoreum)		1.39+/-0.37		Pastorok & Becker 1990
105	NE	Puget Sound, WA	SBA		EPA/ACOE Puget Sound Interim Criteria	Aquatic biota				USACOE 1988
106 +/-156	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.001+/-0.001 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.555+/-0.471	2.68+/-2.3	Hall et al. 1992
106 +/-26.3	NE	Pascagoula Naval Station, MS	COA	10-d	Not significantly toxic (1+/-1.41% mortality)	Crossostrea virginica (oyster)	ADT	7.31+/-3.86		Parrish 1990
106 +/-26.3	NE	Pascagoula Naval Station, MS	COA	10-d	Not significantly toxic (4+/-2.83% mortality)	Penaeus duorarum (pink shrimp)	ADT	7.31+/-3.86		Parrish 1990
106 +/-26.3	NE	Pascagoula Naval Station, MS	COA	10-d	Not significantly toxic (5+/-1.41% mortality)	Nereis virens (polychaete)	ADT	7.31+/-3.86		Parrish 1990
106 +/-57	SG	Galveston Bay, TX	COA	1-h	Toxic (20.4+/-18.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	1.26+/-0.47	14.6+/-10.1	Carr 1992
107	NE	San Francisco Bay, CA	COA	48-h	Least toxic (17.3% mortality)	Mussel	LAR	1.25		Chapman et al. 1987a
107 +/-122	NE	Commencement Bay, WA	COA	48-h	Least toxic (15.1+/-3.1% abnormality)	Oyster	LAR			Tetra Tech 1985
107 +/-13.6	NG	San Francisco Bay, CA	COA	48-h	Moderately toxic (57.1+/-13.6% mortality)	Mussel	LAR	1.14+/-.33		Chapman et al. 1987a
108 +/-78.9	NE	Commencement Bay, WA	COA	10-d	Least toxic (12.5+/-4.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
109	NC	Strait of Georgia, BC	COA	48-h	Significant increase in burrowing time	Macoma balthica (bivalve)		1.13		McGreer 1979
110 +/-8.52	NE	San Francisco Bay, CA	COA	4-wk	Least toxic (116+/-4.3 young produced)	Tigriopus californicus (copepod)	ADT	1.23+/-.09		Chapman et al. 1987a
112 +/-73.8	NE	Gulfport Mississippi Channel, MS	COA	10-d	Not significantly toxic (8+/-2% mortality)	Crossostrea virginica (oyster)	ADT	6.73+/-2.04		Parrish 1987b
112 +/-73.8	NE	Gulfport Mississippi Channel, MS	COA	10-d	Not significantly toxic (22+/-5.29% mortality)	Arenicola cristata (lugworm)	ADT	6.73+/-2.04		Parrish 1987b
112 +/-73.8	NE	Gulfport Mississippi Channel, MS	COA	10-d	Not significantly toxic (3.3+/-3.06% mortality)	Penaeus duorarum (pink shrimp)	ADT	6.73+/-2.04		Parrish 1987b
114 +/-21.7	NE	San Francisco Bay, CA	COA	48-h	Least toxic (18+/-8.01% abnormal)	Mussel	LAR	1.2+/-.38		Chapman et al. 1987a
114 +/-72.1	SG	Mississippi River, MS, LA	COA		Significantly toxic (32.9+/-36.4% mortality)	Mysidopsis bahia (mysid shrimp)		1.07+/-0.924	1.41+/-1.93	EMAP Louisiana Province 1991
115 +/-25.7	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (25.9+/-5.01% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.21+/-0.444	2.41+/-2.32	Bricker et al. 1993
116 +/-71.4	NE	Pensacola Naval Air Station, FL	COA	10-d	Not significantly toxic (0% mortality)	Crossostrea virginica (oyster)	ADT	2.5+/-2.83		Parrish 1988a
116 +/-71.4	NE	Pensacola Naval Air Station, FL	COA	10-d	Not significantly toxic (5+/-1.41% mortality)	Penaeus duorarum (pink shrimp)	ADT	2.5+/-2.83		Parrish 1988a
116 +/-71.4	NE	Pensacola Naval Air Station, FL	COA	10-d	Not significantly toxic (8% mortality)	Arenicola cristata (lugworm)	ADT	2.5+/-2.83		Parrish 1988a
121 +/-187	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (8.8+/-7.12% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
121 +/-187	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (14+/-9.22% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
121 +/-187	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.005+/-0.0004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
121 +/-28.1	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.125+/-0.084 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.25+/-0.468	1.98+/-2.25	Bricker et al. 1993
122 +/-29.4	SG	San Francisco Bay, CA	COA	48-h	Moderately toxic (25.1+/-6.61% abnormal)	Mussel	LAR	1.26+/-0.17		Chapman et al. 1987a
123 +/-20.9	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-7.99% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.14+/-0.352	6.09+/-5.38	Bricker et al. 1993
123 +/-53	SG	Jetty Island Pier, Everett Marina, WA	COA	10-d	Toxic (19.5+/-0.707% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.15+/-0.071		Hart Crowser & Associates Inc. 1986

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Zinc	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
124	+/-46.1	NE	San Francisco Bay, CA	COA	10-d	Least toxic (13.6+/-7.76% mortality)	Amphipod	ADT	1.4 +/- 0.79		Chapman et al. 1987a
126		*	Sidney Tar Pond, NS	COA	10-d	Significantly toxic (100% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
126		*	Sidney Tar Pond, NS	COA	10-d	Significantly toxic (100% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
126	+/-18.4	NE	Mobile Bay, AL	COA	10-d	Not significantly toxic (0.5+/-0.778% mortality)	Ampelisca abdita (amphipod)		1.24+/-0.948	8.51+/-4.76	EMAP Louisiana Province 1991
126	+/-32.3	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (6.48+/-10.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
126	+/-32.3	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99+/-0.862% normal development)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
127	+/-53.7	SG	Mississippi River, MS, LA	COA	10-d	Significantly toxic (15.9+/-6.65% mortality)	Ampelisca abdita (amphipod)		1.22+/-0.717	0.235+/-0.276	EMAP Louisiana Province 1991
128	+/-44.2	NE	San Francisco Bay, CA	COA	10-d	Least Toxic (4.63+/-2.91% avoidance)	Amphipod	ADT	1.44+/-.74		Chapman et al. 1987a
129		NE	Palos Verdes, CA	COA		High density (93.4 N/0.1 sq.m.)	Echinoderm		1.3+/-0.77		Swartz et al. 1986
130		*	San Francisco Bay, CA	AETA	48-h	San Francisco Bay AET	Oyster; mussel	LAR			Long & Morgan 1990
130	+/-131	NE	Burrard Inlet, BC	COA	10-d	Not toxic (8.9+/-2.99% mortality)	Corophium volutator (amphipod)	ADT	2.8+/-1.96		McLeay et al. 1991
130	+/-131	NE	Burrard Inlet, BC	COA	10-d	Not toxic (97.2+/-2.84% reburial)	Rhepoxynius abronius (amphipod)	ADT	2.8+/-1.96		McLeay et al. 1991
136	+/-32.5	NE	Palos Verdes, CA	COA		High density (20.9+/-0.23 N/0.1 sq.m.)	Amphipod		1.7+/-0.61		Swartz et al. 1986
136	+/-32.5	NE	Palos Verdes, CA	COA		High density (11.2+/-1.64 N/0.1 sq.m.)	Phoxocephalid		1.7+/-0.61		Swartz et al. 1986
136	+/-77.7	NE	San Francisco Bay, CA	COA	48-h	Not significantly toxic (31.9+/-15.5% abnormal)	Bivalve	LAR			Long & Morgan 1990
138	+/-58.9	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.074+/-0.043 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.27+/-0.626	6.21+/-5.41	Bricker et al. 1993
138	+/-87	NE	Houston Ship Channel, TX	COA	7-d	Not significantly toxic (7.5+/-5% mortality)	Sheepshead minnow	ADT	0.137+/-0.056		Crocker et al. 1991
140	+/-59.8	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.096+/-0.101 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.37+/-0.759	6.93+/-6.83	Bricker et al. 1993
144	+/-141	NE	Burrard Inlet, BC	COA	10-d	Not toxic (7.9+/-5.12% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.64+/-2.14		McLeay et al. 1991
146	+/-72.6	NC	San Francisco Bay, CA	COA	10-d	Moderately toxic (33.8+/-4.7% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
146	+/-51.4	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.008+/-0.001 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.19+/-1.27	12+/-11.3	Bricker et al. 1993
148	+/-62	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.167+/-0.198 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.59+/-1.09	4.67+/-6.99	Bricker et al. 1993
150		*	California	AETA	48-h	California AET Values	Mytilus edulis (bivalve)	LAR			Becker et al. 1990
150		*	Northern California	AETA		Northern California AET Values	Benthic species				Becker et al. 1990
150		NE	Burrard Inlet, BC	SQO		Sediment Quality Objectives	Aquatic biota				Swain & Nijman 1991
150	+/-48.7	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-6.07% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.71+/-0.9	15.3+/-23.2	Bricker et al. 1993
151	+/-66.2	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99.3+/-0.827% normal development)	Mulinia lateralis (bivalve)	LAR	1.43+/-0.738	14.7+/-24	Bricker et al. 1993
153	+/-4.8	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (19.3+/-5.86% mortality)	Ampelisca abidta (amphipod)	SUB ADT	1.82+/-0.225	6.3+/-6.2	Bricker et al. 1993
154	+/-91	SG	San Francisco Bay, CA	COA	48-h	Significantly toxic (55.7+/-22.7% abnormal)	Bivalve	LAR			Long & Morgan 1990
155	+/-197	*	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (55.0+/-22.6% mortality)	Hyalella azteca (amphipod)	JUV	0.338+/-0.133	2.9+/-3.11	Hall et al. 1992
157	+/-130	*	Curtis Creek, Baltimore, MD	COA	10-d	Significantly toxic (82.8+/-22.2% mortality)	Leptocheirus plumulosus (amphipod)	JUV			McGee et al. 1993
158		*	Laboratory	SSBA	10-d	LC10	Rhepoxynius abronius (amphipod)	ADT	0.25		Swartz et al. 1988
158	+/-63.4	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (12.3+/-14.5% mortality)	Mulinia lateralis (bivalve)	LAR	1.53+/-0.743	15.7+/-23.2	Bricker et al. 1993
158	+/-86.6	SG	San Francisco Bay, CA	COA	10-d	Significantly toxic (42.9+/-19.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
160		NE	Puget Sound, WA	AETA		PSDDA Screening level concentration	Aquatic biota				USACOE 1988
165	+/-24.6	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (21.5+/-6.36% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.35+/-1.05	10.5+/-13.4	Bricker et al. 1993
165	+/-56	SG	San Francisco Bay, CA	COA	10-d	Moderately toxic (28.3+/-7.51% mortality)	Amphipod	ADT	2.01+/-.98		Chapman et al. 1987a
168	+/-250	*	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (63.0+/-24.3% mortality)	Hyalella azteca (amphipod)	JUV	0.317+/-0.228	2.57+/-2.67	Hall et al. 1992
169	+/-52.7	*	Fraser River Estuary, BC	COA		Sediments devoid of feral clams	Macoma balthica (bivalve)		1.95		McGreer 1982
170	+/-34.7	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.061+/-0.038 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.8+/-0.477	8.52+/-10.7	Bricker et al. 1993
171	+/-90.6	NE	San Francisco Bay, CA	COA	10-d	Least toxic (18+/-6.6% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
172		*	Strait of Georgia, BC	COA	24-h	Significantly toxic (avoidance)	Macoma balthica (bivalve)		3.09		McGreer 1979

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172 +/-92	*	San Francisco Bay, CA	COA	48-h	Moderately toxic (59.4+/-11.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
172 +/-69	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (30.5+/-16.4% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.62+/-0.777	17.7+/-26.3	Bricker et al. 1993
174 +/-234	NE	Houston Ship Channel, TX	COA	10-d	Not significantly toxic (5.4+/-3.6% mortality)	Amphipod	ADT	0.129+/-0.054		Crocker et al. 1991
175 +/-88.1	NE	Bayou La Batre, AB	COA	10-d	Not significantly toxic (46.7+/-11.4% mortality)	Nereis virens (polychaete)	ADT			Parrish 1987a
175 +/-88.1	NE	Bayou La Batre, AB	COA	10-d	Not significantly toxic (5.3+/-2.31% mortality)	Crossostrea virginica (oyster)	ADT			Parrish 1987a
175 +/-88.1	NE	Bayou La Batre, AB	COA	10-d	Not significantly toxic (14+/-9.17% mortality)	Penaeus duorarum (pink shrimp)	ADT			Parrish 1987a
177 +/-96.1	NE	San Francisco Bay, CA	COA	10-d	Not significantly toxic (18.4+/-6.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
180	NC	Puget Sound, WA	COA	2-d	Significantly toxic (3.8% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.5		Pastorok & Becker 1990
180 +/-67.5	NE	Palos Verdes, CA	COA		High species richness (70.9+/-16.9 S/0.1 sq.m.)	Benthic species	VAR			Ferraro et al. 1991
181 +/-6.08	NE	Palos Verdes, CA	COA		High abundance (944+/-101 N/0.1 sq.m.)	Benthic species	VAR			Ferraro et al. 1991
182 +/-384	*	Southern California	COA		Low abundance (35.3+/-15.8 N/0.1 sq.m.)	Arthropods				Word & Mearns 1979 (As cited in L&M 1990)
182 +/-74.1	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (17+/-16.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.99+/-1	21.6+/-24.5	Bricker et al. 1993
185 +/-335	*	Commencement Bay, WA	COA	48-h	Moderately toxic (23+/-2.3% abnormality)	Oyster	LAR			Tetra Tech 1985
186 +/-156	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (51.3+/-6.95% mortality)	Mulinia lateralis (bivalve)	LAR	1.8+/-1.71	29.6+/-46.3	Bricker et al. 1993
186 +/-36.7	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (39.5+/-18.2% mortality)	Ampelisca abidta (amphipod)	SUB ADT	2.06+/-0.523	20.1+/-13.9	Bricker et al. 1993
187 +/-142	*	Curtis Creek, Baltimore, MD	COA	20-d	Significantly toxic (94.6+/-9.35% mortality)	Leptocheirus plumulosus (amphipod)	JUV			McGee et al. 1993
188	*	Laboratory	SSBA	72-h	Significantly toxic (74% avoidance)	Rhepoxynius spp.				Oakden et al. 1984a
188	NE	Laboratory	SSBA	72-h	Not significantly toxic (4% mortality)	Rhepoxynius spp.				Oakden et al. 1984a
188 +/- 480	NE	Narragansett Bay, RI	COA	10-d	Not significantly toxic (5.28+/-3.04% mortality)	Ampelisca abdita (amphipod)	ADT			Munns et al. 1991
188 +/-132	NE	Palos Verdes, CA	COA		High species richness (80.8+/-13.7 S/0.1 sq.m.)	Macro benthos		2.10+/-1.15		Swartz et al. 1985a
188 +/-132	NE	Palos Verdes, CA	COA		High density (54.5+/-9.91 N/0.1 sq.m.)	Amphipod		2.1+/-1.15		Swartz et al. 1985a
188 +/-132	NE	Palos Verdes, CA	COA		High density (34.3+/-5.67 N/0.1 sq.m.)	Phoxocephalid		2.1+/-1.15		Swartz et al. 1985a
188 +/-132	NE	Palos Verdes, CA	COA		High density (111+/-32 N/0.1 sq.m.)	Crustacea		2.1+/-1.15		Swartz et al. 1985a
189 +/-273	*	Tampa Bay, FL	COA	1-h	Most toxic (1.96+/-3.19% fertilization)	Arbacia punctulata (sea urchin)	GAM		3.95+/-5.94	Long 1993
189 +/-115	SG	San Francisco Bay, CA	COA	10-d	Highly toxic (67+/-11.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
190	*	United States	EqPA		EPA Chronic Marine EP Threshold	Aquatic biota		1		Lyman et al. 1987
190	*	United States	EqPA		Chronic Marine EqP Threshold	Aquatic biota		1		Bolton et al. 1985
190 +/-78.5	SG	Houston Ship Channel, TX	COA	10-d	Significantly toxic (22.7+/-0.778% mortality)	Amphipod	ADT	0.248+/-0.132		Crocker et al. 1991
191 +/-45.3	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (15.2+/-9.21% mortality)	Mulinia lateralis (bivalve)	LAR	2.17+/-0.663	18.4+/-19.9	Bricker et al. 1993
193 +/-79.7	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.1+/-2.78% normal development)	Mulinia lateralis (bivalve)	LAR	2.12+/-1.04	22.9+/-23.7	Bricker et al. 1993
194 +/-42	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.3+/-2.22% normal development)	Mulinia lateralis (bivalve)	LAR	2.18+/-0.531	19.1+/-12.5	Bricker et al. 1993
197 +/-415	*	Southern California	COA		Low species richness (51.2+/-8.6 S/0.1 sq.m.)	Benthic species				Word & Mearns 1979 (As cited in L&M 1990)
198 +/-59.2	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (96+/-1.66% normal development)	Mulinia lateralis (bivalve)	LAR	2.52+/-0.997	35+/-42.9	Bricker et al. 1993
202 +/-101	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (23.3+/-6.14% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.738		Word et al. 1988
203 +/-37.7	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.5+/-11.4% mortality)	Mulinia lateralis (bivalve)	LAR	2.33+/-0.364	26.8+/-9.42	Bricker et al. 1993
205 +/-89.8	*	San Francisco Bay, CA	COA	48-h	Highly toxic (92.4+/-4.5% abnormal)	Bivalve	LAR			Long & Morgan 1990
205 +/-93.1	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (10.4+/-6.3% mortality)	Nephtys caecoides (polychaete)		1.63+/-0.657		Word et al. 1988
205 +/-93.1	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (0.2+/-0.6% mortality)	Macoma nasuta (clam)		1.63+/-0.657		Word et al. 1988
206 +/-81.6	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (34.9+/-15.7% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.23+/-1.04	25.4+/-25.5	Bricker et al. 1993
207 +/-84.7	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (23+/-4.24% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.46+/-1.22	40+/-55.1	Bricker et al. 1993
211 +/-342	*	Commencement Bay, WA	COA	10-d	Moderately toxic (26+/-5.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
211 +/-39.6	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.014+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.51+/-0.45	29.6+/-15.7	Bricker et al. 1993

Table 10. A summary of the available data on the biological effects associated with sediment-sorbed ZINC (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Zinc Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
212 +/-243	NE	Southern California	COA	10-d	Not significantly toxic (23.2% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
213 +/-64.5	NE	Pascagoula Mississippi Channel, MS	COA	10-d	Not significantly toxic (5.6+/-2.2% mortality)	Arenicola cristata (lugworm)	ADT			Parrish 1987c
213 +/-64.5	NE	Pascagoula Mississippi Channel, MS	COA	10-d	Not significantly toxic (6.5+/-5.14% mortality)	Penaeus duorarum (pink shrimp)	ADT			Parrish 1987c
213 +/-64.5	NE	Pascagoula Mississippi Channel, MS	COA	10-d	Not significantly toxic (0.7+/-0.82% mortality)	Crossostrea virginica (oyster)	ADT			Parrish 1987c
216 +/-56.4	SG	Oakland Harbor, CA	COA	10-d	Significantly toxic (35.3+/-2.5% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.56+/-0.07		Word et al. 1988
216 +/-81	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.016+/-0.007 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.26+/-0.936	43.4+/-35.6	Bricker et al. 1993
217 +/-203	NE	Puget Sound, WA	COA	20-d	Not significantly toxic (5+/-3.86% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.46+/-0.26		Pastorok & Becker 1990
219 +/-373	NE	Gulf of Mexico	COA	48-h	Not toxic (4.54+/-5.37% mortality)	Crassostrea gigas (oyster)	LAR	0.443+/-0.127		Chapman et al. 1991
220 +/-231	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (16.5+/-9.19% mortality)	Streblospio benedicti (polychaete worm)		0.783+/-0.845	4.83+/-2.23	Hall et al. 1992
223 +/-0.3	*	Los Angeles, CA	COA	96-h	Highly toxic (>50% mortality)	Palaemonetes pugio (shrimp)				Lee & Mariani 1977
223 +/-140	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (13.8+/-4.09% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.47+/-0.306		Pastorok & Becker 1990
225 +/-80.1	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (91.5+/-7.28% normal development)	Mulinia lateralis (bivalve)	LAR	2.6+/-0.899	36.8+/-34.9	Bricker et al. 1993
227 +/-171	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (6.67+/-8.07% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.51+/-0.330		Pastorok & Becker 1990
228 +/-77.8	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (29.8+/-13.9% mortality)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.07	32.1+/-28.4	Bricker et al. 1993
230	*	San Francisco Bay, CA	AETA	10-d	San Francisco Bay AET	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
230	*	Northern California	AETA	10-d	Northern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
230 +/-444	*	Southern California	COA		Low abundance (6.1+/-7.2 N/0.1 sq.m.)	Echinoderm				Word & Mearns 1979 (As cited in L&M 1990)
234 +/-82.9	*	San Francisco Bay, CA	COA	48-h	Highly toxic (92.3+/-5.5% mortality)	Mussel	LAR	2.87+/-1.32		Chapman et al. 1987a
234 +/-82.9	*	San Francisco Bay, CA	COA	4-wk	Moderately toxic (94.9+/-10.1 young produced)	Tigriopus californicus (copepod)	ADT	2.87+/-1.07		Chapman et al. 1987a
240 +/-64	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.013+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.79+/-0.744	37.6+/-25.3	Bricker et al. 1993
240 +/-82.4	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.1+/-13.3% mortality)	Mulinia lateralis (bivalve)	LAR	2.68+/-0.955	31.8+/-24.4	Bricker et al. 1993
241 +/-351	NE	Gulf of Mexico	COA	48-h	Not significantly toxic (7.76+/-1.89% abnormality)	Crassostrea gigas (oyster)	LAR	0.425+/-0.128		Chapman et al. 1991
243 +/-99.5	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (88.5+/-8.39% normal development)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.05	38.1+/-38.9	Bricker et al. 1993
245 +/-195	NE	Palos Verdes, CA	COA	10-d	Not significantly toxic (11.9+/-5.36% mortality)	Rhepoxynius abronius (amphipod)	VAR			Ferraro et al. 1991
245 +/-201	NE	Hudson-Raritan Bay, NY	COA	14-d	Not toxic (increased growth rate)	Chromadorina germanica (nematode)				Tietjen & Lee 1984
249 +/-72.2	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (96.6+/-3.79% normal development)	Mulinia lateralis (bivalve)	LAR	2.87+/-0.94	35.1+/-25.9	Bricker et al. 1993
251 +/-289	*	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (45.5+/-12% mortality)	Lepidactylus dytiscus (amphipod)		0.383+/-0.279	3.61+/-2.79	Hall et al. 1992
253 +/-71.9	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (38+/-13% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.92+/-0.937	34.6+/-23.9	Bricker et al. 1993
260	*	Puget Sound, WA	AETA		1986 Puget Sound AET	Benthic species		15		Bellar et al. 1986
268 +/-198	*	Palos Verdes, CA	COA		Low abundance (2.4+/-5.65 N/0.1 sq.m.)	Echinoderms	VAR			Ferraro et al. 1991
271		***PEL***								
273	*	San Francisco Bay, CA	COA	48-h	Highly toxic (66.8% abnormal)	Mussel	LAR	3.59		Chapman et al. 1987a
276	*	Laboratory	SSBA	10-d	LC50	Rhepoxynius abronius (amphipod)	ADT	0.25		Swartz et al. 1988
280 +/-38.9	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.011+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.28+/-0.363	45.3+/-21.4	Bricker et al. 1993
283 +/-248	SG	Palos Verdes, CA	COA		Low abundance (415+/-94.4 N/0.1 sq.m.)	Benthic species	VAR			Ferraro et al. 1991
289 +/-768	NE	Chesapeake Bay, MD, VI; Delaware Bay, DE	COA		Not significantly toxic (mean ET50; burrowing time 0.76+/-0.266 h)	Mya arenaria (clam)	1-2 cm			Phelps 1990
290 +/-35.9	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (75.1+/-10.6% mortality)	Mulinia lateralis (bivalve)	LAR	3.32+/-0.317	42.3+/-19.2	Bricker et al. 1993
294 +/-204	*	Palos Verdes, CA	COA		Low abundance (13.8+/-11.4 N/0.1 sq.m.)	Amphipods	VAR			Ferraro et al. 1991
294 +/-204	*	Palos Verdes, CA	COA		Low abundance (5.87+/-7.06 N/0.1 sq.m.)	Phoxocephalids	VAR			Ferraro et al. 1991
298 +/-335	*	Tampa Bay, FL	COA		Significantly toxic (EC50; 0.021+/-0.012 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)			6.13+/-8.06	Long 1993
318 +/-282	NE	Palos Verdes, CA	COA		High density (594+/-688 N/0.1 sq.m.)	Mollusca		2.53+/-1.27		Swartz et al. 1985a
318 +/-282	NE	Palos Verdes, CA	COA	10-d	Not significantly toxic (8+/-5.7% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.53+/-1.27		Swartz et al. 1985a

Table 10. A summary of the available data on the biological effects associated with sediment-sorbed ZINC (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Zinc	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
321		*	San Francisco Bay, CA	COA	10-d	Most toxic (95% mortality)	Amphipod	ADT	4.03		Chapman et al. 1987a
321		*	San Francisco Bay, CA	COA	10-d	Highly toxic (37% avoidance)	Amphipod	ADT	4.03		Chapman et al. 1987a
334		*	Black Rock Harbor, CT	COA	14-d	Significantly toxic (100% mortality)	Nereis virens (sandworm)				Simmers et al. 1984
339		NE	Palos Verdes, CA	COA		High density (2177 N/0.1 sq.m.)	Polychaeta		3.2		Swartz et al. 1985a
340		*	California	AETA		California AET Values	Benthic species				Becker et al. 1990
340		*	Southern California	AETA		Southern California AET Values	Benthic species				Becker et al. 1990
340	+/-52.6	NE	Stamford, CT	COA	96-h	Not toxic (10% mortality)	Palaemonetes pugio (shrimp)				Lee & Mariani 1977
347	+/-592	NE	Southern California	COA		High abundance (88.9+/-35.4 N/0.1 sq.m.)	Benthic species				Word & Mearns 1979 (As cited in L&M 1990)
348		*	Curtis Creek, Baltimore, MD	COA	10-d	Significantly toxic (55% mortality)	Hyalella azteca (amphipod)	JUV			McGee et al. 1993
348	+/-234	NE	Southern California	COA	10-d	Significantly toxicity (51.7% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
380		*	Burrard Inlet, BC	COA	10-d	Highly toxic (23% emergence)	Corophium volutator (amphipod)	ADT	3.5		McLeay et al. 1991
380		*	Burrard Inlet, BC	COA	10-d	Highly toxic (30.5% emergence)	Rhepoxynius abronius (amphipod)	ADT	3.5		McLeay et al. 1991
383		*	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29% mortality)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
383		*	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (89.7% reburial)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
383		*	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
383		*	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	6.41	Hall et al. 1992
387	+/-783	*	Commencement Bay, WA	COA	48-h	Highly toxic (44.5+/-19% abnormality)	Oyster	LAR			Tetra Tech 1985
387	+/-504	NE	Tampa Bay, FL	COA	48-h	Not significantly toxic (38.5+/-2.9% mortality)	Mulinaria lateralis (coot clam)	LAR		2.64+/-3.04	Long 1993
394	+/-612	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (4.43+/-2.1% mortality)	Panope generosa (geoduck)	JUV	1.51+/-0.261		Pastorok & Becker 1990
398	+/-311	NE	Palos Verdes, CA	COA	10-d	Not significantly toxic (9.5+/-5.45% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.42+/-0.88		Swartz et al. 1986
410		*	Puget Sound, WA	AETA		1988 Puget Sound AET	Benthic community				PTI 1988
410		*	Puget Sound, WA	SQG		Chemical Criteria	Benthic community		1		WDE 1989
414	+/-472	NC	Gulf of Mexico	COA	10-d	Significantly toxic (41.75+/-38.9% mortality)	Rhepoxynius abronius (amphipod)	ADT	0.45+/-0.058		Chapman et al. 1991
432	+/-657	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (2.09+/-1.73% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.56+/-0.329		Pastorok & Becker 1990
442	+/-652	*	Puget Sound, WA	COA	15-min	Significantly toxic (EC50; 0.065+/-0.043% extract)	Microtox (Photobacterium phosphoreum)		1.58+/-0.255		Pastorok & Becker 1990
449	+/-252	SG	Hudson-Raritan Bay, NY	COA	14-d	Significantly toxic (reduced growth rate)	Chromadorina germanica (nematode)				Tietjen & Lee 1984
452	+/-315	*	Palos Verdes, CA	COA		Low density (0.2+/-0.14 N/0.1 sq.m.)	Echinoderm		2.64+/-0.77		Swartz et al. 1986
455		*	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (82.9% reburial)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
455		*	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>20% emergence)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
455		*	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	5.58	Hall et al. 1992
455		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.016 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
463		NC	Gulf of Mexico	COA		Most toxic (100 TU/g)	Microtox (Photobacterium phosphoreum)		0.4		Chapman et al. 1991
465	+/-372	*	Tampa Bay, FL	COA	10-d	Significantly toxic (32.1+/-16.9% mortality)	Ampelisca abdita (amphipod)	SUBADT		7.63+/-9.44	Long 1993
472	+/-757	*	Puget Sound, WA	COA	2-d	Significantly toxic (60.4+/-46.5% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.57+/-0.287		Pastorok & Becker 1990
525	+/-332	SG	Palos Verdes, CA	COA		Low density (365+/-178 N/0.1 sq.m.)	Polychaeta		3.15+/-1.32		Swartz et al. 1985a
560		*	United States	EqPA		EPA Acute Marine EP Threshold	Aquatic biota		1		Lyman et al. 1987
566	+/-280	*	Palos Verdes, CA	COA		Low density (0.03+/-0.08 N/0.1 sq.m.)	Echinoderm		3.53+/-0.742		Swartz et al. 1985a
566	+/-280	*	Palos Verdes, CA	COA		Low density (0.233+/-0.367 N/0.1 sq.m.)	Foraminifera (sponge)		3.53+/-0.742		Swartz et al. 1985a
566	+/-280	*	Palos Verdes, CA	COA		Low density (0.3+/-0.8 N/0.1 sq.m.)	Ophiuroidea (brittle star)		3.53+/-0.742		Swartz et al. 1985a
571	+/-85.3	*	Laboratory	SSBA	72-h	LC50	Rhepoxynius spp.				Oakden et al. 1984a
595		SG	Sidney Tar Pond, NS	COA	20-d	Significantly toxic (52% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
600	+/-925	*	Puget Sound, WA	COA	10-d	Significantly toxic (80.8+/-30.6% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.266		Pastorok & Becker 1990

Table 10. A summary of the available data on the biological effects associated with sediment-sorbed ZINC (ppm) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Zinc	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
636	+/-8.6	NE	Norwalk River, CT	COA	96-h	Not toxic (0% mortality)	Palaemonetes pugio (shrimp)				Lee & Mariani 1977
660	+/-186	*	Palos Verdes, CA	COA		Low density (5.3+/-3.7 N/0.1 sq.m.)	Amphipod		3.13+/-0.15		Swartz et al. 1986
660	+/-186	*	Palos Verdes, CA	COA		Low density (0.13+/-0.23 N/0.1 sq.m.)	Phoxocephalid		3.13+/-0.15		Swartz et al. 1986
701		*	Palos Verdes, CA	COA		Low species richness (19.2 S/0.1 sq.m.)	Benthic species	VAR			Ferraro et al. 1991
732	+/-115	*	Palos Verdes, CA	COA		Low species richness (26.0+/-11.5 S/0.1 sq.m.)	Macro benthos		3.95+/-0.238		Swartz et al. 1985a
732	+/-115	*	Palos Verdes, CA	COA		Low density (1.0+/-1.2 N/0.1 sq.m.)	Amphipod		3.95+/-0.238		Swartz et al. 1985a
732	+/-115	*	Palos Verdes, CA	COA		Low density (0 N/0.1 sq.m.)	Phoxocephalid		3.95+/-0.238		Swartz et al. 1985a
732	+/-115	*	Palos Verdes, CA	COA		Low density (8.7+/-6.01 N/0.1 sq.m.)	Crustacea		3.95+/-0.238		Swartz et al. 1985a
738	+/-394	NE	Baltimore Harbor, MD	COA	48-h	Least toxic; TLm	Fundulus heteroclitus (mummichog)				Tsai et al. 1979
738	+/-394	NE	Baltimore Harbor, MD	COA	48-h	Least toxic; TLm	Leiostomus xanthurus (spot)				Tsai et al. 1979
739	+/-139	*	Palos Verdes, CA	COA		Low density (21.5+/-11.6 N/0.1 sq.m.)	Mollusca		4+/-0.265		Swartz et al. 1985a
739	+/-139	*	Palos Verdes, CA	COA	10-d	Significantly toxic (21+/-6.3% mortality)	Rhepoxynius abronius (amphipod)	ADT	4+/-0.265		Swartz et al. 1985a
870		*	Puget Sound, WA	AETA	10-d	1986 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT	15		Bellar et al. 1986
>870		-	California	AETA	10-d	California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
>870		-	Southern California	AETA	10-d	Southern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
939	+/-1600	NE	Gulf of Mexico	COA		Not toxic (3.21+/-0.239 diversity index)	Benthic species		0.464+/-0.143		Chapman et al. 1991
941	+/-1373	*	Commencement Bay, WA	COA	10-d	Highly toxic (78.5+/-19.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
960		*	Puget Sound, WA	AETA	10-d	1988 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT			PTI 1988
986	+/-1678	NE	Gulf of Mexico	COA		Least toxic (6.32+/-3.68 TU/g)	Microtox (Photobacterium phosphoreum)		0.47+/-0.149		Chapman et al. 1991
1003	+/-1227	*	Puget Sound, WA	COA	20-d	Significantly toxic (37.3+/-22% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.87+/-0.208		Pastorok & Becker 1990
1029	+/-2230	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (6.8+/-7.31% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
1029	+/-2230	NE	Halifax Harbour, NS	COA	20-d	Not significantly toxic (0.7+/-1.63% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
1031	+/-2229	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (8.5+/-6.06% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
1239	+/-1966	NE	Gulf of Mexico	COA	10-d	Not significantly toxic (9+/-3.96% mortality)	Rhepoxynius abronius (amphipod)	ADT	0.471+/-0.18		Chapman et al. 1991
1600		*	Puget Sound, WA	AETA	15-min	1988 Puget Sound AET	Microtox (Photobacterium phosphoreum)				PTI 1988
1600		*	Puget Sound, WA	AETA	48-h	1988 Puget Sound AET	Crassostrea gigas (oyster)	LAR			PTI 1988
1600		*	Puget Sound, WA	AETA		PSDDA Maximum Level Criteria	Aquatic biota				USACOE 1988
1600		*	Puget Sound, WA	AETA	15-min	1986 Puget Sound AET	Microtox (Photobacterium phosphoreum)		15		Bellar et al. 1986
1600		*	Puget Sound, WA	AETA	48-h	1986 Puget Sound AET	Crassostrea gigas (oyster)	LAR	15		Bellar et al. 1986
1655	+/-1940	*	Gulf of Mexico	COA	10-d	Highly toxic (2.5+/-1.05% emergence/d)	Rhepoxynius abronius (amphipod)	ADT	0.5+/-0.155		Chapman et al. 1991
1804	+/-2098	*	Baltimore Harbor, MD	COA	48-h	Most toxic; TLm	Fundulus heteroclitus (mummichog)				Tsai et al. 1979
1804	+/-2098	*	Baltimore Harbor, MD	COA	48-h	Most toxic; TLm	Leiostomus xanthurus (spot)				Tsai et al. 1979
2199	+/-2219	*	Gulf of Mexico	COA	48-h	Highly toxic (59.4+/-15.5% mortality)	Crassostrea gigas (oyster)	LAR	0.5+/-0.18		Chapman et al. 1991
2799	+/-2287	*	Gulf of Mexico	COA	48-h	Significantly toxic (32.6+/-14.2% abnormality)	Crassostrea gigas (oyster)	LAR	0.567+/-0.153		Chapman et al. 1991
3651	+/-6626	NE	Halifax Harbour, NS	COA	20-d	Not significantly toxic (1+/-2% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
3654	+/-6624	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (5.2+/-3.5% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
4854	+/-7561	*	Halifax Harbour, NS	COA	10-d	Significantly toxic (61.7+/-12.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990

Table 11. A summary of the available data on the biological effects associated with sediment-sorbed ACENAPHTHENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Acenaphthene Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.1 +/-0.058	NE	Chandeleur Sound, LA	COA		Not significantly toxic (1.03+/-2.05% mortality)	Mysidopsis bahia (mysid shrimp)		0.824+/-0.915	1.69+/-0.920	EMAP Louisiana Province 1991
0.105 +/-0.021	NC	Apalachee Bay, FL	COA	10-d	Significantly toxic (15.6% mortality)	Ampelisca abdita (amphipod)		0.438+/-0.442	0.421+/-0.593	EMAP Louisiana Province 1991
0.108 +/-0.05	NC	Chandeleur Sound, LA	COA	10-d	Significantly toxic (11.5+/-4.86% mortality)	Ampelisca abdita (amphipod)		0.811+/-0.711	1.87+/-0.973	EMAP Louisiana Province 1991
0.118 +/-0.025	NE	Apalachee Bay, FL	COA		Not significantly toxic (0.75+/-1.5% mortality)	Mysidopsis bahia (mysid shrimp)		0.540+/-0.385	0.405+/-0.417	EMAP Louisiana Province 1991
0.13	NC	Mobile Bay, AL	COA		Significantly toxic (10% mortality)	Mysidopsis bahia (mysid shrimp)		0.009	0.004	EMAP Louisiana Province 1991
0.13 +/-0.028	NE	Apalachee Bay, FL	COA	10-d	Not significantly toxic (3.3+/-3.25% mortality)	Ampelisca abdita (amphipod)		0.643+/-0.455	0.390+/-0.410	EMAP Louisiana Province 1991
0.138 +/-0.033	SG	Chandeleur Sound, LA	COA		Significantly toxic (7.6+/-1.32% mortality)	Mysidopsis bahia (mysid shrimp)		0.624+/-0.197	2.07+/-1.19	EMAP Louisiana Province 1991
0.147 +/-0.035	NE	Chandeleur Sound, LA	COA	10-d	Not significantly toxic (2.87+/-4.05% mortality)	Ampelisca abdita (amphipod)		0.517+/-0.166	2.02+/-1.38	EMAP Louisiana Province 1991
0.185 +/-0.163	NC	Mississippi Sound, MS	COA	10-d	Significantly toxic (11.6+/-3.39% mortality)	Ampelisca abdita (amphipod)		0.111+/-0.045	0.03	EMAP Louisiana Province 1991
0.19 +/-0.07	NE	Galveston Bay, TX	COA		High abundance (27.3+/-10 N/0.00203 sq.m.)	Mollusca		1.64+/-0.4	1.39+/-0.17	Carr 1992
0.235 +/-0.106	NE	Galveston Bay, TX	COA		High abundance (155+/-49.5 N/0.00203 sq.m.)	Oligochaeta		1.2+/-1.27	4.27+/-3.85	Carr 1992
0.265 +/-0.161	NE	Galveston Bay, TX	COA		High abundance (359+/-92.8 N/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
0.27 +/-0.16	NE	Galveston Bay, TX	COA		High species richness (24.5+/-3.7 S/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
0.333 +/-0.078	NC	Mississippi Sound, MS	COA		Significantly toxic (12.2+/-4.42% mortality)	Mysidopsis bahia (mysid shrimp)		0.939+/-0.335	2.63+/-2.3	EMAP Louisiana Province 1991
0.35 +/-0.229	NE	Mississippi Sound, MS	COA		Not significantly toxic (0.789+/-1.59% mortality)	Mysidopsis bahia (mysid shrimp)		0.827+/-0.757	1.46+/-1.58	EMAP Louisiana Province 1991
0.374 +/-0.187	NE	Mississippi Sound, MS	COA	10-d	Not significantly toxic (1.4+/-1.73% mortality)	Ampelisca abdita (amphipod)		0.998+/-0.602	2.01+/-1.82	EMAP Louisiana Province 1991
0.381 +/-.336	NE	Galveston Bay, TX	COA		High abundance (16.2+/-6.19 N/0.00203 sq.m.)	Copepoda		0.844+/-0.524	4.73+/-3.1	Carr 1992
0.398 +/-0.197	NE	Galveston Bay, TX	COA		High abundance (156+/-22.9 N/0.00203 sq.m.)	Polychaeta		0.916+/-0.661	2.94+/-2.3	Carr 1992
0.42 +/-0.441	NE	Galveston Bay, TX	COA	48-h	Not toxic (98.1+/-1.79% normal development)	Arbacia punctulata (sea urchin)	EMB	.748+/-0.476	4.16+/-3.45	Carr 1992
0.71 +/-0.184	NE	Mobile Bay, AL	COA	10-d	Not significantly toxic (0.5+/-0.778% mortality)	Ampelisca abdita (amphipod)		1.24+/-0.948	8.51+/-4.76	EMAP Louisiana Province 1991
0.738 +/-0.499	NE	Matagorda Bay, TX	COA		Not significantly toxic (1.58+/-1.82% mortality)	Mysidopsis bahia (mysid shrimp)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
0.738 +/-0.499	NE	Matagorda Bay, TX	COA	10-d	Not significantly toxic (2.33+/-4.65% mortality)	Ampelisca abdita (amphipod)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
0.985 +/-1.21	SG	Mobile Bay, AL	COA	10-d	Significantly toxic (46+/-49.3% mortality)	Ampelisca abdita (amphipod)		0.22+/-0.298	3.84+/-5.43	EMAP Louisiana Province 1991
1	NE	Puget Sound, WA	COA		Not toxic (10% prevalence of idiopathic degeneration/necrosis)	Parophrys vetulus (English sole)				Malins et al. 1985
1	NE	Puget Sound, WA	COA		Not toxic (17.5% prevalence of steatosis and hemosiderosis)	Parophrys vetulus (English sole)				Malins et al. 1985
1	NE	Puget Sound, WA	COA		Not toxic (0% occurrence of hepatic cellular alterations)	Parophrys vetulus (English sole)				Malins et al. 1985
1	NE	Puget Sound, WA	COA		Not toxic (5% prevalence of hepatocellular regenerative foci)	Parophrys vetulus (English sole)				Malins et al. 1985
1	NE	Puget Sound, WA	COA		Not toxic (0% prevalence of hepatic cellular alterations)	Parophrys vetulus (English sole)				Malins et al. 1985
1	NE	Puget Sound, WA	COA		Not toxic (32.5% prevalence of hepatic idiopathic lesions)	Parophrys vetulus (English sole)				Malins et al. 1985
1.07 +/-1.05	NC	Mississippi River, MS, LA	COA	10-d	Significantly toxic (15.9+/-6.65% mortality)	Ampelisca abdita (amphipod)		1.22+/-0.717	0.235+/-0.276	EMAP Louisiana Province 1991
1.09 +/-0.665	NE	Mobile Bay, AL	COA		Not significantly toxic (1.07+/-1.85% mortality)	Mysidopsis bahia (mysid shrimp)		0.968+/-0.815	8.23+/-3.4	EMAP Louisiana Province 1991
1.22 +/-1.52	NE	Galveston Bay, TX	COA		High Abundance (6+/-1.41 N/0.00203 sq.m.)	Amphipoda		0.955+/-0.629	7.21+/-8.2	Carr 1992
1.31 +/-0.707	NC	Mississippi River, MS, LA	COA		Significantly toxic (32.9+/-36.4% mortality)	Mysidopsis bahia (mysid shrimp)		1.07+/-0.924	1.41+/-1.93	EMAP Louisiana Province 1991
1.32 +/-1.82	NC	Galveston Bay, TX	COA		Significantly toxic (13.4+/-9.11% mortality)	Mysidopsis bahia (mysid shrimp)		0.778+/-0.482	1.21+/-0.778	EMAP Louisiana Province 1991
1.4 +/-1.51	NC	Galveston Bay, TX	COA	10-d	Significantly toxic (15.8+/-3.89% mortality)	Ampelisca abdita (amphipod)		0.647+/-0.606	0.160+/-0.184	EMAP Louisiana Province 1991
1.53 +/-1.75	NE	Puget Sound, WA	COA	15-min	Not significantly toxic (EC50; 0.283+/-0.168% extract)	Microtox (Photobacterium phosphoreum)		1.39+/-0.37		Pastorok & Becker 1990
1.86 +/-1.86	NE	Galveston Bay, TX	COA	10-d	Not significantly toxic (1.35+/-1.45% mortality)	Ampelisca abdita (amphipod)		0.961+/-0.537	1.17+/-0.640	EMAP Louisiana Province 1991
1.98 +/-1.06	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (5.8+/-3.7% mortality)	Rhepoxynius abronius (amphipod)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
1.98 +/-1.06	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (3.4+/-1.82% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
1.98 +/-1.06	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (11.2+/-3.7% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992

Table 11. A summary of the available data on the biological effects associated with sediment-sorbed ACENAPHTHENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Acenaphthene Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
1.98 +/-1.06	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (3.52+/-1.66% mortality)	Macoma nasuta (clam)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
2.04 +/-3.95	*	Galveston Bay, TX	COA		Moderate abundance (58.3+/-16.2 N/0.00203 sq.m.)	Oligochaeta		0.632+/-0.274	7.93+/-5.6	Carr 1992
2.09 +/-1.6	NE	Galveston Bay, TX	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		0.934+/-0.657	0.457+/-0.530	EMAP Louisiana Province 1991
2.09 +/-2.5	NE	Mississippi River, MS, LA	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		1.3+/-0.83	1.14+/-1	EMAP Louisiana Province 1991
2.33 +/-2.15	NE	Mississippi River, MS, LA	COA	10-d	Not significantly toxic (7.8+/-1.63% mortality)	Ampelisca abdita (amphipod)		1.15+/-1.04	2.31+/-0.651	EMAP Louisiana Province 1991
2.35 +/-3.83	NC	Galveston Bay, TX	COA	1-h	Toxic (20.4+/-18.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	1.26+/-0.47	14.6+/-10.1	Carr 1992
2.71 +/-4.92	NE	Galveston Bay, TX	COA		High abundance (154+/-30.2 N/0.00203 sq.m.)	Benthic invertebrates		0.47+/-0.27	9.07+/-2.94	Carr 1992
2.97 +/-13.1	NE	Galveston Bay, TX	COA	1-h	Not toxic (92.5+/-6.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	0.77+/-0.448	6.37+/-6.58	Carr 1992
3	NC	Halifax Harbour, NS	COA	10-d	Significantly toxic (61.7+/-12.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
3.1 +/-12.8	*	Galveston Bay, TX	COA		Low abundance (0.3+/-0.651 N/0.00203 sq.m.)	Amphipoda		0.859+/-0.487	7.67+/-8.12	Carr 1992
3.28 +/-13	*	Galveston Bay, TX	COA		Low abundance (1.86+/-2.59 N/0.00203 sq.m.)	Mollusca		0.784+/-0.421	8.29+/-8.13	Carr 1992
3.38 +/-13.2	*	Galveston Bay, TX	COA		Low species richness (10+/-3.73 S/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
3.38 +/-13.2	*	Galveston Bay, TX	COA		Low abundance (89+/-60.7 N/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
3.45 +/-14.2	*	Galveston Bay, TX	COA		Low abundance (4.21+/-5.66 N/0.00203 sq.m.)	Oligochaeta		0.895+/-0.453	7.85+/-8.8	Carr 1992
3.5 +/-1	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (5.2+/-3.5% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
3.5 +/-1	NE	Halifax Harbour, NS	COA	20-d	Not significantly toxic (1+/-2% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
3.85 +/-14.2	*	Galveston Bay, TX	COA		Low abundance (41.7+/-21.8 N/0.00203 sq.m.)	Polychaeta		0.848+/-0.427	9.21+/-8.61	Carr 1992
3.92 +/-1.59	NC	Southern California	COA	10-d	Significantly toxicity (51.7% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
4.77 +/-15.9	*	Galveston Bay, TX	COA		Low abundance (2.05+/-1.58 N/0.00203 sq.m.)	Copepoda		0.879+/-0.47	9.63+/-9.65	Carr 1992
4.94 +/-1.02	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-7.99% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.14+/-0.352	6.09+/-5.38	Bricker et al. 1993
4.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (0.33+/-0.516% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (2.33+/-1.03% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (15.3+/-11.0% mortality)	Hyalella azteca (amphipod)	JUV	0.648+/-0.641	1.74+/-1.39	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1% mortality)	Streblospio benedicti (polychaete worm)		1.38	3.25	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (16.5+/-9.19% mortality)	Streblospio benedicti (polychaete worm)		0.783+/-0.845	4.83+/-2.23	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.367+/-0.085 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.0005 mg/day growth)	Streblospio benedicti (polychaete worm)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.003+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.316+/-0.120	2.13+/-2.46	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (7.2+/-1.92% mortality)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.6+/-0.55% reburial)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.001+/-0.001 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.555+/-0.471	2.68+/-2.3	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1.83+/-1.6% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (3.5+/-1.87% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (9.25+/-5.32% mortality)	Lepidactylus dytiscus (amphipod)		0.638+/-0.768	1.65+/-1.62	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (22.3+/-7.37% mortality)	Hyalella azteca (amphipod)	JUV	0.788+/-0.866	2.04+/-1.75	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (8.8+/-7.12% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (14+/-9.22% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.1+/-0.865% reburial)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992

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Acenaphthene Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<20% emergence)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (-0.057+/-0.04 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.001mg/day growth)	Streblospio benedicti (polychaete worm)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.016 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.005+/-0.0004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (55.0+/-22.6% mortality)	Hyalella azteca (amphipod)	JUV	0.338+/-0.133	2.9+/-3.11	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29.8+/-11.1% mortality)	Streblospio benedicti (polychaete worm)		0.316+/-0.12	2.13+/-2.46	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (55.0+/-19.5% mortality)	Streblospio benedicti (polychaete worm)		0.349+/-0.11	1.07+/-0.66	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.003 mg/day growth)	Lepidactylus dytiscus (amphipod)		1.38	3.25	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29% mortality)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (89.7% reburial)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	6.41	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (45.5+/-12% mortality)	Lepidactylus dytiscus (amphipod)		0.383+/-0.279	3.61+/-2.79	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (63.0+/-24.3% mortality)	Hyalella azteca (amphipod)	JUV	0.317+/-0.228	2.57+/-2.67	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (22% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (28% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (82.9% reburial)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>20% emergence)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	5.58	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.008+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.4	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.003 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
5	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (3% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
5	NE	Sidney Tar Pond, NS	COA	10-d	Not significantly toxic (4% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
5	NE	Sidney Tar Pond, NS	COA	10-d	Not significantly toxic (3% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
6.71		***TEL***								
6.92 +/-11.8	NE	Southern California	COA	10-d	Not significantly toxic (23.2% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
7.28 +/-2.76	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.061+/-0.038 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.8+/-0.477	8.52+/-10.7	Bricker et al. 1993
7.34 +/-19.9	*	Galveston Bay, TX	COA	48-h	Toxic (4.65+/-16.1% normal development)	Arbacia punctulata (sea urchin)	EMB	1.06+/-0.449	14.5+/-9.2	Carr 1992
8.7 +/-4.36	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (19.3+/-5.86% mortality)	Ampelisca abidta (amphipod)	SUB ADT	1.82+/-0.225	6.3+/-6.2	Bricker et al. 1993
8.8 +/-5.3	NE	Sidney Tar Pond, NS	COA	20-d	Not significantly toxic (8+/-5.66% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
9	*	San Francisco Bay, CA	AETA	48-h	San Francisco Bay AET	Oyster; mussel	LAR			Long & Morgan 1990
9	NC	Puget Sound, WA	COA	2-d	Significantly toxic (3.8% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.5		Pastorok & Becker 1990
9.38 +/-4.21	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (15.2+/-9.21% mortality)	Mulinia lateralis (bivalve)	LAR	2.17+/-0.663	18.4+/-19.9	Bricker et al. 1993
9.95 +/-5.42	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.3+/-2.22% normal development)	Mulinia lateralis (bivalve)	LAR	2.18+/-0.531	19.1+/-12.5	Bricker et al. 1993
10.2 +/-6.73	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (39.5+/-18.2% mortality)	Ampelisca abidta (amphipod)	SUB ADT	2.06+/-0.523	20.1+/-13.9	Bricker et al. 1993
10.4 +/-4.63	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.125+/-0.084 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.25+/-0.468	1.98+/-2.25	Bricker et al. 1993
11.8 +/-8.35	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (96+/-1.66% normal development)	Mulinia lateralis (bivalve)	LAR	2.52+/-0.997	35+/-42.9	Bricker et al. 1993

Table 11. A summary of the available data on the biological effects associated with sediment-sorbed ACENAPHTHENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Acenaphthene Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
11.9 +/-7.88	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.5+/-11.4% mortality)	Mulinia lateralis (bivalve)	LAR	2.33+/-0.364	26.8+/-9.42	Bricker et al. 1993
12.2 +/-6.17	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.014+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.51+/-0.45	29.6+/-15.7	Bricker et al. 1993
12.5	*	Sidney Tar Pond, NS	COA	10-d	Significantly toxic (100% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
12.5	*	Sidney Tar Pond, NS	COA	10-d	Significantly toxic (100% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
13.3 +/-7.31	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (25.9+/-5.01% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.21+/-0.444	2.41+/-2.32	Bricker et al. 1993
13.7 +/-15.4	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.167+/-0.198 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.59+/-1.09	4.67+/-6.99	Bricker et al. 1993
13.7 +/-16.5	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.074+/-0.043 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.27+/-0.626	6.21+/-5.41	Bricker et al. 1993
13.7 +/-27.8	NE	Galveston Bay, TX	COA		Low species (11.2+/-1.94 S/0.00203 sq.m.)	Benthic species		0.642+/-0.356	13.4+/-8.65	Carr 1992
13.9 +/-14.7	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.096+/-0.101 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.37+/-0.759	6.93+/-6.83	Bricker et al. 1993
14.5 +/-17.4	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (12.3+/-14.5% mortality)	Mulinia lateralis (bivalve)	LAR	1.53+/-0.743	15.7+/-23.2	Bricker et al. 1993
15.1 +/-18.8	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99.3+/-0.827% normal development)	Mulinia lateralis (bivalve)	LAR	1.43+/-0.738	14.7+/-24	Bricker et al. 1993
15.4 +/-21.1	NE	Oahu, Hawaii	COA	10-d	Not significantly toxic (7.2+/-1.89% mortality)	Eohaustorius estuarius (amphipod)	ADT	1.93+/-1.94	10.3+/-12.4	Lamberson et al. 1993
15.4 +/-21.1	NE	Oahu, Hawaii	COA	10-d	Not significantly toxic (10.1+/-4.01% mortality)	Corophium acherusicum (amphipod)	ADT	1.93+/-1.94	10.3+/-12.4	Lamberson et al. 1993
16	*	California	AETA	48-h	California AET Values	Mytilus edulis (bivalve)	LAR			Becker et al. 1990
16	*	California	AETA		California AET Values	Benthic species				Becker et al. 1990
16	*	Northern California	AETA		Northern California AET Values	Benthic species				Becker et al. 1990
17 +/-15.3	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (6.48+/-10.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
17 +/-15.3	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99+/-0.862% normal development)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
17.5 +/-22	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (13.8+/-4.09% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.47+/-0.306		Pastorok & Becker 1990
18.8 +/-27.6	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (6.67+/-8.07% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.51+/-0.330		Pastorok & Becker 1990
19.3 +/-29.2	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-6.07% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.71+/-0.9	15.3+/-23.2	Bricker et al. 1993
19.4 +/-20.4	*	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (30.5+/-16.4% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.62+/-0.777	17.7+/-26.3	Bricker et al. 1993
22.2 +/-26.7	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (17+/-16.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.99+/-1	21.6+/-24.5	Bricker et al. 1993
23.5	*	Sidney Tar Pond, NS	COA	20-d	Significantly toxic (52% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
26.8 +/-31.4	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.1+/-2.78% normal development)	Mulinia lateralis (bivalve)	LAR	2.12+/-1.04	22.9+/-23.7	Bricker et al. 1993
30 +/-33.4	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (21.5+/-6.36% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.35+/-1.05	10.5+/-13.4	Bricker et al. 1993
30.8 +/-25.6	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (6.8+/-7.31% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
30.8 +/-25.6	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (8.5+/-6.06% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
30.8 +/-25.6	NE	Halifax Harbour, NS	COA	20-d	Not significantly toxic (0.7+/-1.63% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
33	*	Puget Sound, WA	AETA	15-min	1986 Puget Sound AET	Microtox (Photobacterium phosphoreum)		1		Bellar et al. 1986
33	*	Puget Sound, WA	AETA	48-h	1986 Puget Sound AET	Crassostrea gigas (oyster)	LAR	1		Bellar et al. 1986
33	*	Puget Sound, WA	AETA		1986 Puget Sound AET	Benthic species		1		Bellar et al. 1986
34 +/-44.4	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (34.9+/-15.7% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.23+/-1.04	25.4+/-25.5	Bricker et al. 1993
35.8 +/-48.3	*	Galveston Bay, TX	COA		Low abundance (53+/-33.9 N/0.00203 sq.m.)	Benthic invertebrates		0.985+/-0.247	22+/-11.2	Carr 1992
37.8 +/-39.3	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (29.8+/-13.9% mortality)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.07	32.1+/-28.4	Bricker et al. 1993
40.2 +/-19	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.008+/-0.001 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.19+/-1.27	12+/-11.3	Bricker et al. 1993
41.9 +/-49.9	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.013+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.79+/-0.744	37.6+/-25.3	Bricker et al. 1993
42	*	Puget Sound, WA	AETA	10-d	1986 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT	1		Bellar et al. 1986
45.7 +/-41.2	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (38+/-13% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.92+/-0.937	34.6+/-23.9	Bricker et al. 1993
46 +/-41.3	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (96.6+/-3.79% normal development)	Mulinia lateralis (bivalve)	LAR	2.87+/-0.94	35.1+/-25.9	Bricker et al. 1993

Table 11. A summary of the available data on the biological effects associated with sediment-sorbed ACENAPHTHENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Acenaphthene Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
47.3 +/-81.2	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.016+/-0.007 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.26+/-0.936	43.4+/-35.6	Bricker et al. 1993
48.4 +/-59.4	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (23+/-4.24% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.46+/-1.22	40+/-55.1	Bricker et al. 1993
50	NE	Burrard Inlet, BC	SQO		Sediment Quality Objectives	Aquatic biota				Swain & Nijman 1991
52.4 +/-64.7	*	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.1+/-13.3% mortality)	Mulinia lateralis (bivalve)	LAR	2.68+/-0.955	31.8+/-24.4	Bricker et al. 1993
56	*	San Francisco Bay, CA	AETA	10-d	San Francisco Bay AET	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
56	*	Northern California	AETA	10-d	Northern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
56	*	California	AETA	10-d	California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
56.1 +/-41.8	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.011+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.28+/-0.363	45.3+/-21.4	Bricker et al. 1993
56.7 +/-70	NE	Commencement Bay, WA	COA	48-h	Least toxic (15.1+/-3.1% abnormality)	Oyster	LAR			Tetra Tech 1985
59.9 +/-102	*	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (91.5+/-7.28% normal development)	Mulinia lateralis (bivalve)	LAR	2.6+/-0.899	36.8+/-34.9	Bricker et al. 1993
60	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (18% mortality)	Ampelisca abdita (amphipod)		0.028	9 ug/g	Windom In Prep
60	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (0% mortality)	Arbacia punctulata (sea urchin)		0.03	19 ug/g	Windom In Prep
62.5 +/-43	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (75.1+/-10.6% mortality)	Mulinia lateralis (bivalve)	LAR	3.32+/-0.317	42.3+/-19.2	Bricker et al. 1993
63	NE	Puget Sound, WA	AETA		PSDDA Screening level concentration	Aquatic biota				USACOE 1988
67.5 +/-2.89	NE	Brunswick Harbor Entrance, GA	COA	48-h	Not significantly toxic (86.6+/-4.25% normal development)	Arbacia punctulata (sea urchin)		0.181+/-0.162	182+/-208 ug/g	Windom In Prep
68.3 +/-2.89	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (28.3+/-6.11% mortality)	Mysidopsis bahia (mysid)		0.246+/-0.051	127+/-24 ug/g	Windom In Prep
70 +/-9.57	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (91.3+/-2.91% normal development)	Arbacia punctulata (sea urchin)		0.299+/-0.251	114+/-68.4 ug/g	Windom In Prep
70.6 +/-10.4	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (9.78+/-5.33% mortality)	Mysidopsis bahia (mysid)		0.24+/-0.247	91.9+/-73.4 ug/g	Windom In Prep
70.6 +/-11.2	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (4+/-2.83% mortality)	Menidia beryllina (silverside)		0.243+/-0.264	90.5+/-78.4 ug/g	Windom In Prep
71.7 +/-12.9	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (27.5+/-10.6% mortality)	Mysidopsis bahia (mysid)		0.237+/-0.311	74.6+/-85.5 ug/g	Windom In Prep
71.7 +/-9.31	SG	Savannah River Entrance Channel, GA	COA	48-h	Significantly toxic (25.4+/-7.66% mortality)	Arbacia punctulata (sea urchin)		0.344+/-0.242	129.5+/-59.3 ug/g	Windom In Prep
71.7		***PEL***								
71.9 +/-10.3	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (11.6+/-4.33% mortality)	Ampelisca abdita (amphipod)		0.267+/-0.25	102+/-71.1 ug/g	Windom In Prep
80	NE	Tampa Bay, FL	COA	10-d	Not significantly toxic (14.6+/-7.67% mortality)	Ampelisca abdita (amphipod)	SUBADT	1.63+/-0.596		Long 1993
80	NE	Tampa Bay, FL	COA	1-h	Least toxic (79.4+/-9.9% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.45+/-0.587		Long 1993
80	NE	Tampa Bay, FL	COA		Not significantly toxic (EC50; 0.066+/-0.033 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.89+/-0.902		Long 1993
80	NG	Tampa Bay, FL	COA	1-h	Moderately toxic (15.3+/-10.6% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.94+/-0.908		Long 1993
85.9 +/-97	NE	Commencement Bay, WA	COA	10-d	Least toxic (12.5+/-4.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
90.6 +/-24.3	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (10.6+/-3.17% mortality)	Ampelisca abdita (amphipod)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
90.6 +/-24.3	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (8.00+/-2.92% mortality)	Mysidopsis bahia (mysid)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
92 +/-130	*	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (88.5+/-8.39% normal development)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.05	38.1+/-38.9	Bricker et al. 1993
92.9 +/-25.6	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (5.43+/-3.21% mortality)	Mysidopsis bahia (mysid)		1.21+/-1.13	9096+/-13378 ug/g	Windom In Prep
92.9 +/-25.6	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (9.61+/-2.7% mortality)	Menidia beryllina (silverside)		1.22+/-1.13	9172+/-13363 ug/g	Windom In Prep
96.6 +/-127	*	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (51.3+/-6.95% mortality)	Mulinia lateralis (bivalve)	LAR	1.8+/-1.71	29.6+/-46.3	Bricker et al. 1993
100	SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (16% mortality)	Mysidopsis bahia (mysid)		1.8	7095 ug/g	Windom In Prep
100	SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (22.3% mortality)	Menidia beryllina (silverside)		1.71	6562 ug/g	Windom In Prep
109 +/-14.7	SG	Brunswick Harbor Entrance, GA	COA	48-h	Significantly toxic (14.6+/-18.9% normal development)	Arbacia punctulata (sea urchin)		1.99+/-0.562	14009+/-13434 ug/g	Windom In Prep
119 +/-105	*	Commencement Bay, WA	COA	48-h	Moderately toxic (23+/-2.3% abnormality)	Oyster	LAR			Tetra Tech 1985
127 +/-117	SG	Commencement Bay, WA	COA	10-d	Moderately toxic (26+/-5.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
150	*	Eagle Harbor, WA	COA	4-d	LC50	Rhepoxynius abronius (amphipod)	ADT			Swartz et al. 1989

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Acenaphthene Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
160	*	Puget Sound, WA	SQG		Chemical Criteria	Benthic community		1		WDE 1989
175 +/-187	*	Tampa Bay, FL	COA	1-h	Most toxic (0.091+/-0.187% fertilization)	Arbacia punctulata (sea urchin)	GAM	2.96+/-1.49		Long 1993
210 +/-212	*	Tampa Bay, FL	COA	10-d	Significantly toxic (35.2+/-17.5% mortality)	Ampelisca abdita (amphipod)	SUBADT	3.53+/-1.35		Long 1993
230 +/-220	*	Tampa Bay, FL	COA		Significantly toxic (EC50; 0.017+/-0.012 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.47+/-1.49		Long 1993
247 +/-147	NE	Burrard Inlet, BC	COA	10-d	Not toxic (4.5+/-3.02% emergence)	Rhepoxynius abronius (amphipod)	ADT	2.66+/-2.15		McLeay et al. 1991
247 +/-147	NE	Burrard Inlet, BC	COA	10-d	Not toxic (5.21+/-3.61% emergence)	Corophium volutator (amphipod)	ADT	3.18+/-2.1		McLeay et al. 1991
283 +/-140	NE	Burrard Inlet, BC	COA	10-d	Not toxic (8.9+/-2.99% mortality)	Corophium volutator (amphipod)	ADT	2.8+/-1.96		McLeay et al. 1991
283 +/-140	NE	Burrard Inlet, BC	COA	10-d	Not toxic (97.2+/-2.84% reburial)	Rhepoxynius abronius (amphipod)	ADT	2.8+/-1.96		McLeay et al. 1991
293 +/-73.8	NE	Elizabeth River, VA	COA	96-h	No significant change in respiration rate	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
306 +/-604	*	Commencement Bay, WA	COA	48-h	Highly toxic (44.5+/-19% abnormality)	Oyster	LAR			Tetra Tech 1985
350 +/-45.8	NE	Burrard Inlet, BC	COA	10-d	Not toxic (7.9+/-5.12% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.64+/-2.14		McLeay et al. 1991
390	SG	Burrard Inlet, BC	COA	10-d	Highly toxic (23% emergence)	Corophium volutator (amphipod)	ADT	3.5		McLeay et al. 1991
390	SG	Burrard Inlet, BC	COA	10-d	Highly toxic (30.5% emergence)	Rhepoxynius abronius (amphipod)	ADT	3.5		McLeay et al. 1991
486 +/-714	NE	Elizabeth River, VA	COA	96-h	Not significantly toxic (4.5+/-3.24% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
500	*	Puget Sound, WA	AETA	15-min	1988 Puget Sound AET	Microtox (Photobacterium phosphoreum)				PTI 1988
500	*	Puget Sound, WA	AETA	48-h	1988 Puget Sound AET	Crassostrea gigas (oyster)	LAR			PTI 1988
630	*	Puget Sound, WA	AETA		PSDDA Maximum Level Criteria	Aquatic biota				USACOE 1988
654 +/-1049	*	Commencement Bay, WA	COA	10-d	Highly toxic (78.5+/-19.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
679 +/-469	SG	Elizabeth River, VA	COA	96-h	Significantly toxic (50.7+/-39% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
680 +/-814	*	Elizabeth River, VA	COA	96-h	Significant decrease in respiration rates	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
730	*	Puget Sound, WA	AETA		1988 Puget Sound AET	Benthic community				PTI 1988
2000	*	Puget Sound, WA	AETA	10-d	1988 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT			PTI 1988
2400 +/-103	*	United States	EqPA		Sediment Quality Criteria					Hansen et al. 1991d
3031 +/-4271	*	Puget Sound, WA	COA		Toxic (71.6+/-14.6% prevalence of idiopathic degeneration/necrosis)	Parophrys vetulus (English sole)				Malins et al. 1985
3031 +/-4271	*	Puget Sound, WA	COA		Toxic (51.4+/-21.1% prevalence of steatosis and hemosiderosis)	Parophrys vetulus (English sole)				Malins et al. 1985
3031 +/-4271	*	Puget Sound, WA	COA		Toxic (19+/-6.15% prevalence of hepatocellular regenerative foci)	Parophrys vetulus (English sole)				Malins et al. 1985
3031 +/-4271	*	Puget Sound, WA	COA		Toxic (26.7+/-6.43% prevalence of hepatic neoplasms)	Parophrys vetulus (English sole)				Malins et al. 1985
3031 +/-4271	*	Puget Sound, WA	COA		Toxic (88+/-3.65% prevalence of hepatic idiopathic lesions)	Parophrys vetulus (English sole)				Malins et al. 1985
3031 +/-4271	*	Puget Sound, WA	COA		Toxic (44.2+/-8.5% prevalence of hepatic cellular alterations)	Parophrys vetulus (English sole)				Malins et al. 1985
3598 +/-8532	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (4.43+/-2.1% mortality)	Panope generosa (geoduck)	JUV	1.51+/-0.261		Pastorok & Becker 1990
4156 +/-9146	NE	Puget Sound, WA	COA	20-d	Not significantly toxic (5+/-3.86% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.46+/-0.26		Pastorok & Becker 1990
5599 +/-24392	NE	Eagle Harbor, WA	COA	10-d	Least toxic (13+/-7% mortality)	Rhepoxynius abronius (amphipod)	ADT			CH2M Hill 1989
6522 +/-8915	SG	Eagle Harbor, WA	COA	10-d	Moderately toxic (41+/-9% mortality)	Rhepoxynius abronius (amphipod)	ADT			CH2M Hill 1989
9779 +/-24017	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (2.09+/-1.73% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.56+/-0.329		Pastorok & Becker 1990
10947 +/-23838	*	Puget Sound, WA	COA	15-min	Significantly toxic (EC50; 0.065+/-0.043% extract)	Microtox (Photobacterium phosphoreum)		1.58+/-0.255		Pastorok & Becker 1990
14584 +/-26866	*	Puget Sound, WA	COA	2-d	Significantly toxic (60.4+/-46.5% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.57+/-0.287		Pastorok & Becker 1990
16500	*	United States	EqPA		Chronic Marine Sediment Safe Level Criteria					Pavlou 1987
16500	*	United States	EqPA		Chronic Marine EqP Threshold	Aquatic biota		1		Bolton et al. 1985
21868 +/-31046	*	Puget Sound, WA	COA	10-d	Significantly toxic (80.8+/-30.6% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.266		Pastorok & Becker 1990
27167 +/-46621	*	Puget Sound, WA	COA	20-d	Significantly toxic (37.3+/-22% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.87+/-0.208		Pastorok & Becker 1990

Table 11. A summary of the available data on the biological effects associated with sediment-sorbed ACENAPHTHENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Acenaphthene Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
39557 +/-48678	*	Eagle Harbor, WA	COA	10-d	Highly toxic (95.5+/-8.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			CH2M Hill 1989
81000	*	Puget Sound, WA	COA	10-d	Significantly toxic (56% mortality)	Panope generosa (geoduck)	JUV	2.1		Pastorok & Becker 1990

Table 12. A summary of the available data on the biological effects associated with sediment-sorbed ACENAPHTHYLENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Acenaphthylene Std Dev		Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.04		NC	Apalachee Bay, FL	COA	10-d	Significantly toxic (15.6% mortality)	Ampelisca abdita (amphipod)		0.438+/-0.442	0.421+/-0.593	EMAP Louisiana Province 1991
0.04		NC	Mobile Bay, AL	COA		Significantly toxic (10% mortality)	Mysidopsis bahia (mysid shrimp)		0.009	0.004	EMAP Louisiana Province 1991
0.048	+/-0.01	NE	Apalachee Bay, FL	COA		Not significantly toxic (0.75+/-1.5% mortality)	Mysidopsis bahia (mysid shrimp)		0.540+/-0.385	0.405+/-0.417	EMAP Louisiana Province 1991
0.055	+/-0.007	NE	Apalachee Bay, FL	COA	10-d	Not significantly toxic (3.3+/-3.25% mortality)	Ampelisca abdita (amphipod)		0.643+/-0.455	0.390+/-0.410	EMAP Louisiana Province 1991
0.062	+/-0.026	NC	Chandeleur Sound, LA	COA	10-d	Significantly toxic (11.5+/-4.86% mortality)	Ampelisca abdita (amphipod)		0.811+/-0.711	1.87+/-0.973	EMAP Louisiana Province 1991
0.065	+/-0.025	NE	Chandeleur Sound, LA	COA		Not significantly toxic (1.03+/-2.05% mortality)	Mysidopsis bahia (mysid shrimp)		0.824+/-0.915	1.69+/-0.920	EMAP Louisiana Province 1991
0.072	+/-0.033	SG	Chandeleur Sound, LA	COA		Significantly toxic (7.6+/-1.32% mortality)	Mysidopsis bahia (mysid shrimp)		0.624+/-0.197	2.07+/-1.19	EMAP Louisiana Province 1991
0.083	+/-0.032	NE	Chandeleur Sound, LA	COA	10-d	Not significantly toxic (2.87+/-4.05% mortality)	Ampelisca abdita (amphipod)		0.517+/-0.166	2.02+/-1.38	EMAP Louisiana Province 1991
0.115	+/-0.092	NC	Mississippi Sound, MS	COA	10-d	Significantly toxic (11.6+/-3.39% mortality)	Ampelisca abdita (amphipod)		0.111+/-0.045	0.03	EMAP Louisiana Province 1991
0.235	+/-0.086	NE	Galveston Bay, TX	COA		High abundance (154+/-30.2 N/0.00203 sq.m.)	Benthic invertebrates		0.47+/-0.27	9.07+/-2.94	Carr 1992
0.44	+/-0.339	NE	Galveston Bay, TX	COA		High abundance (155+/-49.5 N/0.00203 sq.m.)	Oligochaeta		1.2+/-1.27	4.27+/-3.85	Carr 1992
0.535	+/-0.7	NC	Mobile Bay, AL	COA	10-d	Significantly toxic (46+/-49.3% mortality)	Ampelisca abdita (amphipod)		0.22+/-0.298	3.84+/-5.43	EMAP Louisiana Province 1991
0.7	+/-0.448	NC	Mississippi Sound, MS	COA		Significantly toxic (12.2+/-4.42% mortality)	Mysidopsis bahia (mysid shrimp)		0.939+/-0.335	2.63+/-2.3	EMAP Louisiana Province 1991
0.777	+/-0.806	NE	Mississippi Sound, MS	COA		Not significantly toxic (0.789+/-1.59% mortality)	Mysidopsis bahia (mysid shrimp)		0.827+/-0.757	1.46+/-1.58	EMAP Louisiana Province 1991
0.83	+/-0.313	NE	Galveston Bay, TX	COA		High abundance (27.3+/-10 N/0.00203 sq.m.)	Mollusca		1.64+/-0.4	1.39+/-0.17	Carr 1992
0.869	+/-0.696	NE	Mississippi Sound, MS	COA	10-d	Not significantly toxic (1.4+/-1.73% mortality)	Ampelisca abdita (amphipod)		0.998+/-0.602	2.01+/-1.82	EMAP Louisiana Province 1991
1.08	+/-0.72	NE	Puget Sound, WA	COA	15-min	Not significantly toxic (EC50; 0.283+/-0.168% extract)	Microtox (Photobacterium phosphoreum)		1.39+/-0.37		Pastorok & Becker 1990
1.19	+/-0.16	NE	Mobile Bay, AL	COA		Not significantly toxic (1.07+/-1.85% mortality)	Mysidopsis bahia (mysid shrimp)		0.968+/-0.815	8.23+/-3.4	EMAP Louisiana Province 1991
1.27	+/-0.113	NE	Mobile Bay, AL	COA	10-d	Not significantly toxic (0.5+/-0.778% mortality)	Ampelisca abdita (amphipod)		1.24+/-0.948	8.51+/-4.76	EMAP Louisiana Province 1991
1.35	+/-1.72	NE	Mississippi River, MS, LA	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		1.3+/-0.83	1.14+/-1	EMAP Louisiana Province 1991
1.48	+/-1.9	NC	Mississippi River, MS, LA	COA	10-d	Significantly toxic (15.9+/-6.65% mortality)	Ampelisca abdita (amphipod)		1.22+/-0.717	0.235+/-0.276	EMAP Louisiana Province 1991
1.7	+/-1.55	*	Galveston Bay, TX	COA		Moderate abundance (58.3+/-16.2 N/0.00203 sq.m.)	Oligochaeta		0.632+/-0.274	7.93+/-5.6	Carr 1992
1.75	+/-1.86	NE	Galveston Bay, TX	COA		High species richness (24.5+/-3.7 S/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
1.75	+/-1.86	NE	Galveston Bay, TX	COA		High abundance (359+/-92.8 N/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
1.87	+/-0.983	NE	Mississippi River, MS, LA	COA	10-d	Not significantly toxic (7.8+/-1.63% mortality)	Ampelisca abdita (amphipod)		1.15+/-1.04	2.31+/-0.651	EMAP Louisiana Province 1991
1.92	+/-2.55	NE	Galveston Bay, TX	COA		High abundance (16.2+/-6.19 N/0.00203 sq.m.)	Copepoda		0.844+/-0.524	4.73+/-3.1	Carr 1992
1.99	+/-2.03	NE	Matagorda Bay, TX	COA		Not significantly toxic (1.58+/-1.82% mortality)	Mysidopsis bahia (mysid shrimp)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
1.99	+/-2.03	NE	Matagorda Bay, TX	COA	10-d	Not significantly toxic (2.33+/-4.65% mortality)	Ampelisca abdita (amphipod)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
2	+/-1.17	SG	Mississippi River, MS, LA	COA		Significantly toxic (32.9+/-36.4% mortality)	Mysidopsis bahia (mysid shrimp)		1.07+/-0.924	1.41+/-1.93	EMAP Louisiana Province 1991
2.26	+/-2.18	NE	Galveston Bay, TX	COA		High abundance (156+/-22.9 N/0.00203 sq.m.)	Polychaeta		0.916+/-0.661	2.94+/-2.3	Carr 1992
2.45	+/-4.94	NE	Galveston Bay, TX	COA		Low species (11.2+/-1.94 S/0.00203 sq.m.)	Benthic species		0.642+/-0.356	13.4+/-8.65	Carr 1992
2.61	+/-3.09	NC	Galveston Bay, TX	COA		Low abundance (0.3+/-0.651 N/0.00203 sq.m.)	Amphipoda		0.859+/-0.487	7.67+/-8.12	Carr 1992
2.95		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (0.33+/-0.516% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
2.95		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (2.33+/-1.03% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
2.95		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (15.3+/-11.0% mortality)	Hyalella azteca (amphipod)	JUV	0.648+/-0.641	1.74+/-1.39	Hall et al. 1992
2.95		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1% mortality)	Streblospio benedicti (polychaete worm)		1.38	3.25	Hall et al. 1992
2.95		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (16.5+/-9.19% mortality)	Streblospio benedicti (polychaete worm)		0.783+/-0.845	4.83+/-2.23	Hall et al. 1992
2.95		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.367+/-0.085 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
2.95		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.0005 mg/day growth)	Streblospio benedicti (polychaete worm)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
2.95		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.003+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.316+/-0.120	2.13+/-2.46	Hall et al. 1992

Table 12. A summary of the available data on the biological effects associated with sediment-sorbed ACENAPHTHYLENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Acenaphthylene Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
2.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (7.2+/-1.92% mortality)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
2.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.6+/-0.55% reburial)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
2.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
2.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
2.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.001+/-0.001 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.555+/-0.471	2.68+/-2.3	Hall et al. 1992
2.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1.83+/-1.6% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
2.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (3.5+/-1.87% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
2.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (9.25+/-5.32% mortality)	Lepidactylus dytiscus (amphipod)		0.638+/-0.768	1.65+/-1.62	Hall et al. 1992
2.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (22.3+/-7.37% mortality)	Hyalella azteca (amphipod)	JUV	0.788+/-0.866	2.04+/-1.75	Hall et al. 1992
2.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (8.8+/-7.12% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
2.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (14+/-9.22% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
2.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.1+/-0.865% reburial)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
2.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<20% emergence)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
2.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
2.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (-0.057+/-0.04 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
2.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.001mg/day growth)	Streblospio benedicti (polychaete worm)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
2.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.016 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
2.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.005+/-0.0004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
2.95	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (55.0+/-22.6% mortality)	Hyalella azteca (amphipod)	JUV	0.338+/-0.133	2.9+/-3.11	Hall et al. 1992
2.95	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29.8+/-11.1% mortality)	Streblospio benedicti (polychaete worm)		0.316+/-0.12	2.13+/-2.46	Hall et al. 1992
2.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (55.0+/-19.5% mortality)	Streblospio benedicti (polychaete worm)		0.349+/-0.11	1.07+/-0.66	Hall et al. 1992
2.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.003 mg/day growth)	Lepidactylus dytiscus (amphipod)		1.38	3.25	Hall et al. 1992
2.95	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29% mortality)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
2.95	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (89.7% reburial)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
2.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
2.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	6.41	Hall et al. 1992
2.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
2.95	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (45.5+/-12% mortality)	Lepidactylus dytiscus (amphipod)		0.383+/-0.279	3.61+/-2.79	Hall et al. 1992
2.95	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (63.0+/-24.3% mortality)	Hyalella azteca (amphipod)	JUV	0.317+/-0.228	2.57+/-2.67	Hall et al. 1992
2.95	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (22% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
2.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (28% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
2.95	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (82.9% reburial)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
2.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>20% emergence)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
2.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	5.58	Hall et al. 1992
2.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.008+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.4	Hall et al. 1992
2.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.003 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
3.34 +/-3.96	NC	Galveston Bay, TX	COA	1-h	Toxic (20.4+/-18.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	1.26+/-0.47	14.6+/-10.1	Carr 1992
3.59 +/-4.04	NC	Galveston Bay, TX	COA	48-h	Toxic (4.65+/-16.1% normal development)	Arbacia punctulata (sea urchin)	EMB	1.06+/-0.449	14.5+/-9.2	Carr 1992
3.83 +/-4.71	NE	Galveston Bay, TX	COA	10-d	Not significantly toxic (1.35+/-1.45% mortality)	Ampelisca abdita (amphipod)		0.961+/-0.537	1.17+/-0.640	EMAP Louisiana Province 1991
3.99 +/-9.68	NE	Galveston Bay, TX	COA	1-h	Not toxic (92.5+/-6.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	0.77+/-0.448	6.37+/-6.58	Carr 1992

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Acenaphthylene Std Dev		Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
4.03	+/-10.8	NE	Galveston Bay, TX	COA	48-h	Not toxic (98.1+/-1.79% normal development)	Arbacia punctulata (sea urchin)	EMB	.748+/-0.476	4.16+/-3.45	Carr 1992
4.14	+/-5.72	NC	Galveston Bay, TX	COA		Significantly toxic (13.4+/-9.11% mortality)	Mysidopsis bahia (mysid shrimp)		0.778+/-0.482	1.21+/-0.778	EMAP Louisiana Province 1991
4.41	+/-9.73	*	Galveston Bay, TX	COA		Low species richness (10+/-3.73 S/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
4.41	+/-9.73	*	Galveston Bay, TX	COA		Low abundance (89+/-60.7 N/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
4.41	+/-9.55	*	Galveston Bay, TX	COA		Low abundance (1.86+/-2.59 N/0.00203 sq.m.)	Mollusca		0.784+/-0.421	8.29+/-8.13	Carr 1992
4.68	+/-10.5	*	Galveston Bay, TX	COA		Low abundance (41.7+/-21.8 N/0.00203 sq.m.)	Polychaeta		0.848+/-0.427	9.21+/-8.61	Carr 1992
4.97	+/-10.4	*	Galveston Bay, TX	COA		Low abundance (4.21+/-5.66 N/0.00203 sq.m.)	Oligochaeta		0.895+/-0.453	7.85+/-8.8	Carr 1992
5		NC	Puget Sound, WA	COA	2-d	Significantly toxic (3.8% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.5		Pastorok & Becker 1990
5		NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (5.2+/-3.5% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
5		NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (3% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
5		NE	Halifax Harbour, NS	COA	20-d	Not significantly toxic (1+/-2% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
5		NE	Sidney Tar Pond, NS	COA	10-d	Not significantly toxic (4% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
5		NE	Sidney Tar Pond, NS	COA	10-d	Not significantly toxic (3% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
5		NE	Sidney Tar Pond, NS	COA	20-d	Not significantly toxic (8+/-5.66% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
5.55	+/-11.6	*	Galveston Bay, TX	COA		Low abundance (2.05+/-1.58 N/0.00203 sq.m.)	Copepoda		0.879+/-0.47	9.63+/-9.65	Carr 1992
5.87			***TEL***								
6.2	+/-5.59	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (5.8+/-3.7% mortality)	Rhepoxynius abronius (amphipod)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
6.2	+/-5.59	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (3.4+/-1.82% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
6.2	+/-5.59	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (11.2+/-3.7% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
6.2	+/-5.59	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (3.52+/-1.66% mortality)	Macoma nasuta (clam)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
6.89	+/-7.93	*	Galveston Bay, TX	COA		Low abundance (53+/-33.9 N/0.00203 sq.m.)	Benthic invertebrates		0.985+/-0.247	22+/-11.2	Carr 1992
7.25	+/-8.22	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (13.8+/-4.09% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.47+/-0.306		Pastorok & Becker 1990
7.52	+/-10.5	NE	Galveston Bay, TX	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		0.934+/-0.657	0.457+/-0.530	EMAP Louisiana Province 1991
8.4	+/-10.1	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (6.67+/-8.07% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.51+/-0.330		Pastorok & Becker 1990
9.83	+/-13.8	*	Galveston Bay, TX	COA	10-d	Significantly toxic (15.8+/-3.89% mortality)	Ampelisca abdita (amphipod)		0.647+/-0.606	0.160+/-0.184	EMAP Louisiana Province 1991
20		*	Eagle Harbor, WA	COA	4-d	LC50	Rhepoxynius abronius (amphipod)	ADT			Swartz et al. 1989
21	+/-31	NE	Puget Sound, WA	COA	20-d	Not significantly toxic (5+/-3.86% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.46+/-0.26		Pastorok & Becker 1990
21.4	+/-43.4	NE	Oahu, Hawaii	COA	10-d	Not significantly toxic (7.2+/-1.89% mortality)	Eohaustorius estuarius (amphipod)	ADT	1.93+/-1.94	10.3+/-12.4	Lamberson et al. 1993
21.4	+/-43.4	NE	Oahu, Hawaii	COA	10-d	Not significantly toxic (10.1+/-4.01% mortality)	Corophium acherusicum (amphipod)	ADT	1.93+/-1.94	10.3+/-12.4	Lamberson et al. 1993
26	+/-35.9	NE	Galveston Bay, TX	COA		High Abundance (6+/-1.41 N/0.00203 sq.m.)	Amphipoda		0.955+/-0.629	7.21+/-8.2	Carr 1992
26.7	+/-35.4	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (4.43+/-2.1% mortality)	Panope generosa (geoduck)	JUV	1.51+/-0.261		Pastorok & Becker 1990
36.8	+/-13.5	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.5+/-11.4% mortality)	Mulinia lateralis (bivalve)	LAR	2.33+/-0.364	26.8+/-9.42	Bricker et al. 1993
37		*	Puget Sound, WA	AETA	10-d	1986 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT	1		Bellar et al. 1986
>37		-	Puget Sound, WA	AETA	15-min	1986 Puget Sound AET	Microtox (Photobacterium phosphoreum)		1		Bellar et al. 1986
>37		-	Puget Sound, WA	AETA	48-h	1986 Puget Sound AET	Crassostrea gigas (oyster)	LAR	1		Bellar et al. 1986
41.3	+/-14.5	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (39.5+/-18.2% mortality)	Ampelisca abidta (amphipod)	SUB ADT	2.06+/-0.523	20.1+/-13.9	Bricker et al. 1993
43		*	Puget Sound, WA	AETA		1986 Puget Sound AET	Benthic species		1		Bellar et al. 1986
43.4	+/-17	NC	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.014+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.51+/-0.45	29.6+/-15.7	Bricker et al. 1993
43.9	+/-12.7	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-7.99% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.14+/-0.352	6.09+/-5.38	Bricker et al. 1993
44		*	California	AETA		California AET Values	Benthic species				Becker et al. 1990

Table 12. A summary of the available data on the biological effects associated with sediment-sorbed ACENAPHTHYLENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Acenaphthylene Std Dev		Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
44		*	Southern California	AETA		Southern California AET Values	Benthic species				Becker et al. 1990
44.4	+/-14.1	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.3+/-2.22% normal development)	Mulinia lateralis (bivalve)	LAR	2.18+/-0.531	19.1+/-12.5	Bricker et al. 1993
45.8	+/-19.2	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (19.3+/-5.86% mortality)	Ampelisca abidta (amphipod)	SUB ADT	1.82+/-0.225	6.3+/-6.2	Bricker et al. 1993
47.4		*	United States	SLCA		National Screening Level Concentration-Marine	Benthic species		1		Neff et al. 1987
50.4	+/-13.5	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.061+/-0.038 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.8+/-0.477	8.52+/-10.7	Bricker et al. 1993
50.9	+/-14.9	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (15.2+/-9.21% mortality)	Mulinia lateralis (bivalve)	LAR	2.17+/-0.663	18.4+/-19.9	Bricker et al. 1993
57.6	+/-26.2	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (96+/-1.66% normal development)	Mulinia lateralis (bivalve)	LAR	2.52+/-0.997	35+/-42.9	Bricker et al. 1993
60		NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (18% mortality)	Ampelisca abdita (amphipod)		0.028	9 ug/g	Windom In Prep
60		NE	Burrard Inlet, BC	SQO		Sediment Quality Objectives	Aquatic biota				Swain & Nijman 1991
60		NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (0% mortality)	Arbacia punctulata (sea urchin)		0.03	19 ug/g	Windom In Prep
64		NE	Puget Sound, WA	AETA		PSDDA Screening level concentration	Aquatic biota				USACOE 1988
64.7	+/-18.4	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.125+/-0.084 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.25+/-0.468	1.98+/-2.25	Bricker et al. 1993
67.3	+/-20.1	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (25.9+/-5.01% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.21+/-0.444	2.41+/-2.32	Bricker et al. 1993
67.5	+/-2.89	NE	Brunswick Harbor Entrance, GA	COA	48-h	Not significantly toxic (86.6+/-4.25% normal development)	Arbacia punctulata (sea urchin)		0.181+/-0.162	182+/-208 ug/g	Windom In Prep
68.3	+/-2.89	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (28.3+/-6.11% mortality)	Mysidopsis bahia (mysid)		0.246+/-0.051	127+/-24 ug/g	Windom In Prep
70	+/-9.57	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (91.3+/-2.91% normal development)	Arbacia punctulata (sea urchin)		0.299+/-0.251	114+/-68.4 ug/g	Windom In Prep
70.6	+/-10.4	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (9.78+/-5.33% mortality)	Mysidopsis bahia (mysid)		0.24+/-0.247	91.9+/-73.4 ug/g	Windom In Prep
70.6	+/-11.2	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (4+/-2.83% mortality)	Menidia beryllina (silverside)		0.243+/-0.264	90.5+/-78.4 ug/g	Windom In Prep
71.4	+/-56.2	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.096+/-0.101 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.37+/-0.759	6.93+/-6.83	Bricker et al. 1993
71.7	+/-12.9	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (27.5+/-10.6% mortality)	Mysidopsis bahia (mysid)		0.237+/-0.311	74.6+/-85.5 ug/g	Windom In Prep
71.7	+/-9.31	SG	Savannah River Entrance Channel, GA	COA	48-h	Significantly toxic (25.4+/-7.66% mortality)	Arbacia punctulata (sea urchin)		0.344+/-0.242	129.5+/-59.3 ug/g	Windom In Prep
71.9	+/-10.3	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (11.6+/-4.33% mortality)	Ampelisca abdita (amphipod)		0.267+/-0.25	102+/-71.1 ug/g	Windom In Prep
72.7	+/-57.7	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.074+/-0.043 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.27+/-0.626	6.21+/-5.41	Bricker et al. 1993
73.5	+/-48.8	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (12.3+/-14.5% mortality)	Mulinia lateralis (bivalve)	LAR	1.53+/-0.743	15.7+/-23.2	Bricker et al. 1993
75	+/-58.2	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99.3+/-0.827% normal development)	Mulinia lateralis (bivalve)	LAR	1.43+/-0.738	14.7+/-24	Bricker et al. 1993
77.7	+/-166	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (2.09+/-1.73% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.56+/-0.329		Pastorok & Becker 1990
78.4	+/-158	NE	Commencement Bay, WA	COA	48-h	Least toxic (15.1+/-3.1% abnormality)	Oyster	LAR			Tetra Tech 1985
78.7	+/-72.2	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.167+/-0.198 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.59+/-1.09	4.67+/-6.99	Bricker et al. 1993
80		NE	Tampa Bay, FL	COA	10-d	Not significantly toxic (14.6+/-7.67% mortality)	Ampelisca abdita (amphipod)	SUBADT	1.63+/-0.596		Long 1993
80		NE	Tampa Bay, FL	COA	1-h	Least toxic (79.4+/-9.9% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.45+/-0.587		Long 1993
80		NG	Tampa Bay, FL	COA	1-h	Moderately toxic (15.3+/-10.6% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.94+/-0.908		Long 1993
80	+/-10	NE	Tampa Bay, FL	COA		Not significantly toxic (EC50; 0.066+/-0.033 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.89+/-0.902		Long 1993
80	+/-164	*	Puget Sound, WA	COA	15-min	Significantly toxic (EC50; 0.065+/-0.043% extract)	Microtox (Photobacterium phosphoreum)		1.58+/-0.255		Pastorok & Becker 1990
82.1	+/-53.8	NC	Commencement Bay, WA	COA	10-d	Moderately toxic (26+/-5.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
87.4	+/-62.6	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (6.48+/-10.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
87.4	+/-62.6	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99+/-0.862% normal development)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
89	+/-60.9	*	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (30.5+/-16.4% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.62+/-0.777	17.7+/-26.3	Bricker et al. 1993
90.6	+/-24.3	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (10.6+/-3.17% mortality)	Ampelisca abdita (amphipod)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
90.6	+/-24.3	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (8.00+/-2.92% mortality)	Mysidopsis bahia (mysid)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
92.9	+/-25.6	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (5.43+/-3.21% mortality)	Mysidopsis bahia (mysid)		1.21+/-1.13	9096+/-13378 ug/g	Windom In Prep

Table 12. A summary of the available data on the biological effects associated with sediment-sorbed ACENAPHTHYLENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Acenaphthylene Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
92.9 +/-25.6	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (9.61+/-2.7% mortality)	Menidia beryllina (silverside)		1.22+/-1.13	9172+/-13363 ug/g	Windom In Prep
99.3 +/-58.5	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (91.5+/-7.28% normal development)	Mulinia lateralis (bivalve)	LAR	2.6+/-0.899	36.8+/-34.9	Bricker et al. 1993
100	SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (16% mortality)	Mysidopsis bahia (mysid)		1.8	7095 ug/g	Windom In Prep
100	SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (22.3% mortality)	Menidia beryllina (silverside)		1.71	6562 ug/g	Windom In Prep
100 +/-63.3	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.016+/-0.007 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.26+/-0.936	43.4+/-35.6	Bricker et al. 1993
101 +/-187	*	Puget Sound, WA	COA	2-d	Significantly toxic (60.4+/-46.5% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.57+/-0.287		Pastorok & Becker 1990
102 +/-135	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-6.07% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.71+/-0.9	15.3+/-23.2	Bricker et al. 1993
102 +/-116	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (17+/-16.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.99+/-1	21.6+/-24.5	Bricker et al. 1993
109 +/-14.7	SG	Brunswick Harbor Entrance, GA	COA	48-h	Significantly toxic (14.6+/-18.9% normal development)	Arbacia punctulata (sea urchin)		1.99+/-0.562	14009+/-13434 ug/g	Windom In Prep
110 +/-160	NE	Commencement Bay, WA	COA	10-d	Least toxic (12.5+/-4.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
112 +/-131	SG	Commencement Bay, WA	COA	48-h	Moderately toxic (23+/-2.3% abnormality)	Oyster	LAR			Tetra Tech 1985
120	NE	Elizabeth River, VA	COA	96-h	Not significantly toxic (4.5+/-3.24% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
120	NE	Elizabeth River, VA	COA	96-h	No significant change in respiration rate	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
122 +/-148	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.1+/-2.78% normal development)	Mulinia lateralis (bivalve)	LAR	2.12+/-1.04	22.9+/-23.7	Bricker et al. 1993
127 +/-92.9	NE	Burrard Inlet, BC	COA	10-d	Not toxic (4.5+/-3.02% emergence)	Rhepoxynius abronius (amphipod)	ADT	2.66+/-2.15		McLeay et al. 1991
127 +/-92.9	NE	Burrard Inlet, BC	COA	10-d	Not toxic (5.21+/-3.61% emergence)	Corophium volutator (amphipod)	ADT	3.18+/-2.1		McLeay et al. 1991
127 +/-60	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (88.5+/-8.39% normal development)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.05	38.1+/-38.9	Bricker et al. 1993
128		***PEL***								
129 +/-2750	SG	Commencement Bay, WA	COA	48-h	Highly toxic (44.5+/-19% abnormality)	Oyster	LAR			Tetra Tech 1985
131 +/-131	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (6.8+/-7.31% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
131 +/-131	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (8.5+/-6.06% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
131 +/-131	NE	Halifax Harbour, NS	COA	20-d	Not significantly toxic (0.7+/-1.63% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
132 +/-152	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (34.9+/-15.7% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.23+/-1.04	25.4+/-25.5	Bricker et al. 1993
139 +/-114	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (51.3+/-6.95% mortality)	Mulinia lateralis (bivalve)	LAR	1.8+/-1.71	29.6+/-46.3	Bricker et al. 1993
150 +/-219	*	Puget Sound, WA	COA	10-d	Significantly toxic (80.8+/-30.6% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.266		Pastorok & Becker 1990
158 +/-127	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (21.5+/-6.36% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.35+/-1.05	10.5+/-13.4	Bricker et al. 1993
159 +/-176	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.013+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.79+/-0.744	37.6+/-25.3	Bricker et al. 1993
>160	-	California	AETA	10-d	California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
>160	-	Southern California	AETA	10-d	Southern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
167 +/-115	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.008+/-0.001 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.19+/-1.27	12+/-11.3	Bricker et al. 1993
168 +/-186	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (29.8+/-13.9% mortality)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.07	32.1+/-28.4	Bricker et al. 1993
179 +/-201	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.1+/-13.3% mortality)	Mulinia lateralis (bivalve)	LAR	2.68+/-0.955	31.8+/-24.4	Bricker et al. 1993
194 +/-184	*	Tampa Bay, FL	COA	1-h	Most toxic (0.091+/-0.187% fertilization)	Arbacia punctulata (sea urchin)	GAM	2.96+/-1.49		Long 1993
195 +/-158	SG	Commencement Bay, WA	COA	10-d	Highly toxic (78.5+/-19.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
207 +/-209	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (38+/-13% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.92+/-0.937	34.6+/-23.9	Bricker et al. 1993
211 +/-207	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (96.6+/-3.79% normal development)	Mulinia lateralis (bivalve)	LAR	2.87+/-0.94	35.1+/-25.9	Bricker et al. 1993
236 +/-202	*	Tampa Bay, FL	COA	10-d	Significantly toxic (35.2+/-17.5% mortality)	Ampelisca abdita (amphipod)	SUBADT	3.53+/-1.35		Long 1993
237 +/-308	*	Puget Sound, WA	COA	20-d	Significantly toxic (37.3+/-22% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.87+/-0.208		Pastorok & Becker 1990
250 +/-210	*	Tampa Bay, FL	COA		Significantly toxic (EC50; 0.017+/-0.012 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.47+/-1.49		Long 1993
253 +/-220	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.011+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.28+/-0.363	45.3+/-21.4	Bricker et al. 1993

Table 12. A summary of the available data on the biological effects associated with sediment-sorbed ACENAPHTHYLENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Acenaphthylene Std Dev		Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
253	+/-262	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (23+/-4.24% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.46+/-1.22	40+/-55.1	Bricker et al. 1993
297	+/-236	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (75.1+/-10.6% mortality)	Mulinia lateralis (bivalve)	LAR	3.32+/-0.317	42.3+/-19.2	Bricker et al. 1993
470	+/-691	NE	Burrard Inlet, BC	COA	10-d	Not toxic (8.9+/-2.99% mortality)	Corophium volutator (amphipod)	ADT	2.8+/-1.96		McLeay et al. 1991
470	+/-691	NE	Burrard Inlet, BC	COA	10-d	Not toxic (97.2+/-2.84% reburial)	Rhepoxynius abronius (amphipod)	ADT	2.8+/-1.96		McLeay et al. 1991
548	+/-870	*	Elizabeth River, VA	COA	96-h	Significant decrease in respiration rates	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
>560		-	Puget Sound, WA	AETA	15-min	1988 Puget Sound AET	Microtox (Photobacterium phosphoreum)				PTI 1988
>560		-	Puget Sound, WA	AETA	48-h	1988 Puget Sound AET	Crassostrea gigas (oyster)	LAR			PTI 1988
590		*	Puget Sound, WA	COA	10-d	Significantly toxic (56% mortality)	Panope generosa (geoduck)	JUV	2.1		Pastorok & Becker 1990
610	+/-773	NE	Burrard Inlet, BC	COA	10-d	Not toxic (7.9+/-5.12% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.64+/-2.14		McLeay et al. 1991
640		*	Puget Sound, WA	AETA		PSDDA Maximum Level Criteria	Aquatic biota				USACOE 1988
660		*	Puget Sound, WA	SQG		Chemical Criteria	Benthic community		1		WDE 1989
1060	+/-1420	*	Elizabeth River, VA	COA	96-h	Significantly toxic (50.7+/-39% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
1300		*	Puget Sound, WA	AETA		1988 Puget Sound AET	Benthic community				PTI 1988
1300		*	Puget Sound, WA	AETA	10-d	1988 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT			PTI 1988
1500		*	Burrard Inlet, BC	COA	10-d	Highly toxic (23% emergence)	Corophium volutator (amphipod)	ADT	3.5		McLeay et al. 1991
1500		*	Burrard Inlet, BC	COA	10-d	Highly toxic (30.5% emergence)	Rhepoxynius abronius (amphipod)	ADT	3.5		McLeay et al. 1991
6000		*	United States	EqPA		Chronic Marine EqP Threshold	Aquatic biota		1		Bolton et al. 1985

Table 13. A summary of the available data on the biological effects associated with sediment-sorbed ANTHRACENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Anthracene Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.03	NC	Mobile Bay, AL	COA		Significantly toxic (10% mortality)	Mysidopsis bahia (mysid shrimp)		0.009	0.004	EMAP Louisiana Province 1991
0.065 +/-0.007	NG	Apalachee Bay, FL	COA	10-d	Significantly toxic (15.6% mortality)	Ampelisca abdita (amphipod)		0.438+/-0.442	0.421+/-0.593	EMAP Louisiana Province 1991
0.065 +/-0.013	NE	Apalachee Bay, FL	COA		Not significantly toxic (0.75+/-1.5% mortality)	Mysidopsis bahia (mysid shrimp)		0.540+/-0.385	0.405+/-0.417	EMAP Louisiana Province 1991
0.065 +/-0.021	NE	Apalachee Bay, FL	COA	10-d	Not significantly toxic (3.3+/-3.25% mortality)	Ampelisca abdita (amphipod)		0.643+/-0.455	0.390+/-0.410	EMAP Louisiana Province 1991
0.095 +/-0.073	NE	Chandeleur Sound, LA	COA		Not significantly toxic (1.03+/-2.05% mortality)	Mysidopsis bahia (mysid shrimp)		0.824+/-0.915	1.69+/-0.920	EMAP Louisiana Province 1991
0.115 +/-0.065	NC	Chandeleur Sound, LA	COA	10-d	Significantly toxic (11.5+/-4.86% mortality)	Ampelisca abdita (amphipod)		0.811+/-0.711	1.87+/-0.973	EMAP Louisiana Province 1991
0.16 +/-0.68	SG	Chandeleur Sound, LA	COA		Significantly toxic (7.6+/-1.32% mortality)	Mysidopsis bahia (mysid shrimp)		0.624+/-0.197	2.07+/-1.19	EMAP Louisiana Province 1991
0.163 +/-0.096	NE	Chandeleur Sound, LA	COA	10-d	Not significantly toxic (2.87+/-4.05% mortality)	Ampelisca abdita (amphipod)		0.517+/-0.166	2.02+/-1.38	EMAP Louisiana Province 1991
0.35 +/-0.453	NC	Mississippi Sound, MS	COA	10-d	Significantly toxic (11.6+/-3.39% mortality)	Ampelisca abdita (amphipod)		0.111+/-0.045	0.03	EMAP Louisiana Province 1991
0.57 +/-0.113	NE	Galveston Bay, TX	COA		High abundance (155+/-49.5 N/0.00203 sq.m.)	Oligochaeta		1.2+/-1.27	4.27+/-3.85	Carr 1992
0.77 +/-0.365	NE	Galveston Bay, TX	COA		High abundance (27.3+/-10 N/0.00203 sq.m.)	Mollusca		1.64+/-0.4	1.39+/-0.17	Carr 1992
1.12 +/-0.765	NE	Galveston Bay, TX	COA		High abundance (359+/-92.8 N/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
1.12 +/-0.77	NE	Galveston Bay, TX	COA		High species richness (24.5+/-3.7 S/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
1.31 +/-0.752	NE	Matagorda Bay, TX	COA		Not significantly toxic (1.58+/-1.82% mortality)	Mysidopsis bahia (mysid shrimp)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
1.31 +/-0.752	NE	Matagorda Bay, TX	COA	10-d	Not significantly toxic (2.33+/-4.65% mortality)	Ampelisca abdita (amphipod)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
1.54 +/-0.919	NC	Mississippi Sound, MS	COA		Significantly toxic (12.2+/-4.42% mortality)	Mysidopsis bahia (mysid shrimp)		0.939+/-0.335	2.63+/-2.3	EMAP Louisiana Province 1991
1.57 +/-2.18	NC	Mobile Bay, AL	COA	10-d	Significantly toxic (46+/-49.3% mortality)	Ampelisca abdita (amphipod)		0.22+/-0.298	3.84+/-5.43	EMAP Louisiana Province 1991
1.73 +/-0.974	NE	Galveston Bay, TX	COA		High abundance (156+/-22.9 N/0.00203 sq.m.)	Polychaeta		0.916+/-0.661	2.94+/-2.3	Carr 1992
1.76 +/-1.75	NE	Mississippi Sound, MS	COA		Not significantly toxic (0.789+/-1.59% mortality)	Mysidopsis bahia (mysid shrimp)		0.827+/-0.757	1.46+/-1.58	EMAP Louisiana Province 1991
1.94 +/-1.5	NE	Mississippi Sound, MS	COA	10-d	Not significantly toxic (1.4+/-1.73% mortality)	Ampelisca abdita (amphipod)		0.998+/-0.602	2.01+/-1.82	EMAP Louisiana Province 1991
2.04 +/-2.30	NE	Galveston Bay, TX	COA		High abundance (16.2+/-6.19 N/0.00203 sq.m.)	Copepoda		0.844+/-0.524	4.73+/-3.1	Carr 1992
2.69 +/-4.34	NE	Galveston Bay, TX	COA	48-h	Not toxic (98.1+/-1.79% normal development)	Arbacia punctulata (sea urchin)	EMB	.748+/-0.476	4.16+/-3.45	Carr 1992
2.92 +/-0.834	NE	Mobile Bay, AL	COA	10-d	Not significantly toxic (0.5+/-0.778% mortality)	Ampelisca abdita (amphipod)		1.24+/-0.948	8.51+/-4.76	EMAP Louisiana Province 1991
2.98 +/-0.6	NE	Mobile Bay, AL	COA		Not significantly toxic (1.07+/-1.85% mortality)	Mysidopsis bahia (mysid shrimp)		0.968+/-0.815	8.23+/-3.4	EMAP Louisiana Province 1991
3.04 +/-3.3	NC	Mississippi River, MS, LA	COA	10-d	Significantly toxic (15.9+/-6.65% mortality)	Ampelisca abdita (amphipod)		1.22+/-0.717	0.235+/-0.276	EMAP Louisiana Province 1991
3.2 +/-3.53	NE	Mississippi River, MS, LA	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		1.3+/-0.83	1.14+/-1	EMAP Louisiana Province 1991
3.67 +/-2.41	SG	Mississippi River, MS, LA	COA		Significantly toxic (32.9+/-36.4% mortality)	Mysidopsis bahia (mysid shrimp)		1.07+/-0.924	1.41+/-1.93	EMAP Louisiana Province 1991
3.83 +/-2.64	NE	Mississippi River, MS, LA	COA	10-d	Not significantly toxic (7.8+/-1.63% mortality)	Ampelisca abdita (amphipod)		1.15+/-1.04	2.31+/-0.651	EMAP Louisiana Province 1991
3.83 +/-6.58	NE	Galveston Bay, TX	COA	1-h	Not toxic (92.5+/-6.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	0.77+/-0.448	6.37+/-6.58	Carr 1992
3.86 +/-5.1	NC	Galveston Bay, TX	COA	10-d	Significantly toxic (15.8+/-3.89% mortality)	Ampelisca abdita (amphipod)		0.647+/-0.606	0.160+/-0.184	EMAP Louisiana Province 1991
4.17 +/-5.75	NC	Galveston Bay, TX	COA		Significantly toxic (13.4+/-9.11% mortality)	Mysidopsis bahia (mysid shrimp)		0.778+/-0.482	1.21+/-0.778	EMAP Louisiana Province 1991
4.33 +/-3.7	NE	Galveston Bay, TX	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		0.934+/-0.657	0.457+/-0.530	EMAP Louisiana Province 1991
4.45 +/-4.73	NE	Galveston Bay, TX	COA	10-d	Not significantly toxic (1.35+/-1.45% mortality)	Ampelisca abdita (amphipod)		0.961+/-0.537	1.17+/-0.640	EMAP Louisiana Province 1991
4.57 +/-7.11	*	Galveston Bay, TX	COA		Low abundance (4.21+/-5.66 N/0.00203 sq.m.)	Oligochaeta		0.895+/-0.453	7.85+/-8.8	Carr 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (0.33+/-0.516% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (2.33+/-1.03% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (15.3+/-11.0% mortality)	Hyalella azteca (amphipod)	JUV	0.648+/-0.641	1.74+/-1.39	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1% mortality)	Streblospio benedicti (polychaete worm)		1.38	3.25	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (16.5+/-9.19% mortality)	Streblospio benedicti (polychaete worm)		0.783+/-0.845	4.83+/-2.23	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.367+/-0.085 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992

Table 13. A summary of the available data on the biological effects associated with sediment-sorbed ANTHRACENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Anthracene Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.0005 mg/day growth)	Streblospio benedicti (polychaete worm)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.003+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.316+/-0.120	2.13+/-2.46	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (7.2+/-1.92% mortality)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.6+/-0.55% reburial)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.001+/-0.001 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.555+/-0.471	2.68+/-2.3	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1.83+/-1.6% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (3.5+/-1.87% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (9.25+/-5.32% mortality)	Lepidactylus dytiscus (amphipod)		0.638+/-0.768	1.65+/-1.62	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (22.3+/-7.37% mortality)	Hyalella azteca (amphipod)	JUV	0.788+/-0.866	2.04+/-1.75	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (8.8+/-7.12% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (14+/-9.22% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.1+/-0.865% reburial)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<20% emergence)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (-0.057+/-0.04 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.001mg/day growth)	Streblospio benedicti (polychaete worm)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.016 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.005+/-0.0004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (55.0+/-22.6% mortality)	Hyalella azteca (amphipod)	JUV	0.338+/-0.133	2.9+/-3.11	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29.8+/-11.1% mortality)	Streblospio benedicti (polychaete worm)		0.316+/-0.12	2.13+/-2.46	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (55.0+/-19.5% mortality)	Streblospio benedicti (polychaete worm)		0.349+/-0.11	1.07+/-0.66	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.003 mg/day growth)	Lepidactylus dytiscus (amphipod)		1.38	3.25	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29% mortality)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (89.7% reburial)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	6.41	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (45.5+/-12% mortality)	Lepidactylus dytiscus (amphipod)		0.383+/-0.279	3.61+/-2.79	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (63.0+/-24.3% mortality)	Hyalella azteca (amphipod)	JUV	0.317+/-0.228	2.57+/-2.67	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (22% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (28% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (82.9% reburial)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>20% emergence)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	5.58	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.008+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.4	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.003 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
5	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (3% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
5	NE	Sidney Tar Pond, NS	COA	10-d	Not significantly toxic (4% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990

Table 13. A summary of the available data on the biological effects associated with sediment-sorbed ANTHRACENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Anthracene	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
5		NE	Sidney Tar Pond, NS	COA	10-d	Not significantly toxic (3% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
5		NE	Sidney Tar Pond, NS	COA	20-d	Not significantly toxic (8+/-5.66% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
5.94	+/-15	NC	Galveston Bay, TX	COA		Low abundance (0.3+/-0.651 N/0.00203 sq.m.)	Amphipoda		0.859+/-0.487	7.67+/-8.12	Carr 1992
6.82	+/-15.5	*	Galveston Bay, TX	COA		Low abundance (1.86+/-2.59 N/0.00203 sq.m.)	Mollusca		0.784+/-0.421	8.29+/-8.13	Carr 1992
6.99	+/-15.7	*	Galveston Bay, TX	COA		Low species richness (10+/-3.73 S/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
6.99	+/-15.7	*	Galveston Bay, TX	COA		Low abundance (89+/-60.7 N/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
7.76	+/-16.9	*	Galveston Bay, TX	COA		Low abundance (41.7+/-21.8 N/0.00203 sq.m.)	Polychaeta		0.848+/-0.427	9.21+/-8.61	Carr 1992
9.14	+/-18.8	*	Galveston Bay, TX	COA		Low abundance (2.05+/-1.58 N/0.00203 sq.m.)	Copepoda		0.879+/-0.47	9.63+/-9.65	Carr 1992
10		NE	Burrard Inlet, BC	SQO		Sediment Quality Objectives	Aquatic biota				Swain & Nijman 1991
11	+/-14.9	NE	Galveston Bay, TX	COA		High Abundance (6+/-1.41 N/0.00203 sq.m.)	Amphipoda		0.955+/-0.629	7.21+/-8.2	Carr 1992
12.5	+/-22.7	*	Galveston Bay, TX	COA	48-h	Toxic (4.65+/-16.1% normal development)	Arbacia punctulata (sea urchin)	EMB	1.06+/-0.449	14.5+/-9.2	Carr 1992
13.3	+/-8.3	NE	Puget Sound, WA	COA	15-min	Not significantly toxic (EC50; 0.283+/-0.168% extract)	Microtox (Photobacterium phosphoreum)		1.39+/-0.37		Pastorok & Becker 1990
13.6	+/-9.71	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (5.8+/-3.7% mortality)	Rhepoxynius abronius (amphipod)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
13.6	+/-9.71	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (3.4+/-1.82% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
13.6	+/-9.71	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (11.2+/-3.7% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
13.6	+/-9.71	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (3.52+/-1.66% mortality)	Macoma nasuta (clam)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
14.9	+/-31.8	*	Galveston Bay, TX	COA		Moderate abundance (58.3+/-16.2 N/0.00203 sq.m.)	Oligochaeta		0.632+/-0.274	7.93+/-5.6	Carr 1992
15.4	+/-7.5	NE	San Francisco Bay, CA	COA	48-h	Least toxic (23.3+/-7.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
16.9	+/-30.9	*	Galveston Bay, TX	COA	1-h	Toxic (20.4+/-18.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	1.26+/-0.47	14.6+/-10.1	Carr 1992
18.2	+/-17.8	NC	Galveston Bay, TX	COA		Low abundance (53+/-33.9 N/0.00203 sq.m.)	Benthic invertebrates		0.985+/-0.247	22+/-11.2	Carr 1992
20	+/-31.4	NE	Galveston Bay, TX	COA		Low species (11.2+/-1.94 S/0.00203 sq.m.)	Benthic species		0.642+/-0.356	13.4+/-8.65	Carr 1992
21	+/-39.3	NE	Galveston Bay, TX	COA		High abundance (154+/-30.2 N/0.00203 sq.m.)	Benthic invertebrates		0.47+/-0.27	9.07+/-2.94	Carr 1992
24		*	San Francisco Bay, CA	AETA	48-h	San Francisco Bay AET	Oyster; mussel	LAR			Long & Morgan 1990
29.1	+/-4.37	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-7.99% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.14+/-0.352	6.09+/-5.38	Bricker et al. 1993
34.3	+/-41.2	NE	San Francisco Bay, CA	COA	48-h	Not significantly toxic (31.9+/-15.5% abnormal)	Bivalve	LAR			Long & Morgan 1990
34.8	+/-49.4	NE	Oahu, Hawaii	COA	10-d	Not significantly toxic (7.2+/-1.89% mortality)	Eohaustorius estuarius (amphipod)	ADT	1.93+/-1.94	10.3+/-12.4	Lamberson et al. 1993
34.8	+/-49.4	NE	Oahu, Hawaii	COA	10-d	Not significantly toxic (10.1+/-4.01% mortality)	Corophium acherusicum (amphipod)	ADT	1.93+/-1.94	10.3+/-12.4	Lamberson et al. 1993
35.9	+/-52.2	NE	Southern California	COA	10-d	Not significantly toxic (23.2% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
36.8	+/-11.5	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.061+/-0.038 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.8+/-0.477	8.52+/-10.7	Bricker et al. 1993
42.5	+/-16.8	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (19.3+/-5.86% mortality)	Ampelisca abidta (amphipod)	SUB ADT	1.82+/-0.225	6.3+/-6.2	Bricker et al. 1993
43	+/-17.3	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (39.5+/-18.2% mortality)	Ampelisca abidta (amphipod)	SUB ADT	2.06+/-0.523	20.1+/-13.9	Bricker et al. 1993
43	+/-26	NE	Jetty Island Pier, Everett Marina, WA	COA	10-d	Not toxic (12.3+/-2.87% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.08+/-0.66		Hart Crowser & Associates Inc. 1986
44.1	+/-14.4	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.3+/-2.22% normal development)	Mulinia lateralis (bivalve)	LAR	2.18+/-0.531	19.1+/-12.5	Bricker et al. 1993
46.1	+/-19.5	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (15.2+/-9.21% mortality)	Mulinia lateralis (bivalve)	LAR	2.17+/-0.663	18.4+/-19.9	Bricker et al. 1993
46.3	+/-18.5	NG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.5+/-11.4% mortality)	Mulinia lateralis (bivalve)	LAR	2.33+/-0.364	26.8+/-9.42	Bricker et al. 1993
46.9			***TEL***								
50	+/-14.2	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.125+/-0.084 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.25+/-0.468	1.98+/-2.25	Bricker et al. 1993
51.3	+/-24.8	NC	Oakland Harbor, CA	COA	10-d	Significantly toxic (35.3+/-2.5% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.56+/-0.07		Word et al. 1988
52.5	+/-20.2	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.014+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.51+/-0.45	29.6+/-15.7	Bricker et al. 1993
54.7	+/-43.6	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (10.4+/-6.3% mortality)	Nephtys caecoides (polychaete)		1.63+/-0.657		Word et al. 1988

Table 13. A summary of the available data on the biological effects associated with sediment-sorbed ANTHRACENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Anthracene Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
54.7 +/-43.6	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (0.2+/-0.6% mortality)	Macoma nasuta (clam)		1.63+/-0.657		Word et al. 1988
55.4 +/-47.7	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (23.3+/-6.14% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.738		Word et al. 1988
56	NC	Puget Sound, WA	COA	2-d	Significantly toxic (3.8% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.5		Pastorok & Becker 1990
56 +/-130	NE	Narragansett Bay, RI	COA	10-d	Not significantly toxic (5.28+/-3.04% mortality))	Ampelisca abdita (amphipod)	ADT			Munns et al. 1991
59.3 +/-23	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (25.9+/-5.01% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.21+/-0.444	2.41+/-2.32	Bricker et al. 1993
59.7 +/-43.4	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (96+/-1.66% normal development)	Mulinia lateralis (bivalve)	LAR	2.52+/-0.997	35+/-42.9	Bricker et al. 1993
60	*	California	AETA	48-h	California AET Values	Mytilus edulis (bivalve)	LAR			Becker et al. 1990
60	*	Northern California	AETA		Northern California AET Values	Benthic species				Becker et al. 1990
60	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (18% mortality)	Ampelisca abdita (amphipod)		0.028	9 ug/g	Windom In Prep
60	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (0% mortality)	Arbacia punctulata (sea urchin)		0.03	19 ug/g	Windom In Prep
63 +/-72	NC	San Francisco Bay, CA	COA	10-d	Moderately toxic (33.8+/-4.7% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
64	*	Puget Sound, WA	AETA	15-min	1986 Puget Sound AET	Microtox (Photobacterium phosphoreum)		1		Bellar et al. 1986
64	*	Puget Sound, WA	AETA	48-h	1986 Puget Sound AET	Crassostrea gigas (oyster)	LAR	1		Bellar et al. 1986
64	*	Puget Sound, WA	AETA	10-d	1986 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT	1		Bellar et al. 1986
66.4 +/-58.8	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (12.3+/-14.5% mortality)	Mulinia lateralis (bivalve)	LAR	1.53+/-0.743	15.7+/-23.2	Bricker et al. 1993
67 +/-63.4	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.096+/-0.101 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.37+/-0.759	6.93+/-6.83	Bricker et al. 1993
67.5 +/-2.89	NE	Brunswick Harbor Entrance, GA	COA	48-h	Not significantly toxic (86.6+/-4.25% normal development)	Arbacia punctulata (sea urchin)		0.181+/-0.162	182+/-208 ug/g	Windom In Prep
67.5 +/-67.6	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.074+/-0.043 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.27+/-0.626	6.21+/-5.41	Bricker et al. 1993
68.3 +/-2.89	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (28.3+/-6.11% mortality)	Mysidopsis bahia (mysid)		0.246+/-0.051	127+/-24 ug/g	Windom In Prep
68.9 +/-80.3	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.167+/-0.198 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.59+/-1.09	4.67+/-6.99	Bricker et al. 1993
69.5 +/-69.9	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99.3+/-0.827% normal development)	Mulinia lateralis (bivalve)	LAR	1.43+/-0.738	14.7+/-24	Bricker et al. 1993
70	*	Eagle Harbor, WA	COA	4-d	LC50	Rhepoxynius abronius (amphipod)	ADT			Swartz et al. 1989
70 +/-9.57	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (91.3+/-2.91% normal development)	Arbacia punctulata (sea urchin)		0.299+/-0.251	114+/-68.4 ug/g	Windom In Prep
70.6 +/-10.4	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (9.78+/-5.33% mortality)	Mysidopsis bahia (mysid)		0.24+/-0.247	91.9+/-73.4 ug/g	Windom In Prep
70.6 +/-11.2	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (4+/-2.83% mortality)	Menidia beryllina (silverside)		0.243+/-0.264	90.5+/-78.4 ug/g	Windom In Prep
71.7 +/-9.31	SG	Savannah River Entrance Channel, GA	COA	48-h	Significantly toxic (25.4+/-7.66% mortality)	Arbacia punctulata (sea urchin)		0.344+/-0.242	129.5+/-59.3 ug/g	Windom In Prep
71.7 +/-12.9	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (27.5+/-10.6% mortality)	Mysidopsis bahia (mysid)		0.237+/-0.311	74.6+/-85.5 ug/g	Windom In Prep
71.9 +/-10.3	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (11.6+/-4.33% mortality)	Ampelisca abdita (amphipod)		0.267+/-0.25	102+/-71.1 ug/g	Windom In Prep
75 +/-117	NE	Burrard Inlet, BC	COA	10-d	Not toxic (4.5+/-3.02% emergence)	Rhepoxynius abronius (amphipod)	ADT	2.66+/-2.15		McLeay et al. 1991
75 +/-117	NE	Burrard Inlet, BC	COA	10-d	Not toxic (5.21+/-3.61% emergence)	Corophium volutator (amphipod)	ADT	3.18+/-2.1		McLeay et al. 1991
83.9 +/-84.8	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (6.48+/-10.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
83.9 +/-84.8	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99+/-0.862% normal development)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
85 +/-77.8	SG	Jetty Island Pier, Everett Marina, WA	COA	10-d	Toxic (19.5+/-0.707% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.15+/-0.071		Hart Crowser & Associates Inc. 1986
85.3 +/-119	*	San Francisco Bay, CA	COA	48-h	Moderately toxic (59.4+/-11.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
87	*	Puget Sound, WA	AETA		1986 Puget Sound AET	Benthic species		1		Bellar et al. 1986
87.9 +/-74.8	*	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (30.5+/-16.4% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.62+/-0.777	17.7+/-26.3	Bricker et al. 1993
90	NE	Tampa Bay, FL	COA	10-d	Not significantly toxic (14.6+/-7.67% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.63+/-0.596		Long 1993
90	NE	Tampa Bay, FL	COA	1-h	Least toxic (79.4+/-9.9% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.45+/-0.587		Long 1993
90	NE	Tampa Bay, FL	COA		Not significantly toxic (EC50; 0.066+/-0.033 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.89+/-0.902		Long 1993
90	NG	Tampa Bay, FL	COA	1-h	Moderately toxic (15.3+/-10.6% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.94+/-0.908		Long 1993

Table 13. A summary of the available data on the biological effects associated with sediment-sorbed ANTHRACENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Anthracene Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
90.6 +/-24.3	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (10.6+/-3.17% mortality)	Ampelisca abdita (amphipod)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
90.6 +/-24.3	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (8.00+/-2.92% mortality)	Mysidopsis bahia (mysid)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
92.9 +/-25.6	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (5.43+/-3.21% mortality)	Mysidopsis bahia (mysid)		1.21+/-1.13	9096+/-13378 ug/g	Windom In Prep
92.9 +/-25.6	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (9.61+/-2.7% mortality)	Menidia beryllina (silverside)		1.22+/-1.13	9172+/-13363 ug/g	Windom In Prep
98.4 +/-140	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-6.07% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.71+/-0.9	15.3+/-23.2	Bricker et al. 1993
100	SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (16% mortality)	Mysidopsis bahia (mysid)		1.8	7095 ug/g	Windom In Prep
100	SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (22.3% mortality)	Menidia beryllina (silverside)		1.71	6562 ug/g	Windom In Prep
102 +/-124	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (13.8+/-4.09% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.47+/-0.306		Pastorok & Becker 1990
104 +/-124	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (17+/-16.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.99+/-1	21.6+/-24.5	Bricker et al. 1993
109 +/-14.7	SG	Brunswick Harbor Entrance, GA	COA	48-h	Significantly toxic (14.6+/-18.9% normal development)	Arbacia punctulata (sea urchin)		1.99+/-0.562	14009+/-13434 ug/g	Windom In Prep
109 +/-153	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (6.67+/-8.07% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.51+/-0.330		Pastorok & Becker 1990
110 +/-257	NE	San Francisco Bay, CA	COA	10-d	Least toxic (18+/-6.6% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
119 +/-277	SG	San Francisco Bay, CA	COA	10-d	Significantly toxic (42.9+/-19.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
120 +/-269	NE	San Francisco Bay, CA	COA	10-d	Not significantly toxic (18.4+/-6.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
126 +/-149	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.1+/-2.78% normal development)	Mulinia lateralis (bivalve)	LAR	2.12+/-1.04	22.9+/-23.7	Bricker et al. 1993
130	NE	Puget Sound, WA	AETA		PSDDA Screening level concentration	Aquatic biota				USACOE 1988
139 +/-177	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.016+/-0.007 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.26+/-0.936	43.4+/-35.6	Bricker et al. 1993
145 +/-162	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (34.9+/-15.7% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.23+/-1.04	25.4+/-25.5	Bricker et al. 1993
148 +/-148	NE	Commencement Bay, WA	COA	48-h	Least toxic (15.1+/-3.1% abnormality)	Oyster	LAR			Tetra Tech 1985
150	NE	Puget Sound, WA	COA		Not toxic (10% prevalence of idiopathic degeneration/necrosis)	Parophrys vetulus (English sole)				Malins et al. 1985
150	NE	Puget Sound, WA	COA		Not toxic (17.5% prevalence of steatosis and hemosiderosis)	Parophrys vetulus (English sole)				Malins et al. 1985
150	NE	Puget Sound, WA	COA		Not toxic (0% occurrence of hepatic cellular alterations)	Parophrys vetulus (English sole)				Malins et al. 1985
150	NE	Puget Sound, WA	COA		Not toxic (5% prevalence of hepatocellular regenerative foci)	Parophrys vetulus (English sole)				Malins et al. 1985
150	NE	Puget Sound, WA	COA		Not toxic (0% prevalence of hepatic cellular alterations)	Parophrys vetulus (English sole)				Malins et al. 1985
150	NE	Puget Sound, WA	COA		Not toxic (32.5% prevalence of hepatic idiopathic lesions)	Parophrys vetulus (English sole)				Malins et al. 1985
163	*	United States	SLCA		National Screening Level Concentration-Marine	Benthic species		1		Neff et al. 1987
166 +/-177	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (6.8+/-7.31% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
166 +/-177	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (8.5+/-6.06% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
166 +/-177	NE	Halifax Harbour, NS	COA	20-d	Not significantly toxic (0.7+/-1.63% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
169 +/-213	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (91.5+/-7.28% normal development)	Mulinia lateralis (bivalve)	LAR	2.6+/-0.899	36.8+/-34.9	Bricker et al. 1993
170 +/-188	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (21.5+/-6.36% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.35+/-1.05	10.5+/-13.4	Bricker et al. 1993
179 +/-184	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.013+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.79+/-0.744	37.6+/-25.3	Bricker et al. 1993
180 +/-191	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (29.8+/-13.9% mortality)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.07	32.1+/-28.4	Bricker et al. 1993
184 +/-347	*	San Francisco Bay, CA	COA	48-h	Significantly toxic (55.7+/-22.7% abnormal)	Bivalve	LAR			Long & Morgan 1990
190	*	United States	EqPA		99% Chronic Marine Criteria	Aquatic organisms		1		Pavlou et al. 1987
202 +/-142	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.008+/-0.001 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.19+/-1.27	12+/-11.3	Bricker et al. 1993
208 +/-208	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.1+/-13.3% mortality)	Mulinia lateralis (bivalve)	LAR	2.68+/-0.955	31.8+/-24.4	Bricker et al. 1993
219 +/-201	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (38+/-13% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.92+/-0.937	34.6+/-23.9	Bricker et al. 1993
220 +/-200	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (96.6+/-3.79% normal development)	Mulinia lateralis (bivalve)	LAR	2.87+/-0.94	35.1+/-25.9	Bricker et al. 1993
225 +/-131	*	Southern California	COA	10-d	Significantly toxicity (51.7% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988

Table 13. A summary of the available data on the biological effects associated with sediment-sorbed ANTHRACENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Anthracene	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
226	+/-268	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (23+/-4.24% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.46+/-1.22	40+/-55.1	Bricker et al. 1993
227	+/-198	NE	Commencement Bay, WA	COA	10-d	Least toxic (12.5+/-4.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
237	+/-455	*	San Francisco Bay, CA	COA	10-d	Highly toxic (67+/-11.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
241	+/-265	*	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (88.5+/-8.39% normal development)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.05	38.1+/-38.9	Bricker et al. 1993
245			***PEL***								
260		*	California	AETA		California AET Values	Benthic species				Becker et al. 1990
260		*	Southern California	AETA		Southern California AET Values	Benthic species				Becker et al. 1990
265	+/-228	SG	Commencement Bay, WA	COA	10-d	Moderately toxic (26+/-5.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
266	+/-270	*	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (51.3+/-6.95% mortality)	Mulinia lateralis (bivalve)	LAR	1.8+/-1.71	29.6+/-46.3	Bricker et al. 1993
267	+/-204	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.011+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.28+/-0.363	45.3+/-21.4	Bricker et al. 1993
281	+/-321	*	Tampa Bay, FL	COA	1-h	Most toxic (0.091+/-0.187% fertilization)	Arbacia punctulata (sea urchin)	GAM	2.96+/-1.49		Long 1993
282	+/-207	*	Commencement Bay, WA	COA	48-h	Moderately toxic (23+/-2.3% abnormality)	Oyster	LAR			Tetra Tech 1985
299	+/-208	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (75.1+/-10.6% mortality)	Mulinia lateralis (bivalve)	LAR	3.32+/-0.317	42.3+/-19.2	Bricker et al. 1993
353	+/-355	*	Tampa Bay, FL	COA	10-d	Significantly toxic (35.2+/-17.5% mortality)	Ampelisca abdita (amphipod)	SUB ADT	3.53+/-1.35		Long 1993
363	+/-353	*	Commencement Bay, WA	COA	48-h	Highly toxic (44.5+/-19% abnormality)	Oyster	LAR			Tetra Tech 1985
380		*	United States	EqPA		95% Chronic Marine Criteria	Aquatic organisms		1		Pavlou et al. 1987
390	+/-370	*	Tampa Bay, FL	COA		Significantly toxic (EC50; 0.017+/-0.012 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.47+/-1.49		Long 1993
431	+/-719	NE	Burrard Inlet, BC	COA	10-d	Not toxic (8.9+/-2.99% mortality)	Corophium volutator (amphipod)	ADT	2.8+/-1.96		McLeay et al. 1991
431	+/-719	NE	Burrard Inlet, BC	COA	10-d	Not toxic (97.2+/-2.84% reburial)	Rhepoxynius abronius (amphipod)	ADT	2.8+/-1.96		McLeay et al. 1991
476	+/-549	*	Commencement Bay, WA	COA	10-d	Highly toxic (78.5+/-19.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
506	+/-1043	NE	Elizabeth River, VA	COA	96-h	Not significantly toxic (4.5+/-3.24% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
560		*	Puget Sound, WA	SQG		Low Abundance Threshold Concentration	Praxillella gracilis (polycheata)		3.0		Tetra Tech 1986
560		*	Puget Sound, WA	SQG		Low Abundance Threshold Concentration	Euphilomedes producta (ostracoda)		7.0		Tetra Tech 1986
573	+/-809	NE	Burrard Inlet, BC	COA	10-d	Not toxic (7.9+/-5.12% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.64+/-2.14		McLeay et al. 1991
>620		-	Southern California	AETA	10-d	Southern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
735	+/-1498	NE	Elizabeth River, VA	COA	96-h	No significant change in respiration rate	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
923	+/-558	*	San Francisco Bay, CA	COA	48-h	Highly toxic (92.4+/-4.5% abnormal)	Bivalve	LAR			Long & Morgan 1990
960		*	Puget Sound, WA	AETA	15-min	1988 Puget Sound AET	Microtox (Photobacterium phosphoreum)				PTI 1988
960		*	Puget Sound, WA	AETA	48-h	1988 Puget Sound AET	Crassostrea gigas (oyster)	LAR			PTI 1988
1100		*	San Francisco Bay, CA	AETA	10-d	San Francisco Bay AET	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
1100		*	Northern California	AETA	10-d	Northern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
1100		*	California	AETA	10-d	California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
1177	+/-1582	NC	Eagle Harbor, WA	COA	10-d	Moderately toxic (41+/-9% mortality)	Rhepoxynius abronius (amphipod)	ADT			CH2M Hill 1989
1300		*	Puget Sound, WA	AETA		PSDDA Maximum Level Criteria	Aquatic biota				USACOE 1988
1490	+/-5389	NE	Eagle Harbor, WA	COA	10-d	Least toxic (13+/-7% mortality)	Rhepoxynius abronius (amphipod)	ADT			CH2M Hill 1989
1500		*	Burrard Inlet, BC	COA	10-d	Highly toxic (23% emergence)	Corophium volutator (amphipod)	ADT	3.5		McLeay et al. 1991
1500		*	Burrard Inlet, BC	COA	10-d	Highly toxic (30.5% emergence)	Rhepoxynius abronius (amphipod)	ADT	3.5		McLeay et al. 1991
1753	+/-3492	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (5.2+/-3.5% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
1753	+/-3492	NE	Halifax Harbour, NS	COA	20-d	Not significantly toxic (1+/-2% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
2200		*	Puget Sound, WA	SQG		Chemical Criteria	Benthic community		1		WDE 1989

Table 13. A summary of the available data on the biological effects associated with sediment-sorbed ANTHRACENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Anthracene	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
2335	+/-4031	*	Halifax Harbour, NS	COA	10-d	Significantly toxic (61.7+/-12.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
2970	+/-6464	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (4.43+/-2.1% mortality)	Panope generosa (geoduck)	JUV	1.51+/-0.261		Pastorok & Becker 1990
3240	+/-6976	NE	Puget Sound, WA	COA	20-d	Not significantly toxic (5+/-3.86% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.46+/-0.26		Pastorok & Becker 1990
3849	+/-9462	*	Elizabeth River, VA	COA	96-h	Significant decrease in respiration rates	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
4400		*	Puget Sound, WA	AETA		1988 Puget Sound AET	Benthic community				PTI 1988
6040	+/-13470	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (2.09+/-1.73% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.56+/-0.329		Pastorok & Becker 1990
7128	+/-13460	*	Puget Sound, WA	COA	15-min	Significantly toxic (EC50; 0.065+/-0.043% extract)	Microtox (Photobacterium phosphoreum)		1.58+/-0.255		Pastorok & Becker 1990
7371	+/-4730	*	Puget Sound, WA	COA		Toxic (71.6+/-14.6% prevalence of idiopathic degeneration/necrosis)	Parophrys vetulus (English sole)				Malins et al. 1985
7371	+/-4730	*	Puget Sound, WA	COA		Toxic (51.4+/-21.1% prevalence of steatosis and hemosiderosis)	Parophrys vetulus (English sole)				Malins et al. 1985
7371	+/-4730	*	Puget Sound, WA	COA		Toxic (19+/-6.15% prevalence of hepatocellular regenerative foci)	Parophrys vetulus (English sole)				Malins et al. 1985
7371	+/-4730	*	Puget Sound, WA	COA		Toxic (26.7+/-6.43% prevalence of hepatic neoplasms)	Parophrys vetulus (English sole)				Malins et al. 1985
7371	+/-4730	*	Puget Sound, WA	COA		Toxic (88+/-3.65% prevalence of hepatic idiopathic lesions)	Parophrys vetulus (English sole)				Malins et al. 1985
7371	+/-4730	*	Puget Sound, WA	COA		Toxic (44.2+/-8.5% prevalence of hepatic cellular alterations)	Parophrys vetulus (English sole)				Malins et al. 1985
7597	+/-7264	*	Eagle Harbor, WA	COA	10-d	Highly toxic (95.5+/-8.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			CH2M Hill 1989
9436	+/-15005	*	Puget Sound, WA	COA	2-d	Significantly toxic (60.4+/-46.5% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.57+/-0.287		Pastorok & Becker 1990
9800	+/-15107	*	Elizabeth River, VA	COA	96-h	Significantly toxic (50.7+/-39% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
11000		*	United States	EqPA		Chronic Marine EqP Threshold	Aquatic biota		1		Bolton et al. 1985
13000		*	Puget Sound, WA	AETA	10-d	1988 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT			PTI 1988
14110	+/-16780	*	Puget Sound, WA	COA	10-d	Significantly toxic (80.8+/-30.6% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.266		Pastorok & Becker 1990
15567	+/-24642	*	Puget Sound, WA	COA	20-d	Significantly toxic (37.3+/-22% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.87+/-0.208		Pastorok & Becker 1990
44000		*	Puget Sound, WA	COA	10-d	Significantly toxic (56% mortality)	Panope generosa (geoduck)	JUV	2.1		Pastorok & Becker 1990
3E+05		*	Sidney Tar Pond, NS	COA	20-d	Significantly toxic (52% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990

Table 14. A summary of the available data on the biological effects associated with sediment-sorbed FLUORENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Fluorene Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.19	NC	Mobile Bay, AL	COA		Significantly toxic (10% mortality)	Mysidopsis bahia (mysid shrimp)		0.009	0.004	EMAP Louisiana Province 1991
0.195 +/-0.049	NE	Apalachee Bay, FL	COA	10-d	Not significantly toxic (3.3+/-3.25% mortality)	Ampelisca abdita (amphipod)		0.643+/-0.455	0.390+/-0.410	EMAP Louisiana Province 1991
0.21 +/-0.044	NE	Apalachee Bay, FL	COA		Not significantly toxic (0.75+/-1.5% mortality)	Mysidopsis bahia (mysid shrimp)		0.540+/-0.385	0.405+/-0.417	EMAP Louisiana Province 1991
0.225 +/-0.049	SG	Apalachee Bay, FL	COA	10-d	Significantly toxic (15.6% mortality)	Ampelisca abdita (amphipod)		0.438+/-0.442	0.421+/-0.593	EMAP Louisiana Province 1991
0.253 +/-0.116	NE	Chandeleur Sound, LA	COA	10-d	Not significantly toxic (2.87+/-4.05% mortality)	Ampelisca abdita (amphipod)		0.517+/-0.166	2.02+/-1.38	EMAP Louisiana Province 1991
0.264 +/-0.084	NC	Chandeleur Sound, LA	COA		Significantly toxic (7.6+/-1.32% mortality)	Mysidopsis bahia (mysid shrimp)		0.624+/-0.197	2.07+/-1.19	EMAP Louisiana Province 1991
0.283 +/-0.143	SG	Chandeleur Sound, LA	COA	10-d	Significantly toxic (11.5+/-4.86% mortality)	Ampelisca abdita (amphipod)		0.811+/-0.711	1.87+/-0.973	EMAP Louisiana Province 1991
0.285 +/-0.184	NE	Chandeleur Sound, LA	COA		Not significantly toxic (1.03+/-2.05% mortality)	Mysidopsis bahia (mysid shrimp)		0.824+/-0.915	1.69+/-0.920	EMAP Louisiana Province 1991
0.543 +/-0.232	NE	Galveston Bay, TX	COA		High abundance (27.3+/-10 N/0.00203 sq.m.)	Mollusca		1.64+/-0.4	1.39+/-0.17	Carr 1992
0.6 +/-0.24	NE	Galveston Bay, TX	COA		High abundance (155+/-49.5 N/0.00203 sq.m.)	Oligochaeta		1.2+/-1.27	4.27+/-3.85	Carr 1992
0.73 +/-0.849	NC	Mississippi Sound, MS	COA	10-d	Significantly toxic (11.6+/-3.39% mortality)	Ampelisca abdita (amphipod)		0.111+/-0.045	0.03	EMAP Louisiana Province 1991
0.74 +/-0.44	NE	Galveston Bay, TX	COA		High species richness (24.5+/-3.7 S/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
0.74 +/-0.437	NE	Galveston Bay, TX	COA		High abundance (359+/-92.8 N/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
0.981 +/-0.622	NE	Galveston Bay, TX	COA		High abundance (16.2+/-6.19 N/0.00203 sq.m.)	Copepoda		0.844+/-0.524	4.73+/-3.1	Carr 1992
1.02 +/-0.551	NE	Galveston Bay, TX	COA		High abundance (156+/-22.9 N/0.00203 sq.m.)	Polychaeta		0.916+/-0.661	2.94+/-2.3	Carr 1992
1.17 +/-1.38	NC	Mobile Bay, AL	COA	10-d	Significantly toxic (46+/-49.3% mortality)	Ampelisca abdita (amphipod)		0.22+/-0.298	3.84+/-5.43	EMAP Louisiana Province 1991
1.24 +/-1.06	NE	Mississippi Sound, MS	COA		Not significantly toxic (0.789+/-1.59% mortality)	Mysidopsis bahia (mysid shrimp)		0.827+/-0.757	1.46+/-1.58	EMAP Louisiana Province 1991
1.3 +/-1.9	NE	Galveston Bay, TX	COA	48-h	Not toxic (98.1+/-1.79% normal development)	Arbacia punctulata (sea urchin)	EMB	.748+/-0.476	4.16+/-3.45	Carr 1992
1.41 +/-1.05	NE	Mississippi Sound, MS	COA	10-d	Not significantly toxic (1.4+/-1.73% mortality)	Ampelisca abdita (amphipod)		0.998+/-0.602	2.01+/-1.82	EMAP Louisiana Province 1991
1.46 +/-1.06	SG	Mississippi Sound, MS	COA		Significantly toxic (12.2+/-4.42% mortality)	Mysidopsis bahia (mysid shrimp)		0.939+/-0.335	2.63+/-2.3	EMAP Louisiana Province 1991
1.7	NE	Mobile Bay, AL	COA	10-d	Not significantly toxic (0.5+/-0.778% mortality)	Ampelisca abdita (amphipod)		1.24+/-0.948	8.51+/-4.76	EMAP Louisiana Province 1991
1.85 +/-0.254	NE	Mobile Bay, AL	COA		Not significantly toxic (1.07+/-1.85% mortality)	Mysidopsis bahia (mysid shrimp)		0.968+/-0.815	8.23+/-3.4	EMAP Louisiana Province 1991
1.98 +/-1.18	NE	Matagorda Bay, TX	COA		Not significantly toxic (1.58+/-1.82% mortality)	Mysidopsis bahia (mysid shrimp)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
1.98 +/-1.18	NE	Matagorda Bay, TX	COA	10-d	Not significantly toxic (2.33+/-4.65% mortality)	Ampelisca abdita (amphipod)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
2.51 +/-2.96	NC	Galveston Bay, TX	COA		Significantly toxic (13.4+/-9.11% mortality)	Mysidopsis bahia (mysid shrimp)		0.778+/-0.482	1.21+/-0.778	EMAP Louisiana Province 1991
2.52 +/-1.57	NC	Mississippi River, MS, LA	COA	10-d	Significantly toxic (15.9+/-6.65% mortality)	Ampelisca abdita (amphipod)		1.22+/-0.717	0.235+/-0.276	EMAP Louisiana Province 1991
2.62 +/-1.43	NC	Mississippi River, MS, LA	COA		Significantly toxic (32.9+/-36.4% mortality)	Mysidopsis bahia (mysid shrimp)		1.07+/-0.924	1.41+/-1.93	EMAP Louisiana Province 1991
3.1 +/-5.11	*	Galveston Bay, TX	COA		Moderate abundance (58.3+/-16.2 N/0.00203 sq.m.)	Oligochaeta		0.632+/-0.274	7.93+/-5.6	Carr 1992
3.23 +/-10.2	NE	Galveston Bay, TX	COA	1-h	Not toxic (92.5+/-6.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	0.77+/-0.448	6.37+/-6.58	Carr 1992
3.33 +/-9.93	NC	Galveston Bay, TX	COA		Low abundance (0.3+/-0.651 N/0.00203 sq.m.)	Amphipoda		0.859+/-0.487	7.67+/-8.12	Carr 1992
3.6 +/-4.92	SG	Galveston Bay, TX	COA	1-h	Toxic (20.4+/-18.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	1.26+/-0.47	14.6+/-10.1	Carr 1992
3.73 +/-10.2	*	Galveston Bay, TX	COA		Low abundance (1.86+/-2.59 N/0.00203 sq.m.)	Mollusca		0.784+/-0.421	8.29+/-8.13	Carr 1992
3.75 +/-11	*	Galveston Bay, TX	COA		Low abundance (4.21+/-5.66 N/0.00203 sq.m.)	Oligochaeta		0.895+/-0.453	7.85+/-8.8	Carr 1992
3.82 +/-10.3	*	Galveston Bay, TX	COA		Low species richness (10+/-3.73 S/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
3.82 +/-10.3	*	Galveston Bay, TX	COA		Low abundance (89+/-60.7 N/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
3.84 +/-3.44	NE	Mississippi River, MS, LA	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		1.3+/-0.83	1.14+/-1	EMAP Louisiana Province 1991
3.87 +/-6.42	NE	Galveston Bay, TX	COA		High abundance (154+/-30.2 N/0.00203 sq.m.)	Benthic invertebrates		0.47+/-0.27	9.07+/-2.94	Carr 1992
3.94 +/-3.3	NE	Mississippi River, MS, LA	COA	10-d	Not significantly toxic (7.8+/-1.63% mortality)	Ampelisca abdita (amphipod)		1.15+/-1.04	2.31+/-0.651	EMAP Louisiana Province 1991
4.04 +/-3.9	NE	Galveston Bay, TX	COA	10-d	Not significantly toxic (1.35+/-1.45% mortality)	Ampelisca abdita (amphipod)		0.961+/-0.537	1.17+/-0.640	EMAP Louisiana Province 1991
4.05 +/-4.29	NG	Galveston Bay, TX	COA	10-d	Significantly toxic (15.8+/-3.89% mortality)	Ampelisca abdita (amphipod)		0.647+/-0.606	0.160+/-0.184	EMAP Louisiana Province 1991

Table 14. A summary of the available data on the biological effects associated with sediment-sorbed FLUORENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Fluorene Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
4.24 +/-11.1	*	Galveston Bay, TX	COA		Low abundance (41.7+/-21.8 N/0.00203 sq.m.)	Polychaeta		0.848+/-0.427	9.21+/-8.61	Carr 1992
4.59 +/-3.11	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (5.8+/-3.7% mortality)	Rhepoxynius abronius (amphipod)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
4.59 +/-3.11	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (3.4+/-1.82% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
4.59 +/-3.11	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (11.2+/-3.7% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
4.59 +/-3.11	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (3.52+/-1.66% mortality)	Macoma nasuta (clam)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (0.33+/-0.516% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (2.33+/-1.03% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (15.3+/-11.0% mortality)	Hyalella azteca (amphipod)	JUV	0.648+/-0.641	1.74+/-1.39	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1% mortality)	Streblospio benedicti (polychaete worm)		1.38	3.25	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (16.5+/-9.19% mortality)	Streblospio benedicti (polychaete worm)		0.783+/-0.845	4.83+/-2.23	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.367+/-0.085 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.0005 mg/day growth)	Streblospio benedicti (polychaete worm)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.003+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.316+/-0.120	2.13+/-2.46	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (7.2+/-1.92% mortality)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.6+/-0.55% reburial)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.001+/-0.001 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.555+/-0.471	2.68+/-2.3	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1.83+/-1.6% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (3.5+/-1.87% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (9.25+/-5.32% mortality)	Lepidactylus dytiscus (amphipod)		0.638+/-0.768	1.65+/-1.62	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (22.3+/-7.37% mortality)	Hyalella azteca (amphipod)	JUV	0.788+/-0.866	2.04+/-1.75	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (8.8+/-7.12% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (14+/-9.22% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.1+/-0.865% reburial)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<20% emergence)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (-0.057+/-0.04 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.001mg/day growth)	Streblospio benedicti (polychaete worm)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.016 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.005+/-0.0004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (55.0+/-22.6% mortality)	Hyalella azteca (amphipod)	JUV	0.338+/-0.133	2.9+/-3.11	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29.8+/-11.1% mortality)	Streblospio benedicti (polychaete worm)		0.316+/-0.12	2.13+/-2.46	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (55.0+/-19.5% mortality)	Streblospio benedicti (polychaete worm)		0.349+/-0.11	1.07+/-0.66	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.003 mg/day growth)	Lepidactylus dytiscus (amphipod)		1.38	3.25	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29% mortality)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (89.7% reburial)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	6.41	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992

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Fluorene	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
4.95		NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (45.5+/-12% mortality)	Lepidactylus dytiscus (amphipod)		0.383+/-0.279	3.61+/-2.79	Hall et al. 1992
4.95		NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (63.0+/-24.3% mortality)	Hyalella azteca (amphipod)	JUV	0.317+/-0.228	2.57+/-2.67	Hall et al. 1992
4.95		NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (22% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
4.95		NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (28% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
4.95		NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (82.9% reburial)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
4.95		NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>20% emergence)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
4.95		NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	5.58	Hall et al. 1992
4.95		NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.008+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.4	Hall et al. 1992
4.95		NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.003 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
5		NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (3% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
5		NE	Sidney Tar Pond, NS	COA	10-d	Not significantly toxic (4% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
5		NE	Sidney Tar Pond, NS	COA	10-d	Not significantly toxic (3% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
5.01	+/-6.53	NE	Galveston Bay, TX	COA		High Abundance (6+/-1.41 N/0.00203 sq.m.)	Amphipoda		0.955+/-0.629	7.21+/-8.2	Carr 1992
5.11	+/-12.4	*	Galveston Bay, TX	COA		Low abundance (2.05+/-1.58 N/0.00203 sq.m.)	Copepoda		0.879+/-0.47	9.63+/-9.65	Carr 1992
5.57	+/-5.99	NE	Puget Sound, WA	COA	15-min	Not significantly toxic (EC50; 0.283+/-0.168% extract)	Microtox (Photobacterium phosphoreum)		1.39+/-0.37		Pastorok & Becker 1990
5.58	+/-4.02	NE	Galveston Bay, TX	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		0.934+/-0.657	0.457+/-0.530	EMAP Louisiana Province 1991
6	+/-4.5	NE	San Francisco Bay, CA	COA	48-h	Least toxic (23.3+/-7.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
6.94	+/-15.4	*	Galveston Bay, TX	COA	48-h	Toxic (4.65+/-16.1% normal development)	Arbacia punctulata (sea urchin)	EMB	1.06+/-0.449	14.5+/-9.2	Carr 1992
7.75	+/-16.3	NE	Southern California	COA	10-d	Not significantly toxic (23.2% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
10.4	+/-1.77	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-7.99% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.14+/-0.352	6.09+/-5.38	Bricker et al. 1993
11		*	San Francisco Bay, CA	AETA	48-h	San Francisco Bay AET	Oyster; mussel	LAR			Long & Morgan 1990
11.3	+/-8.24	SG	Southern California	COA	10-d	Significantly toxicity (51.7% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
11.9	+/-21.4	NE	Galveston Bay, TX	COA		Low species (11.2+/-1.94 S/0.00203 sq.m.)	Benthic species		0.642+/-0.356	13.4+/-8.65	Carr 1992
>12		-	Southern California	AETA	10-d	Southern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
13		*	Southern California	AETA		Southern California AET Values	Benthic species				Becker et al. 1990
14.4	+/-4.43	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.061+/-0.038 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.8+/-0.477	8.52+/-10.7	Bricker et al. 1993
16	+/-22.5	NE	San Francisco Bay, CA	COA	48-h	Not significantly toxic (31.9+/-15.5% abnormal)	Bivalve	LAR			Long & Morgan 1990
16.7	+/-7.08	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (19.3+/-5.86% mortality)	Ampelisca abidta (amphipod)	SUB ADT	1.82+/-0.225	6.3+/-6.2	Bricker et al. 1993
17.9	+/-6.61	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.3+/-2.22% normal development)	Mulinia lateralis (bivalve)	LAR	2.18+/-0.531	19.1+/-12.5	Bricker et al. 1993
17.9	+/-7.87	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (39.5+/-18.2% mortality)	Ampelisca abidta (amphipod)	SUB ADT	2.06+/-0.523	20.1+/-13.9	Bricker et al. 1993
18	+/-6.9	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (15.2+/-9.21% mortality)	Mulinia lateralis (bivalve)	LAR	2.17+/-0.663	18.4+/-19.9	Bricker et al. 1993
18.6	+/-39.3	NE	Narragansett Bay, RI	COA	10-d	Not significantly toxic (5.28+/-3.04% mortality))	Ampelisca abdita (amphipod)	ADT			Munns et al. 1991
19		*	California	AETA	48-h	California AET Values	Mytilus edulis (bivalve)	LAR			Becker et al. 1990
19		*	California	AETA		California AET Values	Benthic species				Becker et al. 1990
19		*	Northern California	AETA		Northern California AET Values	Benthic species				Becker et al. 1990
19	+/-30	*	San Francisco Bay, CA	COA	48-h	Moderately toxic (59.4+/-11.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
19.4	+/-8.86	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.5+/-11.4% mortality)	Mulinia lateralis (bivalve)	LAR	2.33+/-0.364	26.8+/-9.42	Bricker et al. 1993
20.2	+/-29.3	NE	Oahu, Hawaii	COA	10-d	Not significantly toxic (7.2+/-1.89% mortality)	Eohaustorius estuarius (amphipod)	ADT	1.93+/-1.94	10.3+/-12.4	Lamberson et al. 1993
20.2	+/-29.3	NE	Oahu, Hawaii	COA	10-d	Not significantly toxic (10.1+/-4.01% mortality)	Corophium acherusicum (amphipod)	ADT	1.93+/-1.94	10.3+/-12.4	Lamberson et al. 1993
20.5	+/-7.02	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.125+/-0.084 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.25+/-0.468	1.98+/-2.25	Bricker et al. 1993

Table 14. A summary of the available data on the biological effects associated with sediment-sorbed FLUORENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Fluorene Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
21.1 +/-7.82	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.014+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.51+/-0.45	29.6+/-15.7	Bricker et al. 1993
21.2		***TEL***								
22	NC	Puget Sound, WA	COA	2-d	Significantly toxic (3.8% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.5		Pastorok & Becker 1990
22.3 +/-13.9	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (96+/-1.66% normal development)	Mulinia lateralis (bivalve)	LAR	2.52+/-0.997	35+/-42.9	Bricker et al. 1993
22.4 +/-20.4	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.167+/-0.198 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.59+/-1.09	4.67+/-6.99	Bricker et al. 1993
24.6 +/-22.8	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.096+/-0.101 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.37+/-0.759	6.93+/-6.83	Bricker et al. 1993
24.6 +/-26.2	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.074+/-0.043 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.27+/-0.626	6.21+/-5.41	Bricker et al. 1993
24.9 +/-10.3	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (25.9+/-5.01% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.21+/-0.444	2.41+/-2.32	Bricker et al. 1993
25.2 +/-25.3	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (12.3+/-14.5% mortality)	Mulinia lateralis (bivalve)	LAR	1.53+/-0.743	15.7+/-23.2	Bricker et al. 1993
26 +/-27.7	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99.3+/-0.827% normal development)	Mulinia lateralis (bivalve)	LAR	1.43+/-0.738	14.7+/-24	Bricker et al. 1993
28 +/-37.4	*	Galveston Bay, TX	COA		Low abundance (53+/-33.9 N/0.00203 sq.m.)	Benthic invertebrates		0.985+/-0.247	22+/-11.2	Carr 1992
29.1 +/-48.3	NC	San Francisco Bay, CA	COA	10-d	Significantly toxic (42.9+/-19.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
29.5 +/-21.4	NC	San Francisco Bay, CA	COA	10-d	Moderately toxic (33.8+/-4.7% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
31 +/-39.4	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-6.07% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.71+/-0.9	15.3+/-23.2	Bricker et al. 1993
31.3 +/-36.2	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (13.8+/-4.09% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.47+/-0.306		Pastorok & Becker 1990
32.5 +/-29	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (6.48+/-10.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
32.5 +/-29	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99+/-0.862% normal development)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
32.9 +/-30.1	*	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (30.5+/-16.4% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.62+/-0.777	17.7+/-26.3	Bricker et al. 1993
33.3 +/-76.7	SG	San Francisco Bay, CA	COA	10-d	Highly toxic (67+/-11.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
34	NE	Puget Sound, WA	COA		Not toxic (10% prevalence of idiopathic degeneration/necrosis)	Parophrys vetulus (English sole)				Malins et al. 1985
34	NE	Puget Sound, WA	COA		Not toxic (17.5% prevalence of steatosis and hemosiderosis)	Parophrys vetulus (English sole)				Malins et al. 1985
34	NE	Puget Sound, WA	COA		Not toxic (0% occurrence of hepatic cellular alterations)	Parophrys vetulus (English sole)				Malins et al. 1985
34	NE	Puget Sound, WA	COA		Not toxic (5% prevalence of hepatocellular regenerative foci)	Parophrys vetulus (English sole)				Malins et al. 1985
34	NE	Puget Sound, WA	COA		Not toxic (0% prevalence of hepatic cellular alterations)	Parophrys vetulus (English sole)				Malins et al. 1985
34	NE	Puget Sound, WA	COA		Not toxic (32.5% prevalence of hepatic idiopathic lesions)	Parophrys vetulus (English sole)				Malins et al. 1985
34.3 +/-45.3	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (6.67+/-8.07% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.51+/-0.330		Pastorok & Becker 1990
34.7 +/-64.0	*	San Francisco Bay, CA	COA	48-h	Significantly toxic (55.7+/-22.7% abnormal)	Bivalve	LAR			Long & Morgan 1990
34.8 +/-32.1	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (17+/-16.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.99+/-1	21.6+/-24.5	Bricker et al. 1993
36	*	Puget Sound, WA	AETA	15-min	1986 Puget Sound AET	Microtox (Photobacterium phosphoreum)		1		Bellar et al. 1986
36	*	Puget Sound, WA	AETA	48-h	1986 Puget Sound AET	Crassostrea gigas (oyster)	LAR	1		Bellar et al. 1986
36	*	Puget Sound, WA	AETA	10-d	1986 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT	1		Bellar et al. 1986
38.3 +/-20.2	NE	Burrard Inlet, BC	COA	10-d	Not toxic (4.5+/-3.02% emergence)	Rhepoxynius abronius (amphipod)	ADT	2.66+/-2.15		McLeay et al. 1991
38.3 +/-20.2	NE	Burrard Inlet, BC	COA	10-d	Not toxic (5.21+/-3.61% emergence)	Corophium volutator (amphipod)	ADT	3.18+/-2.1		McLeay et al. 1991
38.9 +/-34.8	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.1+/-2.78% normal development)	Mulinia lateralis (bivalve)	LAR	2.12+/-1.04	22.9+/-23.7	Bricker et al. 1993
39.2 +/-49.3	NE	San Francisco Bay, CA	COA	10-d	Least toxic (18+/-6.6% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
42.6 +/-50.8	NE	San Francisco Bay, CA	COA	10-d	Not significantly toxic (18.4+/-6.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
43	*	Puget Sound, WA	AETA		1986 Puget Sound AET	Benthic species		1		Bellar et al. 1986
46.9 +/-21.8	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (23.3+/-6.14% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.738		Word et al. 1988
47 +/-21.2	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (10.4+/-6.3% mortality)	Nephtys caecoides (polychaete)		1.63+/-0.657		Word et al. 1988
47 +/-21.2	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (0.2+/-0.6% mortality)	Macoma nasuta (clam)		1.63+/-0.657		Word et al. 1988

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Fluorene Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
47.5 +/-21.7	SG	Oakland Harbor, CA	COA	10-d	Significantly toxic (35.3+/-2.5% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.56+/-0.07		Word et al. 1988
49.6 +/-61.6	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (34.9+/-15.7% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.23+/-1.04	25.4+/-25.5	Bricker et al. 1993
50	NE	Burrard Inlet, BC	SQO		Sediment Quality Objectives	Aquatic biota				Swain & Nijman 1991
50 +/-93.3	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (5.2+/-3.5% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
50 +/-93.3	NE	Halifax Harbour, NS	COA	20-d	Not significantly toxic (1+/-2% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
50.9 +/-41.1	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (29.8+/-13.9% mortality)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.07	32.1+/-28.4	Bricker et al. 1993
58.4 +/-39	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (38+/-13% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.92+/-0.937	34.6+/-23.9	Bricker et al. 1993
58.4 +/-39.8	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (96.6+/-3.79% normal development)	Mulinia lateralis (bivalve)	LAR	2.87+/-0.94	35.1+/-25.9	Bricker et al. 1993
58.8 +/-65.3	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (23+/-4.24% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.46+/-1.22	40+/-55.1	Bricker et al. 1993
59	*	United States	EqPA		99% Chronic Marine Criteria	Aquatic organisms		1		Pavlou et al. 1987
59 +/-65.4	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (21.5+/-6.36% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.35+/-1.05	10.5+/-13.4	Bricker et al. 1993
59.2 +/-69.3	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.013+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.79+/-0.744	37.6+/-25.3	Bricker et al. 1993
60	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (18% mortality)	Ampelisca abdita (amphipod)		0.028	9 ug/g	Windom In Prep
60	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (0% mortality)	Arbacia punctulata (sea urchin)		0.03	19 ug/g	Windom In Prep
64	NE	Puget Sound, WA	AETA		PSDDA Screening level concentration	Aquatic biota				USACOE 1988
65 +/-108	*	Halifax Harbour, NS	COA	10-d	Significantly toxic (61.7+/-12.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
67.5 +/-2.89	NE	Brunswick Harbor Entrance, GA	COA	48-h	Not significantly toxic (86.6+/-4.25% normal development)	Arbacia punctulata (sea urchin)		0.181+/-0.162	182+/-208 ug/g	Windom In Prep
68.3 +/-2.89	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (28.3+/-6.11% mortality)	Mysidopsis bahia (mysid)		0.246+/-0.051	127+/-24 ug/g	Windom In Prep
69.7 +/-37.8	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.011+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.28+/-0.363	45.3+/-21.4	Bricker et al. 1993
70 +/-9.57	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (91.3+/-2.91% normal development)	Arbacia punctulata (sea urchin)		0.299+/-0.251	114+/-68.4 ug/g	Windom In Prep
70.6 +/-10.4	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (9.78+/-5.33% mortality)	Mysidopsis bahia (mysid)		0.24+/-0.247	91.9+/-73.4 ug/g	Windom In Prep
70.6 +/-11.2	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (4+/-2.83% mortality)	Menidia beryllina (silverside)		0.243+/-0.264	90.5+/-78.4 ug/g	Windom In Prep
71.7 +/-12.9	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (27.5+/-10.6% mortality)	Mysidopsis bahia (mysid)		0.237+/-0.311	74.6+/-85.5 ug/g	Windom In Prep
71.7 +/-9.31	SG	Savannah River Entrance Channel, GA	COA	48-h	Significantly toxic (25.4+/-7.66% mortality)	Arbacia punctulata (sea urchin)		0.344+/-0.242	129.5+/-59.3 ug/g	Windom In Prep
71.9 +/-10.3	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (11.6+/-4.33% mortality)	Ampelisca abdita (amphipod)		0.267+/-0.25	102+/-71.1 ug/g	Windom In Prep
72.7 +/-96.8	*	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.1+/-13.3% mortality)	Mulinia lateralis (bivalve)	LAR	2.68+/-0.955	31.8+/-24.4	Bricker et al. 1993
73.5 +/-35	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (75.1+/-10.6% mortality)	Mulinia lateralis (bivalve)	LAR	3.32+/-0.317	42.3+/-19.2	Bricker et al. 1993
74.5 +/-43.5	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.008+/-0.001 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.19+/-1.27	12+/-11.3	Bricker et al. 1993
75.3 +/-76.1	NE	Commencement Bay, WA	COA	48-h	Least toxic (15.1+/-3.1% abnormality)	Oyster	LAR			Tetra Tech 1985
77 +/-132	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.016+/-0.007 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.26+/-0.936	43.4+/-35.6	Bricker et al. 1993
90	NE	Tampa Bay, FL	COA	10-d	Not significantly toxic (14.6+/-7.67% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.63+/-0.596		Long 1993
90	NE	Tampa Bay, FL	COA	1-h	Least toxic (79.4+/-9.9% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.45+/-0.587		Long 1993
90	NE	Tampa Bay, FL	COA		Not significantly toxic (EC50; 0.066+/-0.033 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.89+/-0.902		Long 1993
90	NG	Tampa Bay, FL	COA	1-h	Moderately toxic (15.3+/-10.6% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.94+/-0.908		Long 1993
90.6 +/-24.3	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (10.6+/-3.17% mortality)	Ampelisca abdita (amphipod)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
90.6 +/-24.3	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (8.00+/-2.92% mortality)	Mysidopsis bahia (mysid)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
92.9 +/-25.6	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (5.43+/-3.21% mortality)	Mysidopsis bahia (mysid)		1.21+/-1.13	9096+/-13378 ug/g	Windom In Prep
92.9 +/-25.6	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (9.61+/-2.7% mortality)	Menidia beryllina (silverside)		1.22+/-1.13	9172+/-13363 ug/g	Windom In Prep
100	SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (16% mortality)	Mysidopsis bahia (mysid)		1.8	7095 ug/g	Windom In Prep
100	SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (22.3% mortality)	Menidia beryllina (silverside)		1.71	6562 ug/g	Windom In Prep

Table 14. A summary of the available data on the biological effects associated with sediment-sorbed FLUORENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Fluorene Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
101	*	United States	SLCA		National Screening Level Concentration-Marine	Benthic species		1		Neff et al. 1987
101 +/-165	*	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (91.5+/-7.28% normal development)	Mulinia lateralis (bivalve)	LAR	2.6+/-0.899	36.8+/-34.9	Bricker et al. 1993
109 +/-14.7	SG	Brunswick Harbor Entrance, GA	COA	48-h	Significantly toxic (14.6+/-18.9% normal development)	Arbacia punctulata (sea urchin)		1.99+/-0.562	14009+/-13434 ug/g	Windom In Prep
117 +/-113	NE	Commencement Bay, WA	COA	10-d	Least toxic (12.5+/-4.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
143 +/-119	*	Commencement Bay, WA	COA	48-h	Moderately toxic (23+/-2.3% abnormality)	Oyster	LAR			Tetra Tech 1985
144		***PEL***								
146 +/-167	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (6.8+/-7.31% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
146 +/-167	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (8.5+/-6.06% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
146 +/-167	NE	Halifax Harbour, NS	COA	20-d	Not significantly toxic (0.7+/-1.63% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
147 +/-131	SG	Commencement Bay, WA	COA	10-d	Moderately toxic (26+/-5.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
154 +/-210	*	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (88.5+/-8.39% normal development)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.05	38.1+/-38.9	Bricker et al. 1993
154 +/-231	NE	Burrard Inlet, BC	COA	10-d	Not toxic (8.9+/-2.99% mortality)	Corophium volutator (amphipod)	ADT	2.8+/-1.96		McLeay et al. 1991
154 +/-231	NE	Burrard Inlet, BC	COA	10-d	Not toxic (97.2+/-2.84% reburial)	Rhepoxynius abronius (amphipod)	ADT	2.8+/-1.96		McLeay et al. 1991
160	*	United States	EqPA		95% Chronic Marine Criteria	Aquatic organisms		1		Pavlou et al. 1987
160 +/-208	*	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (51.3+/-6.95% mortality)	Mulinia lateralis (bivalve)	LAR	1.8+/-1.71	29.6+/-46.3	Bricker et al. 1993
162 +/-105	*	San Francisco Bay, CA	COA	48-h	Highly toxic (92.4+/-4.5% abnormal)	Bivalve	LAR			Long & Morgan 1990
167 +/-240	NE	Elizabeth River, VA	COA	96-h	No significant change in respiration rate	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
187 +/-234	NC	Eagle Harbor, WA	COA	10-d	Moderately toxic (41+/-9% mortality)	Rhepoxynius abronius (amphipod)	ADT			CH2M Hill 1989
197 +/-191	NE	Elizabeth River, VA	COA	96-h	Not significantly toxic (4.5+/-3.24% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
200 +/-260	NE	Burrard Inlet, BC	COA	10-d	Not toxic (7.9+/-5.12% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.64+/-2.14		McLeay et al. 1991
210	*	Eagle Harbor, WA	COA	4-d	LC50	Rhepoxynius abronius (amphipod)	ADT			Swartz et al. 1989
210	*	San Francisco Bay, CA	AETA	10-d	San Francisco Bay AET	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
210	*	Northern California	AETA	10-d	Northern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
210	*	California	AETA	10-d	California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
230	*	Puget Sound, WA	SQG		Chemical Criteria	Benthic community		1		WDE 1989
235 +/-206	*	Tampa Bay, FL	COA	1-h	Most toxic (0.091+/-0.187% fertilization)	Arbacia punctulata (sea urchin)	GAM	2.96+/-1.49		Long 1993
290 +/-219	*	Tampa Bay, FL	COA	10-d	Significantly toxic (35.2+/-17.5% mortality)	Ampelisca abdita (amphipod)	SUB ADT	3.53+/-1.35		Long 1993
320 +/-220	*	Tampa Bay, FL	COA		Significantly toxic (EC50; 0.017+/-0.012 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.47+/-1.49		Long 1993
353 +/-746	*	Commencement Bay, WA	COA	48-h	Highly toxic (44.5+/-19% abnormality)	Oyster	LAR			Tetra Tech 1985
396	NE	Laboratory	SSBA	~4-m	No significant change in liver somatic indices	Pseudopleuronectes americanus (flounder)	ADT			Payne et al. 1988
500	*	Burrard Inlet, BC	COA	10-d	Highly toxic (23% emergence)	Corophium volutator (amphipod)	ADT	3.5		McLeay et al. 1991
500	*	Burrard Inlet, BC	COA	10-d	Highly toxic (30.5% emergence)	Rhepoxynius abronius (amphipod)	ADT	3.5		McLeay et al. 1991
540	*	Puget Sound, WA	AETA	15-min	1988 Puget Sound AET	Microtox (Photobacterium phosphoreum)				PTI 1988
540	*	Puget Sound, WA	AETA	48-h	1988 Puget Sound AET	Crassostrea gigas (oyster)	LAR			PTI 1988
640	*	Puget Sound, WA	AETA		PSDDA Maximum Level Criteria	Aquatic biota				USACOE 1988
707 +/-1341	*	Commencement Bay, WA	COA	10-d	Highly toxic (78.5+/-19.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
1000	*	Puget Sound, WA	AETA		1988 Puget Sound AET	Benthic community				PTI 1988
1017 +/-4679	NE	Eagle Harbor, WA	COA	10-d	Least toxic (13+/-7% mortality)	Rhepoxynius abronius (amphipod)	ADT			CH2M Hill 1989
3324 +/-8573	*	Elizabeth River, VA	COA	96-h	Significant decrease in respiration rates	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
3600	*	Puget Sound, WA	AETA	10-d	1988 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT			PTI 1988

Table 14. A summary of the available data on the biological effects associated with sediment-sorbed FLUORENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Fluorene	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
3805	+/-8840	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (4.43+/-2.1% mortality)	Panope generosa (geoduck)	JUV	1.51+/-0.261		Pastorok & Becker 1990
4013	+/-4938	*	Puget Sound, WA	COA		Toxic (71.6+/-14.6% prevalence of idiopathic degeneration/necrosis)	Parophrys vetulus (English sole)				Malins et al. 1985
4013	+/-4938	*	Puget Sound, WA	COA		Toxic (51.4+/-21.1% prevalence of steatosis and hemosiderosis)	Parophrys vetulus (English sole)				Malins et al. 1985
4013	+/-4938	*	Puget Sound, WA	COA		Toxic (19+/-6.15% prevalence of hepatocellular regenerative foci)	Parophrys vetulus (English sole)				Malins et al. 1985
4013	+/-4938	*	Puget Sound, WA	COA		Toxic (26.7+/-6.43% prevalence of hepatic neoplasms)	Parophrys vetulus (English sole)				Malins et al. 1985
4013	+/-4938	*	Puget Sound, WA	COA		Toxic (88+/-3.65% prevalence of hepatic idiopathic lesions)	Parophrys vetulus (English sole)				Malins et al. 1985
4013	+/-4938	*	Puget Sound, WA	COA		Toxic (44.2+/-8.5% prevalence of hepatic cellular alterations)	Parophrys vetulus (English sole)				Malins et al. 1985
4338	+/-9495	NE	Puget Sound, WA	COA	20-d	Not significantly toxic (5+/-3.86% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.46+/-0.26		Pastorok & Becker 1990
7000		*	United States	EqPA		Chronic Marine EqP Threshold	Aquatic biota		1		Bolton et al. 1985
7303	+/-10320	NE	Sidney Tar Pond, NS	COA	20-d	Not significantly toxic (8+/-5.66% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
8485	+/-13901	*	Elizabeth River, VA	COA	96-h	Significantly toxic (50.7+/-39% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
10186	+/-24872	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (2.09+/-1.73% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.56+/-0.329		Pastorok & Becker 1990
11438	+/-24689	*	Puget Sound, WA	COA	15-min	Significantly toxic (EC50; 0.065+/-0.043% extract)	Microtox (Photobacterium phosphoreum)		1.58+/-0.255		Pastorok & Becker 1990
13527	+/-18106	NE	Laboratory	SSBA	~4-m	No significant change in kidney MFO induction	Pseudopleuronectes americanus (flounder)	ADT			Payne et al. 1988
14600		*	Sidney Tar Pond, NS	COA	10-d	Significantly toxic (100% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
14600		*	Sidney Tar Pond, NS	COA	10-d	Significantly toxic (100% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
15230	+/-27810	*	Puget Sound, WA	COA	2-d	Significantly toxic (60.4+/-46.5% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.57+/-0.287		Pastorok & Becker 1990
22811	+/-65559	*	Eagle Harbor, WA	COA	10-d	Highly toxic (95.5+/-8.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			CH2M Hill 1989
22832	+/-32084	*	Puget Sound, WA	COA	10-d	Significantly toxic (80.8+/-30.6% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.266		Pastorok & Becker 1990
23418	+/-21387	NE	Laboratory	SSBA	~4-m	No significant change in spleen condition indices	Pseudopleuronectes americanus (flounder)	ADT			Payne et al. 1988
28407	+/-48148	*	Puget Sound, WA	COA	20-d	Significantly toxic (37.3+/-22% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.87+/-0.208		Pastorok & Becker 1990
84000		*	Puget Sound, WA	COA	10-d	Significantly toxic (56% mortality)	Panope generosa (geoduck)	JUV	2.1		Pastorok & Becker 1990
85400		*	Sidney Tar Pond, NS	COA	20-d	Significantly toxic (52% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
220533	+/-252275	*	Laboratory	SSBA	~4-m	Significant change in liver somatic indices	Pseudopleuronectes americanus (flounder)	ADT			Payne et al. 1988
285267	+/-265181	*	Laboratory	SSBA	~4-m	Significant increase in kidney MFO induction	Pseudopleuronectes americanus (flounder)	ADT			Payne et al. 1988
406325	+/-229668	*	Laboratory	SSBA	~4-m	Significant change in spleen condition indices	Pseudopleuronectes americanus (flounder)	ADT			Payne et al. 1988

Table 15. A summary of the available data on the biological effects associated with sediment-sorbed 2-METHYLNAPHTHALENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

2-Methylnaphthalene	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.44		NC	Mobile Bay, AL	COA		Significantly toxic (10% mortality)	Mysidopsis bahia (mysid shrimp)		0.009	0.004	EMAP Louisiana Province 1991
0.75	+/-0.28	NC	Mississippi Sound, MS	COA	10-d	Significantly toxic (11.6+/-3.39% mortality)	Ampelisca abdita (amphipod)		0.111+/-0.045	0.03	EMAP Louisiana Province 1991
0.872	+/-0.354	NC	Chandeleur Sound, LA	COA		Significantly toxic (7.6+/-1.32% mortality)	Mysidopsis bahia (mysid shrimp)		0.624+/-0.197	2.07+/-1.19	EMAP Louisiana Province 1991
0.902	+/-0.796	NC	Chandeleur Sound, LA	COA	10-d	Significantly toxic (11.5+/-4.86% mortality)	Ampelisca abdita (amphipod)		0.811+/-0.711	1.87+/-0.973	EMAP Louisiana Province 1991
1.05	+/-0.978	NE	Chandeleur Sound, LA	COA		Not significantly toxic (1.03+/-2.05% mortality)	Mysidopsis bahia (mysid shrimp)		0.824+/-0.915	1.69+/-0.920	EMAP Louisiana Province 1991
1.05	+/-0.339	NE	Chandeleur Sound, LA	COA	10-d	Not significantly toxic (2.87+/-4.05% mortality)	Ampelisca abdita (amphipod)		0.517+/-0.166	2.02+/-1.38	EMAP Louisiana Province 1991
1.5	+/-0.658	NE	Mississippi Sound, MS	COA		Not significantly toxic (0.789+/-1.59% mortality)	Mysidopsis bahia (mysid shrimp)		0.827+/-0.757	1.46+/-1.58	EMAP Louisiana Province 1991
1.62	+/-1.02	NC	Apalachee Bay, FL	COA	10-d	Significantly toxic (15.6% mortality)	Ampelisca abdita (amphipod)		0.438+/-0.442	0.421+/-0.593	EMAP Louisiana Province 1991
1.75		NE	Puget Sound, WA	COA		Not toxic (10% prevalence of idiopathic degeneration/necrosis)	Parophrys vetulus (English sole)				Malins et al. 1985
1.75		NE	Puget Sound, WA	COA		Not toxic (17.5% prevalence of steatosis and hemosiderosis)	Parophrys vetulus (English sole)				Malins et al. 1985
1.75		NE	Puget Sound, WA	COA		Not toxic (0% occurrence of hepatic cellular alterations)	Parophrys vetulus (English sole)				Malins et al. 1985
1.75		NE	Puget Sound, WA	COA		Not toxic (5% prevalence of hepatocellular regenerative foci)	Parophrys vetulus (English sole)				Malins et al. 1985
1.75		NE	Puget Sound, WA	COA		Not toxic (0% prevalence of hepatic cellular alterations)	Parophrys vetulus (English sole)				Malins et al. 1985
1.75		NE	Puget Sound, WA	COA		Not toxic (32.5% prevalence of hepatic idiopathic lesions)	Parophrys vetulus (English sole)				Malins et al. 1985
1.75	+/-0.546	NE	Mississippi Sound, MS	COA	10-d	Not significantly toxic (1.4+/-1.73% mortality)	Ampelisca abdita (amphipod)		0.998+/-0.602	2.01+/-1.82	EMAP Louisiana Province 1991
1.82	+/-0.577	SG	Mississippi Sound, MS	COA		Significantly toxic (12.2+/-4.42% mortality)	Mysidopsis bahia (mysid shrimp)		0.939+/-0.335	2.63+/-2.3	EMAP Louisiana Province 1991
1.84	+/-0.955	NE	Apalachee Bay, FL	COA		Not significantly toxic (0.75+/-1.5% mortality)	Mysidopsis bahia (mysid shrimp)		0.540+/-0.385	0.405+/-0.417	EMAP Louisiana Province 1991
1.88	+/-2.04	NC	Mobile Bay, AL	COA	10-d	Significantly toxic (46+/-49.3% mortality)	Ampelisca abdita (amphipod)		0.22+/-0.298	3.84+/-5.43	EMAP Louisiana Province 1991
2.05	+/-1.23	NE	Apalachee Bay, FL	COA	10-d	Not significantly toxic (3.3+/-3.25% mortality)	Ampelisca abdita (amphipod)		0.643+/-0.455	0.390+/-0.410	EMAP Louisiana Province 1991
2.65	+/-0.93	NE	Matagorda Bay, TX	COA		Not significantly toxic (1.58+/-1.82% mortality)	Mysidopsis bahia (mysid shrimp)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
2.65	+/-0.93	NE	Matagorda Bay, TX	COA	10-d	Not significantly toxic (2.33+/-4.65% mortality)	Ampelisca abdita (amphipod)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
2.76	+/-0.014	NE	Mobile Bay, AL	COA	10-d	Not significantly toxic (0.5+/-0.778% mortality)	Ampelisca abdita (amphipod)		1.24+/-0.948	8.51+/-4.76	EMAP Louisiana Province 1991
2.95	+/-0.323	NE	Mobile Bay, AL	COA		Not significantly toxic (1.07+/-1.85% mortality)	Mysidopsis bahia (mysid shrimp)		0.968+/-0.815	8.23+/-3.4	EMAP Louisiana Province 1991
4.31	+/-2.65	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (5.8+/-3.7% mortality)	Rhepoxynius abronius (amphipod)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
4.31	+/-2.65	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (3.4+/-1.82% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
4.31	+/-2.65	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (11.2+/-3.7% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
4.31	+/-2.65	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (3.52+/-1.66% mortality)	Macoma nasuta (clam)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
4.39	+/-4.85	NC	Galveston Bay, TX	COA	10-d	Significantly toxic (15.8+/-3.89% mortality)	Ampelisca abdita (amphipod)		0.647+/-0.606	0.160+/-0.184	EMAP Louisiana Province 1991
4.6		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (0.33+/-0.516% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
4.6		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (2.33+/-1.03% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
4.6		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (15.3+/-11.0% mortality)	Hyalella azteca (amphipod)	JUV	0.648+/-0.641	1.74+/-1.39	Hall et al. 1992
4.6		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1% mortality)	Streblospio benedicti (polychaete worm)		1.38	3.25	Hall et al. 1992
4.6		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (16.5+/-9.19% mortality)	Streblospio benedicti (polychaete worm)		0.783+/-0.845	4.83+/-2.23	Hall et al. 1992
4.6		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.367+/-0.085 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
4.6		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.0005 mg/day growth)	Streblospio benedicti (polychaete worm)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
4.6		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.003+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.316+/-0.120	2.13+/-2.46	Hall et al. 1992
4.6		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (7.2+/-1.92% mortality)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
4.6		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.6+/-0.55% reburial)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
4.6		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
4.6		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.56+/-0.47	1.5+/-1.13	Hall et al. 1992

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4.6	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.001+/-0.001 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.555+/-0.471	2.68+/-2.3	Hall et al. 1992
4.6	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1.83+/-1.6% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
4.6	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (3.5+/-1.87% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
4.6	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (9.25+/-5.32% mortality)	Lepidactylus dytiscus (amphipod)		0.638+/-0.768	1.65+/-1.62	Hall et al. 1992
4.6	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (22.3+/-7.37% mortality)	Hyalella azteca (amphipod)	JUV	0.788+/-0.866	2.04+/-1.75	Hall et al. 1992
4.6	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (8.8+/-7.12% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
4.6	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (14+/-9.22% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
4.6	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.1+/-0.865% reburial)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
4.6	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<20% emergence)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
4.6	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
4.6	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (-0.057+/-0.04 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
4.6	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.001mg/day growth)	Streblospio benedicti (polychaete worm)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
4.6	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.016 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
4.6	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.005+/-0.0004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
4.6	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (55.0+/-22.6% mortality)	Hyalella azteca (amphipod)	JUV	0.338+/-0.133	2.9+/-3.11	Hall et al. 1992
4.6	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29.8+/-11.1% mortality)	Streblospio benedicti (polychaete worm)		0.316+/-0.12	2.13+/-2.46	Hall et al. 1992
4.6	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (55.0+/-19.5% mortality)	Streblospio benedicti (polychaete worm)		0.349+/-0.11	1.07+/-0.66	Hall et al. 1992
4.6	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.003 mg/day growth)	Lepidactylus dytiscus (amphipod)		1.38	3.25	Hall et al. 1992
4.6	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29% mortality)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
4.6	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (89.7% reburial)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
4.6	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
4.6	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	6.41	Hall et al. 1992
4.6	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
4.6	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (45.5+/-12% mortality)	Lepidactylus dytiscus (amphipod)		0.383+/-0.279	3.61+/-2.79	Hall et al. 1992
4.6	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (63.0+/-24.3% mortality)	Hyalella azteca (amphipod)	JUV	0.317+/-0.228	2.57+/-2.67	Hall et al. 1992
4.6	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (22% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
4.6	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (28% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
4.6	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (82.9% reburial)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
4.6	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>20% emergence)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
4.6	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	5.58	Hall et al. 1992
4.6	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.008+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.4	Hall et al. 1992
4.6	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.003 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
5.1 +/-6.76	NC	Galveston Bay, TX	COA		Significantly toxic (13.4+/-9.11% mortality)	Mysidopsis bahia (mysid shrimp)		0.778+/-0.482	1.21+/-0.778	EMAP Louisiana Province 1991
7.05 +/-6.77	NE	Galveston Bay, TX	COA	10-d	Not significantly toxic (1.35+/-1.45% mortality)	Ampelisca abdita (amphipod)		0.961+/-0.537	1.17+/-0.640	EMAP Louisiana Province 1991
7.18 +/-8.69	NE	Mississippi River, MS, LA	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		1.3+/-0.83	1.14+/-1	EMAP Louisiana Province 1991
7.23 +/-6	NE	Galveston Bay, TX	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		0.934+/-0.657	0.457+/-0.530	EMAP Louisiana Province 1991
8.2 +/-11.6	NE	Oahu, Hawaii	COA	10-d	Not significantly toxic (7.2+/-1.89% mortality)	Eohaustorius estuarius (amphipod)	ADT	1.93+/-1.94	10.3+/-12.4	Lamberson et al. 1993
8.2 +/-11.6	NE	Oahu, Hawaii	COA	10-d	Not significantly toxic (10.1+/-4.01% mortality)	Corophium acherusicum (amphipod)	ADT	1.93+/-1.94	10.3+/-12.4	Lamberson et al. 1993
8.57 +/-10.7	NC	Mississippi River, MS, LA	COA	10-d	Significantly toxic (15.9+/-6.65% mortality)	Ampelisca abdita (amphipod)		1.22+/-0.717	0.235+/-0.276	EMAP Louisiana Province 1991
9.9 +/-4.85	NE	Mississippi River, MS, LA	COA	10-d	Not significantly toxic (7.8+/-1.63% mortality)	Ampelisca abdita (amphipod)		1.15+/-1.04	2.31+/-0.651	EMAP Louisiana Province 1991

Table 15. A summary of the available data on the biological effects associated with sediment-sorbed 2-METHYLNAPHTHALENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

2-Methylnaphthalene	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
11.3	+/-6.81	SG	Mississippi River, MS, LA	COA		Significantly toxic (32.9+/-36.4% mortality)	Mysidopsis bahia (mysid shrimp)		1.07+/-0.924	1.41+/-1.93	EMAP Louisiana Province 1991
12.7	+/-5.25	NE	Puget Sound, WA	COA	15-min	Not significantly toxic (EC50; 0.283+/-0.168% extract)	Microtox (Photobacterium phosphoreum)		1.39+/-0.37		Pastorok & Becker 1990
16.4	+/-33.3	NE	Southern California	COA	10-d	Not significantly toxic (23.2% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
16.8	+/-3.86	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-7.99% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.14+/-0.352	6.09+/-5.38	Bricker et al. 1993
20.2	+/-6.8	NE	San Francisco Bay, CA	COA	48-h	Least toxic (23.3+/-7.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
20.2			***TEL***								
23.5	+/-5.36	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.125+/-0.084 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.25+/-0.468	1.98+/-2.25	Bricker et al. 1993
23.7	+/-3.5	NE	San Francisco Bay, CA	COA	48-h	Not significantly toxic (31.9+/-15.5% abnormal)	Bivalve	LAR			Long & Morgan 1990
23.9	+/-3.69	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (19.3+/-5.86% mortality)	Ampelisca abidta (amphipod)	SUB ADT	1.82+/-0.225	6.3+/-6.2	Bricker et al. 1993
25		NC	Puget Sound, WA	COA	2-d	Significantly toxic (3.8% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.5		Pastorok & Becker 1990
25.1	+/-5.4	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.061+/-0.038 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.8+/-0.477	8.52+/-10.7	Bricker et al. 1993
25.4	+/-7.03	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (25.9+/-5.01% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.21+/-0.444	2.41+/-2.32	Bricker et al. 1993
25.5	+/-22.7	SG	San Francisco Bay, CA	COA	48-h	Moderately toxic (59.4+/-11.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
27		*	San Francisco Bay, CA	AETA	48-h	San Francisco Bay AET	Oyster; mussel	LAR			Long & Morgan 1990
28.2	+/-7.91	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (15.2+/-9.21% mortality)	Mulinia lateralis (bivalve)	LAR	2.17+/-0.663	18.4+/-19.9	Bricker et al. 1993
28.5	+/-20.9	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.074+/-0.043 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.27+/-0.626	6.21+/-5.41	Bricker et al. 1993
28.7	+/-18.5	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (12.3+/-14.5% mortality)	Mulinia lateralis (bivalve)	LAR	1.53+/-0.743	15.7+/-23.2	Bricker et al. 1993
28.8	+/-21.2	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99.3+/-0.827% normal development)	Mulinia lateralis (bivalve)	LAR	1.43+/-0.738	14.7+/-24	Bricker et al. 1993
30.1	+/-8.67	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (39.5+/-18.2% mortality)	Ampelisca abidta (amphipod)	SUB ADT	2.06+/-0.523	20.1+/-13.9	Bricker et al. 1993
30.5	+/-33.2	NC	San Francisco Bay, CA	COA	10-d	Significantly toxic (42.9+/-19.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
30.5	+/-8.64	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.3+/-2.22% normal development)	Mulinia lateralis (bivalve)	LAR	2.18+/-0.531	19.1+/-12.5	Bricker et al. 1993
30.6	+/-3.67	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (96+/-1.66% normal development)	Mulinia lateralis (bivalve)	LAR	2.52+/-0.997	35+/-42.9	Bricker et al. 1993
31.6	+/-25	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (13.8+/-4.09% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.47+/-0.306		Pastorok & Becker 1990
31.7	+/-30.8	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.096+/-0.101 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.37+/-0.759	6.93+/-6.83	Bricker et al. 1993
32.3	+/-41.2	NC	San Francisco Bay, CA	COA	10-d	Highly toxic (67+/-11.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
32.5	+/-28.5	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (6.67+/-8.07% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.51+/-0.330		Pastorok & Becker 1990
33.8	+/-27.1	NC	San Francisco Bay, CA	COA	10-d	Moderately toxic (33.8+/-4.7% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
34.1	+/-7.68	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.014+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.51+/-0.45	29.6+/-15.7	Bricker et al. 1993
34.2	+/-33.2	NE	San Francisco Bay, CA	COA	10-d	Least toxic (18+/-6.6% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
34.9	+/-35.7	SG	San Francisco Bay, CA	COA	48-h	Significantly toxic (55.7+/-22.7% abnormal)	Bivalve	LAR			Long & Morgan 1990
35.1	+/-22.5	*	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (30.5+/-16.4% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.62+/-0.777	17.7+/-26.3	Bricker et al. 1993
35.1	+/-6.79	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.5+/-11.4% mortality)	Mulinia lateralis (bivalve)	LAR	2.33+/-0.364	26.8+/-9.42	Bricker et al. 1993
35.4	+/-31.7	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (6.48+/-10.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
35.4	+/-31.7	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99+/-0.862% normal development)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
38.5	+/-35.4	NE	San Francisco Bay, CA	COA	10-d	Not significantly toxic (18.4+/-6.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
45		*	Puget Sound, WA	AETA	15-min	1986 Puget Sound AET	Microtox (Photobacterium phosphoreum)		1		Bellar et al. 1986
45		*	Puget Sound, WA	AETA	48-h	1986 Puget Sound AET	Crassostrea gigas (oyster)	LAR	1		Bellar et al. 1986
45		*	Puget Sound, WA	AETA	10-d	1986 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT	1		Bellar et al. 1986
45		*	Puget Sound, WA	AETA		1986 Puget Sound AET	Benthic species		1		Bellar et al. 1986
47.4	+/-63.1	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.167+/-0.198 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.59+/-1.09	4.67+/-6.99	Bricker et al. 1993

Table 15. A summary of the available data on the biological effects associated with sediment-sorbed 2-METHYLNAPHTHALENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

2-Methylnaphthalene	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
48.7	+/-67.5	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-6.07% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.71+/-0.9	15.3+/-23.2	Bricker et al. 1993
52.4	+/-63.6	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (17+/-16.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.99+/-1	21.6+/-24.5	Bricker et al. 1993
56.9	+/-71.3	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.016+/-0.007 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.26+/-0.936	43.4+/-35.6	Bricker et al. 1993
60		NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (18% mortality)	Ampelisca abdita (amphipod)		0.028	9 ug/g	Windom In Prep
64.9	+/-154	*	Southern California	COA	10-d	Significantly toxicity (51.7% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
66.4	+/-76.8	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.1+/-2.78% normal development)	Mulinia lateralis (bivalve)	LAR	2.12+/-1.04	22.9+/-23.7	Bricker et al. 1993
67		NE	Puget Sound, WA	AETA		PSDDA Screening level concentration	Aquatic biota				USACOE 1988
67.5	+/-2.89	NE	Brunswick Harbor Entrance, GA	COA	48-h	Not significantly toxic (86.6+/-4.25% normal development)	Arbacia punctulata (sea urchin)		0.181+/-0.162	182+/-208 ug/g	Windom In Prep
68.3	+/-2.89	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (28.3+/-6.11% mortality)	Mysidopsis bahia (mysid)		0.246+/-0.051	127+/-24 ug/g	Windom In Prep
70		*	California	AETA	48-h	California AET Values	Mytilus edulis (bivalve)	LAR			Becker et al. 1990
70		*	California	AETA		California AET Values	Benthic species				Becker et al. 1990
70		*	Northern California	AETA		Northern California AET Values	Benthic species				Becker et al. 1990
70	+/-10.5	NC	Savannah River Entrance Channel, GA	COA	48-h	Significantly toxic (25.4+/-7.66% mortality)	Arbacia punctulata (sea urchin)		0.344+/-0.242	129.5+/-59.3 ug/g	Windom In Prep
70.5	+/-67.9	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (21.5+/-6.36% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.35+/-1.05	10.5+/-13.4	Bricker et al. 1993
72.1	+/-11.1	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (91.3+/-2.91% normal development)	Arbacia punctulata (sea urchin)		0.299+/-0.251	114+/-68.4 ug/g	Windom In Prep
72.2	+/-11.5	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (9.78+/-5.33% mortality)	Mysidopsis bahia (mysid)		0.24+/-0.247	91.9+/-73.4 ug/g	Windom In Prep
73.4	+/-86	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (91.5+/-7.28% normal development)	Mulinia lateralis (bivalve)	LAR	2.6+/-0.899	36.8+/-34.9	Bricker et al. 1993
73.8	+/-11.3	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (11.6+/-4.33% mortality)	Ampelisca abdita (amphipod)		0.267+/-0.25	102+/-71.1 ug/g	Windom In Prep
73.8	+/-11.3	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (4+/-2.83% mortality)	Menidia beryllina (silverside)		0.243+/-0.264	90.5+/-78.4 ug/g	Windom In Prep
74.2	+/-13.9	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (27.5+/-10.6% mortality)	Mysidopsis bahia (mysid)		0.237+/-0.311	74.6+/-85.5 ug/g	Windom In Prep
75.6	+/-81.9	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (34.9+/-15.7% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.23+/-1.04	25.4+/-25.5	Bricker et al. 1993
77.1	+/-58.5	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.008+/-0.001 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.19+/-1.27	12+/-11.3	Bricker et al. 1993
85		NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (0% mortality)	Arbacia punctulata (sea urchin)		0.03	19 ug/g	Windom In Prep
90.6	+/-24.3	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (10.6+/-3.17% mortality)	Ampelisca abdita (amphipod)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
90.6	+/-24.3	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (8.00+/-2.92% mortality)	Mysidopsis bahia (mysid)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
92.9	+/-25.6	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (5.43+/-3.21% mortality)	Mysidopsis bahia (mysid)		1.21+/-1.13	9096+/-13378 ug/g	Windom In Prep
92.9	+/-25.6	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (9.61+/-2.7% mortality)	Menidia beryllina (silverside)		1.22+/-1.13	9172+/-13363 ug/g	Windom In Prep
95.2	+/-90.3	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.013+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.79+/-0.744	37.6+/-25.3	Bricker et al. 1993
98.3	+/-41.2	*	San Francisco Bay, CA	COA	48-h	Highly toxic (92.4+/-4.5% abnormal)	Bivalve	LAR			Long & Morgan 1990
100		SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (16% mortality)	Mysidopsis bahia (mysid)		1.8	7095 ug/g	Windom In Prep
100		SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (22.3% mortality)	Menidia beryllina (silverside)		1.71	6562 ug/g	Windom In Prep
102	+/-114	*	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (51.3+/-6.95% mortality)	Mulinia lateralis (bivalve)	LAR	1.8+/-1.71	29.6+/-46.3	Bricker et al. 1993
102	+/-108	*	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (88.5+/-8.39% normal development)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.05	38.1+/-38.9	Bricker et al. 1993
102	+/-98.2	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (29.8+/-13.9% mortality)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.07	32.1+/-28.4	Bricker et al. 1993
109	+/-14.7	SG	Brunswick Harbor Entrance, GA	COA	48-h	Significantly toxic (14.6+/-18.9% normal development)	Arbacia punctulata (sea urchin)		1.99+/-0.562	14009+/-13434 ug/g	Windom In Prep
114	+/-97	*	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.1+/-13.3% mortality)	Mulinia lateralis (bivalve)	LAR	2.68+/-0.955	31.8+/-24.4	Bricker et al. 1993
120	+/-139	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (23+/-4.24% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.46+/-1.22	40+/-55.1	Bricker et al. 1993
126	+/-100	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (96.6+/-3.79% normal development)	Mulinia lateralis (bivalve)	LAR	2.87+/-0.94	35.1+/-25.9	Bricker et al. 1993
127	+/-99.8	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (38+/-13% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.92+/-0.937	34.6+/-23.9	Bricker et al. 1993
>130		-	San Francisco Bay, CA	AETA	10-d	San Francisco Bay AET	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990

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2-Methylnaphthalene				Analysis	Test			Life			
	Std Dev	Hit	Area	Type	Type	End-Point Measured	Species	Stage	TOC (%)	AVS (umol/g)	Reference
>130		-	Northern California	AETA	10-d	Northern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
>130		-	California	AETA	10-d	California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
151	+/-97.2	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.011+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.28+/-0.363	45.3+/-21.4	Bricker et al. 1993
165	+/-121	NE	Commencement Bay, WA	COA	48-h	Least toxic (15.1+/-3.1% abnormality)	Oyster	LAR			Tetra Tech 1985
168	+/-169	NE	Commencement Bay, WA	COA	10-d	Least toxic (12.5+/-4.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
175	+/-89.9	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (75.1+/-10.6% mortality)	Mulinia lateralis (bivalve)	LAR	3.32+/-0.317	42.3+/-19.2	Bricker et al. 1993
201			***PEL***								
207	+/-169	SG	Commencement Bay, WA	COA	48-h	Moderately toxic (23+/-2.3% abnormality)	Oyster	LAR			Tetra Tech 1985
213	+/-129	SG	Commencement Bay, WA	COA	10-d	Moderately toxic (26+/-5.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
326	+/-313	*	Commencement Bay, WA	COA	48-h	Highly toxic (44.5+/-19% abnormality)	Oyster	LAR			Tetra Tech 1985
380		*	Puget Sound, WA	SQG		Low Abundance Threshold Concentration	Praxillella gracilis (polycheata)		3.0		Tetra Tech 1986
380		*	Puget Sound, WA	SQG		Low Abundance Threshold Concentration	Euphilomedes producta (ostracoda)		7.0		Tetra Tech 1986
546	+/-490	*	Commencement Bay, WA	COA	10-d	Highly toxic (78.5+/-19.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
565		*	Puget Sound, WA	SQG		Low Abundance Threshold Concentration	Nucula tenuis (pelecypoda)		4.0		Tetra Tech 1986
640		*	Puget Sound, WA	SQG		Chemical Criteria	Benthic community		1		WDE 1989
670		*	Puget Sound, WA	AETA	15-min	1988 Puget Sound AET	Microtox (Photobacterium phosphoreum)				PTI 1988
670		*	Puget Sound, WA	AETA	48-h	1988 Puget Sound AET	Crassostrea gigas (oyster)	LAR			PTI 1988
670		*	Puget Sound, WA	AETA		PSDDA Maximum Level Criteria	Aquatic biota				USACOE 1988
920	+/-2192	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (4.43+/-2.1% mortality)	Panope generosa (geoduck)	JUV	1.51+/-0.261		Pastorok & Becker 1990
1052	+/-1213	*	Puget Sound, WA	COA		Toxic (71.6+/-14.6% prevalence of idiopathic degeneration/necrosis)	Parophrys vetulus (English sole)				Malins et al. 1985
1052	+/-1213	*	Puget Sound, WA	COA		Toxic (51.4+/-21.1% prevalence of steatosis and hemosiderosis)	Parophrys vetulus (English sole)				Malins et al. 1985
1052	+/-1213	*	Puget Sound, WA	COA		Toxic (19+/-6.15% prevalence of hepatocellular regenerative foci)	Parophrys vetulus (English sole)				Malins et al. 1985
1052	+/-1213	*	Puget Sound, WA	COA		Toxic (26.7+/-6.43% prevalence of hepatic neoplasms)	Parophrys vetulus (English sole)				Malins et al. 1985
1052	+/-1213	*	Puget Sound, WA	COA		Toxic (88+/-3.65% prevalence of hepatic idiopathic lesions)	Parophrys vetulus (English sole)				Malins et al. 1985
1052	+/-1213	*	Puget Sound, WA	COA		Toxic (44.2+/-8.5% prevalence of hepatic cellular alterations)	Parophrys vetulus (English sole)				Malins et al. 1985
1062	+/-2350	NE	Puget Sound, WA	COA	20-d	Not significantly toxic (5+/-3.86% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.46+/-0.26		Pastorok & Becker 1990
1400		*	Puget Sound, WA	AETA		1988 Puget Sound AET	Benthic community				PTI 1988
1900		*	Puget Sound, WA	AETA	10-d	1988 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT			PTI 1988
2728	+/-6771	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (2.09+/-1.73% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.56+/-0.329		Pastorok & Becker 1990
2987	+/-6717	*	Puget Sound, WA	COA	15-min	Significantly toxic (EC50; 0.065+/-0.043% extract)	Microtox (Photobacterium phosphoreum)		1.58+/-0.255		Pastorok & Becker 1990
3965	+/-7598	*	Puget Sound, WA	COA	2-d	Significantly toxic (60.4+/-46.5% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.57+/-0.287		Pastorok & Becker 1990
5932	+/-8856	*	Puget Sound, WA	COA	10-d	Significantly toxic (80.8+/-30.6% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.266		Pastorok & Becker 1990
7709	+/-13242	*	Puget Sound, WA	COA	20-d	Significantly toxic (37.3+/-22% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.87+/-0.208		Pastorok & Becker 1990
23000		*	Puget Sound, WA	COA	10-d	Significantly toxic (56% mortality)	Panope generosa (geoduck)	JUV	2.1		Pastorok & Becker 1990

Table 16. A summary of the available data on the biological effects associated with sediment-sorbed NAPHTHALENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Naphthalene	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.42		NC	Mobile Bay, AL	COA		Significantly toxic (10% mortality)	Mysidopsis bahia (mysid shrimp)		0.009	0.004	EMAP Louisiana Province 1991
0.64	+/-0.24	NC	Mississippi Sound, MS	COA	10-d	Significantly toxic (11.6+/-3.39% mortality)	Ampelisca abdita (amphipod)		0.111+/-0.045	0.03	EMAP Louisiana Province 1991
0.905	+/-0.544	NC	Apalachee Bay, FL	COA	10-d	Significantly toxic (15.6% mortality)	Ampelisca abdita (amphipod)		0.438+/-0.442	0.421+/-0.593	EMAP Louisiana Province 1991
1.14	+/-0.775	NE	Apalachee Bay, FL	COA		Not significantly toxic (0.75+/-1.5% mortality)	Mysidopsis bahia (mysid shrimp)		0.540+/-0.385	0.405+/-0.417	EMAP Louisiana Province 1991
1.26	+/-0.304	NE	Galveston Bay, TX	COA		High abundance (27.3+/-10 N/0.00203 sq.m.)	Mollusca		1.64+/-0.4	1.39+/-0.17	Carr 1992
1.32	+/-0.17	NE	Galveston Bay, TX	COA		High abundance (155+/-49.5 N/0.00203 sq.m.)	Oligochaeta		1.2+/-1.27	4.27+/-3.85	Carr 1992
1.37	+/-1.14	NE	Apalachee Bay, FL	COA	10-d	Not significantly toxic (3.3+/-3.25% mortality)	Ampelisca abdita (amphipod)		0.643+/-0.455	0.390+/-0.410	EMAP Louisiana Province 1991
1.44	+/-0.43	NE	Galveston Bay, TX	COA		High species richness (24.5+/-3.7 S/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
1.44	+/-0.433	NE	Galveston Bay, TX	COA		High abundance (359+/-92.8 N/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
1.46	+/-0.747	NC	Chandeleur Sound, LA	COA	10-d	Significantly toxic (11.5+/-4.86% mortality)	Ampelisca abdita (amphipod)		0.811+/-0.711	1.87+/-0.973	EMAP Louisiana Province 1991
1.49	+/-0.961	NE	Chandeleur Sound, LA	COA		Not significantly toxic (1.03+/-2.05% mortality)	Mysidopsis bahia (mysid shrimp)		0.824+/-0.915	1.69+/-0.920	EMAP Louisiana Province 1991
1.51	+/-0.265	SG	Chandeleur Sound, LA	COA		Significantly toxic (7.6+/-1.32% mortality)	Mysidopsis bahia (mysid shrimp)		0.624+/-0.197	2.07+/-1.19	EMAP Louisiana Province 1991
1.58	+/-0.342	NE	Chandeleur Sound, LA	COA	10-d	Not significantly toxic (2.87+/-4.05% mortality)	Ampelisca abdita (amphipod)		0.517+/-0.166	2.02+/-1.38	EMAP Louisiana Province 1991
1.63	+/-0.792	NE	Galveston Bay, TX	COA		High abundance (154+/-30.2 N/0.00203 sq.m.)	Benthic invertebrates		0.47+/-0.27	9.07+/-2.94	Carr 1992
1.95	+/-0.774	NE	Galveston Bay, TX	COA		High abundance (16.2+/-6.19 N/0.00203 sq.m.)	Copepoda		0.844+/-0.524	4.73+/-3.1	Carr 1992
1.96	+/-0.66	NE	Galveston Bay, TX	COA		High abundance (156+/-22.9 N/0.00203 sq.m.)	Polychaeta		0.916+/-0.661	2.94+/-2.3	Carr 1992
2.01	+/-1.08	NE	Mississippi Sound, MS	COA		Not significantly toxic (0.789+/-1.59% mortality)	Mysidopsis bahia (mysid shrimp)		0.827+/-0.757	1.46+/-1.58	EMAP Louisiana Province 1991
2.1	+/-0.426	SG	Mississippi Sound, MS	COA		Significantly toxic (12.2+/-4.42% mortality)	Mysidopsis bahia (mysid shrimp)		0.939+/-0.335	2.63+/-2.3	EMAP Louisiana Province 1991
2.17	+/-1.81	NE	Galveston Bay, TX	COA	48-h	Not toxic (98.1+/-1.79% normal development)	Arbacia punctulata (sea urchin)	EMB	.748+/-0.476	4.16+/-3.45	Carr 1992
2.29	+/-0.718	NE	Mississippi Sound, MS	COA	10-d	Not significantly toxic (1.4+/-1.73% mortality)	Ampelisca abdita (amphipod)		0.998+/-0.602	2.01+/-1.82	EMAP Louisiana Province 1991
2.3		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (0.33+/-0.516% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
2.3		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (2.33+/-1.03% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
2.3		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (15.3+/-11.0% mortality)	Hyalella azteca (amphipod)	JUV	0.648+/-0.641	1.74+/-1.39	Hall et al. 1992
2.3		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1% mortality)	Streblospio benedicti (polychaete worm)		1.38	3.25	Hall et al. 1992
2.3		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (16.5+/-9.19% mortality)	Streblospio benedicti (polychaete worm)		0.783+/-0.845	4.83+/-2.23	Hall et al. 1992
2.3		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.367+/-0.085 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
2.3		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.0005 mg/day growth)	Streblospio benedicti (polychaete worm)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
2.3		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.003+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.316+/-0.120	2.13+/-2.46	Hall et al. 1992
2.3		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (7.2+/-1.92% mortality)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
2.3		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.6+/-0.55% reburial)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
2.3		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
2.3		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
2.3		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.001+/-0.001 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.555+/-0.471	2.68+/-2.3	Hall et al. 1992
2.3		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1.83+/-1.6% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
2.3		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (3.5+/-1.87% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
2.3		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (9.25+/-5.32% mortality)	Lepidactylus dytiscus (amphipod)		0.638+/-0.768	1.65+/-1.62	Hall et al. 1992
2.3		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (22.3+/-7.37% mortality)	Hyalella azteca (amphipod)	JUV	0.788+/-0.866	2.04+/-1.75	Hall et al. 1992
2.3		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (8.8+/-7.12% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
2.3		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (14+/-9.22% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
2.3		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.1+/-0.865% reburial)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
2.3		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<20% emergence)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
2.3		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	1.65+/-1.40	Hall et al. 1992

Table 16. A summary of the available data on the biological effects associated with sediment-sorbed NAPHTHALENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Naphthalene Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
2.3	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (-0.057+/-0.04 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
2.3	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.001mg/day growth)	Streblospio benedicti (polychaete worm)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
2.3	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.016 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
2.3	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.005+/-0.0004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
2.3	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (55.0+/-22.6% mortality)	Hyalella azteca (amphipod)	JUV	0.338+/-0.133	2.9+/-3.11	Hall et al. 1992
2.3	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29.8+/-11.1% mortality)	Streblospio benedicti (polychaete worm)		0.316+/-0.12	2.13+/-2.46	Hall et al. 1992
2.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (55.0+/-19.5% mortality)	Streblospio benedicti (polychaete worm)		0.349+/-0.11	1.07+/-0.66	Hall et al. 1992
2.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.003 mg/day growth)	Lepidactylus dytiscus (amphipod)		1.38	3.25	Hall et al. 1992
2.3	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29% mortality)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
2.3	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (89.7% reburial)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
2.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
2.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	6.41	Hall et al. 1992
2.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
2.3	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (45.5+/-12% mortality)	Lepidactylus dytiscus (amphipod)		0.383+/-0.279	3.61+/-2.79	Hall et al. 1992
2.3	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (63.0+/-24.3% mortality)	Hyalella azteca (amphipod)	JUV	0.317+/-0.228	2.57+/-2.67	Hall et al. 1992
2.3	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (22% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
2.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (28% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
2.3	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (82.9% reburial)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
2.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>20% emergence)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
2.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	5.58	Hall et al. 1992
2.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.008+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.4	Hall et al. 1992
2.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.003 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
2.33 +/-1.84	NE	Galveston Bay, TX	COA	1-h	Not toxic (92.5+/-6.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	0.77+/-0.448	6.37+/-6.58	Carr 1992
2.33 +/-0.442	SG	Galveston Bay, TX	COA		Moderate abundance (58.3+/-16.2 N/0.00203 sq.m.)	Oligochaeta		0.632+/-0.274	7.93+/-5.6	Carr 1992
2.36 +/-1.19	NC	Galveston Bay, TX	COA		Low abundance (0.3+/-0.651 N/0.00203 sq.m.)	Amphipoda		0.859+/-0.487	7.67+/-8.12	Carr 1992
2.36 +/-2.06	NE	Galveston Bay, TX	COA		Low species (11.2+/-1.94 S/0.00203 sq.m.)	Benthic species		0.642+/-0.356	13.4+/-8.65	Carr 1992
2.51 +/-1.16	NE	Matagorda Bay, TX	COA		Not significantly toxic (1.58+/-1.82% mortality)	Mysidopsis bahia (mysid shrimp)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
2.51 +/-1.16	NE	Matagorda Bay, TX	COA	10-d	Not significantly toxic (2.33+/-4.65% mortality)	Ampelisca abdita (amphipod)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
2.68 +/-1.81	*	Galveston Bay, TX	COA		Low abundance (1.86+/-2.59 N/0.00203 sq.m.)	Mollusca		0.784+/-0.421	8.29+/-8.13	Carr 1992
2.71 +/-2.01	*	Galveston Bay, TX	COA		Low abundance (4.21+/-5.66 N/0.00203 sq.m.)	Oligochaeta		0.895+/-0.453	7.85+/-8.8	Carr 1992
2.71 +/-1.84	SG	Galveston Bay, TX	COA		Low species richness (10+/-3.73 S/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
2.71 +/-1.84	SG	Galveston Bay, TX	COA		Low abundance (89+/-60.7 N/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
2.72 +/-3.25	NC	Mobile Bay, AL	COA	10-d	Significantly toxic (46+/-49.3% mortality)	Ampelisca abdita (amphipod)		0.22+/-0.298	3.84+/-5.43	EMAP Louisiana Province 1991
2.75 +/-1.99	SG	Galveston Bay, TX	COA		Low abundance (41.7+/-21.8 N/0.00203 sq.m.)	Polychaeta		0.848+/-0.427	9.21+/-8.61	Carr 1992
2.96 +/-2.14	SG	Galveston Bay, TX	COA		Low abundance (2.05+/-1.58 N/0.00203 sq.m.)	Copepoda		0.879+/-0.47	9.63+/-9.65	Carr 1992
2.98 +/-1.62	SG	Galveston Bay, TX	COA	48-h	Toxic (4.65+/-16.1% normal development)	Arbacia punctulata (sea urchin)	EMB	1.06+/-0.449	14.5+/-9.2	Carr 1992
3.05 +/-1.32	SG	Galveston Bay, TX	COA	1-h	Toxic (20.4+/-18.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	1.26+/-0.47	14.6+/-10.1	Carr 1992
3.81 +/-3.61	*	Galveston Bay, TX	COA		Low abundance (53+/-33.9 N/0.00203 sq.m.)	Benthic invertebrates		0.985+/-0.247	22+/-11.2	Carr 1992
4.09 +/-4.71	NC	Galveston Bay, TX	COA		Significantly toxic (13.4+/-9.11% mortality)	Mysidopsis bahia (mysid shrimp)		0.778+/-0.482	1.21+/-0.778	EMAP Louisiana Province 1991
4.19 +/-0.276	NE	Mobile Bay, AL	COA	10-d	Not significantly toxic (0.5+/-0.778% mortality)	Ampelisca abdita (amphipod)		1.24+/-0.948	8.51+/-4.76	EMAP Louisiana Province 1991
4.46 +/-0.52	NE	Mobile Bay, AL	COA		Not significantly toxic (1.07+/-1.85% mortality)	Mysidopsis bahia (mysid shrimp)		0.968+/-0.815	8.23+/-3.4	EMAP Louisiana Province 1991
4.54 +/-5.15	NC	Galveston Bay, TX	COA	10-d	Significantly toxic (15.8+/-3.89% mortality)	Ampelisca abdita (amphipod)		0.647+/-0.606	0.160+/-0.184	EMAP Louisiana Province 1991

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Naphthalene	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
5		NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (3% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
5		NE	Sidney Tar Pond, NS	COA	10-d	Not significantly toxic (4% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
5		NE	Sidney Tar Pond, NS	COA	10-d	Not significantly toxic (3% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
5.42	+/-6.26	NE	Galveston Bay, TX	COA		High Abundance (6+/-1.41 N/0.00203 sq.m.)	Amphipoda		0.955+/-0.629	7.21+/-8.2	Carr 1992
5.44	+/-4.71	NE	Galveston Bay, TX	COA	10-d	Not significantly toxic (1.35+/-1.45% mortality)	Ampelisca abdita (amphipod)		0.961+/-0.537	1.17+/-0.640	EMAP Louisiana Province 1991
5.72	+/-3.29	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (5.8+/-3.7% mortality)	Rhepoxynius abronius (amphipod)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
5.72	+/-3.29	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (3.4+/-1.82% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
5.72	+/-3.29	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (11.2+/-3.7% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
5.72	+/-3.29	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (3.52+/-1.66% mortality)	Macoma nasuta (clam)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
6.19	+/-4.64	NE	Galveston Bay, TX	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		0.934+/-0.657	0.457+/-0.530	EMAP Louisiana Province 1991
8.17	+/-16.1	NE	Southern California	COA	10-d	Not significantly toxic (23.2% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
8.9		NE	Puget Sound, WA	COA		Not toxic (10% prevalence of idiopathic degeneration/necrosis)	Parophrys vetulus (English sole)				Malins et al. 1985
8.9		NE	Puget Sound, WA	COA		Not toxic (17.5% prevalence of steatosis and hemosiderosis)	Parophrys vetulus (English sole)				Malins et al. 1985
8.9		NE	Puget Sound, WA	COA		Not toxic (0% occurrence of hepatic cellular alterations)	Parophrys vetulus (English sole)				Malins et al. 1985
8.9		NE	Puget Sound, WA	COA		Not toxic (5% prevalence of hepatocellular regenerative foci)	Parophrys vetulus (English sole)				Malins et al. 1985
8.9		NE	Puget Sound, WA	COA		Not toxic (0% prevalence of hepatic cellular alterations)	Parophrys vetulus (English sole)				Malins et al. 1985
8.9		NE	Puget Sound, WA	COA		Not toxic (32.5% prevalence of hepatic idiopathic lesions)	Parophrys vetulus (English sole)				Malins et al. 1985
9.13	+/-5.78	NC	Mississippi River, MS, LA	COA	10-d	Significantly toxic (15.9+/-6.65% mortality)	Ampelisca abdita (amphipod)		1.22+/-0.717	0.235+/-0.276	EMAP Louisiana Province 1991
9.41	+/-5.37	NC	Mississippi River, MS, LA	COA		Significantly toxic (32.9+/-36.4% mortality)	Mysidopsis bahia (mysid shrimp)		1.07+/-0.924	1.41+/-1.93	EMAP Louisiana Province 1991
10.1	+/-7.2	NE	Mississippi River, MS, LA	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		1.3+/-0.83	1.14+/-1	EMAP Louisiana Province 1991
10.4	+/-6.8	NE	Mississippi River, MS, LA	COA	10-d	Not significantly toxic (7.8+/-1.63% mortality)	Ampelisca abdita (amphipod)		1.15+/-1.04	2.31+/-0.651	EMAP Louisiana Province 1991
21	+/-6.7	NE	Puget Sound, WA	COA	15-min	Not significantly toxic (EC50; 0.283+/-0.168% extract)	Microtox (Photobacterium phosphoreum)		1.39+/-0.37		Pastorok & Becker 1990
26.7	+/-8.05	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-7.99% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.14+/-0.352	6.09+/-5.38	Bricker et al. 1993
28.3	+/-35.9	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (6.8+/-7.31% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
28.3	+/-35.9	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (8.5+/-6.06% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
28.3	+/-35.9	NE	Halifax Harbour, NS	COA	20-d	Not significantly toxic (0.7+/-1.63% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
29.8	+/-14.3	NE	Oahu, Hawaii	COA	10-d	Not significantly toxic (7.2+/-1.89% mortality)	Eohaustorius estuarius (amphipod)	ADT	1.93+/-1.94	10.3+/-12.4	Lamberson et al. 1993
29.8	+/-14.3	NE	Oahu, Hawaii	COA	10-d	Not significantly toxic (10.1+/-4.01% mortality)	Corophium acherusicum (amphipod)	ADT	1.93+/-1.94	10.3+/-12.4	Lamberson et al. 1993
30		SG	Eagle Harbor, WA	COA	4-d	LC50	Rhepoxynius abronius (amphipod)	ADT			Swartz et al. 1989
31.6	+/-6.33	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (19.3+/-5.86% mortality)	Ampelisca abidta (amphipod)	SUB ADT	1.82+/-0.225	6.3+/-6.2	Bricker et al. 1993
32.7	+/-9.92	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.125+/-0.084 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.25+/-0.468	1.98+/-2.25	Bricker et al. 1993
33.3	+/-10.3	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (25.9+/-5.01% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.21+/-0.444	2.41+/-2.32	Bricker et al. 1993
34.6			***TEL***								
34.8	+/-6.92	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.061+/-0.038 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.8+/-0.477	8.52+/-10.7	Bricker et al. 1993
36.7	+/-8.71	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (15.2+/-9.21% mortality)	Mulinia lateralis (bivalve)	LAR	2.17+/-0.663	18.4+/-19.9	Bricker et al. 1993
37.4	+/-6.19	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (96+/-1.66% normal development)	Mulinia lateralis (bivalve)	LAR	2.52+/-0.997	35+/-42.9	Bricker et al. 1993
39	+/-9.6	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (39.5+/-18.2% mortality)	Ampelisca abidta (amphipod)	SUB ADT	2.06+/-0.523	20.1+/-13.9	Bricker et al. 1993
39.1	+/-9.38	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.3+/-2.22% normal development)	Mulinia lateralis (bivalve)	LAR	2.18+/-0.531	19.1+/-12.5	Bricker et al. 1993
39.2	+/-24.9	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99.3+/-0.827% normal development)	Mulinia lateralis (bivalve)	LAR	1.43+/-0.738	14.7+/-24	Bricker et al. 1993
41.4	+/-32.1	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.074+/-0.043 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.27+/-0.626	6.21+/-5.41	Bricker et al. 1993
41.6	+/-9.31	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.014+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.51+/-0.45	29.6+/-15.7	Bricker et al. 1993
42.7	+/-29.7	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (12.3+/-14.5% mortality)	Mulinia lateralis (bivalve)	LAR	1.53+/-0.743	15.7+/-23.2	Bricker et al. 1993

Table 16. A summary of the available data on the biological effects associated with sediment-sorbed NAPHTHALENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Naphthalene Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
42.7 +/-38	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.096+/-0.101 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.37+/-0.759	6.93+/-6.83	Bricker et al. 1993
43.1 +/-26.2	NC	San Francisco Bay, CA	COA	48-h	Moderately toxic (59.4+/-11.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
43.3 +/-8.18	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.5+/-11.4% mortality)	Mulinia lateralis (bivalve)	LAR	2.33+/-0.364	26.8+/-9.42	Bricker et al. 1993
46.2 +/-38.2	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (6.48+/-10.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
46.2 +/-38.2	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99+/-0.862% normal development)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
48 +/-24.7	NC	San Francisco Bay, CA	COA	10-d	Moderately toxic (33.8+/-4.7% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
50.1 +/-33.6	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (30.5+/-16.4% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.62+/-0.777	17.7+/-26.3	Bricker et al. 1993
51	*	Northern California	AETA		Northern California AET Values	Benthic species				Becker et al. 1990
53.4 +/-40.0	NC	San Francisco Bay, CA	COA	48-h	Significantly toxic (55.7+/-22.7% abnormal)	Bivalve	LAR			Long & Morgan 1990
53.4 +/-37.6	NC	San Francisco Bay, CA	COA	10-d	Significantly toxic (42.9+/-19.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
57.9 +/-50.6	NE	San Francisco Bay, CA	COA	10-d	Least toxic (18+/-6.6% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
59 +/-66.4	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.167+/-0.198 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.59+/-1.09	4.67+/-6.99	Bricker et al. 1993
59.5 +/-38.1	NE	Jetty Island Pier, Everett Marina, WA	COA	10-d	Not toxic (12.3+/-2.87% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.08+/-0.66		Hart Crowser & Associates Inc. 1986
60	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (18% mortality)	Ampelisca abdita (amphipod)		0.028	9 ug/g	Windom In Prep
60	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (0% mortality)	Arbacia punctulata (sea urchin)		0.03	19 ug/g	Windom In Prep
60 +/-107	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (5.2+/-3.5% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
60 +/-107	NE	Halifax Harbour, NS	COA	20-d	Not significantly toxic (1+/-2% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
61.6 +/-77.0	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-6.07% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.71+/-0.9	15.3+/-23.2	Bricker et al. 1993
63.2 +/-57.2	NE	San Francisco Bay, CA	COA	48-h	Least toxic (23.3+/-7.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
64 +/-45.8	SG	San Francisco Bay, CA	COA	10-d	Highly toxic (67+/-11.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
65.2 +/-53.5	NE	San Francisco Bay, CA	COA	10-d	Not significantly toxic (18.4+/-6.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
66.1 +/-72.8	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (17+/-16.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.99+/-1	21.6+/-24.5	Bricker et al. 1993
67.5 +/-2.89	NE	Brunswick Harbor Entrance, GA	COA	48-h	Not significantly toxic (86.6+/-4.25% normal development)	Arbacia punctulata (sea urchin)		0.181+/-0.162	182+/-208 ug/g	Windom In Prep
68.3 +/-2.89	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (28.3+/-6.11% mortality)	Mysidopsis bahia (mysid)		0.246+/-0.051	127+/-24 ug/g	Windom In Prep
70	NE	Tampa Bay, FL	COA	10-d	Not significantly toxic (14.6+/-7.67% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.63+/-0.596		Long 1993
70	NE	Tampa Bay, FL	COA	1-h	Least toxic (79.4+/-9.9% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.45+/-0.587		Long 1993
70	NE	Tampa Bay, FL	COA		Not significantly toxic (EC50; 0.066+/-0.033 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.89+/-0.902		Long 1993
70	NG	Tampa Bay, FL	COA	1-h	Moderately toxic (15.3+/-10.6% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.94+/-0.908		Long 1993
70 +/-9.57	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (91.3+/-2.91% normal development)	Arbacia punctulata (sea urchin)		0.299+/-0.251	114+/-68.4 ug/g	Windom In Prep
70.6 +/-10.4	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (9.78+/-5.33% mortality)	Mysidopsis bahia (mysid)		0.24+/-0.247	91.9+/-73.4 ug/g	Windom In Prep
70.6 +/-11.2	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (4+/-2.83% mortality)	Menidia beryllina (silverside)		0.243+/-0.264	90.5+/-78.4 ug/g	Windom In Prep
71.7 +/-12.9	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (27.5+/-10.6% mortality)	Mysidopsis bahia (mysid)		0.237+/-0.311	74.6+/-85.5 ug/g	Windom In Prep
71.7 +/-9.31	SG	Savannah River Entrance Channel, GA	COA	48-h	Significantly toxic (25.4+/-7.66% mortality)	Arbacia punctulata (sea urchin)		0.344+/-0.242	129.5+/-59.3 ug/g	Windom In Prep
71.9 +/-10.3	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (11.6+/-4.33% mortality)	Ampelisca abdita (amphipod)		0.267+/-0.25	102+/-71.1 ug/g	Windom In Prep
77.3 +/-181	*	Southern California	COA	10-d	Significantly toxicity (51.7% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
78.3 +/-123	*	Halifax Harbour, NS	COA	10-d	Significantly toxic (61.7+/-12.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
78.9 +/-94.4	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.016+/-0.007 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.26+/-0.936	43.4+/-35.6	Bricker et al. 1993
79	NC	Puget Sound, WA	COA	2-d	Significantly toxic (3.8% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.5		Pastorok & Becker 1990
80.5 +/-88.0	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.1+/-2.78% normal development)	Mulinia lateralis (bivalve)	LAR	2.12+/-1.04	22.9+/-23.7	Bricker et al. 1993
86.2 +/-82.3	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (13.8+/-4.09% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.47+/-0.306		Pastorok & Becker 1990
90.6 +/-24.3	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (10.6+/-3.17% mortality)	Ampelisca abdita (amphipod)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
90.6 +/-24.3	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (8.00+/-2.92% mortality)	Mysidopsis bahia (mysid)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep

Table 16. A summary of the available data on the biological effects associated with sediment-sorbed NAPHTHALENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Naphthalene Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
91.2 +/-76.4	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (21.5+/-6.36% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.35+/-1.05	10.5+/-13.4	Bricker et al. 1993
92 +/-97	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (6.67+/-8.07% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.51+/-0.330		Pastorok & Becker 1990
92.9 +/-25.6	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (5.43+/-3.21% mortality)	Mysidopsis bahia (mysid)		1.21+/-1.13	9096+/-13378 ug/g	Windom In Prep
92.9 +/-25.6	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (9.61+/-2.7% mortality)	Menidia beryllina (silverside)		1.22+/-1.13	9172+/-13363 ug/g	Windom In Prep
93.1 +/-95.9	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (34.9+/-15.7% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.23+/-1.04	25.4+/-25.5	Bricker et al. 1993
93.2 +/-73.5	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.008+/-0.001 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.19+/-1.27	12+/-11.3	Bricker et al. 1993
99 +/-15.6	SG	Jetty Island Pier, Everett Marina, WA	COA	10-d	Toxic (19.5+/-0.707% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.15+/-0.071		Hart Crowser & Associates Inc. 1986
100	SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (16% mortality)	Mysidopsis bahia (mysid)		1.8	7095 ug/g	Windom In Prep
100	SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (22.3% mortality)	Menidia beryllina (silverside)		1.71	6562 ug/g	Windom In Prep
109 +/-14.7	SG	Brunswick Harbor Entrance, GA	COA	48-h	Significantly toxic (14.6+/-18.9% normal development)	Arbacia punctulata (sea urchin)		1.99+/-0.562	14009+/-13434 ug/g	Windom In Prep
111 +/-116	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (91.5+/-7.28% normal development)	Mulinia lateralis (bivalve)	LAR	2.6+/-0.899	36.8+/-34.9	Bricker et al. 1993
113 +/-92	SG	Tampa Bay, FL	COA	1-h	Most toxic (0.091+/-0.187% fertilization)	Arbacia punctulata (sea urchin)	GAM	2.96+/-1.49		Long 1993
115 +/-106	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.013+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.79+/-0.744	37.6+/-25.3	Bricker et al. 1993
121 +/-110	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (29.8+/-13.9% mortality)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.07	32.1+/-28.4	Bricker et al. 1993
127 +/-32.4	*	San Francisco Bay, CA	COA	48-h	Highly toxic (92.4+/-4.5% abnormal)	Bivalve	LAR			Long & Morgan 1990
129 +/-105	SG	Tampa Bay, FL	COA	10-d	Significantly toxic (35.2+/-17.5% mortality)	Ampelisca abdita (amphipod)	SUB ADT	3.53+/-1.35		Long 1993
131 +/-155	*	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (51.3+/-6.95% mortality)	Mulinia lateralis (bivalve)	LAR	1.8+/-1.71	29.6+/-46.3	Bricker et al. 1993
137 +/-117	*	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.1+/-13.3% mortality)	Mulinia lateralis (bivalve)	LAR	2.68+/-0.955	31.8+/-24.4	Bricker et al. 1993
140	*	Puget Sound, WA	AETA	15-min	1986 Puget Sound AET	Microtox (Photobacterium phosphoreum)		1		Bellar et al. 1986
140	*	Puget Sound, WA	AETA	48-h	1986 Puget Sound AET	Crassostrea gigas (oyster)	LAR	1		Bellar et al. 1986
140	*	Puget Sound, WA	AETA	10-d	1986 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT	1		Bellar et al. 1986
140	*	Puget Sound, WA	AETA		1986 Puget Sound AET	Benthic species		1		Bellar et al. 1986
140 +/-110	*	Tampa Bay, FL	COA		Significantly toxic (EC50; 0.017+/-0.012 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.47+/-1.49		Long 1993
145 +/-152	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (23+/-4.24% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.46+/-1.22	40+/-55.1	Bricker et al. 1993
149 +/-114	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (96.6+/-3.79% normal development)	Mulinia lateralis (bivalve)	LAR	2.87+/-0.94	35.1+/-25.9	Bricker et al. 1993
149 +/-115	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (38+/-13% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.92+/-0.937	34.6+/-23.9	Bricker et al. 1993
159 +/-134	*	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (88.5+/-8.39% normal development)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.05	38.1+/-38.9	Bricker et al. 1993
160	*	San Francisco Bay, CA	AETA	10-d	San Francisco Bay AET	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
160	*	San Francisco Bay, CA	AETA	48-h	San Francisco Bay AET	Oyster; mussel	LAR			Long & Morgan 1990
>160	-	Northern California	AETA	10-d	Northern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
>160	-	California	AETA	48-h	California AET Values	Mytilus edulis (bivalve)	LAR			Becker et al. 1990
173 +/-191	NE	Burrard Inlet, BC	COA	10-d	Not toxic (4.5+/-3.02% emergence)	Rhepoxynius abronius (amphipod)	ADT	2.66+/-2.15		McLeay et al. 1991
173 +/-191	NE	Burrard Inlet, BC	COA	10-d	Not toxic (5.21+/-3.61% emergence)	Corophium volutator (amphipod)	ADT	3.18+/-2.1		McLeay et al. 1991
177 +/-112	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.011+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.28+/-0.363	45.3+/-21.4	Bricker et al. 1993
200	NE	Burrard Inlet, BC	SQO		Sediment Quality Objectives	Aquatic biota				Swain & Nijman 1991
205 +/-107	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (75.1+/-10.6% mortality)	Mulinia lateralis (bivalve)	LAR	3.32+/-0.317	42.3+/-19.2	Bricker et al. 1993
210	NE	Puget Sound, WA	AETA		PSDDA Screening level concentration	Aquatic biota				USACOE 1988
288 +/-201	NC	Eagle Harbor, WA	COA	10-d	Moderately toxic (41+/-9% mortality)	Rhepoxynius abronius (amphipod)	ADT			CH2M Hill 1989
358 +/-326	NE	Commencement Bay, WA	COA	48-h	Least toxic (15.1+/-3.1% abnormality)	Oyster	LAR			Tetra Tech 1985
391		***PEL***								
414	*	United States	SLCA		National Screening Level Concentration-Marine	Benthic species		1		Neff et al. 1987
456 +/-682	NE	Eagle Harbor, WA	COA	10-d	Least toxic (13+/-7% mortality)	Rhepoxynius abronius (amphipod)	ADT			CH2M Hill 1989

Table 16. A summary of the available data on the biological effects associated with sediment-sorbed NAPHTHALENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Naphthalene	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
500		*	United States	EqPA		99% Chronic Marine Criteria	Aquatic organisms		1		Pavlou et al. 1987
505	+/-681	NE	Burrard Inlet, BC	COA	10-d	Not toxic (8.9+/-2.99% mortality)	Corophium volutator (amphipod)	ADT	2.8+/-1.96		McLeay et al. 1991
505	+/-681	NE	Burrard Inlet, BC	COA	10-d	Not toxic (97.2+/-2.84% reburial)	Rhepoxynius abronius (amphipod)	ADT	2.8+/-1.96		McLeay et al. 1991
510	+/-499	NE	Commencement Bay, WA	COA	10-d	Least toxic (12.5+/-4.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
513	+/-403	NE	Elizabeth River, VA	COA	96-h	Not significantly toxic (4.5+/-3.24% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
522	+/-247	NC	Elizabeth River, VA	COA	96-h	Significant decrease in respiration rates	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
561	+/-561	NE	Elizabeth River, VA	COA	96-h	No significant change in respiration rate	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
593	+/-505	*	Commencement Bay, WA	COA	48-h	Moderately toxic (23+/-2.3% abnormality)	Oyster	LAR			Tetra Tech 1985
594	+/-424	*	Commencement Bay, WA	COA	10-d	Moderately toxic (26+/-5.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
617	+/-322	SG	Elizabeth River, VA	COA	96-h	Significantly toxic (50.7+/-39% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
663	+/-739	NE	Burrard Inlet, BC	COA	10-d	Not toxic (7.9+/-5.12% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.64+/-2.14		McLeay et al. 1991
720		*	United States	EqPA		95% Chronic Marine Criteria	Aquatic organisms		1		Pavlou et al. 1987
>930		-	California	AETA	10-d	California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
>930		-	Southern California	AETA	10-d	Southern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
>930		-	California	AETA		California AET Values	Benthic species				Becker et al. 1990
>930		-	Southern California	AETA		Southern California AET Values	Benthic species				Becker et al. 1990
973	+/-1041	*	Commencement Bay, WA	COA	48-h	Highly toxic (44.5+/-19% abnormality)	Oyster	LAR			Tetra Tech 1985
990		NE	Puget Sound, WA	SQG		Chemical Criteria	Benthic community		1		WDE 1989
1100		*	Puget Sound, WA	SQG		Low Abundance Threshold Concentration	Praxillella gracilis (polycheata)		3.0		Tetra Tech 1986
1300		*	Puget Sound, WA	SQG		Low Abundance Threshold Concentration	Euphilomedes producta (ostracoda)		7.0		Tetra Tech 1986
1400		*	Puget Sound, WA	SQG		Low Abundance Threshold Concentration	Nucula tenuis (pelecypoda)		4.0		Tetra Tech 1986
1500		*	Burrard Inlet, BC	COA	10-d	Highly toxic (23% emergence)	Corophium volutator (amphipod)	ADT	3.5		McLeay et al. 1991
1500		*	Burrard Inlet, BC	COA	10-d	Highly toxic (30.5% emergence)	Rhepoxynius abronius (amphipod)	ADT	3.5		McLeay et al. 1991
1501	+/-2064	*	Eagle Harbor, WA	COA	10-d	Highly toxic (95.5+/-8.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			CH2M Hill 1989
1564	+/-1735	*	Commencement Bay, WA	COA	10-d	Highly toxic (78.5+/-19.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
2100		*	Puget Sound, WA	AETA	15-min	1988 Puget Sound AET	Microtox (Photobacterium phosphoreum)				PTI 1988
2100		*	Puget Sound, WA	AETA	48-h	1988 Puget Sound AET	Crassostrea gigas (oyster)	LAR			PTI 1988
2100		*	Puget Sound, WA	AETA		PSDDA Maximum Level Criteria	Aquatic biota				USACOE 1988
2163	+/-4847	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (4.43+/-2.1% mortality)	Panope generosa (geoduck)	JUV	1.51+/-0.261		Pastorok & Becker 1990
2280	+/-2497	*	Puget Sound, WA	COA		Toxic (71.6+/-14.6% prevalence of idiopathic degeneration/necrosis)	Parophrys vetulus (English sole)				Malins et al. 1985
2280	+/-2497	*	Puget Sound, WA	COA		Toxic (51.4+/-21.1% prevalence of steatosis and hemosiderosis)	Parophrys vetulus (English sole)				Malins et al. 1985
2280	+/-2497	*	Puget Sound, WA	COA		Toxic (19+/-6.15% prevalence of hepatocellular regenerative foci)	Parophrys vetulus (English sole)				Malins et al. 1985
2280	+/-2497	*	Puget Sound, WA	COA		Toxic (26.7+/-6.43% prevalence of hepatic neoplasms)	Parophrys vetulus (English sole)				Malins et al. 1985
2280	+/-2497	*	Puget Sound, WA	COA		Toxic (88+/-3.65% prevalence of hepatic idiopathic lesions)	Parophrys vetulus (English sole)				Malins et al. 1985
2280	+/-2497	*	Puget Sound, WA	COA		Toxic (44.2+/-8.5% prevalence of hepatic cellular alterations)	Parophrys vetulus (English sole)				Malins et al. 1985
2400		*	Puget Sound, WA	AETA	10-d	1988 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT			PTI 1988
2475	+/-5199	NE	Puget Sound, WA	COA	20-d	Not significantly toxic (5+/-3.86% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.46+/-0.26		Pastorok & Becker 1990
2700		*	Puget Sound, WA	AETA		1988 Puget Sound AET	Benthic community				PTI 1988
6164	+/-15231	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (2.09+/-1.73% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.56+/-0.329		Pastorok & Becker 1990
6851	+/-15111	*	Puget Sound, WA	COA	15-min	Significantly toxic (EC50; 0.065+/-0.043% extract)	Microtox (Photobacterium phosphoreum)		1.58+/-0.255		Pastorok & Becker 1990
8500		NE	Laboratory	SSBA	~4-m	No significant change in liver somatic indices	Pseudopleuronectes americanus (flounder)	ADT			Payne et al. 1988
9080	+/-17076	*	Puget Sound, WA	COA	2-d	Significantly toxic (60.4+/-46.5% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.57+/-0.287		Pastorok & Becker 1990

Table 16. A summary of the available data on the biological effects associated with sediment-sorbed NAPHTHALENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Naphthalene	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
10500		*	United States	EqPA		EPA Acute Marine EP Threshold	Aquatic biota		1		Lyman et al. 1987
10500		*	United States	EqPA		Chronic Marine EqP Threshold	Aquatic biota		1		Bolton et al. 1985
13583	+/-19838	*	Puget Sound, WA	COA	10-d	Significantly toxic (80.8+/-30.6% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.266		Pastorok & Becker 1990
17527	+/-29855	*	Puget Sound, WA	COA	20-d	Significantly toxic (37.3+/-22% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.87+/-0.208		Pastorok & Becker 1990
22950	+/-4313	*	Laboratory	SSBA	~4-m	Significant increase in kidney MFO induction	Pseudopleuronectes americanus (flounder)	ADT			Payne et al. 1988
22950	+/-4313	*	Laboratory	SSBA	~4-m	Significant change in liver somatic indices	Pseudopleuronectes americanus (flounder)	ADT			Payne et al. 1988
22950	+/-4313	*	Laboratory	SSBA	~4-m	Significant change in spleen condition indices	Pseudopleuronectes americanus (flounder)	ADT			Payne et al. 1988
32703	+/-46241	NE	Sidney Tar Pond, NS	COA	20-d	Not significantly toxic (8+/-5.66% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
52000		*	Puget Sound, WA	COA	10-d	Significantly toxic (56% mortality)	Panope generosa (geoduck)	JUV	2.1		Pastorok & Becker 1990
65400		*	Sidney Tar Pond, NS	COA	10-d	Significantly toxic (100% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
65400		*	Sidney Tar Pond, NS	COA	10-d	Significantly toxic (100% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
367000		*	Sidney Tar Pond, NS	COA	20-d	Significantly toxic (52% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990

Table 17. A summary of the available data on the biological effects associated with sediment-sorbed PHENANTHRENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Phenanthrene Std Dev		Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.36		NC	Mobile Bay, AL	COA		Significantly toxic (10% mortality)	Mysidopsis bahia (mysid shrimp)		0.009	0.004	EMAP Louisiana Province 1991
0.635	+/-0.417	NE	Chandeleur Sound, LA	COA		Not significantly toxic (1.03+/-2.05% mortality)	Mysidopsis bahia (mysid shrimp)		0.824+/-0.915	1.69+/-0.920	EMAP Louisiana Province 1991
0.705	+/-0.343	NC	Chandeleur Sound, LA	COA	10-d	Significantly toxic (11.5+/-4.86% mortality)	Ampelisca abdita (amphipod)		0.811+/-0.711	1.87+/-0.973	EMAP Louisiana Province 1991
0.892	+/-0.22	SG	Chandeleur Sound, LA	COA		Significantly toxic (7.6+/-1.32% mortality)	Mysidopsis bahia (mysid shrimp)		0.624+/-0.197	2.07+/-1.19	EMAP Louisiana Province 1991
0.923	+/-0.3	NE	Chandeleur Sound, LA	COA	10-d	Not significantly toxic (2.87+/-4.05% mortality)	Ampelisca abdita (amphipod)		0.517+/-0.166	2.02+/-1.38	EMAP Louisiana Province 1991
0.94	+/-0.085	NE	Apalachee Bay, FL	COA	10-d	Not significantly toxic (3.3+/-3.25% mortality)	Ampelisca abdita (amphipod)		0.643+/-0.455	0.390+/-0.410	EMAP Louisiana Province 1991
1.01	+/-0.116	NE	Apalachee Bay, FL	COA		Not significantly toxic (0.75+/-1.5% mortality)	Mysidopsis bahia (mysid shrimp)		0.540+/-0.385	0.405+/-0.417	EMAP Louisiana Province 1991
1.07	+/-0.127	SG	Apalachee Bay, FL	COA	10-d	Significantly toxic (15.6% mortality)	Ampelisca abdita (amphipod)		0.438+/-0.442	0.421+/-0.593	EMAP Louisiana Province 1991
3.38	+/-4.26	NC	Mobile Bay, AL	COA	10-d	Significantly toxic (46+/-49.3% mortality)	Ampelisca abdita (amphipod)		0.22+/-0.298	3.84+/-5.43	EMAP Louisiana Province 1991
3.6	+/-4.53	NC	Mississippi Sound, MS	COA	10-d	Significantly toxic (11.6+/-3.39% mortality)	Ampelisca abdita (amphipod)		0.111+/-0.045	0.03	EMAP Louisiana Province 1991
3.7	+/-1.36	NE	Galveston Bay, TX	COA		High abundance (27.3+/-10 N/0.00203 sq.m.)	Mollusca		1.64+/-0.4	1.39+/-0.17	Carr 1992
3.78	+/-0.912	NE	Galveston Bay, TX	COA		High abundance (155+/-49.5 N/0.00203 sq.m.)	Oligochaeta		1.2+/-1.27	4.27+/-3.85	Carr 1992
4.32	+/-1.67	NE	Galveston Bay, TX	COA		High species richness (24.5+/-3.7 S/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
4.32	+/-1.67	NE	Galveston Bay, TX	COA		High abundance (359+/-92.8 N/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
4.6		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (0.33+/-0.516% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
4.6		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (2.33+/-1.03% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
4.6		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (15.3+/-11.0% mortality)	Hyalella azteca (amphipod)	JUV	0.648+/-0.641	1.74+/-1.39	Hall et al. 1992
4.6		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1% mortality)	Streblospio benedicti (polychaete worm)		1.38	3.25	Hall et al. 1992
4.6		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (16.5+/-9.19% mortality)	Streblospio benedicti (polychaete worm)		0.783+/-0.845	4.83+/-2.23	Hall et al. 1992
4.6		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.367+/-0.085 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
4.6		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.0005 mg/day growth)	Streblospio benedicti (polychaete worm)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
4.6		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.003+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.316+/-0.120	2.13+/-2.46	Hall et al. 1992
4.6		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (7.2+/-1.92% mortality)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
4.6		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.6+/-0.55% reburial)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
4.6		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
4.6		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
4.6		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.001+/-0.001 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.555+/-0.471	2.68+/-2.3	Hall et al. 1992
4.6		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1.83+/-1.6% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
4.6		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (3.5+/-1.87% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
4.6		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (9.25+/-5.32% mortality)	Lepidactylus dytiscus (amphipod)		0.638+/-0.768	1.65+/-1.62	Hall et al. 1992
4.6		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (22.3+/-7.37% mortality)	Hyalella azteca (amphipod)	JUV	0.788+/-0.866	2.04+/-1.75	Hall et al. 1992
4.6		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (8.8+/-7.12% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
4.6		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (14+/-9.22% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
4.6		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.1+/-0.865% reburial)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
4.6		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<20% emergence)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
4.6		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
4.6		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (-0.057+/-0.04 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
4.6		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.001mg/day growth)	Streblospio benedicti (polychaete worm)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
4.6		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.016 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
4.6		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.005+/-0.0004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
4.6		NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (55.0+/-22.6% mortality)	Hyalella azteca (amphipod)	JUV	0.338+/-0.133	2.9+/-3.11	Hall et al. 1992
4.6		NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29.8+/-11.1% mortality)	Streblospio benedicti (polychaete worm)		0.316+/-0.12	2.13+/-2.46	Hall et al. 1992

Table 17. A summary of the available data on the biological effects associated with sediment-sorbed PHENANTHRENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Phenanthrene Std Dev		Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
4.6		NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (55.0+/-19.5% mortality)	Streblospio benedicti (polychaete worm)		0.349+/-0.11	1.07+/-0.66	Hall et al. 1992
4.6		NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.003 mg/day growth)	Lepidactylus dytiscus (amphipod)		1.38	3.25	Hall et al. 1992
4.6		NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29% mortality)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
4.6		NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (89.7% reburial)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
4.6		NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
4.6		NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	6.41	Hall et al. 1992
4.6		NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
4.6		NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (45.5+/-12% mortality)	Lepidactylus dytiscus (amphipod)		0.383+/-0.279	3.61+/-2.79	Hall et al. 1992
4.6		NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (63.0+/-24.3% mortality)	Hyalella azteca (amphipod)	JUV	0.317+/-0.228	2.57+/-2.67	Hall et al. 1992
4.6		NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (22% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
4.6		NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (28% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
4.6		NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (82.9% reburial)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
4.6		NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>20% emergence)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
4.6		NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	5.58	Hall et al. 1992
4.6		NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.008+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.4	Hall et al. 1992
4.6		NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.003 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
4.6	+/-1.6	NE	Laboratory	SSBA	~4-m	No significant change in liver somatic indices	Pseudopleuronectes americanus (flounder)	ADT			Payne et al. 1988
5		NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (3% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
5		NE	Sidney Tar Pond, NS	COA	10-d	Not significantly toxic (3% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
6.2	+/-5.01	NE	Mississippi Sound, MS	COA		Not significantly toxic (0.789+/-1.59% mortality)	Mysidopsis bahia (mysid shrimp)		0.827+/-0.757	1.46+/-1.58	EMAP Louisiana Province 1991
6.77	+/-3.81	NE	Galveston Bay, TX	COA		High abundance (156+/-22.9 N/0.00203 sq.m.)	Polychaeta		0.916+/-0.661	2.94+/-2.3	Carr 1992
7.23	+/-1.2	NE	Mobile Bay, AL	COA		Not significantly toxic (1.07+/-1.85% mortality)	Mysidopsis bahia (mysid shrimp)		0.968+/-0.815	8.23+/-3.4	EMAP Louisiana Province 1991
7.25	+/-5.26	NE	Mississippi Sound, MS	COA	10-d	Not significantly toxic (1.4+/-1.73% mortality)	Ampelisca abdita (amphipod)		0.998+/-0.602	2.01+/-1.82	EMAP Louisiana Province 1991
7.65	+/-1.35	NE	Mobile Bay, AL	COA	10-d	Not significantly toxic (0.5+/-0.778% mortality)	Ampelisca abdita (amphipod)		1.24+/-0.948	8.51+/-4.76	EMAP Louisiana Province 1991
7.77	+/-6.1	SG	Mississippi Sound, MS	COA		Significantly toxic (12.2+/-4.42% mortality)	Mysidopsis bahia (mysid shrimp)		0.939+/-0.335	2.63+/-2.3	EMAP Louisiana Province 1991
8.04	+/-5.79	NE	Galveston Bay, TX	COA		High abundance (16.2+/-6.19 N/0.00203 sq.m.)	Copepoda		0.844+/-0.524	4.73+/-3.1	Carr 1992
9.62	+/-10.1	NE	Galveston Bay, TX	COA	48-h	Not toxic (98.1+/-1.79% normal development)	Arbacia punctulata (sea urchin)	EMB	.748+/-0.476	4.16+/-3.45	Carr 1992
12.5	+/-17.5	NE	Galveston Bay, TX	COA	1-h	Not toxic (92.5+/-6.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	0.77+/-0.448	6.37+/-6.58	Carr 1992
13.1	+/-12.6	NC	Mississippi River, MS, LA	COA	10-d	Significantly toxic (15.9+/-6.65% mortality)	Ampelisca abdita (amphipod)		1.22+/-0.717	0.235+/-0.276	EMAP Louisiana Province 1991
13.1	+/-9.34	NE	Matagorda Bay, TX	COA		Not significantly toxic (1.58+/-1.82% mortality)	Mysidopsis bahia (mysid shrimp)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
13.1	+/-9.34	NE	Matagorda Bay, TX	COA	10-d	Not significantly toxic (2.33+/-4.65% mortality)	Ampelisca abdita (amphipod)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
14.3	+/-18.7	*	Galveston Bay, TX	COA		Low abundance (4.21+/-5.66 N/0.00203 sq.m.)	Oligochaeta		0.895+/-0.453	7.85+/-8.8	Carr 1992
14.7	+/-18.8	NC	Galveston Bay, TX	COA		Significantly toxic (13.4+/-9.11% mortality)	Mysidopsis bahia (mysid shrimp)		0.778+/-0.482	1.21+/-0.778	EMAP Louisiana Province 1991
14.9	+/-10	NC	Mississippi River, MS, LA	COA		Significantly toxic (32.9+/-36.4% mortality)	Mysidopsis bahia (mysid shrimp)		1.07+/-0.924	1.41+/-1.93	EMAP Louisiana Province 1991
15		NE	Burrard Inlet, BC	SQO		Sediment Quality Objectives	Aquatic biota				Swain & Nijman 1991
17.3	+/-12.7	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (5.8+/-3.7% mortality)	Rhepoxynius abronius (amphipod)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
17.3	+/-12.7	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (3.4+/-1.82% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
17.3	+/-12.7	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (11.2+/-3.7% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
17.3	+/-12.7	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (3.52+/-1.66% mortality)	Macoma nasuta (clam)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
18.6	+/-20.5	NE	Mississippi River, MS, LA	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		1.3+/-0.83	1.14+/-1	EMAP Louisiana Province 1991
19.5	+/-46.2	NC	Galveston Bay, TX	COA		Low abundance (0.3+/-0.651 N/0.00203 sq.m.)	Amphipoda		0.859+/-0.487	7.67+/-8.12	Carr 1992
20		NE	Sidney Tar Pond, NS	COA	10-d	Not significantly toxic (4% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990

Table 17. A summary of the available data on the biological effects associated with sediment-sorbed PHENANTHRENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Phenanthrene Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
20.5 +/-17.9	NE	Mississippi River, MS, LA	COA	10-d	Not significantly toxic (7.8+/-1.63% mortality)	Ampelisca abdita (amphipod)		1.15+/-1.04	2.31+/-0.651	EMAP Louisiana Province 1991
21 +/-20	NE	Galveston Bay, TX	COA	10-d	Not significantly toxic (1.35+/-1.45% mortality)	Ampelisca abdita (amphipod)		0.961+/-0.537	1.17+/-0.640	EMAP Louisiana Province 1991
21.7 +/-47.2	*	Galveston Bay, TX	COA		Low abundance (1.86+/-2.59 N/0.00203 sq.m.)	Mollusca		0.784+/-0.421	8.29+/-8.13	Carr 1992
22 +/-23	SG	Galveston Bay, TX	COA	10-d	Significantly toxic (15.8+/-3.89% mortality)	Ampelisca abdita (amphipod)		0.647+/-0.606	0.160+/-0.184	EMAP Louisiana Province 1991
22.2 +/-48	*	Galveston Bay, TX	COA		Low species richness (10+/-3.73 S/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
22.2 +/-48	*	Galveston Bay, TX	COA		Low abundance (89+/-60.7 N/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
24.4 +/-51.6	*	Galveston Bay, TX	COA		Low abundance (41.7+/-21.8 N/0.00203 sq.m.)	Polychaeta		0.848+/-0.427	9.21+/-8.61	Carr 1992
27 +/-34.4	NE	Galveston Bay, TX	COA		High Abundance (6+/-1.41 N/0.00203 sq.m.)	Amphipoda		0.955+/-0.629	7.21+/-8.2	Carr 1992
28.1 +/-19.4	NE	Galveston Bay, TX	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		0.934+/-0.657	0.457+/-0.530	EMAP Louisiana Province 1991
28.2 +/-57.6	*	Galveston Bay, TX	COA		Low abundance (2.05+/-1.58 N/0.00203 sq.m.)	Copepoda		0.879+/-0.47	9.63+/-9.65	Carr 1992
37.7 +/-70.8	*	Galveston Bay, TX	COA	48-h	Toxic (4.65+/-16.1% normal development)	Arbacia punctulata (sea urchin)	EMB	1.06+/-0.449	14.5+/-9.2	Carr 1992
39.4 +/-47.6	NE	Laboratory	SSBA	~4-m	No significant change in kidney MFO induction	Pseudopleuronectes americanus (flounder)	ADT			Payne et al. 1988
48.1 +/-99.2	*	Galveston Bay, TX	COA		Moderate abundance (58.3+/-16.2 N/0.00203 sq.m.)	Oligochaeta		0.632+/-0.274	7.93+/-5.6	Carr 1992
50.6 +/-53.9	NC	Galveston Bay, TX	COA		Low abundance (53+/-33.9 N/0.00203 sq.m.)	Benthic invertebrates		0.985+/-0.247	22+/-11.2	Carr 1992
52.3 +/-97.3	*	Galveston Bay, TX	COA	1-h	Toxic (20.4+/-18.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	1.26+/-0.47	14.6+/-10.1	Carr 1992
60	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (18% mortality)	Ampelisca abdita (amphipod)		0.028	9 ug/g	Windom In Prep
60	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (0% mortality)	Arbacia punctulata (sea urchin)		0.03	19 ug/g	Windom In Prep
62.1 +/-97.8	NE	Galveston Bay, TX	COA		Low species (11.2+/-1.94 S/0.00203 sq.m.)	Benthic species		0.642+/-0.356	13.4+/-8.65	Carr 1992
64.6	NE	San Francisco Bay, CA	COA	48-h	Least toxic (23.3+/-7.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
66.2 +/-57.5	NE	Laboratory	SSBA	~4-m	No significant change in spleen condition indices	Pseudopleuronectes americanus (flounder)	ADT			Payne et al. 1988
67.5 +/-2.89	NE	Brunswick Harbor Entrance, GA	COA	48-h	Not significantly toxic (86.6+/-4.25% normal development)	Arbacia punctulata (sea urchin)		0.181+/-0.162	182+/-208 ug/g	Windom In Prep
67.8 +/-122	NE	Galveston Bay, TX	COA		High abundance (154+/-30.2 N/0.00203 sq.m.)	Benthic invertebrates		0.47+/-0.27	9.07+/-2.94	Carr 1992
68.3 +/-2.89	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (28.3+/-6.11% mortality)	Mysidopsis bahia (mysid)		0.246+/-0.051	127+/-24 ug/g	Windom In Prep
70 +/-9.57	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (91.3+/-2.91% normal development)	Arbacia punctulata (sea urchin)		0.299+/-0.251	114+/-68.4 ug/g	Windom In Prep
70.6 +/-10.4	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (9.78+/-5.33% mortality)	Mysidopsis bahia (mysid)		0.24+/-0.247	91.9+/-73.4 ug/g	Windom In Prep
70.6 +/-11.2	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (4+/-2.83% mortality)	Menidia beryllina (silverside)		0.243+/-0.264	90.5+/-78.4 ug/g	Windom In Prep
71.7 +/-12.9	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (27.5+/-10.6% mortality)	Mysidopsis bahia (mysid)		0.237+/-0.311	74.6+/-85.5 ug/g	Windom In Prep
71.7 +/-9.31	SG	Savannah River Entrance Channel, GA	COA	48-h	Significantly toxic (25.4+/-7.66% mortality)	Arbacia punctulata (sea urchin)		0.344+/-0.242	129.5+/-59.3 ug/g	Windom In Prep
71.9 +/-10.3	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (11.6+/-4.33% mortality)	Ampelisca abdita (amphipod)		0.267+/-0.25	102+/-71.1 ug/g	Windom In Prep
86.7		***TEL***								
88	*	San Francisco Bay, CA	AETA	48-h	San Francisco Bay AET	Oyster; mussel	LAR			Long & Morgan 1990
90	NE	Tampa Bay, FL	COA	1-h	Least toxic (79.4+/-9.9% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.45+/-0.587		Long 1993
90.6 +/-24.3	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (10.6+/-3.17% mortality)	Ampelisca abdita (amphipod)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
90.6 +/-24.3	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (8.00+/-2.92% mortality)	Mysidopsis bahia (mysid)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
92.9 +/-25.6	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (5.43+/-3.21% mortality)	Mysidopsis bahia (mysid)		1.21+/-1.13	9096+/-13378 ug/g	Windom In Prep
92.9 +/-25.6	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (9.61+/-2.7% mortality)	Menidia beryllina (silverside)		1.22+/-1.13	9172+/-13363 ug/g	Windom In Prep
94 +/-53.7	NE	Puget Sound, WA	COA	15-min	Not significantly toxic (EC50; 0.283+/-0.168% extract)	Microtox (Photobacterium phosphoreum)		1.39+/-0.37		Pastorok & Becker 1990
100	*	Puget Sound, WA	AETA	15-min	1986 Puget Sound AET	Microtox (Photobacterium phosphoreum)		1		Bellar et al. 1986
100	*	Puget Sound, WA	AETA	48-h	1986 Puget Sound AET	Crassostrea gigas (oyster)	LAR	1		Bellar et al. 1986
100	SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (16% mortality)	Mysidopsis bahia (mysid)		1.8	7095 ug/g	Windom In Prep
100	SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (22.3% mortality)	Menidia beryllina (silverside)		1.71	6562 ug/g	Windom In Prep
100 +/-28	NE	Tampa Bay, FL	COA	10-d	Not significantly toxic (14.6+/-7.67% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.63+/-0.596		Long 1993

Table 17. A summary of the available data on the biological effects associated with sediment-sorbed PHENANTHRENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Phenanthrene Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
109 +/-14.7	SG	Brunswick Harbor Entrance, GA	COA	48-h	Significantly toxic (14.6+/-18.9% normal development)	Arbacia punctulata (sea urchin)		1.99+/-0.562	14009+/-13434 ug/g	Windom In Prep
110	*	United States	EqPA		99% Chronic Marine Criteria	Aquatic organisms		1		Pavlou et al. 1987
112 +/-11.5	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-7.99% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.14+/-0.352	6.09+/-5.38	Bricker et al. 1993
118 +/-164	NE	Oahu, Hawaii	COA	10-d	Not significantly toxic (7.2+/-1.89% mortality)	Eohaustorius estuarius (amphipod)	ADT	1.93+/-1.94	10.3+/-12.4	Lamberson et al. 1993
118 +/-164	NE	Oahu, Hawaii	COA	10-d	Not significantly toxic (10.1+/-4.01% mortality)	Corophium acherusicum (amphipod)	ADT	1.93+/-1.94	10.3+/-12.4	Lamberson et al. 1993
119	NE	Southern California	COA	10-d	Not significantly toxic (23.2% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
133 +/-30.7	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.061+/-0.038 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.8+/-0.477	8.52+/-10.7	Bricker et al. 1993
140	*	Puget Sound, WA	AETA	10-d	1986 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT	1		Bellar et al. 1986
150	NE	Puget Sound, WA	COA		Not toxic (10% prevalence of idiopathic degeneration/necrosis)	Parophrys vetulus (English sole)				Malins et al. 1985
150	NE	Puget Sound, WA	COA		Not toxic (17.5% prevalence of steatosis and hemosiderosis)	Parophrys vetulus (English sole)				Malins et al. 1985
150	NE	Puget Sound, WA	COA		Not toxic (0% occurrence of hepatic cellular alterations)	Parophrys vetulus (English sole)				Malins et al. 1985
150	NE	Puget Sound, WA	COA		Not toxic (5% prevalence of hepatocellular regenerative foci)	Parophrys vetulus (English sole)				Malins et al. 1985
150	NE	Puget Sound, WA	COA		Not toxic (0% prevalence of hepatic cellular alterations)	Parophrys vetulus (English sole)				Malins et al. 1985
150	NE	Puget Sound, WA	COA		Not toxic (32.5% prevalence of hepatic idiopathic lesions)	Parophrys vetulus (English sole)				Malins et al. 1985
150 +/-120	NE	Tampa Bay, FL	COA		Not significantly toxic (EC50; 0.066+/-0.033 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.89+/-0.902		Long 1993
152 +/-54	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (39.5+/-18.2% mortality)	Ampelisca abidta (amphipod)	SUB ADT	2.06+/-0.523	20.1+/-13.9	Bricker et al. 1993
152 +/-49.1	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.3+/-2.22% normal development)	Mulinia lateralis (bivalve)	LAR	2.18+/-0.531	19.1+/-12.5	Bricker et al. 1993
154 +/-65.5	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.5+/-11.4% mortality)	Mulinia lateralis (bivalve)	LAR	2.33+/-0.364	26.8+/-9.42	Bricker et al. 1993
156 +/-68	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (19.3+/-5.86% mortality)	Ampelisca abidta (amphipod)	SUB ADT	1.82+/-0.225	6.3+/-6.2	Bricker et al. 1993
159	NE	San Francisco Bay, CA	COA	48-h	Not significantly toxic (31.9+/-15.5% abnormal)	Bivalve	LAR			Long & Morgan 1990
170	*	California	AETA	48-h	California AET Values	Mytilus edulis (bivalve)	LAR			Becker et al. 1990
170	*	Northern California	AETA		Northern California AET Values	Benthic species				Becker et al. 1990
170 +/-85.6	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (15.2+/-9.21% mortality)	Mulinia lateralis (bivalve)	LAR	2.17+/-0.663	18.4+/-19.9	Bricker et al. 1993
173 +/-90.4	NE	Jetty Island Pier, Everett Marina, WA	COA	10-d	Not toxic (12.3+/-2.87% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.08+/-0.66		Hart Crowser & Associates Inc. 1986
177 +/-110	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.167+/-0.198 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.59+/-1.09	4.67+/-6.99	Bricker et al. 1993
180 +/-95	*	Tampa Bay, FL	COA	1-h	Moderately toxic (15.3+/-10.6% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.94+/-0.908		Long 1993
180 +/-325	NE	Narragansett Bay, RI	COA	10-d	Not significantly toxic (5.28+/-3.04% mortality))	Ampelisca abdita (amphipod)	ADT			Munns et al. 1991
186 +/-53.8	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.125+/-0.084 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.25+/-0.468	1.98+/-2.25	Bricker et al. 1993
186 +/-92.9	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.014+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.51+/-0.45	29.6+/-15.7	Bricker et al. 1993
188	NE	San Francisco Bay, CA	COA	10-d	Least toxic (18+/-6.6% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
199	NE	San Francisco Bay, CA	COA	10-d	Not significantly toxic (18.4+/-6.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
213	*	Puget Sound, WA	AETA		1986 Puget Sound AET	Benthic species		1		Bellar et al. 1986
215 +/-149	SG	Jetty Island Pier, Everett Marina, WA	COA	10-d	Toxic (19.5+/-0.707% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.15+/-0.071		Hart Crowser & Associates Inc. 1986
220	SG	San Francisco Bay, CA	COA	10-d	Significantly toxic (42.9+/-19.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
222 +/-136	SG	Southern California	COA	10-d	Significantly toxicity (51.7% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
223 +/-169	NE	Burrard Inlet, BC	COA	10-d	Not toxic (4.5+/-3.02% emergence)	Rhepoxynius abronius (amphipod)	ADT	2.66+/-2.15		McLeay et al. 1991
223 +/-169	NE	Burrard Inlet, BC	COA	10-d	Not toxic (5.21+/-3.61% emergence)	Corophium volutator (amphipod)	ADT	3.18+/-2.1		McLeay et al. 1991
224	*	San Francisco Bay, CA	COA	48-h	Moderately toxic (59.4+/-11.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
225 +/-193	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.096+/-0.101 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.37+/-0.759	6.93+/-6.83	Bricker et al. 1993
227 +/-93.4	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (25.9+/-5.01% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.21+/-0.444	2.41+/-2.32	Bricker et al. 1993
228	SG	San Francisco Bay, CA	COA	10-d	Moderately toxic (33.8+/-4.7% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
233	SG	San Francisco Bay, CA	COA	48-h	Significantly toxic (55.7+/-22.7% abnormal)	Bivalve	LAR			Long & Morgan 1990

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Phenanthrene Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
235 +/-203	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (12.3+/-14.5% mortality)	Mulinia lateralis (bivalve)	LAR	1.53+/-0.743	15.7+/-23.2	Bricker et al. 1993
238 +/-214	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (23.3+/-6.14% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.738		Word et al. 1988
240	*	United States	EqPA		95% Chronic Marine Criteria	Aquatic organisms		1		Pavlou et al. 1987
240	NC	Puget Sound, WA	COA	2-d	Significantly toxic (3.8% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.5		Pastorok & Becker 1990
240 +/-227	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.074+/-0.043 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.27+/-0.626	6.21+/-5.41	Bricker et al. 1993
242	SG	San Francisco Bay, CA	COA	10-d	Highly toxic (67+/-11.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
244 +/-200	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (10.4+/-6.3% mortality)	Nephtys caecoides (polychaete)		1.63+/-0.657		Word et al. 1988
244 +/-200	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (0.2+/-0.6% mortality)	Macoma nasuta (clam)		1.63+/-0.657		Word et al. 1988
246 +/-199	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (96+/-1.66% normal development)	Mulinia lateralis (bivalve)	LAR	2.52+/-0.997	35+/-42.9	Bricker et al. 1993
249 +/-242	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99.3+/-0.827% normal development)	Mulinia lateralis (bivalve)	LAR	1.43+/-0.738	14.7+/-24	Bricker et al. 1993
261 +/-291	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-6.07% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.71+/-0.9	15.3+/-23.2	Bricker et al. 1993
267 +/-155	SG	Oakland Harbor, CA	COA	10-d	Significantly toxic (35.3+/-2.5% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.56+/-0.07		Word et al. 1988
270	*	California	AETA		California AET Values	Benthic species				Becker et al. 1990
270	*	Southern California	AETA		Southern California AET Values	Benthic species				Becker et al. 1990
>290	-	Southern California	AETA	10-d	Southern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
291 +/-246	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (6.48+/-10.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
291 +/-246	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99+/-0.862% normal development)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
294 +/-233	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (17+/-16.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.99+/-1	21.6+/-24.5	Bricker et al. 1993
297	NE	Commencement Bay, WA	COA	48-h	Least toxic (15.1+/-3.1% abnormality)	Oyster	LAR			Tetra Tech 1985
308 +/-258	*	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (30.5+/-16.4% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.62+/-0.777	17.7+/-26.3	Bricker et al. 1993
312 +/-246	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.1+/-2.78% normal development)	Mulinia lateralis (bivalve)	LAR	2.12+/-1.04	22.9+/-23.7	Bricker et al. 1993
316 +/-582	NE	Elizabeth River, VA	COA	96-h	No significant change in respiration rate	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
318 +/-291	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (13.8+/-4.09% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.47+/-0.306		Pastorok & Becker 1990
320	NE	Puget Sound, WA	AETA		PSDDA Screening level concentration	Aquatic biota				USACOE 1988
337 +/-364	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (6.67+/-8.07% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.51+/-0.330		Pastorok & Becker 1990
368	*	United States	SLCA		National Screening Level Concentration-Marine	Benthic species		1		Neff et al. 1987
369 +/-329	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (34.9+/-15.7% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.23+/-1.04	25.4+/-25.5	Bricker et al. 1993
374 +/-461	NE	Elizabeth River, VA	COA	96-h	Not significantly toxic (4.5+/-3.24% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
383 +/-332	*	Laboratory	SSBA	~4-m	Significant change in liver somatic indices	Pseudopleuronectes americanus (flounder)	ADT			Payne et al. 1988
384 +/-267	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (29.8+/-13.9% mortality)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.07	32.1+/-28.4	Bricker et al. 1993
408 +/-501	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (6.8+/-7.31% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
408 +/-501	NE	Halifax Harbour, NS	COA	20-d	Not significantly toxic (0.7+/-1.63% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
410 +/-498	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (8.5+/-6.06% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
413 +/-402	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (23+/-4.24% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.46+/-1.22	40+/-55.1	Bricker et al. 1993
417 +/-246	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (96.6+/-3.79% normal development)	Mulinia lateralis (bivalve)	LAR	2.87+/-0.94	35.1+/-25.9	Bricker et al. 1993
418 +/-241	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (38+/-13% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.92+/-0.937	34.6+/-23.9	Bricker et al. 1993
421 +/-363	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.013+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.79+/-0.744	37.6+/-25.3	Bricker et al. 1993
463 +/-477	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.1+/-13.3% mortality)	Mulinia lateralis (bivalve)	LAR	2.68+/-0.955	31.8+/-24.4	Bricker et al. 1993
475	*	San Francisco Bay, CA	COA	48-h	Highly toxic (92.4+/-4.5% abnormal)	Bivalve	LAR			Long & Morgan 1990
478	NE	Commencement Bay, WA	COA	10-d	Least toxic (12.5+/-4.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
483 +/-630	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.016+/-0.007 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.26+/-0.936	43.4+/-35.6	Bricker et al. 1993
484 +/-198	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (75.1+/-10.6% mortality)	Mulinia lateralis (bivalve)	LAR	3.32+/-0.317	42.3+/-19.2	Bricker et al. 1993

Table 17. A summary of the available data on the biological effects associated with sediment-sorbed PHENANTHRENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Phenanthrene Std Dev		Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
487	+/-318	*	Laboratory	SSBA	~4-m	Significant increase in kidney MFO induction	Pseudopleuronectes americanus (flounder)	ADT			Payne et al. 1988
492	+/-228	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.011+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.28+/-0.363	45.3+/-21.4	Bricker et al. 1993
510		*	San Francisco Bay, CA	AETA	10-d	San Francisco Bay AET	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
510		*	Northern California	AETA	10-d	Northern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
510		*	California	AETA	10-d	California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
517	+/-549	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (21.5+/-6.36% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.35+/-1.05	10.5+/-13.4	Bricker et al. 1993
544			***PEL***								
590	+/-750	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (91.5+/-7.28% normal development)	Mulinia lateralis (bivalve)	LAR	2.6+/-0.899	36.8+/-34.9	Bricker et al. 1993
593		*	Commencement Bay, WA	COA	48-h	Moderately toxic (23+/-2.3% abnormality)	Oyster	LAR			Tetra Tech 1985
597		*	Commencement Bay, WA	COA	10-d	Moderately toxic (26+/-5.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
657	+/-350	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.008+/-0.001 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.19+/-1.27	12+/-11.3	Bricker et al. 1993
670		*	Laboratory	SSBA	~4-m	Significant change in spleen condition indices	Pseudopleuronectes americanus (flounder)	ADT			Payne et al. 1988
819	+/-953	*	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (88.5+/-8.39% normal development)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.05	38.1+/-38.9	Bricker et al. 1993
918	+/-1395	NE	Burrard Inlet, BC	COA	10-d	Not toxic (8.9+/-2.99% mortality)	Corophium volutator (amphipod)	ADT	2.8+/-1.96		McLeay et al. 1991
918	+/-1395	NE	Burrard Inlet, BC	COA	10-d	Not toxic (97.2+/-2.84% reburial)	Rhepoxynius abronius (amphipod)	ADT	2.8+/-1.96		McLeay et al. 1991
929	+/-949	*	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (51.3+/-6.95% mortality)	Mulinia lateralis (bivalve)	LAR	1.8+/-1.71	29.6+/-46.3	Bricker et al. 1993
950		*	Eagle Harbor, WA	COA	4-d	LC50	Rhepoxynius abronius (amphipod)	ADT			Swartz et al. 1989
987	+/-1654	*	Elizabeth River, VA	COA	96-h	Significant decrease in respiration rates	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
1000		*	Puget Sound, WA	SQG		Chemical Criteria	Benthic community		1		WDE 1989
1020		*	United States	EqPA		Interim Marine Sediment Quality Criteria (FCV)	Benthic community		1		EPA 1988
1050	+/-1430	*	Tampa Bay, FL	COA	1-h	Most toxic (0.091+/-0.187% fertilization)	Arbacia punctulata (sea urchin)	GAM	2.96+/-1.49		Long 1993
1213	+/-1547	NE	Burrard Inlet, BC	COA	10-d	Not toxic (7.9+/-5.12% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.64+/-2.14		McLeay et al. 1991
1267	+/-2528	NE	Halifax Harbour, NS	COA	20-d	Not significantly toxic (1+/-2% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
1271	+/-2526	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (5.2+/-3.5% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
1379	+/-2545	*	Commencement Bay, WA	COA	48-h	Highly toxic (44.5+/-19% abnormality)	Oyster	LAR			Tetra Tech 1985
1440	+/-1530	*	Tampa Bay, FL	COA	10-d	Significantly toxic (35.2+/-17.5% mortality)	Ampelisca abdita (amphipod)	SUB ADT	3.53+/-1.35		Long 1993
1500		*	Puget Sound, WA	AETA	15-min	1988 Puget Sound AET	Microtox (Photobacterium phosphoreum)				PTI 1988
1500		*	Puget Sound, WA	AETA	48-h	1988 Puget Sound AET	Crassostrea gigas (oyster)	LAR			PTI 1988
1570	+/-1600	*	Tampa Bay, FL	COA		Significantly toxic (EC50; 0.017+/-0.012 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.47+/-1.49		Long 1993
1600	+/-66.5	*	United States	EqPA		Sediment Quality Criteria					Hansen et al. 1991c
1688	+/-2920	*	Halifax Harbour, NS	COA	10-d	Significantly toxic (61.7+/-12.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
1913	+/-2693	*	Elizabeth River, VA	COA	96-h	Significantly toxic (50.7+/-39% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
2142		NC	Eagle Harbor, WA	COA	10-d	Moderately toxic (41+/-9% mortality)	Rhepoxynius abronius (amphipod)	ADT			CH2M Hill 1989
2600		NE	Eagle Harbor, WA	COA	10-d	Least toxic (13+/-7% mortality)	Rhepoxynius abronius (amphipod)	ADT			CH2M Hill 1989
2838		*	Commencement Bay, WA	COA	10-d	Highly toxic (78.5+/-19.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
3000		*	Burrard Inlet, BC	COA	10-d	Highly toxic (23% emergence)	Corophium volutator (amphipod)	ADT	3.5		McLeay et al. 1991
3000		*	Burrard Inlet, BC	COA	10-d	Highly toxic (30.5% emergence)	Rhepoxynius abronius (amphipod)	ADT	3.5		McLeay et al. 1991
3200		*	Puget Sound, WA	AETA		PSDDA Maximum Level Criteria	Aquatic biota				USACOE 1988
5400		*	Puget Sound, WA	AETA		1988 Puget Sound AET	Benthic community				PTI 1988
6900		*	Puget Sound, WA	AETA	10-d	1988 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT			PTI 1988
10376	+/-20580	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (4.43+/-2.1% mortality)	Panope generosa (geoduck)	JUV	1.51+/-0.261		Pastorok & Becker 1990
10939	+/-22172	NE	Puget Sound, WA	COA	20-d	Not significantly toxic (5+/-3.86% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.46+/-0.26		Pastorok & Becker 1990

Table 17. A summary of the available data on the biological effects associated with sediment-sorbed PHENANTHRENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Phenanthrene	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
11656	+/-14472	*	Puget Sound, WA	COA		Toxic (71.6+/-14.6% prevalence of idiopathic degeneration/necrosis)	Parophrys vetulus (English sole)				Malins et al. 1985
11656	+/-14472	*	Puget Sound, WA	COA		Toxic (51.4+/-21.1% prevalence of steatosis and hemosiderosis)	Parophrys vetulus (English sole)				Malins et al. 1985
11656	+/-14472	*	Puget Sound, WA	COA		Toxic (19+/-6.15% prevalence of hepatocellular regenerative foci)	Parophrys vetulus (English sole)				Malins et al. 1985
11656	+/-14472	*	Puget Sound, WA	COA		Toxic (26.7+/-6.43% prevalence of hepatic neoplasms)	Parophrys vetulus (English sole)				Malins et al. 1985
11656	+/-14472	*	Puget Sound, WA	COA		Toxic (88+/-3.65% prevalence of hepatic idiopathic lesions)	Parophrys vetulus (English sole)				Malins et al. 1985
11656	+/-14472	*	Puget Sound, WA	COA		Toxic (44.2+/-8.5% prevalence of hepatic cellular alterations)	Parophrys vetulus (English sole)				Malins et al. 1985
14000		*	United States	EqPA		EPA Acute Marine EP Threshold	Aquatic biota		1		Lyman et al. 1987
14000		*	United States	EqPA		Chronic Marine EqP Threshold	Aquatic biota		1		Bolton et al. 1985
23652	+/-53103	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (2.09+/-1.73% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.56+/-0.329		Pastorok & Becker 1990
27082	+/-52754	*	Puget Sound, WA	COA	15-min	Significantly toxic (EC50; 0.065+/-0.043% extract)	Microtox (Photobacterium phosphoreum)		1.58+/-0.255		Pastorok & Becker 1990
33603		*	Eagle Harbor, WA	COA	10-d	Highly toxic (95.5+/-8.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			CH2M Hill 1989
35916	+/-58952	*	Puget Sound, WA	COA	2-d	Significantly toxic (60.4+/-46.5% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.57+/-0.287		Pastorok & Becker 1990
45903	+/-64909	NE	Sidney Tar Pond, NS	COA	20-d	Not significantly toxic (8+/-5.66% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
53733	+/-66465	*	Puget Sound, WA	COA	10-d	Significantly toxic (80.8+/-30.6% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.266		Pastorok & Becker 1990
64667	+/-100062	*	Puget Sound, WA	COA	20-d	Significantly toxic (37.3+/-22% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.87+/-0.208		Pastorok & Becker 1990
91800		*	Sidney Tar Pond, NS	COA	10-d	Significantly toxic (100% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
91800		*	Sidney Tar Pond, NS	COA	10-d	Significantly toxic (100% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
180000		*	Puget Sound, WA	COA	10-d	Significantly toxic (56% mortality)	Panope generosa (geoduck)	JUV	2.1		Pastorok & Becker 1990
484000		*	Sidney Tar Pond, NS	COA	20-d	Significantly toxic (52% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990

Table 18. A summary of the available data on the biological effects associated with sediment-sorbed TOTAL LOW MOLECULAR WEIGHT PAHs (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Total LMWPAHs	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
2.14		NC	Mobile Bay, AL	COA		Significantly toxic (10% mortality)	Mysidopsis bahia (mysid shrimp)		0.009	0.004	EMAP Louisiana Province 1991
5	+/-5.74	NE	Gulf of Mexico	COA	10-d	Not toxic (0.36+/-0.261% emergence/d)	Rhepoxynius abronius (amphipod)	ADT	0.42+/-0.13		Chapman et al. 1991
5.22	+/-413	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (12.3+/-14.5% mortality)	Mulinia lateralis (bivalve)	LAR	1.53+/-0.743	15.7+/-23.2	Bricker et al. 1993
6.46	+/-4.75	NC	Chandeleur Sound, LA	COA	10-d	Significantly toxic (11.5+/-4.86% mortality)	Ampelisca abdita (amphipod)		0.811+/-0.711	1.87+/-0.973	EMAP Louisiana Province 1991
6.65	+/-1.11	NC	Chandeleur Sound, LA	COA		Significantly toxic (7.6+/-1.32% mortality)	Mysidopsis bahia (mysid shrimp)		0.624+/-0.197	2.07+/-1.19	EMAP Louisiana Province 1991
6.8	+/-6.08	NE	Chandeleur Sound, LA	COA		Not significantly toxic (1.03+/-2.05% mortality)	Mysidopsis bahia (mysid shrimp)		0.824+/-0.915	1.69+/-0.920	EMAP Louisiana Province 1991
7.23	+/-1	NE	Chandeleur Sound, LA	COA	10-d	Not significantly toxic (2.87+/-4.05% mortality)	Ampelisca abdita (amphipod)		0.517+/-0.166	2.02+/-1.38	EMAP Louisiana Province 1991
7.77	+/-1.52	NE	Galveston Bay, TX	COA		High abundance (155+/-49.5 N/0.00203 sq.m.)	Oligochaeta		1.2+/-1.27	4.27+/-3.85	Carr 1992
7.91	+/-2.9	NE	Galveston Bay, TX	COA		High abundance (27.3+/-10 N/0.00203 sq.m.)	Mollusca		1.64+/-0.4	1.39+/-0.17	Carr 1992
8.29	+/-2.86	NC	Apalachee Bay, FL	COA	10-d	Significantly toxic (15.6% mortality)	Ampelisca abdita (amphipod)		0.438+/-0.442	0.421+/-0.593	EMAP Louisiana Province 1991
8.96	+/-3.09	NE	Apalachee Bay, FL	COA		Not significantly toxic (0.75+/-1.5% mortality)	Mysidopsis bahia (mysid shrimp)		0.540+/-0.385	0.405+/-0.417	EMAP Louisiana Province 1991
9.63	+/-9.11	NC	Mississippi Sound, MS	COA	10-d	Significantly toxic (11.6+/-3.39% mortality)	Ampelisca abdita (amphipod)		0.111+/-0.045	0.03	EMAP Louisiana Province 1991
9.63	+/-4.31	NE	Apalachee Bay, FL	COA	10-d	Not significantly toxic (3.3+/-3.25% mortality)	Ampelisca abdita (amphipod)		0.643+/-0.455	0.390+/-0.410	EMAP Louisiana Province 1991
10.3	+/-5.29	NE	Galveston Bay, TX	COA		High species richness (24.5+/-3.7 S/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
10.3	+/-5.29	NE	Galveston Bay, TX	COA		High abundance (359+/-92.8 N/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
15.2	+/-8.2	NE	Galveston Bay, TX	COA		High abundance (156+/-22.9 N/0.00203 sq.m.)	Polychaeta		0.916+/-0.661	2.94+/-2.3	Carr 1992
16.2	+/-19.9	NC	Mobile Bay, AL	COA	10-d	Significantly toxic (46+/-49.3% mortality)	Ampelisca abdita (amphipod)		0.22+/-0.298	3.84+/-5.43	EMAP Louisiana Province 1991
16.6	+/-12.3	NE	Galveston Bay, TX	COA		High abundance (16.2+/-6.19 N/0.00203 sq.m.)	Copepoda		0.844+/-0.524	4.73+/-3.1	Carr 1992
16.9	+/-34	NE	Gulf of Mexico	COA	48-h	Not toxic (4.54+/-5.37% mortality)	Crassostrea gigas (oyster)	LAR	0.443+/-0.127		Chapman et al. 1991
19	+/-11.9	NE	Mississippi Sound, MS	COA		Not significantly toxic (0.789+/-1.59% mortality)	Mysidopsis bahia (mysid shrimp)		0.827+/-0.757	1.46+/-1.58	EMAP Louisiana Province 1991
21.6	+/-29.5	NE	Galveston Bay, TX	COA	48-h	Not toxic (98.1+/-1.79% normal development)	Arbacia punctulata (sea urchin)	EMB	.748+/-0.476	4.16+/-3.45	Carr 1992
22	+/-10.7	NE	Mississippi Sound, MS	COA	10-d	Not significantly toxic (1.4+/-1.73% mortality)	Ampelisca abdita (amphipod)		0.998+/-0.602	2.01+/-1.82	EMAP Louisiana Province 1991
22.4	+/-10.5	SG	Mississippi Sound, MS	COA		Significantly toxic (12.2+/-4.42% mortality)	Mysidopsis bahia (mysid shrimp)		0.939+/-0.335	2.63+/-2.3	EMAP Louisiana Province 1991
28.6	+/-45.8	NE	Gulf of Mexico	COA	48-h	Not significantly toxic (7.76+/-1.89% abnormality)	Crassostrea gigas (oyster)	LAR	0.425+/-0.128		Chapman et al. 1991
28.7	+/-1.93	NE	Mobile Bay, AL	COA	10-d	Not significantly toxic (0.5+/-0.778% mortality)	Ampelisca abdita (amphipod)		1.24+/-0.948	8.51+/-4.76	EMAP Louisiana Province 1991
29.3	+/-1.62	NE	Mobile Bay, AL	COA		Not significantly toxic (1.07+/-1.85% mortality)	Mysidopsis bahia (mysid shrimp)		0.968+/-0.815	8.23+/-3.4	EMAP Louisiana Province 1991
30		NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (3% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
30		NE	Sidney Tar Pond, NS	COA	10-d	Not significantly toxic (3% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
30.4	+/-53.8	NE	Galveston Bay, TX	COA	1-h	Not toxic (92.5+/-6.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	0.77+/-0.448	6.37+/-6.58	Carr 1992
34.3		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (0.33+/-0.516% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
34.3		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (2.33+/-1.03% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
34.3		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (15.3+/-11.0% mortality)	Hyalella azteca (amphipod)	JUV	0.648+/-0.641	1.74+/-1.39	Hall et al. 1992
34.3		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1% mortality)	Streblospio benedicti (polychaete worm)		1.38	3.25	Hall et al. 1992
34.3		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (16.5+/-9.19% mortality)	Streblospio benedicti (polychaete worm)		0.783+/-0.845	4.83+/-2.23	Hall et al. 1992
34.3		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.367+/-0.085 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
34.3		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.0005 mg/day growth)	Streblospio benedicti (polychaete worm)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
34.3		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.003+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.316+/-0.120	2.13+/-2.46	Hall et al. 1992
34.3		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (7.2+/-1.92% mortality)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
34.3		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.6+/-0.55% reburial)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
34.3		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992

Table 18. A summary of the available data on the biological effects associated with sediment-sorbed TOTAL LOW MOLECULAR WEIGHT PAHs (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Total LMWPAHs Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
34.3	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
34.3	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.001+/-0.001 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.555+/-0.471	2.68+/-2.3	Hall et al. 1992
34.3	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1.83+/-1.6% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
34.3	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (3.5+/-1.87% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
34.3	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (9.25+/-5.32% mortality)	Lepidactylus dytiscus (amphipod)		0.638+/-0.768	1.65+/-1.62	Hall et al. 1992
34.3	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (22.3+/-7.37% mortality)	Hyalella azteca (amphipod)	JUV	0.788+/-0.866	2.04+/-1.75	Hall et al. 1992
34.3	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (8.8+/-7.12% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
34.3	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (14+/-9.22% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
34.3	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.1+/-0.865% reburial)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
34.3	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<20% emergence)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
34.3	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
34.3	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (-0.057+/-0.04 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
34.3	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.001mg/day growth)	Streblospio benedicti (polychaete worm)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
34.3	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.016 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
34.3	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.005+/-0.0004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
34.3	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (55.0+/-22.6% mortality)	Hyalella azteca (amphipod)	JUV	0.338+/-0.133	2.9+/-3.11	Hall et al. 1992
34.3	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29.8+/-11.1% mortality)	Streblospio benedicti (polychaete worm)		0.316+/-0.12	2.13+/-2.46	Hall et al. 1992
34.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (55.0+/-19.5% mortality)	Streblospio benedicti (polychaete worm)		0.349+/-0.11	1.07+/-0.66	Hall et al. 1992
34.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.003 mg/day growth)	Lepidactylus dytiscus (amphipod)		1.38	3.25	Hall et al. 1992
34.3	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29% mortality)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
34.3	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (89.7% reburial)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
34.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
34.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	6.41	Hall et al. 1992
34.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
34.3	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (45.5+/-12% mortality)	Lepidactylus dytiscus (amphipod)		0.383+/-0.279	3.61+/-2.79	Hall et al. 1992
34.3	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (63.0+/-24.3% mortality)	Hyalella azteca (amphipod)	JUV	0.317+/-0.228	2.57+/-2.67	Hall et al. 1992
34.3	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (22% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
34.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (28% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
34.3	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (82.9% reburial)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
34.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>20% emergence)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
34.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	5.58	Hall et al. 1992
34.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.008+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.4	Hall et al. 1992
34.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.003 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
35.5 +/-57.6	*	Galveston Bay, TX	COA		Low abundance (4.21+/-5.66 N/0.00203 sq.m.)	Oligochaeta		0.895+/-0.453	7.85+/-8.8	Carr 1992
36.3 +/-16.6	NE	Matagorda Bay, TX	COA		Not significantly toxic (1.58+/-1.82% mortality)	Mysidopsis bahia (mysid shrimp)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
36.3 +/-16.6	NE	Matagorda Bay, TX	COA	10-d	Not significantly toxic (2.33+/-4.65% mortality)	Ampelisca abdita (amphipod)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
38.9 +/-78.7	NC	Galveston Bay, TX	COA		Low abundance (0.3+/-0.651 N/0.00203 sq.m.)	Amphipoda		0.859+/-0.487	7.67+/-8.12	Carr 1992
39.8 +/-44.6	NC	Gulf of Mexico	COA	10-d	Significantly toxic (41.75+/-38.9% mortality)	Rhepoxynius abronius (amphipod)	ADT	0.45+/-0.058		Chapman et al. 1991
41.7	SG	Halifax Harbour, NS	COA	10-d	Significantly toxic (61.7+/-12.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
44.8 +/-82.1	*	Galveston Bay, TX	COA		Low abundance (1.86+/-2.59 N/0.00203 sq.m.)	Mollusca		0.784+/-0.421	8.29+/-8.13	Carr 1992

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Total LMWPAHs	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
45		NE	Sidney Tar Pond, NS	COA	10-d	Not significantly toxic (4% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
45.7	+/-83.5	*	Galveston Bay, TX	COA		Low species richness (10+/-3.73 S/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
45.7	+/-83.5	*	Galveston Bay, TX	COA		Low abundance (89+/-60.7 N/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
50	+/-89.7	*	Galveston Bay, TX	COA		Low abundance (41.7+/-21.8 N/0.00203 sq.m.)	Polychaeta		0.848+/-0.427	9.21+/-8.61	Carr 1992
52.4	+/-67.8	NC	Galveston Bay, TX	COA		Significantly toxic (13.4+/-9.11% mortality)	Mysidopsis bahia (mysid shrimp)		0.778+/-0.482	1.21+/-0.778	EMAP Louisiana Province 1991
56.8	+/-38.1	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (5.8+/-3.7% mortality)	Rhepoxynius abronius (amphipod)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
56.8	+/-38.1	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (3.4+/-1.82% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
56.8	+/-38.1	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (11.2+/-3.7% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
56.8	+/-38.1	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (3.52+/-1.66% mortality)	Macoma nasuta (clam)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
57.8	+/-58.9	NC	Mississippi River, MS, LA	COA	10-d	Significantly toxic (15.9+/-6.65% mortality)	Ampelisca abdita (amphipod)		1.22+/-0.717	0.235+/-0.276	EMAP Louisiana Province 1991
58.2	+/-99.3	*	Galveston Bay, TX	COA		Low abundance (2.05+/-1.58 N/0.00203 sq.m.)	Copepoda		0.879+/-0.47	9.63+/-9.65	Carr 1992
60		NC	Gulf of Mexico	COA		Most toxic (100 TU/g)	Microtox (Photobacterium phosphoreum)		0.4		Chapman et al. 1991
61.8	+/-64.5	NE	Mississippi River, MS, LA	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		1.3+/-0.83	1.14+/-1	EMAP Louisiana Province 1991
67.1	+/-70.8	NC	Galveston Bay, TX	COA	10-d	Significantly toxic (15.8+/-3.89% mortality)	Ampelisca abdita (amphipod)		0.647+/-0.606	0.160+/-0.184	EMAP Louisiana Province 1991
69	+/-43	SG	Mississippi River, MS, LA	COA		Significantly toxic (32.9+/-36.4% mortality)	Mysidopsis bahia (mysid shrimp)		1.07+/-0.924	1.41+/-1.93	EMAP Louisiana Province 1991
73	+/-48.6	NE	Mississippi River, MS, LA	COA	10-d	Not significantly toxic (7.8+/-1.63% mortality)	Ampelisca abdita (amphipod)		1.15+/-1.04	2.31+/-0.651	EMAP Louisiana Province 1991
74.3	+/-118	*	Galveston Bay, TX	COA	48-h	Toxic (4.65+/-16.1% normal development)	Arbacia punctulata (sea urchin)	EMB	1.06+/-0.449	14.5+/-9.2	Carr 1992
75	+/-71.4	NE	Galveston Bay, TX	COA	10-d	Not significantly toxic (1.35+/-1.45% mortality)	Ampelisca abdita (amphipod)		0.961+/-0.537	1.17+/-0.640	EMAP Louisiana Province 1991
75.7	+/-146	*	Galveston Bay, TX	COA		Moderate abundance (58.3+/-16.2 N/0.00203 sq.m.)	Oligochaeta		0.632+/-0.274	7.93+/-5.6	Carr 1992
77.7	+/-102	NE	Galveston Bay, TX	COA		High Abundance (6+/-1.41 N/0.00203 sq.m.)	Amphipoda		0.955+/-0.629	7.21+/-8.2	Carr 1992
85.8	+/-142	*	Galveston Bay, TX	COA	1-h	Toxic (20.4+/-18.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	1.26+/-0.47	14.6+/-10.1	Carr 1992
92.3	+/-66.3	NE	Galveston Bay, TX	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		0.934+/-0.657	0.457+/-0.530	EMAP Louisiana Province 1991
102	+/-180	NE	Galveston Bay, TX	COA		High abundance (154+/-30.2 N/0.00203 sq.m.)	Benthic invertebrates		0.47+/-0.27	9.07+/-2.94	Carr 1992
117	+/-161	NE	Galveston Bay, TX	COA		Low species (11.2+/-1.94 S/0.00203 sq.m.)	Benthic species		0.642+/-0.356	13.4+/-8.65	Carr 1992
136	+/-96	NE	Puget Sound, WA	COA	15-min	Not significantly toxic (EC50; 0.283+/-0.168% extract)	Microtox (Photobacterium phosphoreum)		1.39+/-0.37		Pastorok & Becker 1990
147	+/-173	SG	Galveston Bay, TX	COA		Low abundance (53+/-33.9 N/0.00203 sq.m.)	Benthic invertebrates		0.985+/-0.247	22+/-11.2	Carr 1992
190	+/-45.2	NE	San Francisco Bay, CA	COA	48-h	Least toxic (23.3+/-7.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
208	+/-49.5	NE	San Francisco Bay, CA	COA	48-h	Not significantly toxic (31.9+/-15.5% abnormal)	Bivalve	LAR			Long & Morgan 1990
260		*	San Francisco Bay, CA	AETA	48-h	San Francisco Bay AET	Oyster; mussel	LAR			Long & Morgan 1990
264	+/-41.0	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-7.99% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.14+/-0.352	6.09+/-5.38	Bricker et al. 1993
266	+/-359	NE	Oahu, Hawaii	COA	10-d	Not significantly toxic (7.2+/-1.89% mortality)	Eohaustorius estuarius (amphipod)	ADT	1.93+/-1.94	10.3+/-12.4	Lamberson et al. 1993
266	+/-359	NE	Oahu, Hawaii	COA	10-d	Not significantly toxic (10.1+/-4.01% mortality)	Corophium acherusicum (amphipod)	ADT	1.93+/-1.94	10.3+/-12.4	Lamberson et al. 1993
280	+/-162	NC	San Francisco Bay, CA	COA	48-h	Moderately toxic (57.1+/-13.6% mortality)	Mussel	LAR	1.14+/-.33		Chapman et al. 1987a
287		NE	Southern California	COA	10-d	Not significantly toxic (23.2% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
303	+/-705	NE	Gulf of Mexico	COA		Not toxic (3.21+/-0.239 diversity index)	Benthic species		0.464+/-0.143		Chapman et al. 1991
312			***TEL***								
320		*	California	AETA	48-h	California AET Values	Mytilus edulis (bivalve)	LAR			Becker et al. 1990
320		*	Northern California	AETA		Northern California AET Values	Benthic species				Becker et al. 1990
328	+/-739	NE	Gulf of Mexico	COA		Least toxic (6.32+/-3.68 TU/g)	Microtox (Photobacterium phosphoreum)		0.47+/-0.149		Chapman et al. 1991
332	+/-72.1	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.061+/-0.038 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.8+/-0.477	8.52+/-10.7	Bricker et al. 1993

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335	+/-220	SG	San Francisco Bay, CA	COA	48-h	Moderately toxic (59.4+/-11.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
340	+/-98	NE	San Francisco Bay, CA	COA	4-wk	Least toxic (116+/-4.3 young produced)	Tigriopus californicus (copepod)	ADT	1.23+/-.09		Chapman et al. 1987a
347		*	Puget Sound, WA	AETA	48-h	1986 Puget Sound AET	Crassostrea gigas (oyster)	LAR	1		Bellar et al. 1986
347		*	Puget Sound, WA	AETA	10-d	1986 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT	1		Bellar et al. 1986
355	+/-77	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (19.3+/-5.86% mortality)	Ampelisca abidta (amphipod)	SUB ADT	1.82+/-0.225	6.3+/-6.2	Bricker et al. 1993
358		NE	Puget Sound, WA	COA		Not toxic (10% prevalence of idiopathic degeneration/necrosis)	Parophrys vetulus (English sole)				Malins et al. 1985
358		NE	Puget Sound, WA	COA		Not toxic (17.5% prevalence of steatosis and hemosiderosis)	Parophrys vetulus (English sole)				Malins et al. 1985
358		NE	Puget Sound, WA	COA		Not toxic (0% occurrence of hepatic cellular alterations)	Parophrys vetulus (English sole)				Malins et al. 1985
358		NE	Puget Sound, WA	COA		Not toxic (5% prevalence of hepatocellular regenerative foci)	Parophrys vetulus (English sole)				Malins et al. 1985
358		NE	Puget Sound, WA	COA		Not toxic (0% prevalence of hepatic cellular alterations)	Parophrys vetulus (English sole)				Malins et al. 1985
358		NE	Puget Sound, WA	COA		Not toxic (32.5% prevalence of hepatic idiopathic lesions)	Parophrys vetulus (English sole)				Malins et al. 1985
361	+/-281	NE	San Francisco Bay, CA	COA	48-h	Least toxic (18+/-8.01% abnormal)	Mussel	LAR	1.2+/-.38		Chapman et al. 1987a
371	+/-102	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (39.5+/-18.2% mortality)	Ampelisca abidta (amphipod)	SUB ADT	2.06+/-0.523	20.1+/-13.9	Bricker et al. 1993
376	+/-83	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.3+/-2.22% normal development)	Mulinia lateralis (bivalve)	LAR	2.18+/-0.531	19.1+/-12.5	Bricker et al. 1993
383	+/-302	NC	San Francisco Bay, CA	COA	10-d	Moderately toxic (33.8+/-4.7% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
391	+/-104	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.5+/-11.4% mortality)	Mulinia lateralis (bivalve)	LAR	2.33+/-0.364	26.8+/-9.42	Bricker et al. 1993
395	+/-136	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (15.2+/-9.21% mortality)	Mulinia lateralis (bivalve)	LAR	2.17+/-0.663	18.4+/-19.9	Bricker et al. 1993
407		*	Puget Sound, WA	AETA		1986 Puget Sound AET	Benthic species		1		Bellar et al. 1986
418	+/-99.1	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.125+/-0.084 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.25+/-0.468	1.98+/-2.25	Bricker et al. 1993
435	+/-135	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.014+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.51+/-0.45	29.6+/-15.7	Bricker et al. 1993
440		NC	Puget Sound, WA	COA	2-d	Significantly toxic (3.8% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.5		Pastorok & Becker 1990
454	+/-869	NE	Gulf of Mexico	COA	10-d	Not significantly toxic (9+/-3.96% mortality)	Rhepoxynius abronius (amphipod)	ADT	0.471+/-0.18		Chapman et al. 1991
465	+/-770	NE	San Francisco Bay, CA	COA	10-d	Least toxic (18+/-6.6% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
480		NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (18% mortality)	Ampelisca abdita (amphipod)		0.028	9 ug/g	Windom In Prep
482	+/-163	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (25.9+/-5.01% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.21+/-0.444	2.41+/-2.32	Bricker et al. 1993
500		NE	Burrard Inlet, BC	SQO		Sediment Quality Objectives	Aquatic biota				Swain & Nijman 1991
500		NE	Tampa Bay, FL	COA	1-h	Least toxic (79.4+/-9.9% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.45+/-0.587		Long 1993
509	+/-310	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (96+/-1.66% normal development)	Mulinia lateralis (bivalve)	LAR	2.52+/-0.997	35+/-42.9	Bricker et al. 1993
510	+/-28	NE	Tampa Bay, FL	COA	10-d	Not significantly toxic (14.6+/-7.67% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.63+/-0.596		Long 1993
516	+/-425	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.096+/-0.101 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.37+/-0.759	6.93+/-6.83	Bricker et al. 1993
521	+/-495	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.167+/-0.198 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.59+/-1.09	4.67+/-6.99	Bricker et al. 1993
524	+/-461	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.074+/-0.043 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.27+/-0.626	6.21+/-5.41	Bricker et al. 1993
530		NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (0% mortality)	Arbacia punctulata (sea urchin)		0.03	19 ug/g	Windom In Prep
532	+/-845	NE	San Francisco Bay, CA	COA	10-d	Not significantly toxic (18.4+/-6.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
538	+/-483	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99.3+/-0.827% normal development)	Mulinia lateralis (bivalve)	LAR	1.43+/-0.738	14.7+/-24	Bricker et al. 1993
540	+/-23.1	NE	Brunswick Harbor Entrance, GA	COA	48-h	Not significantly toxic (86.6+/-4.25% normal development)	Arbacia punctulata (sea urchin)		0.181+/-0.162	182+/-208 ug/g	Windom In Prep
547	+/-23.1	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (28.3+/-6.11% mortality)	Mysidopsis bahia (mysid)		0.246+/-0.051	127+/-24 ug/g	Windom In Prep
547	+/-326	SG	San Francisco Bay, CA	COA	48-h	Moderately toxic (25.1+/-6.61% abnormal)	Mussel	LAR	1.26+/-0.17		Chapman et al. 1987a
552	+/-912	*	Gulf of Mexico	COA	10-d	Highly toxic (2.5+/-1.05% emergence/d)	Rhepoxynius abronius (amphipod)	ADT	0.5+/-0.155		Chapman et al. 1991
557	+/-768	SG	San Francisco Bay, CA	COA	10-d	Significantly toxic (42.9+/-19.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990

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Total LMWPAHs	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
560		*	California	AETA		California AET Values	Benthic species				Becker et al. 1990
560		*	Southern California	AETA		Southern California AET Values	Benthic species				Becker et al. 1990
560	+/-130	NE	Tampa Bay, FL	COA		Not significantly toxic (EC50; 0.066+/-0.033 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.89+/-0.902		Long 1993
564	+/-70.7	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (91.3+/-2.91% normal development)	Arbacia punctulata (sea urchin)		0.299+/-0.251	114+/-68.4 ug/g	Windom In Prep
568	+/-79.3	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (9.78+/-5.33% mortality)	Mysidopsis bahia (mysid)		0.24+/-0.247	91.9+/-73.4 ug/g	Windom In Prep
570	+/-75.6	SG	Savannah River Entrance Channel, GA	COA	48-h	Significantly toxic (25.4+/-7.66% mortality)	Arbacia punctulata (sea urchin)		0.344+/-0.242	129.5+/-59.3 ug/g	Windom In Prep
571	+/-84.1	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (4+/-2.83% mortality)	Menidia beryllina (silverside)		0.243+/-0.264	90.5+/-78.4 ug/g	Windom In Prep
578	+/-97.2	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (27.5+/-10.6% mortality)	Mysidopsis bahia (mysid)		0.237+/-0.311	74.6+/-85.5 ug/g	Windom In Prep
579	+/-77.2	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (11.6+/-4.33% mortality)	Ampelisca abdita (amphipod)		0.267+/-0.25	102+/-71.1 ug/g	Windom In Prep
590	+/-95	SG	Tampa Bay, FL	COA	1-h	Moderately toxic (15.3+/-10.6% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.94+/-0.908		Long 1993
594	+/-600	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (13.8+/-4.09% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.47+/-0.306		Pastorok & Becker 1990
596	+/-823	*	San Francisco Bay, CA	COA	48-h	Significantly toxic (55.7+/-22.7% abnormal)	Bivalve	LAR			Long & Morgan 1990
610		NE	Puget Sound, WA	AETA		PSDDA Screening level concentration	Aquatic biota				USACOE 1988
624	+/-951	NE	San Francisco Bay, CA	COA	10-d	Least toxic (13.6+/-7.76% mortality)	Amphipod	ADT	1.4 +/- 0.79		Chapman et al. 1987a
633	+/-745	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (6.67+/-8.07% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.51+/-0.330		Pastorok & Becker 1990
638	+/-542	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (6.48+/-10.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
638	+/-542	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99+/-0.862% normal development)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
661	+/-887	NE	San Francisco Bay, CA	COA	10-d	Least Toxic (4.63+/-2.91% avoidance)	Amphipod	ADT	1.44+/-.74		Chapman et al. 1987a
666	+/-515	*	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (30.5+/-16.4% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.62+/-0.777	17.7+/-26.3	Bricker et al. 1993
680		NE	Puget Sound, WA	SBA		EPA/ACOE Puget Sound Interim Criteria	Aquatic biota				USACOE 1988
682	+/-838	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-6.07% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.71+/-0.9	15.3+/-23.2	Bricker et al. 1993
724	+/-194	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (10.6+/-3.17% mortality)	Ampelisca abdita (amphipod)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
724	+/-194	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (8.00+/-2.92% mortality)	Mysidopsis bahia (mysid)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
739	+/-710	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (17+/-16.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.99+/-1	21.6+/-24.5	Bricker et al. 1993
743	+/-205	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (5.43+/-3.21% mortality)	Mysidopsis bahia (mysid)		1.21+/-1.13	9096+/-13378 ug/g	Windom In Prep
743	+/-205	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (9.61+/-2.7% mortality)	Menidia beryllina (silverside)		1.22+/-1.13	9172+/-13363 ug/g	Windom In Prep
765	+/-1005	SG	San Francisco Bay, CA	COA	10-d	Highly toxic (67+/-11.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
800		SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (16% mortality)	Mysidopsis bahia (mysid)		1.8	7095 ug/g	Windom In Prep
800		SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (22.3% mortality)	Menidia beryllina (silverside)		1.71	6562 ug/g	Windom In Prep
805	+/-1063	*	Gulf of Mexico	COA	48-h	Highly toxic (59.4+/-15.5% mortality)	Crassostrea gigas (oyster)	LAR	0.5+/-0.18		Chapman et al. 1991
852	+/-823	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.1+/-2.78% normal development)	Mulinia lateralis (bivalve)	LAR	2.12+/-1.04	22.9+/-23.7	Bricker et al. 1993
872	+/-118	SG	Brunswick Harbor Entrance, GA	COA	48-h	Significantly toxic (14.6+/-18.9% normal development)	Arbacia punctulata (sea urchin)		1.99+/-0.562	14009+/-13434 ug/g	Windom In Prep
883		NE	Burrard Inlet, BC	COA	10-d	Not toxic (4.5+/-3.02% emergence)	Rhepoxynius abronius (amphipod)	ADT	2.66+/-2.15		McLeay et al. 1991
883		NE	Burrard Inlet, BC	COA	10-d	Not toxic (5.21+/-3.61% emergence)	Corophium volutator (amphipod)	ADT	3.18+/-2.1		McLeay et al. 1991
910		NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (6.8+/-7.31% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
910		NE	Halifax Harbour, NS	COA	20-d	Not significantly toxic (0.7+/-1.63% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
912		*	Southern California	COA	10-d	Significantly toxicity (51.7% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
912		NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (8.5+/-6.06% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
920	+/-2280	*	San Francisco Bay, CA	COA	4-wk	Moderately toxic (94.9+/-10.1 young produced)	Tigriopus californicus (copepod)	ADT	2.87+/-1.07		Chapman et al. 1987a
989	+/-943	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (34.9+/-15.7% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.23+/-1.04	25.4+/-25.5	Bricker et al. 1993

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Total LMWPAHs	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
1019	+/-943	NE	Commencement Bay, WA	COA	48-h	Least toxic (15.1+/-3.1% abnormality)	Oyster	LAR			Tetra Tech 1985
1036	+/-1172	*	Gulf of Mexico	COA	48-h	Significantly toxic (32.6+/-14.2% abnormality)	Crassostrea gigas (oyster)	LAR	0.567+/-0.153		Chapman et al. 1991
1055	+/-1326	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.016+/-0.007 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.26+/-0.936	43.4+/-35.6	Bricker et al. 1993
1164	+/-1030	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (29.8+/-13.9% mortality)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.07	32.1+/-28.4	Bricker et al. 1993
1183	+/-1196	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (21.5+/-6.36% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.35+/-1.05	10.5+/-13.4	Bricker et al. 1993
1185	+/-1054	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.013+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.79+/-0.744	37.6+/-25.3	Bricker et al. 1993
1298	+/-1590	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (91.5+/-7.28% normal development)	Mulinia lateralis (bivalve)	LAR	2.6+/-0.899	36.8+/-34.9	Bricker et al. 1993
1300	+/-1312	*	San Francisco Bay, CA	COA	10-d	Moderately toxic (28.3+/-7.51% mortality)	Amphipod	ADT	2.01+/-.98		Chapman et al. 1987a
1361	+/-1239	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.1+/-13.3% mortality)	Mulinia lateralis (bivalve)	LAR	2.68+/-0.955	31.8+/-24.4	Bricker et al. 1993
1372	+/-1038	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (38+/-13% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.92+/-0.937	34.6+/-23.9	Bricker et al. 1993
1376	+/-1042	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (96.6+/-3.79% normal development)	Mulinia lateralis (bivalve)	LAR	2.87+/-0.94	35.1+/-25.9	Bricker et al. 1993
1408	+/-878	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.008+/-0.001 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.19+/-1.27	12+/-11.3	Bricker et al. 1993
1408	+/-1515	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (23+/-4.24% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.46+/-1.22	40+/-55.1	Bricker et al. 1993
1430		*	Eagle Harbor, WA	COA	4-d	LC50	Rhepoxynius abronius (amphipod)	ADT			Swartz et al. 1989
1442			***PEL***								
1602	+/-1411	NE	Commencement Bay, WA	COA	10-d	Least toxic (12.5+/-4.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
1643	+/-1030	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.011+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.28+/-0.363	45.3+/-21.4	Bricker et al. 1993
1800	+/-1002	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (75.1+/-10.6% mortality)	Mulinia lateralis (bivalve)	LAR	3.32+/-0.317	42.3+/-19.2	Bricker et al. 1993
1824	+/-1993	*	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (88.5+/-8.39% normal development)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.05	38.1+/-38.9	Bricker et al. 1993
1952	+/-2042	*	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (51.3+/-6.95% mortality)	Mulinia lateralis (bivalve)	LAR	1.8+/-1.71	29.6+/-46.3	Bricker et al. 1993
1985	+/-2707	NE	Puget Sound, WA	COA	28-d	Not significantly toxic (1.44 +/-1.74% mortality)	Dendraster exentricus (sand dollar)	JUV			Casillas et al. 1992
1985	+/-2707	NE	Puget Sound, WA	COA	28-d	Not significantly toxic (0.055+/-0.024% growth mm/d)	Dendraster exentricus (sand dollar)	JUV			Casillas et al. 1992
2003	+/-1405	SG	Commencement Bay, WA	COA	48-h	Moderately toxic (23+/-2.3% abnormality)	Oyster	LAR			Tetra Tech 1985
2031	+/-1316	SG	Commencement Bay, WA	COA	10-d	Moderately toxic (26+/-5.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
2050	+/-2360	*	Tampa Bay, FL	COA	1-h	Most toxic (0.091+/-0.187% fertilization)	Arbacia punctulata (sea urchin)	GAM	2.96+/-1.49		Long 1993
2100		*	Northern California	AETA	10-d	Northern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
2100		*	California	AETA	10-d	California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
2100		NE	San Francisco Bay, CA	COA	48-h	Least toxic (17.3% mortality)	Mussel	LAR	1.25		Chapman et al. 1987a
2192		NE	Elizabeth River, VA	COA	96-h	No significant change in respiration rate	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
2196		NE	Elizabeth River, VA	COA	96-h	Not significantly toxic (4.5+/-3.24% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
2280	+/-1195	*	San Francisco Bay, CA	COA	48-h	Highly toxic (92.4+/-4.5% abnormal)	Bivalve	LAR			Long & Morgan 1990
2280	+/-1195	SG	San Francisco Bay, CA	COA	48-h	Highly toxic (92.3+/-5.5% mortality)	Mussel	LAR	2.87+/-1.32		Chapman et al. 1987a
2650	+/-2540	*	Tampa Bay, FL	COA	10-d	Significantly toxic (35.2+/-17.5% mortality)	Ampelisca abdita (amphipod)	SUB ADT	3.53+/-1.35		Long 1993
2761		NE	Burrard Inlet, BC	COA	10-d	Not toxic (8.9+/-2.99% mortality)	Corophium volutator (amphipod)	ADT	2.8+/-1.96		McLeay et al. 1991
2761		NE	Burrard Inlet, BC	COA	10-d	Not toxic (97.2+/-2.84% reburial)	Rhepoxynius abronius (amphipod)	ADT	2.8+/-1.96		McLeay et al. 1991
2800		*	San Francisco Bay, CA	AETA	10-d	San Francisco Bay AET	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
2890	+/-2650	*	Tampa Bay, FL	COA		Significantly toxic (EC50; 0.017+/-0.012 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.47+/-1.49		Long 1993
2960		*	San Francisco Bay, CA	COA	48-h	Highly toxic (66.8% abnormal)	Mussel	LAR	3.59		Chapman et al. 1987a
3139		NE	Halifax Harbour, NS	COA	20-d	Not significantly toxic (1+/-2% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
3143		NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (5.2+/-3.5% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990

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3160		*	San Francisco Bay, CA	COA	10-d	Most toxic (95% mortality)	Amphipod	ADT	4.03		Chapman et al. 1987a
3160		*	San Francisco Bay, CA	COA	10-d	Highly toxic (37% avoidance)	Amphipod	ADT	4.03		Chapman et al. 1987a
3609		NE	Burrard Inlet, BC	COA	10-d	Not toxic (7.9+/-5.12% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.64+/-2.14		McLeay et al. 1991
3700		*	Puget Sound, WA	SQG		Chemical Criteria	Benthic community		1		WDE 1989
3835	+/-4851	*	Commencement Bay, WA	COA	48-h	Highly toxic (44.5+/-19% abnormality)	Oyster	LAR			Tetra Tech 1985
5200		*	Puget Sound, WA	AETA	15-min	1988 Puget Sound AET	Microtox (Photobacterium phosphoreum)				PTI 1988
5200		*	Puget Sound, WA	AETA	48-h	1988 Puget Sound AET	Crassostrea gigas (oyster)	LAR			PTI 1988
6100		*	Puget Sound, WA	AETA		PSDDA Maximum Level Criteria	Aquatic biota				USACOE 1988
6977	+/-8437	*	Commencement Bay, WA	COA	10-d	Highly toxic (78.5+/-19.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
8390		*	Burrard Inlet, BC	COA	10-d	Highly toxic (23% emergence)	Corophium volutator (amphipod)	ADT	3.5		McLeay et al. 1991
8390		*	Burrard Inlet, BC	COA	10-d	Highly toxic (30.5% emergence)	Rhepoxynius abronius (amphipod)	ADT	3.5		McLeay et al. 1991
9910		*	Elizabeth River, VA	COA	96-h	Significant decrease in respiration rates	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
10316		NC	Eagle Harbor, WA	COA	10-d	Moderately toxic (41+/-9% mortality)	Rhepoxynius abronius (amphipod)	ADT			CH2M Hill 1989
11162		NE	Eagle Harbor, WA	COA	10-d	Least toxic (13+/-7% mortality)	Rhepoxynius abronius (amphipod)	ADT			CH2M Hill 1989
13000		*	Puget Sound, WA	AETA		1988 Puget Sound AET	Benthic community				PTI 1988
22554		*	Elizabeth River, VA	COA	96-h	Significantly toxic (50.7+/-39% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
23932	+/-51703	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (4.43+/-2.1% mortality)	Panope generosa (geoduck)	JUV	1.51+/-0.261		Pastorok & Becker 1990
24000		*	Puget Sound, WA	AETA	10-d	1988 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT			PTI 1988
26337	+/-55721	NE	Puget Sound, WA	COA	20-d	Not significantly toxic (5+/-3.86% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.46+/-0.26		Pastorok & Becker 1990
32083		*	Puget Sound, WA	COA		Toxic (71.6+/-14.6% prevalence of idiopathic degeneration/necrosis)	Parophrys vetulus (English sole)				Malins et al. 1985
32083		*	Puget Sound, WA	COA		Toxic (51.4+/-21.1% prevalence of steatosis and hemosiderosis)	Parophrys vetulus (English sole)				Malins et al. 1985
32083		*	Puget Sound, WA	COA		Toxic (19+/-6.15% prevalence of hepatocellular regenerative foci)	Parophrys vetulus (English sole)				Malins et al. 1985
32083		*	Puget Sound, WA	COA		Toxic (26.7+/-6.43% prevalence of hepatic neoplasms)	Parophrys vetulus (English sole)				Malins et al. 1985
32083		*	Puget Sound, WA	COA		Toxic (88+/-3.65% prevalence of hepatic idiopathic lesions)	Parophrys vetulus (English sole)				Malins et al. 1985
32083		*	Puget Sound, WA	COA		Toxic (44.2+/-8.5% prevalence of hepatic cellular alterations)	Parophrys vetulus (English sole)				Malins et al. 1985
58357	+/-136404	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (2.09+/-1.73% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.56+/-0.329		Pastorok & Becker 1990
65000		-	United States	EqPA		Chronic Marine EqP Threshold	Aquatic biota		1		Bolton et al. 1985
66220	+/-135428	*	Puget Sound, WA	COA	15-min	Significantly toxic (EC50; 0.065+/-0.043% extract)	Microtox (Photobacterium phosphoreum)		1.58+/-0.255		Pastorok & Becker 1990
85928		NE	Sidney Tar Pond, NS	COA	20-d	Not significantly toxic (8+/-5.66% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
87917	+/-151987	*	Puget Sound, WA	COA	2-d	Significantly toxic (60.4+/-46.5% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.57+/-0.287		Pastorok & Becker 1990
105069		*	Eagle Harbor, WA	COA	10-d	Highly toxic (95.5+/-8.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			CH2M Hill 1989
131617	+/-173451	*	Puget Sound, WA	COA	10-d	Significantly toxic (80.8+/-30.6% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.266		Pastorok & Becker 1990
159667	+/-260204	*	Puget Sound, WA	COA	20-d	Significantly toxic (37.3+/-22% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.87+/-0.208		Pastorok & Becker 1990
432804	+/-717388	*	Puget Sound, WA	COA	28-d	Significantly toxic (69.5+/-33.3% mortality)	Dendraster exentricus (sand dollar)	JUV			Casillas et al. 1992
432804	+/-717388	*	Puget Sound, WA	COA	28-d	Significantly toxic (0.013+/-0.006% growth mm/d)	Dendraster exentricus (sand dollar)	JUV			Casillas et al. 1992
460000		*	Puget Sound, WA	COA	10-d	Significantly toxic (56% mortality)	Panope generosa (geoduck)	JUV	2.1		Pastorok & Becker 1990
1889424		*	Sidney Tar Pond, NS	COA	20-d	Significantly toxic (52% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990

Table 19. A summary of the available data on the biological effects associated with sediment-sorbed BENZ(A)ANTHRACENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Benz(a)anthracene Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.02	NC	Mobile Bay, AL	COA		Significantly toxic (10% mortality)	Mysidopsis bahia (mysid shrimp)		0.009	0.004	EMAP Louisiana Province 1991
0.095 +/-0.021	NE	Apalachee Bay, FL	COA	10-d	Not significantly toxic (3.3+/-3.25% mortality)	Ampelisca abdita (amphipod)		0.643+/-0.455	0.390+/-0.410	EMAP Louisiana Province 1991
0.103 +/-0.015	NE	Apalachee Bay, FL	COA		Not significantly toxic (0.75+/-1.5% mortality)	Mysidopsis bahia (mysid shrimp)		0.540+/-0.385	0.405+/-0.417	EMAP Louisiana Province 1991
0.11	SG	Apalachee Bay, FL	COA	10-d	Significantly toxic (15.6% mortality)	Ampelisca abdita (amphipod)		0.438+/-0.442	0.421+/-0.593	EMAP Louisiana Province 1991
0.218 +/-0.137	NE	Chandeleur Sound, LA	COA		Not significantly toxic (1.03+/-2.05% mortality)	Mysidopsis bahia (mysid shrimp)		0.824+/-0.915	1.69+/-0.920	EMAP Louisiana Province 1991
0.265 +/-0.132	NC	Chandeleur Sound, LA	COA	10-d	Significantly toxic (11.5+/-4.86% mortality)	Ampelisca abdita (amphipod)		0.811+/-0.711	1.87+/-0.973	EMAP Louisiana Province 1991
0.32 +/-0.297	NC	Mississippi Sound, MS	COA	10-d	Significantly toxic (11.6+/-3.39% mortality)	Ampelisca abdita (amphipod)		0.111+/-0.045	0.03	EMAP Louisiana Province 1991
0.376 +/-0.166	SG	Chandeleur Sound, LA	COA		Significantly toxic (7.6+/-1.32% mortality)	Mysidopsis bahia (mysid shrimp)		0.624+/-0.197	2.07+/-1.19	EMAP Louisiana Province 1991
0.387 +/-0.23	NE	Chandeleur Sound, LA	COA	10-d	Not significantly toxic (2.87+/-4.05% mortality)	Ampelisca abdita (amphipod)		0.517+/-0.166	2.02+/-1.38	EMAP Louisiana Province 1991
0.905 +/-0.601	NE	Galveston Bay, TX	COA		High abundance (155+/-49.5 N/0.00203 sq.m.)	Oligochaeta		1.2+/-1.27	4.27+/-3.85	Carr 1992
1.96 +/-1.09	NE	Galveston Bay, TX	COA		High abundance (27.3+/-10 N/0.00203 sq.m.)	Mollusca		1.64+/-0.4	1.39+/-0.17	Carr 1992
2.95 +/-2.18	NE	Galveston Bay, TX	COA		High species richness (24.5+/-3.7 S/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
2.95 +/-2.18	NE	Galveston Bay, TX	COA		High abundance (359+/-92.8 N/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
3.24 +/-1.33	NC	Mississippi Sound, MS	COA		Significantly toxic (12.2+/-4.42% mortality)	Mysidopsis bahia (mysid shrimp)		0.939+/-0.335	2.63+/-2.3	EMAP Louisiana Province 1991
3.44 +/-3.16	NE	Matagorda Bay, TX	COA		Not significantly toxic (1.58+/-1.82% mortality)	Mysidopsis bahia (mysid shrimp)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
3.44 +/-3.16	NE	Matagorda Bay, TX	COA	10-d	Not significantly toxic (2.33+/-4.65% mortality)	Ampelisca abdita (amphipod)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
3.79 +/-2	NE	Galveston Bay, TX	COA		High abundance (156+/-22.9 N/0.00203 sq.m.)	Polychaeta		0.916+/-0.661	2.94+/-2.3	Carr 1992
4.08 +/-5.24	NE	Galveston Bay, TX	COA	48-h	Not toxic (98.1+/-1.79% normal development)	Arbacia punctulata (sea urchin)	EMB	.748+/-0.476	4.16+/-3.45	Carr 1992
4.08 +/-5.59	NE	Galveston Bay, TX	COA		High abundance (16.2+/-6.19 N/0.00203 sq.m.)	Copepoda		0.844+/-0.524	4.73+/-3.1	Carr 1992
4.1 +/-5.76	NC	Mobile Bay, AL	COA	10-d	Significantly toxic (46+/-49.3% mortality)	Ampelisca abdita (amphipod)		0.22+/-0.298	3.84+/-5.43	EMAP Louisiana Province 1991
4.48 +/-4.68	NE	Mississippi Sound, MS	COA		Not significantly toxic (0.789+/-1.59% mortality)	Mysidopsis bahia (mysid shrimp)		0.827+/-0.757	1.46+/-1.58	EMAP Louisiana Province 1991
4.78 +/-3.88	NE	Mississippi Sound, MS	COA	10-d	Not significantly toxic (1.4+/-1.73% mortality)	Ampelisca abdita (amphipod)		0.998+/-0.602	2.01+/-1.82	EMAP Louisiana Province 1991
<5	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (3% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
<5	NE	Sidney Tar Pond, NS	COA	10-d	Not significantly toxic (4% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
<5	NE	Sidney Tar Pond, NS	COA	10-d	Not significantly toxic (3% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
8.42 +/-18.6	NE	Galveston Bay, TX	COA	1-h	Not toxic (92.5+/-6.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	0.77+/-0.448	6.37+/-6.58	Carr 1992
8.62 +/-11.2	NC	Galveston Bay, TX	COA		Significantly toxic (13.4+/-9.11% mortality)	Mysidopsis bahia (mysid shrimp)		0.778+/-0.482	1.21+/-0.778	EMAP Louisiana Province 1991
8.9	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (0.33+/-0.516% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
8.9	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (2.33+/-1.03% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
8.9	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (15.3+/-11.0% mortality)	Hyalella azteca (amphipod)	JUV	0.648+/-0.641	1.74+/-1.39	Hall et al. 1992
8.9	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1% mortality)	Streblospio benedicti (polychaete worm)		1.38	3.25	Hall et al. 1992
8.9	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (16.5+/-9.19% mortality)	Streblospio benedicti (polychaete worm)		0.783+/-0.845	4.83+/-2.23	Hall et al. 1992
8.9	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.367+/-0.085 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
8.9	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.0005 mg/day growth)	Streblospio benedicti (polychaete worm)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
8.9	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.003+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.316+/-0.120	2.13+/-2.46	Hall et al. 1992
8.9	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (7.2+/-1.92% mortality)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
8.9	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.6+/-0.55% reburial)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
8.9	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
8.9	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
8.9	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.001+/-0.001 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.555+/-0.471	2.68+/-2.3	Hall et al. 1992
8.9	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1.83+/-1.6% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
8.9	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (3.5+/-1.87% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992

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Benz(a)anthracene Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
8.9	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (9.25+/-5.32% mortality)	Lepidactylus dytiscus (amphipod)		0.638+/-0.768	1.65+/-1.62	Hall et al. 1992
8.9	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (22.3+/-7.37% mortality)	Hyalella azteca (amphipod)	JUV	0.788+/-0.866	2.04+/-1.75	Hall et al. 1992
8.9	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (8.8+/-7.12% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
8.9	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (14+/-9.22% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
8.9	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.1+/-0.865% reburial)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
8.9	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<20% emergence)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
8.9	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
8.9	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (-0.057+/-0.04 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
8.9	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.001mg/day growth)	Streblospio benedicti (polychaete worm)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
8.9	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.016 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
8.9	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.005+/-0.0004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
8.9	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (55.0+/-22.6% mortality)	Hyalella azteca (amphipod)	JUV	0.338+/-0.133	2.9+/-3.11	Hall et al. 1992
8.9	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29.8+/-11.1% mortality)	Streblospio benedicti (polychaete worm)		0.316+/-0.12	2.13+/-2.46	Hall et al. 1992
8.9	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (55.0+/-19.5% mortality)	Streblospio benedicti (polychaete worm)		0.349+/-0.11	1.07+/-0.66	Hall et al. 1992
8.9	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.003 mg/day growth)	Lepidactylus dytiscus (amphipod)		1.38	3.25	Hall et al. 1992
8.9	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29% mortality)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
8.9	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (89.7% reburial)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
8.9	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
8.9	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	6.41	Hall et al. 1992
8.9	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
8.9	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (45.5+/-12% mortality)	Lepidactylus dytiscus (amphipod)		0.383+/-0.279	3.61+/-2.79	Hall et al. 1992
8.9	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (63.0+/-24.3% mortality)	Hyalella azteca (amphipod)	JUV	0.317+/-0.228	2.57+/-2.67	Hall et al. 1992
8.9	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (22% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
8.9	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (28% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
8.9	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (82.9% reburial)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
8.9	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>20% emergence)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
8.9	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	5.58	Hall et al. 1992
8.9	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.008+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.4	Hall et al. 1992
8.9	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.003 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
8.93 +/-10.5	NC	Mississippi River, MS, LA	COA	10-d	Significantly toxic (15.9+/-6.65% mortality)	Ampelisca abdita (amphipod)		1.22+/-0.717	0.235+/-0.276	EMAP Louisiana Province 1991
9.19 +/-12.4	NC	Galveston Bay, TX	COA	10-d	Significantly toxic (15.8+/-3.89% mortality)	Ampelisca abdita (amphipod)		0.647+/-0.606	0.160+/-0.184	EMAP Louisiana Province 1991
9.38 +/-2.51	NE	Mobile Bay, AL	COA		Not significantly toxic (1.07+/-1.85% mortality)	Mysidopsis bahia (mysid shrimp)		0.968+/-0.815	8.23+/-3.4	EMAP Louisiana Province 1991
9.83 +/-9.42	NE	Galveston Bay, TX	COA	10-d	Not significantly toxic (1.35+/-1.45% mortality)	Ampelisca abdita (amphipod)		0.961+/-0.537	1.17+/-0.640	EMAP Louisiana Province 1991
9.99 +/-3.23	NE	Mobile Bay, AL	COA	10-d	Not significantly toxic (0.5+/-0.778% mortality)	Ampelisca abdita (amphipod)		1.24+/-0.948	8.51+/-4.76	EMAP Louisiana Province 1991
10.2 +/-20	*	Galveston Bay, TX	COA		Low abundance (4.21+/-5.66 N/0.00203 sq.m.)	Oligochaeta		0.895+/-0.453	7.85+/-8.8	Carr 1992
10.6 +/-9.12	NE	Galveston Bay, TX	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		0.934+/-0.657	0.457+/-0.530	EMAP Louisiana Province 1991
11.8 +/-14.6	NE	Mississippi River, MS, LA	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		1.3+/-0.83	1.14+/-1	EMAP Louisiana Province 1991
12.1 +/-6.03	SG	Mississippi River, MS, LA	COA		Significantly toxic (32.9+/-36.4% mortality)	Mysidopsis bahia (mysid shrimp)		1.07+/-0.924	1.41+/-1.93	EMAP Louisiana Province 1991
13.4 +/-17.1	NE	Galveston Bay, TX	COA		High Abundance (6+/-1.41 N/0.00203 sq.m.)	Amphipoda		0.955+/-0.629	7.21+/-8.2	Carr 1992
15 +/-10.1	NE	Mississippi River, MS, LA	COA	10-d	Not significantly toxic (7.8+/-1.63% mortality)	Ampelisca abdita (amphipod)		1.15+/-1.04	2.31+/-0.651	EMAP Louisiana Province 1991
19.4 +/-63.3	SG	Galveston Bay, TX	COA		Low abundance (0.3+/-0.651 N/0.00203 sq.m.)	Amphipoda		0.859+/-0.487	7.67+/-8.12	Carr 1992
20.8 +/-64.2	*	Galveston Bay, TX	COA		Low abundance (1.86+/-2.59 N/0.00203 sq.m.)	Mollusca		0.784+/-0.421	8.29+/-8.13	Carr 1992

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Benz(a)anthracene Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
21.4 +/-65.3	*	Galveston Bay, TX	COA		Low species richness (10+/-3.73 S/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
21.4 +/-65.3	*	Galveston Bay, TX	COA		Low abundance (89+/-60.7 N/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
24.2 +/-70.4	*	Galveston Bay, TX	COA		Low abundance (41.7+/-21.8 N/0.00203 sq.m.)	Polychaeta		0.848+/-0.427	9.21+/-8.61	Carr 1992
29.3 +/-78.6	*	Galveston Bay, TX	COA		Low abundance (2.05+/-1.58 N/0.00203 sq.m.)	Copepoda		0.879+/-0.47	9.63+/-9.65	Carr 1992
30.1 +/-25	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (5.8+/-3.7% mortality)	Rhepoxynius abronius (amphipod)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
30.1 +/-25	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (3.4+/-1.82% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
30.1 +/-25	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (11.2+/-3.7% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
30.1 +/-25	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (3.52+/-1.66% mortality)	Macoma nasuta (clam)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
45.3 +/-96.7	*	Galveston Bay, TX	COA	48-h	Toxic (4.65+/-16.1% normal development)	Arbacia punctulata (sea urchin)	EMB	1.06+/-0.449	14.5+/-9.2	Carr 1992
45.3 +/-18.9	NE	Puget Sound, WA	COA	15-min	Not significantly toxic (EC50; 0.283+/-0.168% extract)	Microtox (Photobacterium phosphoreum)		1.39+/-0.37		Pastorok & Becker 1990
59.6 +/-129	NE	Southern California	COA	10-d	Not significantly toxic (23.2% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
60	*	San Francisco Bay, CA	AETA	48-h	San Francisco Bay AET	Oyster; mussel	LAR			Long & Morgan 1990
60	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (18% mortality)	Ampelisca abdita (amphipod)		0.028	9 ug/g	Windom In Prep
60	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (0% mortality)	Arbacia punctulata (sea urchin)		0.03	19 ug/g	Windom In Prep
60.2 +/-53.8	NC	Galveston Bay, TX	COA		Low abundance (53+/-33.9 N/0.00203 sq.m.)	Benthic invertebrates		0.985+/-0.247	22+/-11.2	Carr 1992
60.5 +/-137	*	Galveston Bay, TX	COA		Moderate abundance (58.3+/-16.2 N/0.00203 sq.m.)	Oligochaeta		0.632+/-0.274	7.93+/-5.6	Carr 1992
66.2 +/-135	*	Galveston Bay, TX	COA	1-h	Toxic (20.4+/-18.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	1.26+/-0.47	14.6+/-10.1	Carr 1992
67.5 +/-2.89	NE	Brunswick Harbor Entrance, GA	COA	48-h	Not significantly toxic (86.6+/-4.25% normal development)	Arbacia punctulata (sea urchin)		0.181+/-0.162	182+/-208 ug/g	Windom In Prep
68.3 +/-2.89	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (28.3+/-6.11% mortality)	Mysidopsis bahia (mysid)		0.246+/-0.051	127+/-24 ug/g	Windom In Prep
70 +/-9.57	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (91.3+/-2.91% normal development)	Arbacia punctulata (sea urchin)		0.299+/-0.251	114+/-68.4 ug/g	Windom In Prep
70.6 +/-10.4	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (9.78+/-5.33% mortality)	Mysidopsis bahia (mysid)		0.24+/-0.247	91.9+/-73.4 ug/g	Windom In Prep
70.6 +/-11.2	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (4+/-2.83% mortality)	Menidia beryllina (silverside)		0.243+/-0.264	90.5+/-78.4 ug/g	Windom In Prep
71	NE	Puget Sound, WA	COA		Not toxic (10% prevalence of idiopathic degeneration/necrosis)	Parophrys vetulus (English sole)				Malins et al. 1985
71	NE	Puget Sound, WA	COA		Not toxic (17.5% prevalence of steatosis and hemosiderosis)	Parophrys vetulus (English sole)				Malins et al. 1985
71	NE	Puget Sound, WA	COA		Not toxic (0% occurrence of hepatic cellular alterations)	Parophrys vetulus (English sole)				Malins et al. 1985
71	NE	Puget Sound, WA	COA		Not toxic (5% prevalence of hepatocellular regenerative foci)	Parophrys vetulus (English sole)				Malins et al. 1985
71	NE	Puget Sound, WA	COA		Not toxic (0% prevalence of hepatic cellular alterations)	Parophrys vetulus (English sole)				Malins et al. 1985
71	NE	Puget Sound, WA	COA		Not toxic (32.5% prevalence of hepatic idiopathic lesions)	Parophrys vetulus (English sole)				Malins et al. 1985
71.7 +/-12.9	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (27.5+/-10.6% mortality)	Mysidopsis bahia (mysid)		0.237+/-0.311	74.6+/-85.5 ug/g	Windom In Prep
71.7 +/-9.31	SG	Savannah River Entrance Channel, GA	COA	48-h	Significantly toxic (25.4+/-7.66% mortality)	Arbacia punctulata (sea urchin)		0.344+/-0.242	129.5+/-59.3 ug/g	Windom In Prep
71.9 +/-10.3	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (11.6+/-4.33% mortality)	Ampelisca abdita (amphipod)		0.267+/-0.25	102+/-71.1 ug/g	Windom In Prep
74.8		***TEL***								
77.3 +/-135	NE	Galveston Bay, TX	COA		Low species (11.2+/-1.94 S/0.00203 sq.m.)	Benthic species		0.642+/-0.356	13.4+/-8.65	Carr 1992
80	*	Eagle Harbor, WA	COA	4-d	LC50	Rhepoxynius abronius (amphipod)	ADT			Swartz et al. 1989
85.9 +/-170	NE	Galveston Bay, TX	COA		High abundance (154+/-30.2 N/0.00203 sq.m.)	Benthic invertebrates		0.47+/-0.27	9.07+/-2.94	Carr 1992
87	*	Puget Sound, WA	AETA	15-min	1986 Puget Sound AET	Microtox (Photobacterium phosphoreum)		1		Bellar et al. 1986
90.6 +/-24.3	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (10.6+/-3.17% mortality)	Ampelisca abdita (amphipod)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
90.6 +/-24.3	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (8.00+/-2.92% mortality)	Mysidopsis bahia (mysid)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
92.9 +/-25.6	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (5.43+/-3.21% mortality)	Mysidopsis bahia (mysid)		1.21+/-1.13	9096+/-13378 ug/g	Windom In Prep
92.9 +/-25.6	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (9.61+/-2.7% mortality)	Menidia beryllina (silverside)		1.22+/-1.13	9172+/-13363 ug/g	Windom In Prep
95 +/-83.5	NE	Burrard Inlet, BC	COA	10-d	Not toxic (4.5+/-3.02% emergence)	Rhepoxynius abronius (amphipod)	ADT	2.66+/-2.15		McLeay et al. 1991
95 +/-83.5	NE	Burrard Inlet, BC	COA	10-d	Not toxic (5.21+/-3.61% emergence)	Corophium volutator (amphipod)	ADT	3.18+/-2.1		McLeay et al. 1991

Table 19. A summary of the available data on the biological effects associated with sediment-sorbed BENZ(A)ANTHRACENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Benz(a)anthracene				Analysis	Test			Life			
	Std Dev	Hit	Area	Type	Type	End-Point Measured	Species	Stage	TOC (%)	AVS (umol/g)	Reference
100		SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (16% mortality)	Mysidopsis bahia (mysid)		1.8	7095 ug/g	Windom In Prep
100		SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (22.3% mortality)	Menidia beryllina (silverside)		1.71	6562 ug/g	Windom In Prep
107		*	Puget Sound, WA	AETA	48-h	1986 Puget Sound AET	Crassostrea gigas (oyster)	LAR	1		Bellar et al. 1986
107		*	Puget Sound, WA	AETA	10-d	1986 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT	1		Bellar et al. 1986
109	+/-14.7	SG	Brunswick Harbor Entrance, GA	COA	48-h	Significantly toxic (14.6+/-18.9% normal development)	Arbacia punctulata (sea urchin)		1.99+/-0.562	14009+/-13434 ug/g	Windom In Prep
130		NE	Burrard Inlet, BC	SQO		Sediment Quality Objectives	Aquatic biota				Swain & Nijman 1991
130		NE	Tampa Bay, FL	COA	10-d	Not significantly toxic (14.6+/-7.67% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.63+/-0.596		Long 1993
130		NE	Tampa Bay, FL	COA	1-h	Least toxic (79.4+/-9.9% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.45+/-0.587		Long 1993
130	+/-153	NE	Narragansett Bay, RI	COA	10-d	Not significantly toxic (5.28+/-3.04% mortality))	Ampelisca abdita (amphipod)	ADT			Munns et al. 1991
137	+/-178	NE	Jetty Island Pier, Everett Marina, WA	COA	10-d	Not toxic (12.3+/-2.87% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.08+/-0.66		Hart Crowser & Associates Inc. 1986
139	+/-15.2	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-7.99% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.14+/-0.352	6.09+/-5.38	Bricker et al. 1993
150		*	California	AETA	48-h	California AET Values	Mytilus edulis (bivalve)	LAR			Becker et al. 1990
150		*	Northern California	AETA		Northern California AET Values	Benthic species				Becker et al. 1990
157	+/-31.8	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.5+/-11.4% mortality)	Mulinia lateralis (bivalve)	LAR	2.33+/-0.364	26.8+/-9.42	Bricker et al. 1993
160	+/-26.7	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.061+/-0.038 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.8+/-0.477	8.52+/-10.7	Bricker et al. 1993
166	+/-27.5	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (39.5+/-18.2% mortality)	Ampelisca abidta (amphipod)	SUB ADT	2.06+/-0.523	20.1+/-13.9	Bricker et al. 1993
174	+/-45.7	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.3+/-2.22% normal development)	Mulinia lateralis (bivalve)	LAR	2.18+/-0.531	19.1+/-12.5	Bricker et al. 1993
180	+/-100	NE	Tampa Bay, FL	COA		Not significantly toxic (EC50; 0.066+/-0.033 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.89+/-0.902		Long 1993
184	+/-258	NE	Oahu, Hawaii	COA	10-d	Not significantly toxic (7.2+/-1.89% mortality)	Eohaustorius estuarius (amphipod)	ADT	1.93+/-1.94	10.3+/-12.4	Lamberson et al. 1993
184	+/-258	NE	Oahu, Hawaii	COA	10-d	Not significantly toxic (10.1+/-4.01% mortality)	Corophium acherusicum (amphipod)	ADT	1.93+/-1.94	10.3+/-12.4	Lamberson et al. 1993
199	+/-92	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (19.3+/-5.86% mortality)	Ampelisca abidta (amphipod)	SUB ADT	1.82+/-0.225	6.3+/-6.2	Bricker et al. 1993
203	+/-127	SG	Tampa Bay, FL	COA	1-h	Moderately toxic (15.3+/-10.6% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.94+/-0.908		Long 1993
209	+/-111	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (15.2+/-9.21% mortality)	Mulinia lateralis (bivalve)	LAR	2.17+/-0.663	18.4+/-19.9	Bricker et al. 1993
213	+/-117	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.014+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.51+/-0.45	29.6+/-15.7	Bricker et al. 1993
230		NC	Puget Sound, WA	COA	2-d	Significantly toxic (3.8% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.5		Pastorok & Becker 1990
230	+/-64.5	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.125+/-0.084 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.25+/-0.468	1.98+/-2.25	Bricker et al. 1993
235	+/-247	NE	Commencement Bay, WA	COA	48-h	Least toxic (15.1+/-3.1% abnormality)	Oyster	LAR			Tetra Tech 1985
<236	+/-242	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (6.8+/-7.31% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
<236	+/-242	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (8.5+/-6.06% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
<236	+/-242	NE	Halifax Harbour, NS	COA	20-d	Not significantly toxic (0.7+/-1.63% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
236	+/-191	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.167+/-0.198 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.59+/-1.09	4.67+/-6.99	Bricker et al. 1993
236	+/-218	SG	Jetty Island Pier, Everett Marina, WA	COA	10-d	Toxic (19.5+/-0.707% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.15+/-0.071		Hart Crowser & Associates Inc. 1986
260	+/-186	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (12.3+/-14.5% mortality)	Mulinia lateralis (bivalve)	LAR	1.53+/-0.743	15.7+/-23.2	Bricker et al. 1993
261		*	United States	SLCA		National Screening Level Concentration-Marine	Benthic species		1		Neff et al. 1987
266	+/-88.3	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (25.9+/-5.01% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.21+/-0.444	2.41+/-2.32	Bricker et al. 1993
267	+/-210	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.096+/-0.101 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.37+/-0.759	6.93+/-6.83	Bricker et al. 1993
270	+/-233	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99.3+/-0.827% normal development)	Mulinia lateralis (bivalve)	LAR	1.43+/-0.738	14.7+/-24	Bricker et al. 1993
276	+/-238	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.074+/-0.043 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.27+/-0.626	6.21+/-5.41	Bricker et al. 1993
300		*	Puget Sound, WA	AETA		1986 Puget Sound AET	Benthic species		1		Bellar et al. 1986
310	+/-180	*	Southern California	COA	10-d	Significantly toxicity (51.7% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
310	+/-258	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (96+/-1.66% normal development)	Mulinia lateralis (bivalve)	LAR	2.52+/-0.997	35+/-42.9	Bricker et al. 1993
327	+/-367	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-6.07% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.71+/-0.9	15.3+/-23.2	Bricker et al. 1993

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Benz(a)anthracene Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
335 +/-246	*	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (30.5+/-16.4% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.62+/-0.777	17.7+/-26.3	Bricker et al. 1993
354 +/-313	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (6.48+/-10.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
354 +/-313	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99+/-0.862% normal development)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
355 +/-362	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (13.8+/-4.09% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.47+/-0.306		Pastorok & Becker 1990
364 +/-327	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (17+/-16.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.99+/-1	21.6+/-24.5	Bricker et al. 1993
366 +/-447	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (6.67+/-8.07% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.51+/-0.330		Pastorok & Becker 1990
385 +/-295	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (23.3+/-6.14% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.738		Word et al. 1988
390 +/-267	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (10.4+/-6.3% mortality)	Nephtys caecoides (polychaete)		1.63+/-0.657		Word et al. 1988
390 +/-267	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (0.2+/-0.6% mortality)	Macoma nasuta (clam)		1.63+/-0.657		Word et al. 1988
393 +/-353	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.1+/-2.78% normal development)	Mulinia lateralis (bivalve)	LAR	2.12+/-1.04	22.9+/-23.7	Bricker et al. 1993
415 +/-7.1	SG	Oakland Harbor, CA	COA	10-d	Significantly toxic (35.3+/-2.5% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.56+/-0.07		Word et al. 1988
420	*	California	AETA		California AET Values	Benthic species				Becker et al. 1990
420	*	Southern California	AETA		Southern California AET Values	Benthic species				Becker et al. 1990
436 +/-492	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.016+/-0.007 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.26+/-0.936	43.4+/-35.6	Bricker et al. 1993
450	NE	Puget Sound, WA	AETA		PSDDA Screening level concentration	Aquatic biota				USACOE 1988
450 +/-385	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (34.9+/-15.7% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.23+/-1.04	25.4+/-25.5	Bricker et al. 1993
476 +/-437	NE	Commencement Bay, WA	COA	10-d	Least toxic (12.5+/-4.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
485 +/-848	NE	Elizabeth River, VA	COA	96-h	No significant change in respiration rate	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
505 +/-478	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (23+/-4.24% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.46+/-1.22	40+/-55.1	Bricker et al. 1993
520 +/-523	SG	Commencement Bay, WA	COA	10-d	Moderately toxic (26+/-5.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
520 +/-432	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.013+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.79+/-0.744	37.6+/-25.3	Bricker et al. 1993
543 +/-646	NE	Elizabeth River, VA	COA	96-h	Not significantly toxic (4.5+/-3.24% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
548 +/-472	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.1+/-13.3% mortality)	Mulinia lateralis (bivalve)	LAR	2.68+/-0.955	31.8+/-24.4	Bricker et al. 1993
549 +/-384	*	Commencement Bay, WA	COA	48-h	Moderately toxic (23+/-2.3% abnormality)	Oyster	LAR			Tetra Tech 1985
553 +/-462	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (29.8+/-13.9% mortality)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.07	32.1+/-28.4	Bricker et al. 1993
575 +/-568	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (91.5+/-7.28% normal development)	Mulinia lateralis (bivalve)	LAR	2.6+/-0.899	36.8+/-34.9	Bricker et al. 1993
590 +/-428	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (96.6+/-3.79% normal development)	Mulinia lateralis (bivalve)	LAR	2.87+/-0.94	35.1+/-25.9	Bricker et al. 1993
599 +/-436	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (38+/-13% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.92+/-0.937	34.6+/-23.9	Bricker et al. 1993
<641 +/-536	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (5.2+/-3.5% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
<641 +/-536	NE	Halifax Harbour, NS	COA	20-d	Not significantly toxic (1+/-2% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
663 +/-701	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (21.5+/-6.36% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.35+/-1.05	10.5+/-13.4	Bricker et al. 1993
693		***PEL***								
701 +/-423	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.011+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.28+/-0.363	45.3+/-21.4	Bricker et al. 1993
705 +/-353	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (75.1+/-10.6% mortality)	Mulinia lateralis (bivalve)	LAR	3.32+/-0.317	42.3+/-19.2	Bricker et al. 1993
751 +/-704	*	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (88.5+/-8.39% normal development)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.05	38.1+/-38.9	Bricker et al. 1993
752 +/-600	SG	Elizabeth River, VA	COA	96-h	Significant decrease in respiration rates	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
787 +/-525	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.008+/-0.001 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.19+/-1.27	12+/-11.3	Bricker et al. 1993
801 +/-866	*	Commencement Bay, WA	COA	48-h	Highly toxic (44.5+/-19% abnormality)	Oyster	LAR			Tetra Tech 1985
832 +/-770	*	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (51.3+/-6.95% mortality)	Mulinia lateralis (bivalve)	LAR	1.8+/-1.71	29.6+/-46.3	Bricker et al. 1993
<853 +/-401	*	Halifax Harbour, NS	COA	10-d	Significantly toxic (61.7+/-12.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
923 +/-1160	*	Tampa Bay, FL	COA	1-h	Most toxic (0.091+/-0.187% fertilization)	Arbacia punctulata (sea urchin)	GAM	2.96+/-1.49		Long 1993
931 +/-1323	*	Commencement Bay, WA	COA	10-d	Highly toxic (78.5+/-19.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985

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	Std Dev	Hit	Area	Type	Type	End-Point Measured	Species	Stage	TOC (%)	AVS (umol/g)	Reference
1003	+/-829	SG	Elizabeth River, VA	COA	96-h	Significantly toxic (50.7+/-39% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
1100		*	San Francisco Bay, CA	AETA	10-d	San Francisco Bay AET	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
1100		*	Puget Sound, WA	SQG		Chemical Criteria	Benthic community		1		WDE 1989
1100		*	Northern California	AETA	10-d	Northern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
1121	+/-2054	NE	Burrard Inlet, BC	COA	10-d	Not toxic (8.9+/-2.99% mortality)	Corophium volutator (amphipod)	ADT	2.8+/-1.96		McLeay et al. 1991
1121	+/-2054	NE	Burrard Inlet, BC	COA	10-d	Not toxic (97.2+/-2.84% reburial)	Rhepoxynius abronius (amphipod)	ADT	2.8+/-1.96		McLeay et al. 1991
1250	+/-1220	*	Tampa Bay, FL	COA	10-d	Significantly toxic (35.2+/-17.5% mortality)	Ampelisca abdita (amphipod)	SUB ADT	3.53+/-1.35		Long 1993
1300		*	Puget Sound, WA	AETA	15-min	1988 Puget Sound AET	Microtox (Photobacterium phosphoreum)				PTI 1988
>1300		-	California	AETA	10-d	California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
>1300		-	Southern California	AETA	10-d	Southern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
1340	+/-1290	*	Tampa Bay, FL	COA		Significantly toxic (EC50; 0.017+/-0.012 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.47+/-1.49		Long 1993
1493	+/-2344	NE	Burrard Inlet, BC	COA	10-d	Not toxic (7.9+/-5.12% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.64+/-2.14		McLeay et al. 1991
1600		*	United States	EqPA		99% Chronic Marine Criteria	Aquatic organisms		1		Pavlou et al. 1987
1600		*	Puget Sound, WA	AETA	48-h	1988 Puget Sound AET	Crassostrea gigas (oyster)	LAR			PTI 1988
1616	+/-2706	NE	Puget Sound, WA	COA	20-d	Not significantly toxic (5+/-3.86% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.46+/-0.26		Pastorok & Becker 1990
1900	+/-2770	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (4.43+/-2.1% mortality)	Panope generosa (geoduck)	JUV	1.51+/-0.261		Pastorok & Becker 1990
2496	+/-4157	NE	Eagle Harbor, WA	COA	10-d	Least toxic (13+/-7% mortality)	Rhepoxynius abronius (amphipod)	ADT			CH2M Hill 1989
3431	+/-2955	*	Puget Sound, WA	COA		Toxic (71.6+/-14.6% prevalence of idiopathic degeneration/necrosis)	Parophrys vetulus (English sole)				Malins et al. 1985
3431	+/-2955	*	Puget Sound, WA	COA		Toxic (51.4+/-21.1% prevalence of steatosis and hemosiderosis)	Parophrys vetulus (English sole)				Malins et al. 1985
3431	+/-2955	*	Puget Sound, WA	COA		Toxic (19+/-6.15% prevalence of hepatocellular regenerative foci)	Parophrys vetulus (English sole)				Malins et al. 1985
3431	+/-2955	*	Puget Sound, WA	COA		Toxic (26.7+/-6.43% prevalence of hepatic neoplasms)	Parophrys vetulus (English sole)				Malins et al. 1985
3431	+/-2955	*	Puget Sound, WA	COA		Toxic (88+/-3.65% prevalence of hepatic idiopathic lesions)	Parophrys vetulus (English sole)				Malins et al. 1985
3431	+/-2955	*	Puget Sound, WA	COA		Toxic (44.2+/-8.5% prevalence of hepatic cellular alterations)	Parophrys vetulus (English sole)				Malins et al. 1985
3925	+/-7221	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (2.09+/-1.73% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.56+/-0.329		Pastorok & Becker 1990
4200		*	Burrard Inlet, BC	COA	10-d	Highly toxic (23% emergence)	Corophium volutator (amphipod)	ADT	3.5		McLeay et al. 1991
4200		*	Burrard Inlet, BC	COA	10-d	Highly toxic (30.5% emergence)	Rhepoxynius abronius (amphipod)	ADT	3.5		McLeay et al. 1991
4288	+/-7101	*	Puget Sound, WA	COA	15-min	Significantly toxic (EC50; 0.065+/-0.043% extract)	Microtox (Photobacterium phosphoreum)		1.58+/-0.255		Pastorok & Becker 1990
4500		*	Puget Sound, WA	AETA		PSDDA Maximum Level Criteria	Aquatic biota				USACOE 1988
5100		*	Puget Sound, WA	AETA		1988 Puget Sound AET	Benthic community				PTI 1988
5100		*	Puget Sound, WA	AETA	10-d	1988 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT			PTI 1988
5489	+/-7924	*	Puget Sound, WA	COA	2-d	Significantly toxic (60.4+/-46.5% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.57+/-0.287		Pastorok & Becker 1990
7370	+/-9984	*	Eagle Harbor, WA	COA	10-d	Moderately toxic (41+/-9% mortality)	Rhepoxynius abronius (amphipod)	ADT			CH2M Hill 1989
8067	+/-8749	*	Puget Sound, WA	COA	10-d	Significantly toxic (80.8+/-30.6% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.266		Pastorok & Becker 1990
10733	+/-12606	*	Puget Sound, WA	COA	20-d	Significantly toxic (37.3+/-22% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.87+/-0.208		Pastorok & Becker 1990
11088	+/-8941	*	Eagle Harbor, WA	COA	10-d	Highly toxic (95.5+/-8.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			CH2M Hill 1989
<12403	+/-17533	NE	Sidney Tar Pond, NS	COA	20-d	Not significantly toxic (8+/-5.66% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
21000		*	United States	EqPA		95% Chronic Marine Criteria	Aquatic organisms		1		Pavlou et al. 1987
24800		*	Sidney Tar Pond, NS	COA	10-d	Significantly toxic (100% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
24800		*	Sidney Tar Pond, NS	COA	10-d	Significantly toxic (100% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
25000		*	Puget Sound, WA	COA	10-d	Significantly toxic (56% mortality)	Panope generosa (geoduck)	JUV	2.1		Pastorok & Becker 1990
55000		*	United States	EqPA		EPA Acute Marine EP Threshold	Aquatic biota		1		Lyman et al. 1987
55000		*	United States	EqPA		Chronic Marine EqP Threshold	Aquatic biota		1		Bolton et al. 1985

Table 19. A summary of the available data on the biological effects associated with sediment-sorbed BENZ(A)ANTHRACENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Benz(a)anthracene Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
124000	*	Sidney Tar Pond, NS	COA	20-d	Significantly toxic (52% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990

Table 20. A summary of the available data on the biological effects associated with sediment-sorbed BENZO(A)PYRENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Benzo(a)pyrene Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.02	NC	Mobile Bay, AL	COA		Significantly toxic (10% mortality)	Mysidopsis bahia (mysid shrimp)		0.009	0.004	EMAP Louisiana Province 1991
0.14 +/-0.057	NE	Apalachee Bay, FL	COA	10-d	Not significantly toxic (3.3+/-3.25% mortality)	Ampelisca abdita (amphipod)		0.643+/-0.455	0.390+/-0.410	EMAP Louisiana Province 1991
0.17 +/-0.063	NE	Apalachee Bay, FL	COA		Not significantly toxic (0.75+/-1.5% mortality)	Mysidopsis bahia (mysid shrimp)		0.540+/-0.385	0.405+/-0.417	EMAP Louisiana Province 1991
0.2 +/-0.071	SG	Apalachee Bay, FL	COA	10-d	Significantly toxic (15.6% mortality)	Ampelisca abdita (amphipod)		0.438+/-0.442	0.421+/-0.593	EMAP Louisiana Province 1991
0.215 +/-0.212	NE	Chandeleur Sound, LA	COA		Not significantly toxic (1.03+/-2.05% mortality)	Mysidopsis bahia (mysid shrimp)		0.824+/-0.915	1.69+/-0.920	EMAP Louisiana Province 1991
0.263 +/-0.183	NC	Chandeleur Sound, LA	COA	10-d	Significantly toxic (11.5+/-4.86% mortality)	Ampelisca abdita (amphipod)		0.811+/-0.711	1.87+/-0.973	EMAP Louisiana Province 1991
0.315 +/-0.375	NC	Mississippi Sound, MS	COA	10-d	Significantly toxic (11.6+/-3.39% mortality)	Ampelisca abdita (amphipod)		0.111+/-0.045	0.03	EMAP Louisiana Province 1991
0.466 +/-0.247	*	Chandeleur Sound, LA	COA		Significantly toxic (7.6+/-1.32% mortality)	Mysidopsis bahia (mysid shrimp)		0.624+/-0.197	2.07+/-1.19	EMAP Louisiana Province 1991
0.537 +/-0.317	NE	Chandeleur Sound, LA	COA	10-d	Not significantly toxic (2.87+/-4.05% mortality)	Ampelisca abdita (amphipod)		0.517+/-0.166	2.02+/-1.38	EMAP Louisiana Province 1991
0.77 +/-0.622	NE	Galveston Bay, TX	COA		High abundance (155+/-49.5 N/0.00203 sq.m.)	Oligochaeta		1.2+/-1.27	4.27+/-3.85	Carr 1992
1.71 +/-1.12	NE	Galveston Bay, TX	COA		High abundance (27.3+/-10 N/0.00203 sq.m.)	Mollusca		1.64+/-0.4	1.39+/-0.17	Carr 1992
2.98 +/-2.69	NE	Galveston Bay, TX	COA		High species richness (24.5+/-3.7 S/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
2.98 +/-2.69	NE	Galveston Bay, TX	COA		High abundance (359+/-92.8 N/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
3.43 +/-4.54	NE	Galveston Bay, TX	COA		High abundance (16.2+/-6.19 N/0.00203 sq.m.)	Copepoda		0.844+/-0.524	4.73+/-3.1	Carr 1992
3.88 +/-1.39	NC	Mississippi Sound, MS	COA		Significantly toxic (12.2+/-4.42% mortality)	Mysidopsis bahia (mysid shrimp)		0.939+/-0.335	2.63+/-2.3	EMAP Louisiana Province 1991
3.9 +/-3.48	NE	Matagorda Bay, TX	COA		Not significantly toxic (1.58+/-1.82% mortality)	Mysidopsis bahia (mysid shrimp)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
3.9 +/-3.48	NE	Matagorda Bay, TX	COA	10-d	Not significantly toxic (2.33+/-4.65% mortality)	Ampelisca abdita (amphipod)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
4.09 +/-5.26	NE	Galveston Bay, TX	COA	48-h	Not toxic (98.1+/-1.79% normal development)	Arbacia punctulata (sea urchin)	EMB	.748+/-0.476	4.16+/-3.45	Carr 1992
4.37 +/-2.33	NE	Galveston Bay, TX	COA		High abundance (156+/-22.9 N/0.00203 sq.m.)	Polychaeta		0.916+/-0.661	2.94+/-2.3	Carr 1992
4.56 +/-5.4	NE	Mississippi Sound, MS	COA		Not significantly toxic (0.789+/-1.59% mortality)	Mysidopsis bahia (mysid shrimp)		0.827+/-0.757	1.46+/-1.58	EMAP Louisiana Province 1991
<5	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (3% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
<5	NE	Sidney Tar Pond, NS	COA	10-d	Not significantly toxic (4% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
<5	NE	Sidney Tar Pond, NS	COA	10-d	Not significantly toxic (3% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
5.08 +/-4.49	NE	Mississippi Sound, MS	COA	10-d	Not significantly toxic (1.4+/-1.73% mortality)	Ampelisca abdita (amphipod)		0.998+/-0.602	2.01+/-1.82	EMAP Louisiana Province 1991
5.56 +/-7.83	NC	Mobile Bay, AL	COA	10-d	Significantly toxic (46+/-49.3% mortality)	Ampelisca abdita (amphipod)		0.22+/-0.298	3.84+/-5.43	EMAP Louisiana Province 1991
6.25 +/-10.4	NE	Galveston Bay, TX	COA	1-h	Not toxic (92.5+/-6.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	0.77+/-0.448	6.37+/-6.58	Carr 1992
7.6	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (0.33+/-0.516% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
7.6	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (2.33+/-1.03% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
7.6	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (15.3+/-11.0% mortality)	Hyalella azteca (amphipod)	JUV	0.648+/-0.641	1.74+/-1.39	Hall et al. 1992
7.6	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1% mortality)	Streblospio benedicti (polychaete worm)		1.38	3.25	Hall et al. 1992
7.6	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (16.5+/-9.19% mortality)	Streblospio benedicti (polychaete worm)		0.783+/-0.845	4.83+/-2.23	Hall et al. 1992
7.6	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.367+/-0.085 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
7.6	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.0005 mg/day growth)	Streblospio benedicti (polychaete worm)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
7.6	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.003+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.316+/-0.120	2.13+/-2.46	Hall et al. 1992
7.6	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (7.2+/-1.92% mortality)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
7.6	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.6+/-0.55% reburial)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
7.6	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
7.6	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
7.6	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.001+/-0.001 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.555+/-0.471	2.68+/-2.3	Hall et al. 1992
7.6	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1.83+/-1.6% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
7.6	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (3.5+/-1.87% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
7.6	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (9.25+/-5.32% mortality)	Lepidactylus dytiscus (amphipod)		0.638+/-0.768	1.65+/-1.62	Hall et al. 1992

Table 20. A summary of the available data on the biological effects associated with sediment-sorbed BENZO(A)PYRENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Benzo(a)pyrene Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
7.6	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (22.3+/-7.37% mortality)	Hyalella azteca (amphipod)	JUV	0.788+/-0.866	2.04+/-1.75	Hall et al. 1992
7.6	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (8.8+/-7.12% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
7.6	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (14+/-9.22% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
7.6	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.1+/-0.865% reburial)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
7.6	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<20% emergence)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
7.6	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
7.6	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (-0.057+/-0.04 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
7.6	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.001mg/day growth)	Streblospio benedicti (polychaete worm)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
7.6	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.016 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
7.6	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.005+/-0.0004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
7.6	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (55.0+/-22.6% mortality)	Hyalella azteca (amphipod)	JUV	0.338+/-0.133	2.9+/-3.11	Hall et al. 1992
7.6	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29.8+/-11.1% mortality)	Streblospio benedicti (polychaete worm)		0.316+/-0.12	2.13+/-2.46	Hall et al. 1992
7.6	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (55.0+/-19.5% mortality)	Streblospio benedicti (polychaete worm)		0.349+/-0.11	1.07+/-0.66	Hall et al. 1992
7.6	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.003 mg/day growth)	Lepidactylus dytiscus (amphipod)		1.38	3.25	Hall et al. 1992
7.6	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29% mortality)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
7.6	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (89.7% reburial)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
7.6	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
7.6	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	6.41	Hall et al. 1992
7.6	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
7.6	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (45.5+/-12% mortality)	Lepidactylus dytiscus (amphipod)		0.383+/-0.279	3.61+/-2.79	Hall et al. 1992
7.6	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (63.0+/-24.3% mortality)	Hyalella azteca (amphipod)	JUV	0.317+/-0.228	2.57+/-2.67	Hall et al. 1992
7.6	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (22% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
7.6	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (28% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
7.6	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (82.9% reburial)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
7.6	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>20% emergence)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
7.6	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	5.58	Hall et al. 1992
7.6	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.008+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.4	Hall et al. 1992
7.6	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.003 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
7.61 +/-11.3	*	Galveston Bay, TX	COA		Low abundance (4.21+/-5.66 N/0.00203 sq.m.)	Oligochaeta		0.895+/-0.453	7.85+/-8.8	Carr 1992
10	SG	Eagle Harbor, WA	COA	4-d	LC50	Rhepoxynius abronius (amphipod)	ADT			Swartz et al. 1989
11 +/-15.2	NC	Galveston Bay, TX	COA	10-d	Significantly toxic (15.8+/-3.89% mortality)	Ampelisca abdita (amphipod)		0.647+/-0.606	0.160+/-0.184	EMAP Louisiana Province 1991
11 +/-0.931	NE	Mobile Bay, AL	COA		Not significantly toxic (1.07+/-1.85% mortality)	Mysidopsis bahia (mysid shrimp)		0.968+/-0.815	8.23+/-3.4	EMAP Louisiana Province 1991
11 +/-1.32	NE	Mobile Bay, AL	COA	10-d	Not significantly toxic (0.5+/-0.778% mortality)	Ampelisca abdita (amphipod)		1.24+/-0.948	8.51+/-4.76	EMAP Louisiana Province 1991
11.4 +/-12.6	NE	Mississippi River, MS, LA	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		1.3+/-0.83	1.14+/-1	EMAP Louisiana Province 1991
12.1 +/-10.9	NE	Galveston Bay, TX	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		0.934+/-0.657	0.457+/-0.530	EMAP Louisiana Province 1991
12.2 +/-13.8	NC	Mississippi River, MS, LA	COA	10-d	Significantly toxic (15.9+/-6.65% mortality)	Ampelisca abdita (amphipod)		1.22+/-0.717	0.235+/-0.276	EMAP Louisiana Province 1991
12.6 +/-36.4	NC	Galveston Bay, TX	COA		Low abundance (0.3+/-0.651 N/0.00203 sq.m.)	Amphipoda		0.859+/-0.487	7.67+/-8.12	Carr 1992
12.8 +/-16.8	NE	Galveston Bay, TX	COA		High Abundance (6+/-1.41 N/0.00203 sq.m.)	Amphipoda		0.955+/-0.629	7.21+/-8.2	Carr 1992
13.7 +/-37	*	Galveston Bay, TX	COA		Low abundance (1.86+/-2.59 N/0.00203 sq.m.)	Mollusca		0.784+/-0.421	8.29+/-8.13	Carr 1992
14 +/-37.7	*	Galveston Bay, TX	COA		Low species richness (10+/-3.73 S/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
14 +/-37.7	*	Galveston Bay, TX	COA		Low abundance (89+/-60.7 N/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
14.8 +/-17.8	NE	Galveston Bay, TX	COA	10-d	Not significantly toxic (1.35+/-1.45% mortality)	Ampelisca abdita (amphipod)		0.961+/-0.537	1.17+/-0.640	EMAP Louisiana Province 1991

Table 20. A summary of the available data on the biological effects associated with sediment-sorbed BENZO(A)PYRENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Benzo(a)pyrene Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
15 +/-7.47	NE	Mississippi River, MS, LA	COA	10-d	Not significantly toxic (7.8+/-1.63% mortality)	Ampelisca abdita (amphipod)		1.15+/-1.04	2.31+/-0.651	EMAP Louisiana Province 1991
15 +/-21.7	SG	Galveston Bay, TX	COA		Significantly toxic (13.4+/-9.11% mortality)	Mysidopsis bahia (mysid shrimp)		0.778+/-0.482	1.21+/-0.778	EMAP Louisiana Province 1991
15.3 +/-40.7	*	Galveston Bay, TX	COA		Low abundance (41.7+/-21.8 N/0.00203 sq.m.)	Polychaeta		0.848+/-0.427	9.21+/-8.61	Carr 1992
15.8 +/-8.67	SG	Mississippi River, MS, LA	COA		Significantly toxic (32.9+/-36.4% mortality)	Mysidopsis bahia (mysid shrimp)		1.07+/-0.924	1.41+/-1.93	EMAP Louisiana Province 1991
18.9 +/-45.1	*	Galveston Bay, TX	COA		Low abundance (2.05+/-1.58 N/0.00203 sq.m.)	Copepoda		0.879+/-0.47	9.63+/-9.65	Carr 1992
27.1 +/-55.8	*	Galveston Bay, TX	COA	48-h	Toxic (4.65+/-16.1% normal development)	Arbacia punctulata (sea urchin)	EMB	1.06+/-0.449	14.5+/-9.2	Carr 1992
28.1 +/-25.8	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (5.8+/-3.7% mortality)	Rhepoxynius abronius (amphipod)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
28.1 +/-25.8	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (3.4+/-1.82% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
28.1 +/-25.8	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (11.2+/-3.7% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
28.1 +/-25.8	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (3.52+/-1.66% mortality)	Macoma nasuta (clam)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
30	NE	Jetty Island Pier, Everett Marina, WA	COA	10-d	Not toxic (12.3+/-2.87% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.08+/-0.66		Hart Crowser & Associates Inc. 1986
32 +/-29.4	NC	Galveston Bay, TX	COA		Low abundance (53+/-33.9 N/0.00203 sq.m.)	Benthic invertebrates		0.985+/-0.247	22+/-11.2	Carr 1992
36.5 +/-79.5	*	Galveston Bay, TX	COA		Moderate abundance (58.3+/-16.2 N/0.00203 sq.m.)	Oligochaeta		0.632+/-0.274	7.93+/-5.6	Carr 1992
39.9 +/-78	*	Galveston Bay, TX	COA	1-h	Toxic (20.4+/-18.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	1.26+/-0.47	14.6+/-10.1	Carr 1992
41	NE	Puget Sound, WA	COA		Not toxic (10% prevalence of idiopathic degeneration/necrosis)	Parophrys vetulus (English sole)				Malins et al. 1985
41	NE	Puget Sound, WA	COA		Not toxic (17.5% prevalence of steatosis and hemosiderosis)	Parophrys vetulus (English sole)				Malins et al. 1985
41	NE	Puget Sound, WA	COA		Not toxic (0% occurrence of hepatic cellular alterations)	Parophrys vetulus (English sole)				Malins et al. 1985
41	NE	Puget Sound, WA	COA		Not toxic (5% prevalence of hepatocellular regenerative foci)	Parophrys vetulus (English sole)				Malins et al. 1985
41	NE	Puget Sound, WA	COA		Not toxic (0% prevalence of hepatic cellular alterations)	Parophrys vetulus (English sole)				Malins et al. 1985
41	NE	Puget Sound, WA	COA		Not toxic (32.5% prevalence of hepatic idiopathic lesions)	Parophrys vetulus (English sole)				Malins et al. 1985
44 +/-78.4	NE	Galveston Bay, TX	COA		Low species (11.2+/-1.94 S/0.00203 sq.m.)	Benthic species		0.642+/-0.356	13.4+/-8.65	Carr 1992
49.3 +/-7.04	NE	Puget Sound, WA	COA	15-min	Not significantly toxic (EC50; 0.283+/-0.168% extract)	Microtox (Photobacterium phosphoreum)		1.39+/-0.37		Pastorok & Becker 1990
50.1 +/-99	NE	Galveston Bay, TX	COA		High abundance (154+/-30.2 N/0.00203 sq.m.)	Benthic invertebrates		0.47+/-0.27	9.07+/-2.94	Carr 1992
60	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (18% mortality)	Ampelisca abdita (amphipod)		0.028	9 ug/g	Windom In Prep
60	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (0% mortality)	Arbacia punctulata (sea urchin)		0.03	19 ug/g	Windom In Prep
63.1 +/-96.4	NE	Southern California	COA	10-d	Not significantly toxic (23.2% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
67.5 +/-2.89	NE	Brunswick Harbor Entrance, GA	COA	48-h	Not significantly toxic (86.6+/-4.25% normal development)	Arbacia punctulata (sea urchin)		0.181+/-0.162	182+/-208 ug/g	Windom In Prep
68.3 +/-2.89	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (28.3+/-6.11% mortality)	Mysidopsis bahia (mysid)		0.246+/-0.051	127+/-24 ug/g	Windom In Prep
70 +/-9.57	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (91.3+/-2.91% normal development)	Arbacia punctulata (sea urchin)		0.299+/-0.251	114+/-68.4 ug/g	Windom In Prep
70.6 +/-10.4	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (9.78+/-5.33% mortality)	Mysidopsis bahia (mysid)		0.24+/-0.247	91.9+/-73.4 ug/g	Windom In Prep
70.6 +/-11.2	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (4+/-2.83% mortality)	Menidia beryllina (silverside)		0.243+/-0.264	90.5+/-78.4 ug/g	Windom In Prep
71.7 +/-12.9	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (27.5+/-10.6% mortality)	Mysidopsis bahia (mysid)		0.237+/-0.311	74.6+/-85.5 ug/g	Windom In Prep
71.7 +/-9.31	SG	Savannah River Entrance Channel, GA	COA	48-h	Significantly toxic (25.4+/-7.66% mortality)	Arbacia punctulata (sea urchin)		0.344+/-0.242	129.5+/-59.3 ug/g	Windom In Prep
71.9 +/-10.3	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (11.6+/-4.33% mortality)	Ampelisca abdita (amphipod)		0.267+/-0.25	102+/-71.1 ug/g	Windom In Prep
88.8		***TEL***								
90.6 +/-24.3	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (10.6+/-3.17% mortality)	Ampelisca abdita (amphipod)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
90.6 +/-24.3	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (8.00+/-2.92% mortality)	Mysidopsis bahia (mysid)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
92.9 +/-25.6	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (5.43+/-3.21% mortality)	Mysidopsis bahia (mysid)		1.21+/-1.13	9096+/-13378 ug/g	Windom In Prep
92.9 +/-25.6	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (9.61+/-2.7% mortality)	Menidia beryllina (silverside)		1.22+/-1.13	9172+/-13363 ug/g	Windom In Prep
100	SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (16% mortality)	Mysidopsis bahia (mysid)		1.8	7095 ug/g	Windom In Prep
100	SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (22.3% mortality)	Menidia beryllina (silverside)		1.71	6562 ug/g	Windom In Prep
107	*	Puget Sound, WA	AETA	15-min	1986 Puget Sound AET	Microtox (Photobacterium phosphoreum)		1		Bellar et al. 1986

Table 20. A summary of the available data on the biological effects associated with sediment-sorbed BENZO(A)PYRENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Benzo(a)pyrene Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
107	*	Puget Sound, WA	AETA	48-h	1986 Puget Sound AET	Crassostrea gigas (oyster)	LAR	1		Bellar et al. 1986
109 +/-14.7	SG	Brunswick Harbor Entrance, GA	COA	48-h	Significantly toxic (14.6+/-18.9% normal development)	Arbacia punctulata (sea urchin)		1.99+/-0.562	14009+/-13434 ug/g	Windom In Prep
129 +/-61.4	NE	San Francisco Bay, CA	COA	48-h	Least toxic (23.3+/-7.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
144 +/-23.9	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-7.99% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.14+/-0.352	6.09+/-5.38	Bricker et al. 1993
154 +/-173	NE	Narragansett Bay, RI	COA	10-d	Not significantly toxic (5.28+/-3.04% mortality))	Ampelisca abdita (amphipod)	ADT			Munns et al. 1991
160	*	Puget Sound, WA	AETA	10-d	1986 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT	1		Bellar et al. 1986
160	NE	Burrard Inlet, BC	SQO		Sediment Quality Objectives	Aquatic biota				Swain & Nijman 1991
167 +/-18.1	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.5+/-11.4% mortality)	Mulinia lateralis (bivalve)	LAR	2.33+/-0.364	26.8+/-9.42	Bricker et al. 1993
170	NE	Tampa Bay, FL	COA	10-d	Not significantly toxic (14.6+/-7.67% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.63+/-0.596		Long 1993
170	NE	Tampa Bay, FL	COA	1-h	Least toxic (79.4+/-9.9% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.45+/-0.587		Long 1993
171 +/-38.5	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.061+/-0.038 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.8+/-0.477	8.52+/-10.7	Bricker et al. 1993
174 +/-30.8	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (39.5+/-18.2% mortality)	Ampelisca abidta (amphipod)	SUB ADT	2.06+/-0.523	20.1+/-13.9	Bricker et al. 1993
177 +/-147	NE	Burrard Inlet, BC	COA	10-d	Not toxic (4.5+/-3.02% emergence)	Rhepoxynius abronius (amphipod)	ADT	2.66+/-2.15		McLeay et al. 1991
177 +/-147	NE	Burrard Inlet, BC	COA	10-d	Not toxic (5.21+/-3.61% emergence)	Corophium volutator (amphipod)	ADT	3.18+/-2.1		McLeay et al. 1991
179 +/-30.2	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.3+/-2.22% normal development)	Mulinia lateralis (bivalve)	LAR	2.18+/-0.531	19.1+/-12.5	Bricker et al. 1993
180 +/-57	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (19.3+/-5.86% mortality)	Ampelisca abidta (amphipod)	SUB ADT	1.82+/-0.225	6.3+/-6.2	Bricker et al. 1993
210 +/-98.7	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (15.2+/-9.21% mortality)	Mulinia lateralis (bivalve)	LAR	2.17+/-0.663	18.4+/-19.9	Bricker et al. 1993
212 +/-101	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.014+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.51+/-0.45	29.6+/-15.7	Bricker et al. 1993
217 +/-81	SG	Tampa Bay, FL	COA	1-h	Moderately toxic (15.3+/-10.6% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.94+/-0.908		Long 1993
220 +/-269	*	Jetty Island Pier, Everett Marina, WA	COA	10-d	Toxic (19.5+/-0.707% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.15+/-0.071		Hart Crowser & Associates Inc. 1986
220 +/-110	NE	Tampa Bay, FL	COA		Not significantly toxic (EC50; 0.066+/-0.033 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.89+/-0.902		Long 1993
223 +/-52	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.125+/-0.084 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.25+/-0.468	1.98+/-2.25	Bricker et al. 1993
255 +/-79.4	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (25.9+/-5.01% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.21+/-0.444	2.41+/-2.32	Bricker et al. 1993
260	NC	Puget Sound, WA	COA	2-d	Significantly toxic (3.8% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.5		Pastorok & Becker 1990
260 +/-232	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.167+/-0.198 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.59+/-1.09	4.67+/-6.99	Bricker et al. 1993
268 +/-219	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.096+/-0.101 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.37+/-0.759	6.93+/-6.83	Bricker et al. 1993
268 +/-405	NE	Oahu, Hawaii	COA	10-d	Not significantly toxic (7.2+/-1.89% mortality)	Eohaustorius estuarius (amphipod)	ADT	1.93+/-1.94	10.3+/-12.4	Lamberson et al. 1993
268 +/-405	NE	Oahu, Hawaii	COA	10-d	Not significantly toxic (10.1+/-4.01% mortality)	Corophium acherusicum (amphipod)	ADT	1.93+/-1.94	10.3+/-12.4	Lamberson et al. 1993
280 +/-241	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.074+/-0.043 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.27+/-0.626	6.21+/-5.41	Bricker et al. 1993
290 +/-244	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (12.3+/-14.5% mortality)	Mulinia lateralis (bivalve)	LAR	1.53+/-0.743	15.7+/-23.2	Bricker et al. 1993
298 +/-276	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99.3+/-0.827% normal development)	Mulinia lateralis (bivalve)	LAR	1.43+/-0.738	14.7+/-24	Bricker et al. 1993
298 +/-245	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (96+/-1.66% normal development)	Mulinia lateralis (bivalve)	LAR	2.52+/-0.997	35+/-42.9	Bricker et al. 1993
<300 +/-328	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (6.8+/-7.31% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
<300 +/-328	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (8.5+/-6.06% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
<300 +/-328	NE	Halifax Harbour, NS	COA	20-d	Not significantly toxic (0.7+/-1.63% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
329 +/-385	NE	Commencement Bay, WA	COA	48-h	Least toxic (15.1+/-3.1% abnormality)	Oyster	LAR			Tetra Tech 1985
341 +/-297	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (6.48+/-10.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
341 +/-297	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99+/-0.862% normal development)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
365 +/-449	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-6.07% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.71+/-0.9	15.3+/-23.2	Bricker et al. 1993
366 +/-423	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (6.67+/-8.07% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.51+/-0.330		Pastorok & Becker 1990
368 +/-294	*	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (30.5+/-16.4% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.62+/-0.777	17.7+/-26.3	Bricker et al. 1993
372 +/-343	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (13.8+/-4.09% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.47+/-0.306		Pastorok & Becker 1990

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Benzo(a)pyrene Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
397	*	United States	SLCA		National Screening Level Concentration-Marine	Benthic species		1		Neff et al. 1987
399 +/-400	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (17+/-16.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.99+/-1	21.6+/-24.5	Bricker et al. 1993
400 +/-447	NE	San Francisco Bay, CA	COA	10-d	Least toxic (18+/-6.6% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
404 +/-428	*	San Francisco Bay, CA	COA	48-h	Moderately toxic (59.4+/-11.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
423 +/-465	NE	San Francisco Bay, CA	COA	10-d	Not significantly toxic (18.4+/-6.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
429 +/-382	SG	San Francisco Bay, CA	COA	10-d	Significantly toxic (42.9+/-19.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
430	*	California	AETA	48-h	California AET Values	Mytilus edulis (bivalve)	LAR			Becker et al. 1990
430	*	Northern California	AETA		Northern California AET Values	Benthic species				Becker et al. 1990
432 +/-344	SG	San Francisco Bay, CA	COA	10-d	Moderately toxic (33.8+/-4.7% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
449 +/-446	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.1+/-2.78% normal development)	Mulinia lateralis (bivalve)	LAR	2.12+/-1.04	22.9+/-23.7	Bricker et al. 1993
453	*	Puget Sound, WA	AETA		1986 Puget Sound AET	Benthic species		1		Bellar et al. 1986
465 +/-471	*	San Francisco Bay, CA	COA	48-h	Significantly toxic (55.7+/-22.7% abnormal)	Bivalve	LAR			Long & Morgan 1990
466 +/-435	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.016+/-0.007 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.26+/-0.936	43.4+/-35.6	Bricker et al. 1993
486 +/-484	SG	San Francisco Bay, CA	COA	10-d	Highly toxic (67+/-11.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
500 +/-457	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (34.9+/-15.7% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.23+/-1.04	25.4+/-25.5	Bricker et al. 1993
501 +/-418	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (91.5+/-7.28% normal development)	Mulinia lateralis (bivalve)	LAR	2.6+/-0.899	36.8+/-34.9	Bricker et al. 1993
509 +/-354	*	Southern California	COA	10-d	Significantly toxicity (51.7% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
531 +/-459	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (23.3+/-6.14% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.738		Word et al. 1988
553 +/-454	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (10.4+/-6.3% mortality)	Nephtys caecoides (polychaete)		1.63+/-0.657		Word et al. 1988
553 +/-454	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (0.2+/-0.6% mortality)	Macoma nasuta (clam)		1.63+/-0.657		Word et al. 1988
596 +/-593	NE	Commencement Bay, WA	COA	10-d	Least toxic (12.5+/-4.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
600 +/-515	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.013+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.79+/-0.744	37.6+/-25.3	Bricker et al. 1993
622 +/-579	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (29.8+/-13.9% mortality)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.07	32.1+/-28.4	Bricker et al. 1993
625 +/-531	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.1+/-13.3% mortality)	Mulinia lateralis (bivalve)	LAR	2.68+/-0.955	31.8+/-24.4	Bricker et al. 1993
628 +/-496	SG	Oakland Harbor, CA	COA	10-d	Significantly toxic (35.3+/-2.5% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.56+/-0.07		Word et al. 1988
637 +/-501	*	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (88.5+/-8.39% normal development)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.05	38.1+/-38.9	Bricker et al. 1993
640	*	California	AETA		California AET Values	Benthic species				Becker et al. 1990
640	*	Southern California	AETA		Southern California AET Values	Benthic species				Becker et al. 1990
641 +/-660	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (21.5+/-6.36% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.35+/-1.05	10.5+/-13.4	Bricker et al. 1993
680	NE	Puget Sound, WA	AETA		PSDDA Screening level concentration	Aquatic biota				USACOE 1988
684 +/-464	*	Commencement Bay, WA	COA	48-h	Moderately toxic (23+/-2.3% abnormality)	Oyster	LAR			Tetra Tech 1985
699 +/-608	*	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (51.3+/-6.95% mortality)	Mulinia lateralis (bivalve)	LAR	1.8+/-1.71	29.6+/-46.3	Bricker et al. 1993
703 +/-839	NE	Puget Sound, WA	COA	20-d	Not significantly toxic (5+/-3.86% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.46+/-0.26		Pastorok & Becker 1990
720 +/-561	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (38+/-13% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.92+/-0.937	34.6+/-23.9	Bricker et al. 1993
722 +/-562	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (96.6+/-3.79% normal development)	Mulinia lateralis (bivalve)	LAR	2.87+/-0.94	35.1+/-25.9	Bricker et al. 1993
743 +/-803	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (23+/-4.24% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.46+/-1.22	40+/-55.1	Bricker et al. 1993
753 +/-501	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.008+/-0.001 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.19+/-1.27	12+/-11.3	Bricker et al. 1993
763		***PEL***								
800 +/-100	NE	Laboratory	SSBA	10-d	No significant mortality	Rhepoxynius abronius (amphipod)	ADT	0.9		Plesha et al. 1988
<824 +/-617	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (5.2+/-3.5% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
<824 +/-617	NE	Halifax Harbour, NS	COA	20-d	Not significantly toxic (1+/-2% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
865 +/-929	*	Tampa Bay, FL	COA	1-h	Most toxic (0.091+/-0.187% fertilization)	Arbacia punctulata (sea urchin)	GAM	2.96+/-1.49		Long 1993

Table 20. A summary of the available data on the biological effects associated with sediment-sorbed BENZO(A)PYRENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Benzo(a)pyrene	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
867	+/-559	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.011+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.28+/-0.363	45.3+/-21.4	Bricker et al. 1993
890	+/-1322	*	Commencement Bay, WA	COA	10-d	Moderately toxic (26+/-5.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
921	+/-505	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (75.1+/-10.6% mortality)	Mulinia lateralis (bivalve)	LAR	3.32+/-0.317	42.3+/-19.2	Bricker et al. 1993
990		*	Puget Sound, WA	SQG		Chemical Criteria	Benthic community		1		WDE 1989
1091	+/-338	*	San Francisco Bay, CA	COA	48-h	Highly toxic (92.4+/-4.5% abnormal)	Bivalve	LAR			Long & Morgan 1990
<1097	+/-353	*	Halifax Harbour, NS	COA	10-d	Significantly toxic (61.7+/-12.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
1140	+/-955	*	Tampa Bay, FL	COA	10-d	Significantly toxic (35.2+/-17.5% mortality)	Ampelisca abdita (amphipod)	SUB ADT	3.53+/-1.35		Long 1993
1181	+/-1872	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (4.43+/-2.1% mortality)	Panope generosa (geoduck)	JUV	1.51+/-0.261		Pastorok & Becker 1990
1192	+/-1643	*	Commencement Bay, WA	COA	10-d	Highly toxic (78.5+/-19.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
1210	+/-1020	*	Tampa Bay, FL	COA		Significantly toxic (EC50; 0.017+/-0.012 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.47+/-1.49		Long 1993
1261	+/-1620	*	Commencement Bay, WA	COA	48-h	Highly toxic (44.5+/-19% abnormality)	Oyster	LAR			Tetra Tech 1985
1264	+/-898	NC	Elizabeth River, VA	COA	96-h	Significantly toxic (50.7+/-39% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
1300		*	San Francisco Bay, CA	AETA	10-d	San Francisco Bay AET	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
>1300		-	Northern California	AETA	10-d	Northern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
>1300		-	California	AETA	10-d	California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
1383	+/-2415	NE	Burrard Inlet, BC	COA	10-d	Not toxic (8.9+/-2.99% mortality)	Corophium volutator (amphipod)	ADT	2.8+/-1.96		McLeay et al. 1991
1383	+/-2415	NE	Burrard Inlet, BC	COA	10-d	Not toxic (97.2+/-2.84% reburial)	Rhepoxynius abronius (amphipod)	ADT	2.8+/-1.96		McLeay et al. 1991
1481	+/-1170	NC	Elizabeth River, VA	COA	96-h	Significant decrease in respiration rates	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
1579	+/-1121	*	Puget Sound, WA	COA		Toxic (71.6+/-14.6% prevalence of idiopathic degeneration/necrosis)	Parophrys vetulus (English sole)				Malins et al. 1985
1579	+/-1121	*	Puget Sound, WA	COA		Toxic (51.4+/-21.1% prevalence of steatosis and hemosiderosis)	Parophrys vetulus (English sole)				Malins et al. 1985
1579	+/-1121	*	Puget Sound, WA	COA		Toxic (19+/-6.15% prevalence of hepatocellular regenerative foci)	Parophrys vetulus (English sole)				Malins et al. 1985
1579	+/-1121	*	Puget Sound, WA	COA		Toxic (26.7+/-6.43% prevalence of hepatic neoplasms)	Parophrys vetulus (English sole)				Malins et al. 1985
1579	+/-1121	*	Puget Sound, WA	COA		Toxic (88+/-3.65% prevalence of hepatic idiopathic lesions)	Parophrys vetulus (English sole)				Malins et al. 1985
1579	+/-1121	*	Puget Sound, WA	COA		Toxic (44.2+/-8.5% prevalence of hepatic cellular alterations)	Parophrys vetulus (English sole)				Malins et al. 1985
1600		*	Puget Sound, WA	AETA	15-min	1988 Puget Sound AET	Microtox (Photobacterium phosphoreum)				PTI 1988
1600		*	Puget Sound, WA	AETA	48-h	1988 Puget Sound AET	Crassostrea gigas (oyster)	LAR			PTI 1988
1791	+/-2438	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (2.09+/-1.73% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.56+/-0.329		Pastorok & Becker 1990
1800		*	San Francisco Bay, CA	AETA	48-h	San Francisco Bay AET	Oyster; mussel	LAR			Long & Morgan 1990
1840	+/-2737	NE	Burrard Inlet, BC	COA	10-d	Not toxic (7.9+/-5.12% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.64+/-2.14		McLeay et al. 1991
1891	+/-2371	*	Puget Sound, WA	COA	15-min	Significantly toxic (EC50; 0.065+/-0.043% extract)	Microtox (Photobacterium phosphoreum)		1.58+/-0.255		Pastorok & Becker 1990
1959	+/-1993	NE	Eagle Harbor, WA	COA	10-d	Least toxic (13+/-7% mortality)	Rhepoxynius abronius (amphipod)	ADT			CH2M Hill 1989
2293	+/-2640	*	Puget Sound, WA	COA	2-d	Significantly toxic (60.4+/-46.5% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.57+/-0.287		Pastorok & Becker 1990
2764	+/-4982	NE	Elizabeth River, VA	COA	96-h	Not significantly toxic (4.5+/-3.24% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
3000		*	Puget Sound, WA	AETA	10-d	1988 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT			PTI 1988
3248	+/-2803	*	Puget Sound, WA	COA	10-d	Significantly toxic (80.8+/-30.6% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.266		Pastorok & Becker 1990
3485	+/-2475	NC	Eagle Harbor, WA	COA	10-d	Highly toxic (95.5+/-8.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			CH2M Hill 1989
3600		*	Puget Sound, WA	AETA		1988 Puget Sound AET	Benthic community				PTI 1988
3917	+/-7113	NE	Elizabeth River, VA	COA	96-h	No significant change in respiration rate	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
4100	+/-600	*	Laboratory	SSBA	10-d	Significant mortality	Rhepoxynius abronius (amphipod)	ADT	0.9		Plesha et al. 1988
4800	+/-3315	*	Puget Sound, WA	COA	20-d	Significantly toxic (37.3+/-22% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.87+/-0.208		Pastorok & Becker 1990
5000		*	Burrard Inlet, BC	COA	10-d	Highly toxic (23% emergence)	Corophium volutator (amphipod)	ADT	3.5		McLeay et al. 1991
5000		*	Burrard Inlet, BC	COA	10-d	Highly toxic (30.5% emergence)	Rhepoxynius abronius (amphipod)	ADT	3.5		McLeay et al. 1991

Table 20. A summary of the available data on the biological effects associated with sediment-sorbed BENZO(A)PYRENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Benzo(a)pyrene	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
5335	+/-6488	*	Eagle Harbor, WA	COA	10-d	Moderately toxic (41+/-9% mortality)	Rhepoxynius abronius (amphipod)	ADT			CH2M Hill 1989
6300		*	Puget Sound, WA	COA	10-d	Significantly toxic (56% mortality)	Panope generosa (geoduck)	JUV	2.1		Pastorok & Becker 1990
6800		*	Puget Sound, WA	AETA		PSDDA Maximum Level Criteria	Aquatic biota				USACOE 1988
<10853	+/-15341	NE	Sidney Tar Pond, NS	COA	20-d	Not significantly toxic (8+/-5.66% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
18000		*	United States	EqPA		99% Chronic Marine Criteria	Aquatic organisms		1		Pavlou et al. 1987
21700		*	Sidney Tar Pond, NS	COA	10-d	Significantly toxic (100% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
21700		*	Sidney Tar Pond, NS	COA	10-d	Significantly toxic (100% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
45000		*	United States	EqPA		95% Chronic Marine Criteria	Aquatic organisms		1		Pavlou et al. 1987
116000		*	Sidney Tar Pond, NS	COA	20-d	Significantly toxic (52% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
450000		*	United States	EqPA		EPA Acute Marine EP Threshold	Aquatic biota		1		Lyman et al. 1987
450000		*	United States	EqPA		Chronic Marine EqP Threshold	Aquatic biota		1		Bolton et al. 1985

Table 21. A summary of the available data on the biological effects associated with sediment-sorbed CHRYSENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Chrysene	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.05		NC	Mobile Bay, AL	COA		Significantly toxic (10% mortality)	Mysidopsis bahia (mysid shrimp)		0.009	0.004	EMAP Louisiana Province 1991
0.2	+/-0.071	NC	Apalachee Bay, FL	COA	10-d	Significantly toxic (15.6% mortality)	Ampelisca abdita (amphipod)		0.438+/-0.442	0.421+/-0.593	EMAP Louisiana Province 1991
0.218	+/-0.076	NE	Apalachee Bay, FL	COA		Not significantly toxic (0.75+/-1.5% mortality)	Mysidopsis bahia (mysid shrimp)		0.540+/-0.385	0.405+/-0.417	EMAP Louisiana Province 1991
0.235	+/-0.106	NE	Apalachee Bay, FL	COA	10-d	Not significantly toxic (3.3+/-3.25% mortality)	Ampelisca abdita (amphipod)		0.643+/-0.455	0.390+/-0.410	EMAP Louisiana Province 1991
0.39	+/-0.156	NC	Mississippi Sound, MS	COA	10-d	Significantly toxic (11.6+/-3.39% mortality)	Ampelisca abdita (amphipod)		0.111+/-0.045	0.03	EMAP Louisiana Province 1991
0.415	+/-0.357	NE	Chandeleur Sound, LA	COA		Not significantly toxic (1.03+/-2.05% mortality)	Mysidopsis bahia (mysid shrimp)		0.824+/-0.915	1.69+/-0.920	EMAP Louisiana Province 1991
0.447	+/-0.283	NC	Chandeleur Sound, LA	COA	10-d	Significantly toxic (11.5+/-4.86% mortality)	Ampelisca abdita (amphipod)		0.811+/-0.711	1.87+/-0.973	EMAP Louisiana Province 1991
0.558	+/-0.265	SG	Chandeleur Sound, LA	COA		Significantly toxic (7.6+/-1.32% mortality)	Mysidopsis bahia (mysid shrimp)		0.624+/-0.197	2.07+/-1.19	EMAP Louisiana Province 1991
0.59	+/-0.366	NE	Chandeleur Sound, LA	COA	10-d	Not significantly toxic (2.87+/-4.05% mortality)	Ampelisca abdita (amphipod)		0.517+/-0.166	2.02+/-1.38	EMAP Louisiana Province 1991
1.61	+/-0.057	NE	Galveston Bay, TX	COA		High abundance (155+/-49.5 N/0.00203 sq.m.)	Oligochaeta		1.2+/-1.27	4.27+/-3.85	Carr 1992
2.2	+/-1.08	NE	Galveston Bay, TX	COA		High abundance (27.3+/-10 N/0.00203 sq.m.)	Mollusca		1.64+/-0.4	1.39+/-0.17	Carr 1992
3.53	+/-1.37	NC	Mississippi Sound, MS	COA		Significantly toxic (12.2+/-4.42% mortality)	Mysidopsis bahia (mysid shrimp)		0.939+/-0.335	2.63+/-2.3	EMAP Louisiana Province 1991
3.78	+/-3.28	NE	Galveston Bay, TX	COA		High species richness (24.5+/-3.7 S/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
3.78	+/-3.28	NE	Galveston Bay, TX	COA		High abundance (359+/-92.8 N/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
4.28	+/-4.64	NE	Mississippi Sound, MS	COA		Not significantly toxic (0.789+/-1.59% mortality)	Mysidopsis bahia (mysid shrimp)		0.827+/-0.757	1.46+/-1.58	EMAP Louisiana Province 1991
4.71	+/-3.85	NE	Mississippi Sound, MS	COA	10-d	Not significantly toxic (1.4+/-1.73% mortality)	Ampelisca abdita (amphipod)		0.998+/-0.602	2.01+/-1.82	EMAP Louisiana Province 1991
4.82	+/-2.45	NE	Galveston Bay, TX	COA		High abundance (156+/-22.9 N/0.00203 sq.m.)	Polychaeta		0.916+/-0.661	2.94+/-2.3	Carr 1992
4.9	+/-6.36	NE	Galveston Bay, TX	COA		High abundance (16.2+/-6.19 N/0.00203 sq.m.)	Copepoda		0.844+/-0.524	4.73+/-3.1	Carr 1992
<5		NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (3% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
<5		NE	Sidney Tar Pond, NS	COA	10-d	Not significantly toxic (4% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
<5		NE	Sidney Tar Pond, NS	COA	10-d	Not significantly toxic (3% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
5.24	+/-6.24	NE	Galveston Bay, TX	COA	48-h	Not toxic (98.1+/-1.79% normal development)	Arbacia punctulata (sea urchin)	EMB	.748+/-0.476	4.16+/-3.45	Carr 1992
5.25	+/-7.35	NC	Mobile Bay, AL	COA	10-d	Significantly toxic (46+/-49.3% mortality)	Ampelisca abdita (amphipod)		0.22+/-0.298	3.84+/-5.43	EMAP Louisiana Province 1991
5.89	+/-6.32	NE	Matagorda Bay, TX	COA		Not significantly toxic (1.58+/-1.82% mortality)	Mysidopsis bahia (mysid shrimp)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
5.89	+/-6.32	NE	Matagorda Bay, TX	COA	10-d	Not significantly toxic (2.33+/-4.65% mortality)	Ampelisca abdita (amphipod)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
7.25		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (0.33+/-0.516% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
7.25		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (2.33+/-1.03% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
7.25		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (15.3+/-11.0% mortality)	Hyalella azteca (amphipod)	JUV	0.648+/-0.641	1.74+/-1.39	Hall et al. 1992
7.25		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1% mortality)	Streblospio benedicti (polychaete worm)		1.38	3.25	Hall et al. 1992
7.25		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (16.5+/-9.19% mortality)	Streblospio benedicti (polychaete worm)		0.783+/-0.845	4.83+/-2.23	Hall et al. 1992
7.25		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.367+/-0.085 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
7.25		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.0005 mg/day growth)	Streblospio benedicti (polychaete worm)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
7.25		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.003+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.316+/-0.120	2.13+/-2.46	Hall et al. 1992
7.25		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (7.2+/-1.92% mortality)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
7.25		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.6+/-0.55% reburial)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
7.25		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
7.25		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
7.25		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.001+/-0.001 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.555+/-0.471	2.68+/-2.3	Hall et al. 1992
7.25		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1.83+/-1.6% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
7.25		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (3.5+/-1.87% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992

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Chrysene Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
7.25	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (9.25+/-5.32% mortality)	Lepidactylus dytiscus (amphipod)		0.638+/-0.768	1.65+/-1.62	Hall et al. 1992
7.25	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (22.3+/-7.37% mortality)	Hyalella azteca (amphipod)	JUV	0.788+/-0.866	2.04+/-1.75	Hall et al. 1992
7.25	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (8.8+/-7.12% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
7.25	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (14+/-9.22% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
7.25	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.1+/-0.865% reburial)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
7.25	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<20% emergence)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
7.25	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
7.25	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (-0.057+/-0.04 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
7.25	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.001mg/day growth)	Streblospio benedicti (polychaete worm)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
7.25	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.016 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
7.25	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.005+/-0.0004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
7.25	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (55.0+/-22.6% mortality)	Hyalella azteca (amphipod)	JUV	0.338+/-0.133	2.9+/-3.11	Hall et al. 1992
7.25	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29.8+/-11.1% mortality)	Streblospio benedicti (polychaete worm)		0.316+/-0.12	2.13+/-2.46	Hall et al. 1992
7.25	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (55.0+/-19.5% mortality)	Streblospio benedicti (polychaete worm)		0.349+/-0.11	1.07+/-0.66	Hall et al. 1992
7.25	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.003 mg/day growth)	Lepidactylus dytiscus (amphipod)		1.38	3.25	Hall et al. 1992
7.25	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29% mortality)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
7.25	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (89.7% reburial)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
7.25	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
7.25	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	6.41	Hall et al. 1992
7.25	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
7.25	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (45.5+/-12% mortality)	Lepidactylus dytiscus (amphipod)		0.383+/-0.279	3.61+/-2.79	Hall et al. 1992
7.25	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (63.0+/-24.3% mortality)	Hyalella azteca (amphipod)	JUV	0.317+/-0.228	2.57+/-2.67	Hall et al. 1992
7.25	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (22% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
7.25	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (28% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
7.25	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (82.9% reburial)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
7.25	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>20% emergence)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
7.25	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	5.58	Hall et al. 1992
7.25	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.008+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.4	Hall et al. 1992
7.25	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.003 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
8.56 +/-0.007	NE	Mobile Bay, AL	COA	10-d	Not significantly toxic (0.5+/-0.778% mortality)	Ampelisca abdita (amphipod)		1.24+/-0.948	8.51+/-4.76	EMAP Louisiana Province 1991
9.19 +/-1.09	NE	Mobile Bay, AL	COA		Not significantly toxic (1.07+/-1.85% mortality)	Mysidopsis bahia (mysid shrimp)		0.968+/-0.815	8.23+/-3.4	EMAP Louisiana Province 1991
11.3 +/-15.2	NC	Galveston Bay, TX	COA	10-d	Significantly toxic (15.8+/-3.89% mortality)	Ampelisca abdita (amphipod)		0.647+/-0.606	0.160+/-0.184	EMAP Louisiana Province 1991
13.6 +/-30.7	*	Galveston Bay, TX	COA		Low abundance (4.21+/-5.66 N/0.00203 sq.m.)	Oligochaeta		0.895+/-0.453	7.85+/-8.8	Carr 1992
13.9 +/-20.1	NC	Galveston Bay, TX	COA		Significantly toxic (13.4+/-9.11% mortality)	Mysidopsis bahia (mysid shrimp)		0.778+/-0.482	1.21+/-0.778	EMAP Louisiana Province 1991
14 +/-14.7	NE	Mississippi River, MS, LA	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		1.3+/-0.83	1.14+/-1	EMAP Louisiana Province 1991
14.3 +/-15.2	NC	Mississippi River, MS, LA	COA	10-d	Significantly toxic (15.9+/-6.65% mortality)	Ampelisca abdita (amphipod)		1.22+/-0.717	0.235+/-0.276	EMAP Louisiana Province 1991
15.8 +/-20.1	NE	Galveston Bay, TX	COA		High Abundance (6+/-1.41 N/0.00203 sq.m.)	Amphipoda		0.955+/-0.629	7.21+/-8.2	Carr 1992
15.8 +/-13.3	NE	Galveston Bay, TX	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		0.934+/-0.657	0.457+/-0.530	EMAP Louisiana Province 1991
16.6 +/-17.3	NE	Galveston Bay, TX	COA	10-d	Not significantly toxic (1.35+/-1.45% mortality)	Ampelisca abdita (amphipod)		0.961+/-0.537	1.17+/-0.640	EMAP Louisiana Province 1991
16.7 +/-41.5	NE	Galveston Bay, TX	COA	1-h	Not toxic (92.5+/-6.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	0.77+/-0.448	6.37+/-6.58	Carr 1992

Table 21. A summary of the available data on the biological effects associated with sediment-sorbed CHRYSENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Chrysene Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
17 +/-10.4	NE	Mississippi River, MS, LA	COA	10-d	Not significantly toxic (7.8+/-1.63% mortality)	Ampelisca abdita (amphipod)		1.15+/-1.04	2.31+/-0.651	EMAP Louisiana Province 1991
17.3 +/-10.9	SG	Mississippi River, MS, LA	COA		Significantly toxic (32.9+/-36.4% mortality)	Mysidopsis bahia (mysid shrimp)		1.07+/-0.924	1.41+/-1.93	EMAP Louisiana Province 1991
20.5 +/-57.6	SG	Galveston Bay, TX	COA		Low abundance (0.3+/-0.651 N/0.00203 sq.m.)	Amphipoda		0.859+/-0.487	7.67+/-8.12	Carr 1992
22 +/-58.4	*	Galveston Bay, TX	COA		Low abundance (1.86+/-2.59 N/0.00203 sq.m.)	Mollusca		0.784+/-0.421	8.29+/-8.13	Carr 1992
22.5 +/-59.4	*	Galveston Bay, TX	COA		Low species richness (10+/-3.73 S/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
22.5 +/-59.4	*	Galveston Bay, TX	COA		Low abundance (89+/-60.7 N/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
25.3 +/-63.9	*	Galveston Bay, TX	COA		Low abundance (41.7+/-21.8 N/0.00203 sq.m.)	Polychaeta		0.848+/-0.427	9.21+/-8.61	Carr 1992
30	NE	Jetty Island Pier, Everett Marina, WA	COA	10-d	Not toxic (12.3+/-2.87% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.08+/-0.66		Hart Crowser & Associates Inc. 1986
30.6 +/-71.1	*	Galveston Bay, TX	COA		Low abundance (2.05+/-1.58 N/0.00203 sq.m.)	Copepoda		0.879+/-0.47	9.63+/-9.65	Carr 1992
32.7 +/-25.6	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (5.8+/-3.7% mortality)	Rhepoxynius abronius (amphipod)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
32.7 +/-25.6	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (3.4+/-1.82% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
32.7 +/-25.6	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (11.2+/-3.7% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
32.7 +/-25.6	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (3.52+/-1.66% mortality)	Macoma nasuta (clam)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
52.6 +/-116	*	Galveston Bay, TX	COA		Moderate abundance (58.3+/-16.2 N/0.00203 sq.m.)	Oligochaeta		0.632+/-0.274	7.93+/-5.6	Carr 1992
58.5 +/-113	*	Galveston Bay, TX	COA	1-h	Toxic (20.4+/-18.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	1.26+/-0.47	14.6+/-10.1	Carr 1992
58.5 +/-93.5	*	Galveston Bay, TX	COA	48-h	Toxic (4.65+/-16.1% normal development)	Arbacia punctulata (sea urchin)	EMB	1.06+/-0.449	14.5+/-9.2	Carr 1992
60	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (18% mortality)	Ampelisca abdita (amphipod)		0.028	9 ug/g	Windom In Prep
60	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (0% mortality)	Arbacia punctulata (sea urchin)		0.03	19 ug/g	Windom In Prep
62 +/-17.4	NE	Puget Sound, WA	COA	15-min	Not significantly toxic (EC50; 0.283+/-0.168% extract)	Microtox (Photobacterium phosphoreum)		1.39+/-0.37		Pastorok & Becker 1990
67.5 +/-2.89	NE	Brunswick Harbor Entrance, GA	COA	48-h	Not significantly toxic (86.6+/-4.25% normal development)	Arbacia punctulata (sea urchin)		0.181+/-0.162	182+/-208 ug/g	Windom In Prep
68.3 +/-2.89	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (28.3+/-6.11% mortality)	Mysidopsis bahia (mysid)		0.246+/-0.051	127+/-24 ug/g	Windom In Prep
70 +/-9.57	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (91.3+/-2.91% normal development)	Arbacia punctulata (sea urchin)		0.299+/-0.251	114+/-68.4 ug/g	Windom In Prep
70.6 +/-10.4	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (9.78+/-5.33% mortality)	Mysidopsis bahia (mysid)		0.24+/-0.247	91.9+/-73.4 ug/g	Windom In Prep
70.6 +/-11.2	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (4+/-2.83% mortality)	Menidia beryllina (silverside)		0.243+/-0.264	90.5+/-78.4 ug/g	Windom In Prep
71.7 +/-12.9	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (27.5+/-10.6% mortality)	Mysidopsis bahia (mysid)		0.237+/-0.311	74.6+/-85.5 ug/g	Windom In Prep
71.7 +/-9.31	SG	Savannah River Entrance Channel, GA	COA	48-h	Significantly toxic (25.4+/-7.66% mortality)	Arbacia punctulata (sea urchin)		0.344+/-0.242	129.5+/-59.3 ug/g	Windom In Prep
71.9 +/-10.3	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (11.6+/-4.33% mortality)	Ampelisca abdita (amphipod)		0.267+/-0.25	102+/-71.1 ug/g	Windom In Prep
73.3 +/-143	NE	Galveston Bay, TX	COA		High abundance (154+/-30.2 N/0.00203 sq.m.)	Benthic invertebrates		0.47+/-0.27	9.07+/-2.94	Carr 1992
80	*	Eagle Harbor, WA	COA	4-d	LC50	Rhepoxynius abronius (amphipod)	ADT			Swartz et al. 1989
81.8 +/-37	NE	San Francisco Bay, CA	COA	48-h	Least toxic (23.3+/-7.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
90.6 +/-24.3	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (10.6+/-3.17% mortality)	Ampelisca abdita (amphipod)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
90.6 +/-24.3	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (8.00+/-2.92% mortality)	Mysidopsis bahia (mysid)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
92.9 +/-25.6	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (5.43+/-3.21% mortality)	Mysidopsis bahia (mysid)		1.21+/-1.13	9096+/-13378 ug/g	Windom In Prep
92.9 +/-25.6	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (9.61+/-2.7% mortality)	Menidia beryllina (silverside)		1.22+/-1.13	9172+/-13363 ug/g	Windom In Prep
93	*	Puget Sound, WA	AETA	15-min	1986 Puget Sound AET	Microtox (Photobacterium phosphoreum)		1		Bellar et al. 1986
98.3 +/-125	NE	Burrard Inlet, BC	COA	10-d	Not toxic (4.5+/-3.02% emergence)	Rhepoxynius abronius (amphipod)	ADT	2.66+/-2.15		McLeay et al. 1991
98.3 +/-125	NE	Burrard Inlet, BC	COA	10-d	Not toxic (5.21+/-3.61% emergence)	Corophium volutator (amphipod)	ADT	3.18+/-2.1		McLeay et al. 1991
100	SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (16% mortality)	Mysidopsis bahia (mysid)		1.8	7095 ug/g	Windom In Prep
100	SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (22.3% mortality)	Menidia beryllina (silverside)		1.71	6562 ug/g	Windom In Prep
103 +/-120	NE	Galveston Bay, TX	COA		Low species (11.2+/-1.94 S/0.00203 sq.m.)	Benthic species		0.642+/-0.356	13.4+/-8.65	Carr 1992

Table 21. A summary of the available data on the biological effects associated with sediment-sorbed CHRYSENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Chrysene	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
108			***TEL***								
109	+/-14.7	SG	Brunswick Harbor Entrance, GA	COA	48-h	Significantly toxic (14.6+/-18.9% normal development)	Arbacia punctulata (sea urchin)		1.99+/-0.562	14009+/-13434 ug/g	Windom In Prep
127	+/-226	NE	Southern California	COA	10-d	Not significantly toxic (23.2% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
130		NE	Tampa Bay, FL	COA	1-h	Least toxic (79.4+/-9.9% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.45+/-0.587		Long 1993
140		NE	Puget Sound, WA	COA		Not toxic (10% prevalence of idiopathic degeneration/necrosis)	Parophrys vetulus (English sole)				Malins et al. 1985
140		NE	Puget Sound, WA	COA		Not toxic (17.5% prevalence of steatosis and hemosiderosis)	Parophrys vetulus (English sole)				Malins et al. 1985
140		NE	Puget Sound, WA	COA		Not toxic (0% occurrence of hepatic cellular alterations)	Parophrys vetulus (English sole)				Malins et al. 1985
140		NE	Puget Sound, WA	COA		Not toxic (5% prevalence of hepatocellular regenerative foci)	Parophrys vetulus (English sole)				Malins et al. 1985
140		NE	Burrard Inlet, BC	SQO		Sediment Quality Objectives	Aquatic biota				Swain & Nijman 1991
140		NE	Puget Sound, WA	COA		Not toxic (0% prevalence of hepatic cellular alterations)	Parophrys vetulus (English sole)				Malins et al. 1985
140		NE	Puget Sound, WA	COA		Not toxic (32.5% prevalence of hepatic idiopathic lesions)	Parophrys vetulus (English sole)				Malins et al. 1985
162	+/-12	*	Galveston Bay, TX	COA		Low abundance (53+/-33.9 N/0.00203 sq.m.)	Benthic invertebrates		0.985+/-0.247	22+/-11.2	Carr 1992
164	+/-95	NE	Tampa Bay, FL	COA	10-d	Not significantly toxic (14.6+/-7.67% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.63+/-0.596		Long 1993
167	+/-188	NE	Narragansett Bay, RI	COA	10-d	Not significantly toxic (5.28+/-3.04% mortality))	Ampelisca abdita (amphipod)	ADT			Munns et al. 1991
175	+/-16.6	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-7.99% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.14+/-0.352	6.09+/-5.38	Bricker et al. 1993
187		*	Puget Sound, WA	AETA	48-h	1986 Puget Sound AET	Crassostrea gigas (oyster)	LAR	1		Bellar et al. 1986
187		*	Puget Sound, WA	AETA	10-d	1986 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT	1		Bellar et al. 1986
190		*	California	AETA	48-h	California AET Values	Mytilus edulis (bivalve)	LAR			Becker et al. 1990
190		*	Northern California	AETA		Northern California AET Values	Benthic species				Becker et al. 1990
210	+/-27.4	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.5+/-11.4% mortality)	Mulinia lateralis (bivalve)	LAR	2.33+/-0.364	26.8+/-9.42	Bricker et al. 1993
211	+/-26.4	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.061+/-0.038 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.8+/-0.477	8.52+/-10.7	Bricker et al. 1993
219	+/-24	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (39.5+/-18.2% mortality)	Ampelisca abidta (amphipod)	SUB ADT	2.06+/-0.523	20.1+/-13.9	Bricker et al. 1993
230	+/-52.5	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.3+/-2.22% normal development)	Mulinia lateralis (bivalve)	LAR	2.18+/-0.531	19.1+/-12.5	Bricker et al. 1993
240	+/-348	NE	Oahu, Hawaii	COA	10-d	Not significantly toxic (7.2+/-1.89% mortality)	Eohaustorius estuarius (amphipod)	ADT	1.93+/-1.94	10.3+/-12.4	Lamberson et al. 1993
240	+/-348	NE	Oahu, Hawaii	COA	10-d	Not significantly toxic (10.1+/-4.01% mortality)	Corophium acherusicum (amphipod)	ADT	1.93+/-1.94	10.3+/-12.4	Lamberson et al. 1993
<251	+/-265	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (6.8+/-7.31% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
<251	+/-265	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (8.5+/-6.06% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
<251	+/-265	NE	Halifax Harbour, NS	COA	20-d	Not significantly toxic (0.7+/-1.63% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
256	+/-114	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (19.3+/-5.86% mortality)	Ampelisca abidta (amphipod)	SUB ADT	1.82+/-0.225	6.3+/-6.2	Bricker et al. 1993
263	+/-231	*	Tampa Bay, FL	COA	1-h	Moderately toxic (15.3+/-10.6% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.94+/-0.908		Long 1993
275	+/-247	*	Jetty Island Pier, Everett Marina, WA	COA	10-d	Toxic (19.5+/-0.707% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.15+/-0.071		Hart Crowser & Associates Inc. 1986
279	+/-150	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (15.2+/-9.21% mortality)	Mulinia lateralis (bivalve)	LAR	2.17+/-0.663	18.4+/-19.9	Bricker et al. 1993
280	+/-250	NE	Tampa Bay, FL	COA		Not significantly toxic (EC50; 0.066+/-0.033 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.89+/-0.902		Long 1993
281	+/-67.1	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.125+/-0.084 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.25+/-0.468	1.98+/-2.25	Bricker et al. 1993
286	+/-217	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.167+/-0.198 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.59+/-1.09	4.67+/-6.99	Bricker et al. 1993
286	+/-157	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.014+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.51+/-0.45	29.6+/-15.7	Bricker et al. 1993
318	+/-212	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (12.3+/-14.5% mortality)	Mulinia lateralis (bivalve)	LAR	1.53+/-0.743	15.7+/-23.2	Bricker et al. 1993
319	+/-88.7	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (25.9+/-5.01% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.21+/-0.444	2.41+/-2.32	Bricker et al. 1993
320		NC	Puget Sound, WA	COA	2-d	Significantly toxic (3.8% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.5		Pastorok & Becker 1990
327	+/-249	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.096+/-0.101 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.37+/-0.759	6.93+/-6.83	Bricker et al. 1993

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Chrysene Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
328 +/-267	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99.3+/-0.827% normal development)	Mulinia lateralis (bivalve)	LAR	1.43+/-0.738	14.7+/-24	Bricker et al. 1993
341 +/-284	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.074+/-0.043 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.27+/-0.626	6.21+/-5.41	Bricker et al. 1993
358 +/-365	NE	Commencement Bay, WA	COA	48-h	Least toxic (15.1+/-3.1% abnormality)	Oyster	LAR			Tetra Tech 1985
368 +/-466	*	San Francisco Bay, CA	COA	48-h	Moderately toxic (59.4+/-11.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
378 +/-549	NE	San Francisco Bay, CA	COA	10-d	Least toxic (18+/-6.6% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
384	*	United States	SLCA		National Screening Level Concentration-Marine	Benthic species		1		Neff et al. 1987
401 +/-449	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-6.07% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.71+/-0.9	15.3+/-23.2	Bricker et al. 1993
403 +/-281	*	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (30.5+/-16.4% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.62+/-0.777	17.7+/-26.3	Bricker et al. 1993
405 +/-571	NE	San Francisco Bay, CA	COA	10-d	Not significantly toxic (18.4+/-6.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
413 +/-385	SG	San Francisco Bay, CA	COA	10-d	Moderately toxic (33.8+/-4.7% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
423 +/-512	SG	San Francisco Bay, CA	COA	10-d	Significantly toxic (42.9+/-19.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
425 +/-349	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (96+/-1.66% normal development)	Mulinia lateralis (bivalve)	LAR	2.52+/-0.997	35+/-42.9	Bricker et al. 1993
432 +/-345	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (17+/-16.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.99+/-1	21.6+/-24.5	Bricker et al. 1993
438 +/-410	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (6.48+/-10.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
438 +/-410	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99+/-0.862% normal development)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
447	*	Puget Sound, WA	AETA		1986 Puget Sound AET	Benthic species		1		Bellar et al. 1986
448 +/-512	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (6.67+/-8.07% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.51+/-0.330		Pastorok & Becker 1990
453 +/-357	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.1+/-2.78% normal development)	Mulinia lateralis (bivalve)	LAR	2.12+/-1.04	22.9+/-23.7	Bricker et al. 1993
463 +/-424	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (13.8+/-4.09% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.47+/-0.306		Pastorok & Becker 1990
500 +/-671	*	San Francisco Bay, CA	COA	48-h	Significantly toxic (55.7+/-22.7% abnormal)	Bivalve	LAR			Long & Morgan 1990
515 +/-399	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (34.9+/-15.7% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.23+/-1.04	25.4+/-25.5	Bricker et al. 1993
517 +/-729	SG	San Francisco Bay, CA	COA	10-d	Highly toxic (67+/-11.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
520 +/-236	NC	Oakland Harbor, CA	COA	10-d	Significantly toxic (35.3+/-2.5% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.56+/-0.07		Word et al. 1988
523 +/-284	*	Southern California	COA	10-d	Significantly toxicity (51.7% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
530 +/-611	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.016+/-0.007 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.26+/-0.936	43.4+/-35.6	Bricker et al. 1993
546 +/-487	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (23+/-4.24% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.46+/-1.22	40+/-55.1	Bricker et al. 1993
568 +/-469	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (10.4+/-6.3% mortality)	Nephtys caecoides (polychaete)		1.63+/-0.657		Word et al. 1988
568 +/-469	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (0.2+/-0.6% mortality)	Macoma nasuta (clam)		1.63+/-0.657		Word et al. 1988
582 +/-524	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (23.3+/-6.14% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.738		Word et al. 1988
595 +/-451	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.013+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.79+/-0.744	37.6+/-25.3	Bricker et al. 1993
596 +/-438	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (29.8+/-13.9% mortality)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.07	32.1+/-28.4	Bricker et al. 1993
>610	-	Southern California	AETA	10-d	Southern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
617 +/-516	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.1+/-13.3% mortality)	Mulinia lateralis (bivalve)	LAR	2.68+/-0.955	31.8+/-24.4	Bricker et al. 1993
641 +/-386	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (96.6+/-3.79% normal development)	Mulinia lateralis (bivalve)	LAR	2.87+/-0.94	35.1+/-25.9	Bricker et al. 1993
651 +/-389	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (38+/-13% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.92+/-0.937	34.6+/-23.9	Bricker et al. 1993
670	NE	Puget Sound, WA	AETA		PSDDA Screening level concentration	Aquatic biota				USACOE 1988
731 +/-259	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (75.1+/-10.6% mortality)	Mulinia lateralis (bivalve)	LAR	3.32+/-0.317	42.3+/-19.2	Bricker et al. 1993
738 +/-719	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (91.5+/-7.28% normal development)	Mulinia lateralis (bivalve)	LAR	2.6+/-0.899	36.8+/-34.9	Bricker et al. 1993
748 +/-773	NE	Commencement Bay, WA	COA	10-d	Least toxic (12.5+/-4.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
752 +/-362	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.011+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.28+/-0.363	45.3+/-21.4	Bricker et al. 1993

Table 21. A summary of the available data on the biological effects associated with sediment-sorbed CHRYSENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Chrysene	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
780		*	California	AETA		California AET Values	Benthic species				Becker et al. 1990
>780		-	Southern California	AETA		Southern California AET Values	Benthic species				Becker et al. 1990
821	+/-732	SG	Commencement Bay, WA	COA	10-d	Moderately toxic (26+/-5.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
846			***PEL***								
854	+/-922	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (21.5+/-6.36% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.35+/-1.05	10.5+/-13.4	Bricker et al. 1993
<873	+/-1738	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (5.2+/-3.5% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
<873	+/-1738	NE	Halifax Harbour, NS	COA	20-d	Not significantly toxic (1+/-2% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
899	+/-1604	NE	Burrard Inlet, BC	COA	10-d	Not toxic (8.9+/-2.99% mortality)	Corophium volutator (amphipod)	ADT	2.8+/-1.96		McLeay et al. 1991
899	+/-1604	NE	Burrard Inlet, BC	COA	10-d	Not toxic (97.2+/-2.84% reburial)	Rhepoxynius abronius (amphipod)	ADT	2.8+/-1.96		McLeay et al. 1991
902	+/-691	*	Commencement Bay, WA	COA	48-h	Moderately toxic (23+/-2.3% abnormality)	Oyster	LAR			Tetra Tech 1985
946	+/-900	*	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (88.5+/-8.39% normal development)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.05	38.1+/-38.9	Bricker et al. 1993
989	+/-731	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.008+/-0.001 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.19+/-1.27	12+/-11.3	Bricker et al. 1993
1016	+/-558	NC	Elizabeth River, VA	COA	96-h	Significantly toxic (50.7+/-39% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
1028	+/-972	*	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (51.3+/-6.95% mortality)	Mulinia lateralis (bivalve)	LAR	1.8+/-1.71	29.6+/-46.3	Bricker et al. 1993
1100		*	Puget Sound, WA	SQG		Chemical Criteria	Benthic community		1		WDE 1989
<1163	+/-2007	*	Halifax Harbour, NS	COA	10-d	Significantly toxic (61.7+/-12.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
1197	+/-1824	NE	Burrard Inlet, BC	COA	10-d	Not toxic (7.9+/-5.12% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.64+/-2.14		McLeay et al. 1991
1200		*	United States	EqPA		99% Chronic Marine Criteria	Aquatic organisms		1		Pavlou et al. 1987
1218	+/-1286	*	Commencement Bay, WA	COA	48-h	Highly toxic (44.5+/-19% abnormality)	Oyster	LAR			Tetra Tech 1985
1260	+/-1350	*	Tampa Bay, FL	COA	1-h	Most toxic (0.091+/-0.187% fertilization)	Arbacia punctulata (sea urchin)	GAM	2.96+/-1.49		Long 1993
1363	+/-1970	*	Commencement Bay, WA	COA	10-d	Highly toxic (78.5+/-19.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
1400		*	Puget Sound, WA	AETA	15-min	1988 Puget Sound AET	Microtox (Photobacterium phosphoreum)				PTI 1988
1533	+/-845	NC	Elizabeth River, VA	COA	96-h	Significant decrease in respiration rates	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
1679	+/-847	*	San Francisco Bay, CA	COA	48-h	Highly toxic (92.4+/-4.5% abnormal)	Bivalve	LAR			Long & Morgan 1990
1700		*	San Francisco Bay, CA	AETA	48-h	San Francisco Bay AET	Oyster; mussel	LAR			Long & Morgan 1990
1700	+/-1350	*	Tampa Bay, FL	COA	10-d	Significantly toxic (35.2+/-17.5% mortality)	Ampelisca abdita (amphipod)	SUB ADT	3.53+/-1.35		Long 1993
1756	+/-2634	NE	Puget Sound, WA	COA	20-d	Not significantly toxic (5+/-3.86% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.46+/-0.26		Pastorok & Becker 1990
1770	+/-1470	*	Tampa Bay, FL	COA		Significantly toxic (EC50; 0.017+/-0.012 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.47+/-1.49		Long 1993
2100		*	San Francisco Bay, CA	AETA	10-d	San Francisco Bay AET	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
2100		*	Northern California	AETA	10-d	Northern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
2100		*	California	AETA	10-d	California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
2305	+/-3286	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (4.43+/-2.1% mortality)	Panope generosa (geoduck)	JUV	1.51+/-0.261		Pastorok & Becker 1990
2530	+/-4113	NE	Elizabeth River, VA	COA	96-h	Not significantly toxic (4.5+/-3.24% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
2800		*	Puget Sound, WA	AETA	48-h	1988 Puget Sound AET	Crassostrea gigas (oyster)	LAR			PTI 1988
3165	+/-4535	NE	Eagle Harbor, WA	COA	10-d	Least toxic (13+/-7% mortality)	Rhepoxynius abronius (amphipod)	ADT			CH2M Hill 1989
3233	+/-6004	NE	Elizabeth River, VA	COA	96-h	No significant change in respiration rate	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
3300		*	Burrard Inlet, BC	COA	10-d	Highly toxic (23% emergence)	Corophium volutator (amphipod)	ADT	3.5		McLeay et al. 1991
3300		*	Burrard Inlet, BC	COA	10-d	Highly toxic (30.5% emergence)	Rhepoxynius abronius (amphipod)	ADT	3.5		McLeay et al. 1991
4225	+/-6832	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (2.09+/-1.73% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.56+/-0.329		Pastorok & Becker 1990
4400		*	United States	EqPA		95% Chronic Marine Criteria	Aquatic organisms		1		Pavlou et al. 1987

Table 21. A summary of the available data on the biological effects associated with sediment-sorbed CHRYSENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Chrysene Std Dev		Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
4590	+/-6681	*	Puget Sound, WA	COA	15-min	Significantly toxic (EC50; 0.065+/-0.043% extract)	Microtox (Photobacterium phosphoreum)		1.58+/-0.255		Pastorok & Becker 1990
5387	+/-3805	*	Puget Sound, WA	COA		Toxic (71.6+/-14.6% prevalence of idiopathic degeneration/necrosis)	Parophrys vetulus (English sole)				Malins et al. 1985
5387	+/-3805	*	Puget Sound, WA	COA		Toxic (51.4+/-21.1% prevalence of steatosis and hemosiderosis)	Parophrys vetulus (English sole)				Malins et al. 1985
5387	+/-3805	*	Puget Sound, WA	COA		Toxic (19+/-6.15% prevalence of hepatocellular regenerative foci)	Parophrys vetulus (English sole)				Malins et al. 1985
5387	+/-3805	*	Puget Sound, WA	COA		Toxic (26.7+/-6.43% prevalence of hepatic neoplasms)	Parophrys vetulus (English sole)				Malins et al. 1985
5387	+/-3805	*	Puget Sound, WA	COA		Toxic (88+/-3.65% prevalence of hepatic idiopathic lesions)	Parophrys vetulus (English sole)				Malins et al. 1985
5387	+/-3805	*	Puget Sound, WA	COA		Toxic (44.2+/-8.5% prevalence of hepatic cellular alterations)	Parophrys vetulus (English sole)				Malins et al. 1985
5842	+/-7366	*	Puget Sound, WA	COA	2-d	Significantly toxic (60.4+/-46.5% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.57+/-0.287		Pastorok & Becker 1990
6700		*	Puget Sound, WA	AETA		PSDDA Maximum Level Criteria	Aquatic biota				USACOE 1988
8517	+/-7813	*	Puget Sound, WA	COA	10-d	Significantly toxic (80.8+/-30.6% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.266		Pastorok & Becker 1990
9200		*	Puget Sound, WA	AETA		1988 Puget Sound AET	Benthic community				PTI 1988
9200		*	Puget Sound, WA	AETA	10-d	1988 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT			PTI 1988
9203	+/-10972	*	Eagle Harbor, WA	COA	10-d	Moderately toxic (41+/-9% mortality)	Rhepoxynius abronius (amphipod)	ADT			CH2M Hill 1989
10574	+/-7337	*	Eagle Harbor, WA	COA	10-d	Highly toxic (95.5+/-8.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			CH2M Hill 1989
11400	+/-10967	NE	Puget Sound, WA	COA	20-d	Significantly toxic (37.3+/-22% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.87+/-0.208		Pastorok & Becker 1990
<17303	+/-24462	NE	Sidney Tar Pond, NS	COA	20-d	Not significantly toxic (8+/-5.66% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
23000		*	Puget Sound, WA	COA	10-d	Significantly toxic (56% mortality)	Panope generosa (geoduck)	JUV	2.1		Pastorok & Becker 1990
34600		*	Sidney Tar Pond, NS	COA	10-d	Significantly toxic (100% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
34600		*	Sidney Tar Pond, NS	COA	10-d	Significantly toxic (100% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
115000		*	United States	EqPA		EPA Acute Marine EP Threshold	Aquatic biota		1		Lyman et al. 1987
115000		*	United States	EqPA		Chronic Marine EqP Threshold	Aquatic biota		1		Bolton et al. 1985
144000		*	Sidney Tar Pond, NS	COA	20-d	Significantly toxic (52% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990

Table 22. A summary of the available data on the biological effects associated with sediment-sorbed DIBENZO(a,h)ANTHRACENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Dibenzo(a,h)-anthracene Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.03	NC	Mobile Bay, AL	COA		Significantly toxic (10% mortality)	Mysidopsis bahia (mysid shrimp)		0.009	0.004	EMAP Louisiana Province 1991
0.03 +/-0.014	NE	Apalachee Bay, FL	COA	10-d	Not significantly toxic (3.3+/-3.25% mortality)	Ampelisca abdita (amphipod)		0.643+/-0.455	0.390+/-0.410	EMAP Louisiana Province 1991
0.05 +/-0.026	NE	Apalachee Bay, FL	COA		Not significantly toxic (0.75+/-1.5% mortality)	Mysidopsis bahia (mysid shrimp)		0.540+/-0.385	0.405+/-0.417	EMAP Louisiana Province 1991
0.07 +/-0.014	*	Apalachee Bay, FL	COA	10-d	Significantly toxic (15.6% mortality)	Ampelisca abdita (amphipod)		0.438+/-0.442	0.421+/-0.593	EMAP Louisiana Province 1991
0.11 +/-0.067	NE	Chandeleur Sound, LA	COA		Not significantly toxic (1.03+/-2.05% mortality)	Mysidopsis bahia (mysid shrimp)		0.824+/-0.915	1.69+/-0.920	EMAP Louisiana Province 1991
0.115 +/-0.106	NC	Mississippi Sound, MS	COA	10-d	Significantly toxic (11.6+/-3.39% mortality)	Ampelisca abdita (amphipod)		0.111+/-0.045	0.03	EMAP Louisiana Province 1991
0.17 +/-0.107	NC	Chandeleur Sound, LA	COA	10-d	Significantly toxic (11.5+/-4.86% mortality)	Ampelisca abdita (amphipod)		0.811+/-0.711	1.87+/-0.973	EMAP Louisiana Province 1991
0.23 +/-0.192	NE	Chandeleur Sound, LA	COA	10-d	Not significantly toxic (2.87+/-4.05% mortality)	Ampelisca abdita (amphipod)		0.517+/-0.166	2.02+/-1.38	EMAP Louisiana Province 1991
0.254 +/-0.14	*	Chandeleur Sound, LA	COA		Significantly toxic (7.6+/-1.32% mortality)	Mysidopsis bahia (mysid shrimp)		0.624+/-0.197	2.07+/-1.19	EMAP Louisiana Province 1991
0.32 +/-0.325	NE	Galveston Bay, TX	COA		High abundance (155+/-49.5 N/0.00203 sq.m.)	Oligochaeta		1.2+/-1.27	4.27+/-3.85	Carr 1992
0.557 +/-0.29	NE	Galveston Bay, TX	COA		High abundance (27.3+/-10 N/0.00203 sq.m.)	Mollusca		1.64+/-0.4	1.39+/-0.17	Carr 1992
<0.8 +/-0.3	NC	Halifax Harbour, NS	COA	10-d	Significantly toxic (61.7+/-12.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
0.88 +/-0.85	NE	Matagorda Bay, TX	COA		Not significantly toxic (1.58+/-1.82% mortality)	Mysidopsis bahia (mysid shrimp)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
0.88 +/-0.85	NE	Matagorda Bay, TX	COA	10-d	Not significantly toxic (2.33+/-4.65% mortality)	Ampelisca abdita (amphipod)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
0.9 +/-0.73	NE	Galveston Bay, TX	COA		High species richness (24.5+/-3.7 S/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
0.9 +/-0.726	NE	Galveston Bay, TX	COA		High abundance (359+/-92.8 N/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
0.93 +/-1.27	NC	Mobile Bay, AL	COA	10-d	Significantly toxic (46+/-49.3% mortality)	Ampelisca abdita (amphipod)		0.22+/-0.298	3.84+/-5.43	EMAP Louisiana Province 1991
1.02 +/-0.798	NE	Galveston Bay, TX	COA		High abundance (156+/-22.9 N/0.00203 sq.m.)	Polychaeta		0.916+/-0.661	2.94+/-2.3	Carr 1992
1.06 +/-1.28	NE	Galveston Bay, TX	COA		High abundance (16.2+/-6.19 N/0.00203 sq.m.)	Copepoda		0.844+/-0.524	4.73+/-3.1	Carr 1992
1.25 +/-0.706	NC	Mississippi Sound, MS	COA		Significantly toxic (12.2+/-4.42% mortality)	Mysidopsis bahia (mysid shrimp)		0.939+/-0.335	2.63+/-2.3	EMAP Louisiana Province 1991
1.29 +/-1.26	NE	Mississippi Sound, MS	COA		Not significantly toxic (0.789+/-1.59% mortality)	Mysidopsis bahia (mysid shrimp)		0.827+/-0.757	1.46+/-1.58	EMAP Louisiana Province 1991
1.49 +/-1.05	NE	Mississippi Sound, MS	COA	10-d	Not significantly toxic (1.4+/-1.73% mortality)	Ampelisca abdita (amphipod)		0.998+/-0.602	2.01+/-1.82	EMAP Louisiana Province 1991
1.77 +/-2.52	NE	Galveston Bay, TX	COA	48-h	Not toxic (98.1+/-1.79% normal development)	Arbacia punctulata (sea urchin)	EMB	.748+/-0.476	4.16+/-3.45	Carr 1992
1.83 +/-2.5	NE	Galveston Bay, TX	COA	1-h	Not toxic (92.5+/-6.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	0.77+/-0.448	6.37+/-6.58	Carr 1992
1.86 +/-2.58	*	Galveston Bay, TX	COA		Low abundance (4.21+/-5.66 N/0.00203 sq.m.)	Oligochaeta		0.895+/-0.453	7.85+/-8.8	Carr 1992
<1.9 +/-2.1	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (5.2+/-3.5% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
<1.9 +/-2.1	NE	Halifax Harbour, NS	COA	20-d	Not significantly toxic (1+/-2% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
1.93 +/-0.09	NE	Mobile Bay, AL	COA		Not significantly toxic (1.07+/-1.85% mortality)	Mysidopsis bahia (mysid shrimp)		0.968+/-0.815	8.23+/-3.4	EMAP Louisiana Province 1991
1.97 +/-2.35	NE	Mississippi River, MS, LA	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		1.3+/-0.83	1.14+/-1	EMAP Louisiana Province 1991
1.99 +/-0.007	NE	Mobile Bay, AL	COA	10-d	Not significantly toxic (0.5+/-0.778% mortality)	Ampelisca abdita (amphipod)		1.24+/-0.948	8.51+/-4.76	EMAP Louisiana Province 1991
2.44 +/-3.02	NC	Mississippi River, MS, LA	COA	10-d	Significantly toxic (15.9+/-6.65% mortality)	Ampelisca abdita (amphipod)		1.22+/-0.717	0.235+/-0.276	EMAP Louisiana Province 1991
2.57 +/-5.86	NC	Galveston Bay, TX	COA		Low abundance (0.3+/-0.651 N/0.00203 sq.m.)	Amphipoda		0.859+/-0.487	7.67+/-8.12	Carr 1992
2.61 +/-3.49	NC	Galveston Bay, TX	COA	10-d	Significantly toxic (15.8+/-3.89% mortality)	Ampelisca abdita (amphipod)		0.647+/-0.606	0.160+/-0.184	EMAP Louisiana Province 1991
2.81 +/-2.49	NE	Galveston Bay, TX	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		0.934+/-0.657	0.457+/-0.530	EMAP Louisiana Province 1991
2.89 +/-1.05	NE	Mississippi River, MS, LA	COA	10-d	Not significantly toxic (7.8+/-1.63% mortality)	Ampelisca abdita (amphipod)		1.15+/-1.04	2.31+/-0.651	EMAP Louisiana Province 1991
2.95 +/-6.08	*	Galveston Bay, TX	COA		Low abundance (1.86+/-2.59 N/0.00203 sq.m.)	Mollusca		0.784+/-0.421	8.29+/-8.13	Carr 1992
2.99 +/-6.19	*	Galveston Bay, TX	COA		Low species richness (10+/-3.73 S/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
2.99 +/-6.19	*	Galveston Bay, TX	COA		Low abundance (89+/-60.7 N/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
2.99 +/-4.05	SG	Galveston Bay, TX	COA		Significantly toxic (13.4+/-9.11% mortality)	Mysidopsis bahia (mysid shrimp)		0.778+/-0.482	1.21+/-0.778	EMAP Louisiana Province 1991
<3	NC	Sidney Tar Pond, NS	COA	10-d	Significantly toxic (100% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
<3	NC	Sidney Tar Pond, NS	COA	10-d	Significantly toxic (100% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
3.05 +/-3.31	NE	Galveston Bay, TX	COA	10-d	Not significantly toxic (1.35+/-1.45% mortality)	Ampelisca abdita (amphipod)		0.961+/-0.537	1.17+/-0.640	EMAP Louisiana Province 1991

Table 22. A summary of the available data on the biological effects associated with sediment-sorbed DIBENZO(a,h)ANTHRACENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Dibenzo(a,h)-anthracene	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
3.3	+/-6.65	*	Galveston Bay, TX	COA		Low abundance (41.7+/-21.8 N/0.00203 sq.m.)	Polychaeta		0.848+/-0.427	9.21+/-8.61	Carr 1992
3.36	+/-1.71	SG	Mississippi River, MS, LA	COA		Significantly toxic (32.9+/-36.4% mortality)	Mysidopsis bahia (mysid shrimp)		1.07+/-0.924	1.41+/-1.93	EMAP Louisiana Province 1991
3.87	+/-7.34	*	Galveston Bay, TX	COA		Low abundance (2.05+/-1.58 N/0.00203 sq.m.)	Copepoda		0.879+/-0.47	9.63+/-9.65	Carr 1992
3.93	+/-3.45	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (5.8+/-3.7% mortality)	Rhepoxynius abronius (amphipod)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
3.93	+/-3.45	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (3.4+/-1.82% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
3.93	+/-3.45	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (11.2+/-3.7% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
3.93	+/-3.45	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (3.52+/-1.66% mortality)	Macoma nasuta (clam)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
<4	+/-1.4	NE	Sidney Tar Pond, NS	COA	20-d	Not significantly toxic (8+/-5.66% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
4.16	+/-8.95	*	Galveston Bay, TX	COA	48-h	Toxic (4.65+/-16.1% normal development)	Arbacia punctulata (sea urchin)	EMB	1.06+/-0.449	14.5+/-9.2	Carr 1992
4.43	+/-4.18	NC	Galveston Bay, TX	COA		Low abundance (53+/-33.9 N/0.00203 sq.m.)	Benthic invertebrates		0.985+/-0.247	22+/-11.2	Carr 1992
4.67	+/-1.25	NE	Puget Sound, WA	COA	15-min	Not significantly toxic (EC50; 0.283+/-0.168% extract)	Microtox (Photobacterium phosphoreum)		1.39+/-0.37		Pastorok & Becker 1990
<5		NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (3% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
<5		NE	Sidney Tar Pond, NS	COA	10-d	Not significantly toxic (4% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
<5		NE	Sidney Tar Pond, NS	COA	10-d	Not significantly toxic (3% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
5.02	+/-6.71	NE	Galveston Bay, TX	COA		High Abundance (6+/-1.41 N/0.00203 sq.m.)	Amphipoda		0.955+/-0.629	7.21+/-8.2	Carr 1992
6.27	+/-12.6	*	Galveston Bay, TX	COA	1-h	Toxic (20.4+/-18.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	1.26+/-0.47	14.6+/-10.1	Carr 1992
6.99	+/-12.3	*	Galveston Bay, TX	COA		Moderate abundance (58.3+/-16.2 N/0.00203 sq.m.)	Oligochaeta		0.632+/-0.274	7.93+/-5.6	Carr 1992
7.64			***TEL***								
7.68	+/-12.2	NE	Galveston Bay, TX	COA		Low species (11.2+/-1.94 S/0.00203 sq.m.)	Benthic species		0.642+/-0.356	13.4+/-8.65	Carr 1992
8.3		NE	Puget Sound, WA	COA		Not toxic (10% prevalence of idiopathic degeneration/necrosis)	Parophrys vetulus (English sole)				Malins et al. 1985
8.3		NE	Puget Sound, WA	COA		Not toxic (17.5% prevalence of steatosis and hemosiderosis)	Parophrys vetulus (English sole)				Malins et al. 1985
8.3		NE	Puget Sound, WA	COA		Not toxic (0% occurrence of hepatic cellular alterations)	Parophrys vetulus (English sole)				Malins et al. 1985
8.3		NE	Puget Sound, WA	COA		Not toxic (5% prevalence of hepatocellular regenerative foci)	Parophrys vetulus (English sole)				Malins et al. 1985
8.3		NE	Puget Sound, WA	COA		Not toxic (0% prevalence of hepatic cellular alterations)	Parophrys vetulus (English sole)				Malins et al. 1985
8.3		NE	Puget Sound, WA	COA		Not toxic (32.5% prevalence of hepatic idiopathic lesions)	Parophrys vetulus (English sole)				Malins et al. 1985
8.9		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (0.33+/-0.516% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
8.9		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (2.33+/-1.03% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
8.9		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (15.3+/-11.0% mortality)	Hyalella azteca (amphipod)	JUV	0.648+/-0.641	1.74+/-1.39	Hall et al. 1992
8.9		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1% mortality)	Streblospio benedicti (polychaete worm)		1.38	3.25	Hall et al. 1992
8.9		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (16.5+/-9.19% mortality)	Streblospio benedicti (polychaete worm)		0.783+/-0.845	4.83+/-2.23	Hall et al. 1992
8.9		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.367+/-0.085 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
8.9		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.0005 mg/day growth)	Streblospio benedicti (polychaete worm)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
8.9		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.003+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.316+/-0.120	2.13+/-2.46	Hall et al. 1992
8.9		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (7.2+/-1.92% mortality)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
8.9		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.6+/-0.55% reburial)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
8.9		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
8.9		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
8.9		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.001+/-0.001 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.555+/-0.471	2.68+/-2.3	Hall et al. 1992
8.9		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1.83+/-1.6% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
8.9		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (3.5+/-1.87% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
8.9		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (9.25+/-5.32% mortality)	Lepidactylus dytiscus (amphipod)		0.638+/-0.768	1.65+/-1.62	Hall et al. 1992
8.9		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (22.3+/-7.37% mortality)	Hyalella azteca (amphipod)	JUV	0.788+/-0.866	2.04+/-1.75	Hall et al. 1992

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Dibenzo(a,h)-anthracene Std Dev		Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
8.9		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (8.8+/-7.12% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
8.9		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (14+/-9.22% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
8.9		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.1+/-0.865% reburial)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
8.9		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<20% emergence)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
8.9		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
8.9		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (-0.057+/-0.04 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
8.9		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.001mg/day growth)	Streblospio benedicti (polychaete worm)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
8.9		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.016 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
8.9		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.005+/-0.0004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
8.9		NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (55.0+/-22.6% mortality)	Hyalella azteca (amphipod)	JUV	0.338+/-0.133	2.9+/-3.11	Hall et al. 1992
8.9		NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29.8+/-11.1% mortality)	Streblospio benedicti (polychaete worm)		0.316+/-0.12	2.13+/-2.46	Hall et al. 1992
8.9		NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (55.0+/-19.5% mortality)	Streblospio benedicti (polychaete worm)		0.349+/-0.11	1.07+/-0.66	Hall et al. 1992
8.9		NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.003 mg/day growth)	Lepidactylus dytiscus (amphipod)		1.38	3.25	Hall et al. 1992
8.9		NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29% mortality)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
8.9		NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (89.7% reburial)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
8.9		NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
8.9		NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	6.41	Hall et al. 1992
8.9		NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
8.9		NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (45.5+/-12% mortality)	Lepidactylus dytiscus (amphipod)		0.383+/-0.279	3.61+/-2.79	Hall et al. 1992
8.9		NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (63.0+/-24.3% mortality)	Hyalella azteca (amphipod)	JUV	0.317+/-0.228	2.57+/-2.67	Hall et al. 1992
8.9		NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (22% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
8.9		NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (28% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
8.9		NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (82.9% reburial)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
8.9		NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>20% emergence)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
8.9		NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	5.58	Hall et al. 1992
8.9		NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.008+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.4	Hall et al. 1992
8.9		NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.003 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
9.31	+/-15.3	NE	Galveston Bay, TX	COA		High abundance (154+/-30.2 N/0.00203 sq.m.)	Benthic invertebrates		0.47+/-0.27	9.07+/-2.94	Carr 1992
15		*	Puget Sound, WA	AETA	15-min	1986 Puget Sound AET	Microtox (Photobacterium phosphoreum)		1		Bellar et al. 1986
15		*	Puget Sound, WA	AETA	48-h	1986 Puget Sound AET	Crassostrea gigas (oyster)	LAR	1		Bellar et al. 1986
15.4	+/-15.2	NE	San Francisco Bay, CA	COA	48-h	Least toxic (23.3+/-7.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
17		*	Puget Sound, WA	AETA	10-d	1986 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT	1		Bellar et al. 1986
20.5	+/-4.34	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-7.99% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.14+/-0.352	6.09+/-5.38	Bricker et al. 1993
23.5	+/-2.7	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.5+/-11.4% mortality)	Mulinia lateralis (bivalve)	LAR	2.33+/-0.364	26.8+/-9.42	Bricker et al. 1993
23.9	+/-36.4	NE	Southern California	COA	10-d	Not significantly toxic (23.2% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
24.1	+/-4.69	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.061+/-0.038 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.8+/-0.477	8.52+/-10.7	Bricker et al. 1993
24.3	+/-3.75	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (39.5+/-18.2% mortality)	Ampelisca abidta (amphipod)	SUB ADT	2.06+/-0.523	20.1+/-13.9	Bricker et al. 1993
25.2	+/-3.7	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.3+/-2.22% normal development)	Mulinia lateralis (bivalve)	LAR	2.18+/-0.531	19.1+/-12.5	Bricker et al. 1993
25.5	+/-6	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (19.3+/-5.86% mortality)	Ampelisca abidta (amphipod)	SUB ADT	1.82+/-0.225	6.3+/-6.2	Bricker et al. 1993
29	+/-12.7	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.014+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.51+/-0.45	29.6+/-15.7	Bricker et al. 1993
29.1	+/-12.3	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (15.2+/-9.21% mortality)	Mulinia lateralis (bivalve)	LAR	2.17+/-0.663	18.4+/-19.9	Bricker et al. 1993
30	+/-34.6	NE	Burrard Inlet, BC	COA	10-d	Not toxic (4.5+/-3.02% emergence)	Rhepoxynius abronius (amphipod)	ADT	2.66+/-2.15		McLeay et al. 1991

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Dibenzo(a,h)-anthracene	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
30	+/-34.6	NE	Burrard Inlet, BC	COA	10-d	Not toxic (5.21+/-3.61% emergence)	Corophium volutator (amphipod)	ADT	3.18+/-2.1		McLeay et al. 1991
30.1	+/-6.23	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.125+/-0.084 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.25+/-0.468	1.98+/-2.25	Bricker et al. 1993
33.1	+/-8.87	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (25.9+/-5.01% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.21+/-0.444	2.41+/-2.32	Bricker et al. 1993
36.7	+/-29.8	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.096+/-0.101 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.37+/-0.759	6.93+/-6.83	Bricker et al. 1993
37.8	+/-34.5	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.167+/-0.198 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.59+/-1.09	4.67+/-6.99	Bricker et al. 1993
38.2	+/-58.6	NE	Oahu, Hawaii	COA	10-d	Not significantly toxic (7.2+/-1.89% mortality)	Eohaustorius estuarius (amphipod)	ADT	1.93+/-1.94	10.3+/-12.4	Lamberson et al. 1993
38.2	+/-58.6	NE	Oahu, Hawaii	COA	10-d	Not significantly toxic (10.1+/-4.01% mortality)	Corophium acherusicum (amphipod)	ADT	1.93+/-1.94	10.3+/-12.4	Lamberson et al. 1993
38.3	+/-32	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.074+/-0.043 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.27+/-0.626	6.21+/-5.41	Bricker et al. 1993
40.5	+/-30.6	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (96+/-1.66% normal development)	Mulinia lateralis (bivalve)	LAR	2.52+/-0.997	35+/-42.9	Bricker et al. 1993
41		NC	Puget Sound, WA	COA	2-d	Significantly toxic (3.8% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.5		Pastorok & Becker 1990
41.7	+/-46	*	San Francisco Bay, CA	COA	48-h	Moderately toxic (59.4+/-11.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
43.6	+/-47.4	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (12.3+/-14.5% mortality)	Mulinia lateralis (bivalve)	LAR	1.53+/-0.743	15.7+/-23.2	Bricker et al. 1993
43.9	+/-49.6	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99.3+/-0.827% normal development)	Mulinia lateralis (bivalve)	LAR	1.43+/-0.738	14.7+/-24	Bricker et al. 1993
44.3	+/-31.6	NC	San Francisco Bay, CA	COA	10-d	Moderately toxic (33.8+/-4.7% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
45	+/-38.9	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (6.48+/-10.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
45	+/-38.9	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99+/-0.862% normal development)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
47.4	+/-21.7	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (10.4+/-6.3% mortality)	Nephtys caecoides (polychaete)		1.63+/-0.657		Word et al. 1988
47.4	+/-21.7	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (0.2+/-0.6% mortality)	Macoma nasuta (clam)		1.63+/-0.657		Word et al. 1988
47.4	+/-22.5	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (23.3+/-6.14% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.738		Word et al. 1988
47.5	+/-21.7	NG	Oakland Harbor, CA	COA	10-d	Significantly toxic (35.3+/-2.5% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.56+/-0.07		Word et al. 1988
48.9	+/-58.2	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-6.07% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.71+/-0.9	15.3+/-23.2	Bricker et al. 1993
49.2	+/-48.3	NE	Narragansett Bay, RI	COA	10-d	Not significantly toxic (5.28+/-3.04% mortality))	Ampelisca abdita (amphipod)	ADT			Munns et al. 1991
54.5	+/-58.3	NC	San Francisco Bay, CA	COA	10-d	Significantly toxic (42.9+/-19.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
54.7	+/-54.3	*	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (30.5+/-16.4% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.62+/-0.777	17.7+/-26.3	Bricker et al. 1993
54.8	+/-40.6	NE	Commencement Bay, WA	COA	48-h	Least toxic (15.1+/-3.1% abnormality)	Oyster	LAR			Tetra Tech 1985
55.8	+/-57	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (17+/-16.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.99+/-1	21.6+/-24.5	Bricker et al. 1993
57.4	+/-76.7	NE	San Francisco Bay, CA	COA	10-d	Least toxic (18+/-6.6% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
60		NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (18% mortality)	Ampelisca abdita (amphipod)		0.028	9 ug/g	Windom In Prep
60		NE	Burrard Inlet, BC	SQO		Sediment Quality Objectives	Aquatic biota				Swain & Nijman 1991
60		NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (0% mortality)	Arbacia punctulata (sea urchin)		0.03	19 ug/g	Windom In Prep
61.6	+/-79.6	NE	San Francisco Bay, CA	COA	10-d	Not significantly toxic (18.4+/-6.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
63		*	California	AETA	48-h	California AET Values	Mytilus edulis (bivalve)	LAR			Becker et al. 1990
63		*	Northern California	AETA		Northern California AET Values	Benthic species				Becker et al. 1990
63.3	+/-64.7	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.1+/-2.78% normal development)	Mulinia lateralis (bivalve)	LAR	2.12+/-1.04	22.9+/-23.7	Bricker et al. 1993
63.4	+/-80.1	*	San Francisco Bay, CA	COA	48-h	Significantly toxic (55.7+/-22.7% abnormal)	Bivalve	LAR			Long & Morgan 1990
66	+/-45.7	*	Southern California	COA	10-d	Significantly toxicity (51.7% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
66.9	+/-51	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (91.5+/-7.28% normal development)	Mulinia lateralis (bivalve)	LAR	2.6+/-0.899	36.8+/-34.9	Bricker et al. 1993
67.5	+/-2.89	NE	Brunswick Harbor Entrance, GA	COA	48-h	Not significantly toxic (86.6+/-4.25% normal development)	Arbacia punctulata (sea urchin)		0.181+/-0.162	182+/-208 ug/g	Windom In Prep
68.3	+/-2.89	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (28.3+/-6.11% mortality)	Mysidopsis bahia (mysid)		0.246+/-0.051	127+/-24 ug/g	Windom In Prep
70	+/-9.57	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (91.3+/-2.91% normal development)	Arbacia punctulata (sea urchin)		0.299+/-0.251	114+/-68.4 ug/g	Windom In Prep
70.6	+/-10.4	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (9.78+/-5.33% mortality)	Mysidopsis bahia (mysid)		0.24+/-0.247	91.9+/-73.4 ug/g	Windom In Prep
70.6	+/-11.2	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (4+/-2.83% mortality)	Menidia beryllina (silverside)		0.243+/-0.264	90.5+/-78.4 ug/g	Windom In Prep

Table 22. A summary of the available data on the biological effects associated with sediment-sorbed DIBENZO(a,h)ANTHRACENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Dibenzo(a,h)-anthracene	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
70.9	+/-66.8	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (34.9+/-15.7% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.23+/-1.04	25.4+/-25.5	Bricker et al. 1993
71.7	+/-12.9	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (27.5+/-10.6% mortality)	Mysidopsis bahia (mysid)		0.237+/-0.311	74.6+/-85.5 ug/g	Windom In Prep
71.7	+/-139	NG	Commencement Bay, WA	COA	10-d	Highly toxic (78.5+/-19.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
71.7	+/-9.31	SG	Savannah River Entrance Channel, GA	COA	48-h	Significantly toxic (25.4+/-7.66% mortality)	Arbacia punctulata (sea urchin)		0.344+/-0.242	129.5+/-59.3 ug/g	Windom In Prep
71.9	+/-10.3	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (11.6+/-4.33% mortality)	Ampelisca abdita (amphipod)		0.267+/-0.25	102+/-71.1 ug/g	Windom In Prep
72.5	+/-71.3	NE	Commencement Bay, WA	COA	10-d	Least toxic (12.5+/-4.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
72.5	+/-89.6	NE	Burrard Inlet, BC	COA	10-d	Not toxic (8.9+/-2.99% mortality)	Corophium volutator (amphipod)	ADT	2.8+/-1.96		McLeay et al. 1991
72.5	+/-89.6	NE	Burrard Inlet, BC	COA	10-d	Not toxic (97.2+/-2.84% reburial)	Rhepoxynius abronius (amphipod)	ADT	2.8+/-1.96		McLeay et al. 1991
72.5	+/-78.5	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.016+/-0.007 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.26+/-0.936	43.4+/-35.6	Bricker et al. 1993
73.3	+/-110	NE	Burrard Inlet, BC	COA	10-d	Not toxic (7.9+/-5.12% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.64+/-2.14		McLeay et al. 1991
79.6	+/-87.5	SG	San Francisco Bay, CA	COA	10-d	Highly toxic (67+/-11.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
80		*	Puget Sound, WA	AETA		1986 Puget Sound AET	Benthic species		1		Bellar et al. 1986
84.4	+/-59.7	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (88.5+/-8.39% normal development)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.05	38.1+/-38.9	Bricker et al. 1993
84.5	+/-74.3	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (29.8+/-13.9% mortality)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.07	32.1+/-28.4	Bricker et al. 1993
85.2	+/-74.4	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.013+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.79+/-0.744	37.6+/-25.3	Bricker et al. 1993
86.8	+/-75.7	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (51.3+/-6.95% mortality)	Mulinia lateralis (bivalve)	LAR	1.8+/-1.71	29.6+/-46.3	Bricker et al. 1993
86.9	+/-84.6	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (21.5+/-6.36% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.35+/-1.05	10.5+/-13.4	Bricker et al. 1993
88.5	+/-77.5	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.1+/-13.3% mortality)	Mulinia lateralis (bivalve)	LAR	2.68+/-0.955	31.8+/-24.4	Bricker et al. 1993
90.6	+/-24.3	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (10.6+/-3.17% mortality)	Ampelisca abdita (amphipod)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
90.6	+/-24.3	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (8.00+/-2.92% mortality)	Mysidopsis bahia (mysid)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
92.5	+/-123	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (6.67+/-8.07% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.51+/-0.330		Pastorok & Becker 1990
92.9	+/-25.6	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (5.43+/-3.21% mortality)	Mysidopsis bahia (mysid)		1.21+/-1.13	9096+/-13378 ug/g	Windom In Prep
92.9	+/-25.6	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (9.61+/-2.7% mortality)	Menidia beryllina (silverside)		1.22+/-1.13	9172+/-13363 ug/g	Windom In Prep
95	+/-100	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (13.8+/-4.09% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.47+/-0.306		Pastorok & Becker 1990
96	+/-109	NE	Puget Sound, WA	COA	20-d	Not significantly toxic (5+/-3.86% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.46+/-0.26		Pastorok & Becker 1990
97.2	+/-70	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.008+/-0.001 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.19+/-1.27	12+/-11.3	Bricker et al. 1993
98.6	+/-101	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (23+/-4.24% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.46+/-1.22	40+/-55.1	Bricker et al. 1993
100		SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (16% mortality)	Mysidopsis bahia (mysid)		1.8	7095 ug/g	Windom In Prep
100		SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (22.3% mortality)	Menidia beryllina (silverside)		1.71	6562 ug/g	Windom In Prep
101	+/-57.9	*	Commencement Bay, WA	COA	48-h	Moderately toxic (23+/-2.3% abnormality)	Oyster	LAR			Tetra Tech 1985
102	+/-77.4	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (96.6+/-3.79% normal development)	Mulinia lateralis (bivalve)	LAR	2.87+/-0.94	35.1+/-25.9	Bricker et al. 1993
102	+/-78	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (38+/-13% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.92+/-0.937	34.6+/-23.9	Bricker et al. 1993
109	+/-14.7	SG	Brunswick Harbor Entrance, GA	COA	48-h	Significantly toxic (14.6+/-18.9% normal development)	Arbacia punctulata (sea urchin)		1.99+/-0.562	14009+/-13434 ug/g	Windom In Prep
120		*	California	AETA		California AET Values	Benthic species				Becker et al. 1990
120		NE	Puget Sound, WA	AETA		PSDDA Screening level concentration	Aquatic biota				USACOE 1988
>120		-	Southern California	AETA		Southern California AET Values	Benthic species				Becker et al. 1990
121	+/-76.8	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.011+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.28+/-0.363	45.3+/-21.4	Bricker et al. 1993
133			***PEL***								
136	+/-77.2	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (75.1+/-10.6% mortality)	Mulinia lateralis (bivalve)	LAR	3.32+/-0.317	42.3+/-19.2	Bricker et al. 1993
143	+/-174	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (4.43+/-2.1% mortality)	Panope generosa (geoduck)	JUV	1.51+/-0.261		Pastorok & Becker 1990
183	+/-344	*	Commencement Bay, WA	COA	10-d	Moderately toxic (26+/-5.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
<188	+/-230	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (6.8+/-7.31% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990

Table 22. A summary of the available data on the biological effects associated with sediment-sorbed DIBENZO(a,h)ANTHRACENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Dibenzo(a,h)-anthracene Std Dev		Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
<188	+/-230	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (8.5+/-6.06% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
<188	+/-230	NE	Halifax Harbour, NS	COA	20-d	Not significantly toxic (0.7+/-1.63% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
194	+/-192	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (2.09+/-1.73% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.56+/-0.329		Pastorok & Becker 1990
200		*	Burrard Inlet, BC	COA	10-d	Highly toxic (23% emergence)	Corophium volutator (amphipod)	ADT	3.5		McLeay et al. 1991
200		*	Burrard Inlet, BC	COA	10-d	Highly toxic (30.5% emergence)	Rhepoxynius abronius (amphipod)	ADT	3.5		McLeay et al. 1991
201	+/-184	*	Puget Sound, WA	COA	15-min	Significantly toxic (EC50; 0.065+/-0.043% extract)	Microtox (Photobacterium phosphoreum)		1.58+/-0.255		Pastorok & Becker 1990
208	+/-207	*	Puget Sound, WA	COA	2-d	Significantly toxic (60.4+/-46.5% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.57+/-0.287		Pastorok & Becker 1990
217	+/-88.1	*	San Francisco Bay, CA	COA	48-h	Highly toxic (92.4+/-4.5% abnormal)	Bivalve	LAR			Long & Morgan 1990
230		*	Puget Sound, WA	AETA	15-min	1988 Puget Sound AET	Microtox (Photobacterium phosphoreum)				PTI 1988
230		*	Puget Sound, WA	AETA	48-h	1988 Puget Sound AET	Crassostrea gigas (oyster)	LAR			PTI 1988
230		NE	Tampa Bay, FL	COA	10-d	Not significantly toxic (14.6+/-7.67% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.63+/-0.596		Long 1993
230		NE	Tampa Bay, FL	COA	1-h	Least toxic (79.4+/-9.9% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.45+/-0.587		Long 1993
230		NE	Tampa Bay, FL	COA		Not significantly toxic (EC50; 0.066+/-0.033 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.89+/-0.902		Long 1993
230		NG	Tampa Bay, FL	COA	1-h	Moderately toxic (15.3+/-10.6% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.94+/-0.908		Long 1993
260		*	San Francisco Bay, CA	AETA	48-h	San Francisco Bay AET	Oyster; mussel	LAR			Long & Morgan 1990
262	+/-239	*	Puget Sound, WA	COA	10-d	Significantly toxic (80.8+/-30.6% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.266		Pastorok & Becker 1990
263	+/-413	*	Commencement Bay, WA	COA	48-h	Highly toxic (44.5+/-19% abnormality)	Oyster	LAR			Tetra Tech 1985
274	+/-199	*	Puget Sound, WA	COA		Toxic (71.6+/-14.6% prevalence of idiopathic degeneration/necrosis)	Parophrys vetulus (English sole)				Malins et al. 1985
274	+/-199	*	Puget Sound, WA	COA		Toxic (51.4+/-21.1% prevalence of steatosis and hemosiderosis)	Parophrys vetulus (English sole)				Malins et al. 1985
274	+/-199	*	Puget Sound, WA	COA		Toxic (19+/-6.15% prevalence of hepatocellular regenerative foci)	Parophrys vetulus (English sole)				Malins et al. 1985
274	+/-199	*	Puget Sound, WA	COA		Toxic (26.7+/-6.43% prevalence of hepatic neoplasms)	Parophrys vetulus (English sole)				Malins et al. 1985
274	+/-199	*	Puget Sound, WA	COA		Toxic (88+/-3.65% prevalence of hepatic idiopathic lesions)	Parophrys vetulus (English sole)				Malins et al. 1985
274	+/-199	*	Puget Sound, WA	COA		Toxic (44.2+/-8.5% prevalence of hepatic cellular alterations)	Parophrys vetulus (English sole)				Malins et al. 1985
300		*	San Francisco Bay, CA	AETA	10-d	San Francisco Bay AET	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
>300		-	Northern California	AETA	10-d	Northern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
>300		-	California	AETA	10-d	California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
304	+/-145	SG	Tampa Bay, FL	COA	1-h	Most toxic (0.091+/-0.187% fertilization)	Arbacia punctulata (sea urchin)	GAM	2.96+/-1.49		Long 1993
330		*	Puget Sound, WA	SQG		Chemical Criteria	Benthic community		1		WDE 1989
331	+/-164	SG	Tampa Bay, FL	COA	10-d	Significantly toxic (35.2+/-17.5% mortality)	Ampelisca abdita (amphipod)	SUB ADT	3.53+/-1.35		Long 1993
350	+/-170	*	Tampa Bay, FL	COA		Significantly toxic (EC50; 0.017+/-0.012 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.47+/-1.49		Long 1993
360	+/-298	NE	Eagle Harbor, WA	COA	10-d	Least toxic (13+/-7% mortality)	Rhepoxynius abronius (amphipod)	ADT			CH2M Hill 1989
399	+/-252	SG	Eagle Harbor, WA	COA	10-d	Highly toxic (95.5+/-8.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			CH2M Hill 1989
420		*	Puget Sound, WA	COA	10-d	Significantly toxic (56% mortality)	Panope generosa (geoduck)	JUV	2.1		Pastorok & Becker 1990
427	+/-190	*	Puget Sound, WA	COA	20-d	Significantly toxic (37.3+/-22% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.87+/-0.208		Pastorok & Becker 1990
540		*	Puget Sound, WA	AETA	10-d	1988 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT			PTI 1988
797	+/-723	*	Eagle Harbor, WA	COA	10-d	Moderately toxic (41+/-9% mortality)	Rhepoxynius abronius (amphipod)	ADT			CH2M Hill 1989
970		*	Puget Sound, WA	AETA		1988 Puget Sound AET	Benthic community				PTI 1988
1200		*	Puget Sound, WA	AETA		PSDDA Maximum Level Criteria	Aquatic biota				USACOE 1988
12000		*	United States	EqPA		99% Chronic Marine Criteria	Aquatic organisms		1		Pavlou et al. 1987
12000		*	Sidney Tar Pond, NS	COA	20-d	Significantly toxic (52% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
35000		*	United States	EqPA		95% Chronic Marine Criteria	Aquatic organisms		1		Pavlou et al. 1987

Table 23. A summary of the available data on the biological effects associated with sediment-sorbed FLUORANTHENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Fluoranthene Std Dev		Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.16		NC	Mobile Bay, AL	COA		Significantly toxic (10% mortality)	Mysidopsis bahia (mysid shrimp)		0.009	0.004	EMAP Louisiana Province 1991
0.375	+/-0.035	NE	Apalachee Bay, FL	COA	10-d	Not significantly toxic (3.3+/-3.25% mortality)	Ampelisca abdita (amphipod)		0.643+/-0.455	0.390+/-0.410	EMAP Louisiana Province 1991
0.473	+/-0.121	NE	Apalachee Bay, FL	COA		Not significantly toxic (0.75+/-1.5% mortality)	Mysidopsis bahia (mysid shrimp)		0.540+/-0.385	0.405+/-0.417	EMAP Louisiana Province 1991
0.473	+/-0.347	NE	Chandeleur Sound, LA	COA		Not significantly toxic (1.03+/-2.05% mortality)	Mysidopsis bahia (mysid shrimp)		0.824+/-0.915	1.69+/-0.920	EMAP Louisiana Province 1991
0.505	+/-0.445	NC	Mississippi Sound, MS	COA	10-d	Significantly toxic (11.6+/-3.39% mortality)	Ampelisca abdita (amphipod)		0.111+/-0.045	0.03	EMAP Louisiana Province 1991
0.57	+/-0.071	SG	Apalachee Bay, FL	COA	10-d	Significantly toxic (15.6% mortality)	Ampelisca abdita (amphipod)		0.438+/-0.442	0.421+/-0.593	EMAP Louisiana Province 1991
0.593	+/-0.333	NC	Chandeleur Sound, LA	COA	10-d	Significantly toxic (11.5+/-4.86% mortality)	Ampelisca abdita (amphipod)		0.811+/-0.711	1.87+/-0.973	EMAP Louisiana Province 1991
0.787	+/-0.395	NE	Chandeleur Sound, LA	COA	10-d	Not significantly toxic (2.87+/-4.05% mortality)	Ampelisca abdita (amphipod)		0.517+/-0.166	2.02+/-1.38	EMAP Louisiana Province 1991
0.806	+/-0.288	SG	Chandeleur Sound, LA	COA		Significantly toxic (7.6+/-1.32% mortality)	Mysidopsis bahia (mysid shrimp)		0.624+/-0.197	2.07+/-1.19	EMAP Louisiana Province 1991
2.69	+/-0.594	NE	Galveston Bay, TX	COA		High abundance (155+/-49.5 N/0.00203 sq.m.)	Oligochaeta		1.2+/-1.27	4.27+/-3.85	Carr 1992
3.56	+/-1.21	NE	Galveston Bay, TX	COA		High abundance (27.3+/-10 N/0.00203 sq.m.)	Mollusca		1.64+/-0.4	1.39+/-0.17	Carr 1992
<5		NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (3% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
<5		NE	Sidney Tar Pond, NS	COA	10-d	Not significantly toxic (3% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
5.04	+/-3.10	NE	Galveston Bay, TX	COA		High species richness (24.5+/-3.7 S/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
5.04	+/-3.10	NE	Galveston Bay, TX	COA		High abundance (359+/-92.8 N/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
5.3		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (0.33+/-0.516% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
5.3		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (2.33+/-1.03% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
5.3		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (15.3+/-11.0% mortality)	Hyalella azteca (amphipod)	JUV	0.648+/-0.641	1.74+/-1.39	Hall et al. 1992
5.3		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1% mortality)	Streblospio benedicti (polychaete worm)		1.38	3.25	Hall et al. 1992
5.3		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (16.5+/-9.19% mortality)	Streblospio benedicti (polychaete worm)		0.783+/-0.845	4.83+/-2.23	Hall et al. 1992
5.3		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.367+/-0.085 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
5.3		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.0005 mg/day growth)	Streblospio benedicti (polychaete worm)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
5.3		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.003+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.316+/-0.120	2.13+/-2.46	Hall et al. 1992
5.3		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (7.2+/-1.92% mortality)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
5.3		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.6+/-0.55% reburial)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
5.3		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
5.3		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
5.3		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.001+/-0.001 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.555+/-0.471	2.68+/-2.3	Hall et al. 1992
5.3		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1.83+/-1.6% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
5.3		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (3.5+/-1.87% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
5.3		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (9.25+/-5.32% mortality)	Lepidactylus dytiscus (amphipod)		0.638+/-0.768	1.65+/-1.62	Hall et al. 1992
5.3		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (22.3+/-7.37% mortality)	Hyalella azteca (amphipod)	JUV	0.788+/-0.866	2.04+/-1.75	Hall et al. 1992
5.3		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (8.8+/-7.12% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
5.3		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (14+/-9.22% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
5.3		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.1+/-0.865% reburial)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
5.3		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<20% emergence)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
5.3		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
5.3		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (-0.057+/-0.04 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
5.3		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.001mg/day growth)	Streblospio benedicti (polychaete worm)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
5.3		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.016 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
5.3		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.005+/-0.0004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
5.3		NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (55.0+/-22.6% mortality)	Hyalella azteca (amphipod)	JUV	0.338+/-0.133	2.9+/-3.11	Hall et al. 1992

Table 23. A summary of the available data on the biological effects associated with sediment-sorbed FLUORANTHENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Fluoranthene Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
5.3	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29.8+/-11.1% mortality)	Streblospio benedicti (polychaete worm)		0.316+/-0.12	2.13+/-2.46	Hall et al. 1992
5.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (55.0+/-19.5% mortality)	Streblospio benedicti (polychaete worm)		0.349+/-0.11	1.07+/-0.66	Hall et al. 1992
5.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.003 mg/day growth)	Lepidactylus dytiscus (amphipod)		1.38	3.25	Hall et al. 1992
5.3	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29% mortality)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
5.3	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (89.7% reburial)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
5.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
5.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	6.41	Hall et al. 1992
5.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
5.3	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (45.5+/-12% mortality)	Lepidactylus dytiscus (amphipod)		0.383+/-0.279	3.61+/-2.79	Hall et al. 1992
5.3	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (63.0+/-24.3% mortality)	Hyalella azteca (amphipod)	JUV	0.317+/-0.228	2.57+/-2.67	Hall et al. 1992
5.3	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (22% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
5.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (28% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
5.3	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (82.9% reburial)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
5.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>20% emergence)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
5.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	5.58	Hall et al. 1992
5.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.008+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.4	Hall et al. 1992
5.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.003 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
5.5 +/-2.31	NC	Mississippi Sound, MS	COA		Significantly toxic (12.2+/-4.42% mortality)	Mysidopsis bahia (mysid shrimp)		0.939+/-0.335	2.63+/-2.3	EMAP Louisiana Province 1991
7.37 +/-4.27	NE	Galveston Bay, TX	COA		High abundance (156+/-22.9 N/0.00203 sq.m.)	Polychaeta		0.916+/-0.661	2.94+/-2.3	Carr 1992
7.7 +/-8.62	NE	Galveston Bay, TX	COA		High abundance (16.2+/-6.19 N/0.00203 sq.m.)	Copepoda		0.844+/-0.524	4.73+/-3.1	Carr 1992
8.02 +/-8.59	NE	Mississippi Sound, MS	COA		Not significantly toxic (0.789+/-1.59% mortality)	Mysidopsis bahia (mysid shrimp)		0.827+/-0.757	1.46+/-1.58	EMAP Louisiana Province 1991
8.47 +/-7.18	NE	Mississippi Sound, MS	COA	10-d	Not significantly toxic (1.4+/-1.73% mortality)	Ampelisca abdita (amphipod)		0.998+/-0.602	2.01+/-1.82	EMAP Louisiana Province 1991
8.49 +/-10.8	NE	Galveston Bay, TX	COA	48-h	Not toxic (98.1+/-1.79% normal development)	Arbacia punctulata (sea urchin)	EMB	.748+/-0.476	4.16+/-3.45	Carr 1992
<10	NE	Sidney Tar Pond, NS	COA	10-d	Not significantly toxic (4% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
10.1 +/-1.98	*	Laboratory	SSBA	10-d	LC10	Rhepoxynius abronius (amphipod)		0.338+/-0.04		DeWitt et al. 1992
11.6 +/-16.2	NC	Mobile Bay, AL	COA	10-d	Significantly toxic (46+/-49.3% mortality)	Ampelisca abdita (amphipod)		0.22+/-0.298	3.84+/-5.43	EMAP Louisiana Province 1991
13.6 +/-16.2	NE	Matagorda Bay, TX	COA		Not significantly toxic (1.58+/-1.82% mortality)	Mysidopsis bahia (mysid shrimp)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
13.6 +/-16.2	NE	Matagorda Bay, TX	COA	10-d	Not significantly toxic (2.33+/-4.65% mortality)	Ampelisca abdita (amphipod)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
14.7 +/-1.15	*	Laboratory	SSBA	10-d	LC50	Rhepoxynius abronius (amphipod)		0.338+/-0.04		DeWitt et al. 1992
14.8 +/-5.46	NE	Mobile Bay, AL	COA	10-d	Not significantly toxic (0.5+/-0.778% mortality)	Ampelisca abdita (amphipod)		1.24+/-0.948	8.51+/-4.76	EMAP Louisiana Province 1991
15.9 +/-35.1	NE	Galveston Bay, TX	COA	1-h	Not toxic (92.5+/-6.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	0.77+/-0.448	6.37+/-6.58	Carr 1992
17.5 +/-6.1	NE	Mobile Bay, AL	COA		Not significantly toxic (1.07+/-1.85% mortality)	Mysidopsis bahia (mysid shrimp)		0.968+/-0.815	8.23+/-3.4	EMAP Louisiana Province 1991
18 +/-15.8	NC	Mississippi River, MS, LA	COA	10-d	Significantly toxic (15.9+/-6.65% mortality)	Ampelisca abdita (amphipod)		1.22+/-0.717	0.235+/-0.276	EMAP Louisiana Province 1991
20.2 +/-38	*	Galveston Bay, TX	COA		Low abundance (4.21+/-5.66 N/0.00203 sq.m.)	Oligochaeta		0.895+/-0.453	7.85+/-8.8	Carr 1992
20.6 +/-12	NC	Mississippi River, MS, LA	COA		Significantly toxic (32.9+/-36.4% mortality)	Mysidopsis bahia (mysid shrimp)		1.07+/-0.924	1.41+/-1.93	EMAP Louisiana Province 1991
21.2 +/-30.5	NC	Galveston Bay, TX	COA		Significantly toxic (13.4+/-9.11% mortality)	Mysidopsis bahia (mysid shrimp)		0.778+/-0.482	1.21+/-0.778	EMAP Louisiana Province 1991
25.8 +/-34.6	NC	Galveston Bay, TX	COA	10-d	Significantly toxic (15.8+/-3.89% mortality)	Ampelisca abdita (amphipod)		0.647+/-0.606	0.160+/-0.184	EMAP Louisiana Province 1991
27.4 +/-27.8	NE	Galveston Bay, TX	COA	10-d	Not significantly toxic (1.35+/-1.45% mortality)	Ampelisca abdita (amphipod)		0.961+/-0.537	1.17+/-0.640	EMAP Louisiana Province 1991
27.9 +/-35.7	NE	Galveston Bay, TX	COA		High Abundance (6+/-1.41 N/0.00203 sq.m.)	Amphipoda		0.955+/-0.629	7.21+/-8.2	Carr 1992
29.4 +/-19.0	*	Laboratory	SSBA	10-d	LC99	Rhepoxynius abronius (amphipod)		0.338+/-0.04		DeWitt et al. 1992
30.5 +/-33.5	NE	Mississippi River, MS, LA	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		1.3+/-0.83	1.14+/-1	EMAP Louisiana Province 1991
32.6 +/-27.1	NE	Galveston Bay, TX	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		0.934+/-0.657	0.457+/-0.530	EMAP Louisiana Province 1991

Table 23. A summary of the available data on the biological effects associated with sediment-sorbed FLUORANTHENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Fluoranthene Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
33.2 +/-29.7	NE	Mississippi River, MS, LA	COA	10-d	Not significantly toxic (7.8+/-1.63% mortality)	Ampelisca abdita (amphipod)		1.15+/-1.04	2.31+/-0.651	EMAP Louisiana Province 1991
39	*	California	AETA	48-h	California AET Values	Mytilus edulis (bivalve)	LAR			Becker et al. 1990
39.3 +/-130	SG	Galveston Bay, TX	COA		Low abundance (0.3+/-0.651 N/0.00203 sq.m.)	Amphipoda		0.859+/-0.487	7.67+/-8.12	Carr 1992
42.2 +/-132	*	Galveston Bay, TX	COA		Low abundance (1.86+/-2.59 N/0.00203 sq.m.)	Mollusca		0.784+/-0.421	8.29+/-8.13	Carr 1992
43.4 +/-134	*	Galveston Bay, TX	COA		Low species richness (10+/-3.73 S/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
43.4 +/-134	*	Galveston Bay, TX	COA		Low abundance (89+/-60.7 N/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
49 +/-145	*	Galveston Bay, TX	COA		Low abundance (41.7+/-21.8 N/0.00203 sq.m.)	Polychaeta		0.848+/-0.427	9.21+/-8.61	Carr 1992
59.8 +/-162	*	Galveston Bay, TX	COA		Low abundance (2.05+/-1.58 N/0.00203 sq.m.)	Copepoda		0.879+/-0.47	9.63+/-9.65	Carr 1992
60	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (18% mortality)	Ampelisca abdita (amphipod)		0.028	9 ug/g	Windom In Prep
60	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (0% mortality)	Arbacia punctulata (sea urchin)		0.03	19 ug/g	Windom In Prep
67.5 +/-2.89	NE	Brunswick Harbor Entrance, GA	COA	48-h	Not significantly toxic (86.6+/-4.25% normal development)	Arbacia punctulata (sea urchin)		0.181+/-0.162	182+/-208 ug/g	Windom In Prep
68.3 +/-2.89	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (28.3+/-6.11% mortality)	Mysidopsis bahia (mysid)		0.246+/-0.051	127+/-24 ug/g	Windom In Prep
70 +/-9.57	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (91.3+/-2.91% normal development)	Arbacia punctulata (sea urchin)		0.299+/-0.251	114+/-68.4 ug/g	Windom In Prep
70.6 +/-10.4	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (9.78+/-5.33% mortality)	Mysidopsis bahia (mysid)		0.24+/-0.247	91.9+/-73.4 ug/g	Windom In Prep
70.6 +/-11.2	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (4+/-2.83% mortality)	Menidia beryllina (silverside)		0.243+/-0.264	90.5+/-78.4 ug/g	Windom In Prep
71.7 +/-12.9	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (27.5+/-10.6% mortality)	Mysidopsis bahia (mysid)		0.237+/-0.311	74.6+/-85.5 ug/g	Windom In Prep
71.7 +/-9.31	SG	Savannah River Entrance Channel, GA	COA	48-h	Significantly toxic (25.4+/-7.66% mortality)	Arbacia punctulata (sea urchin)		0.344+/-0.242	129.5+/-59.3 ug/g	Windom In Prep
71.9 +/-10.3	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (11.6+/-4.33% mortality)	Ampelisca abdita (amphipod)		0.267+/-0.25	102+/-71.1 ug/g	Windom In Prep
77.6 +/-61	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (5.8+/-3.7% mortality)	Rhepoxynius abronius (amphipod)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
77.6 +/-61	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (3.4+/-1.82% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
77.6 +/-61	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (11.2+/-3.7% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
77.6 +/-61	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (3.52+/-1.66% mortality)	Macoma nasuta (clam)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
90 +/-200	*	Galveston Bay, TX	COA	48-h	Toxic (4.65+/-16.1% normal development)	Arbacia punctulata (sea urchin)	EMB	1.06+/-0.449	14.5+/-9.2	Carr 1992
90.6 +/-24.3	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (10.6+/-3.17% mortality)	Ampelisca abdita (amphipod)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
90.6 +/-24.3	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (8.00+/-2.92% mortality)	Mysidopsis bahia (mysid)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
92.9 +/-25.6	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (5.43+/-3.21% mortality)	Mysidopsis bahia (mysid)		1.21+/-1.13	9096+/-13378 ug/g	Windom In Prep
92.9 +/-25.6	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (9.61+/-2.7% mortality)	Menidia beryllina (silverside)		1.22+/-1.13	9172+/-13363 ug/g	Windom In Prep
100	SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (16% mortality)	Mysidopsis bahia (mysid)		1.8	7095 ug/g	Windom In Prep
100	SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (22.3% mortality)	Menidia beryllina (silverside)		1.71	6562 ug/g	Windom In Prep
107 +/-113	NC	Galveston Bay, TX	COA		Low abundance (53+/-33.9 N/0.00203 sq.m.)	Benthic invertebrates		0.985+/-0.247	22+/-11.2	Carr 1992
109 +/-14.7	SG	Brunswick Harbor Entrance, GA	COA	48-h	Significantly toxic (14.6+/-18.9% normal development)	Arbacia punctulata (sea urchin)		1.99+/-0.562	14009+/-13434 ug/g	Windom In Prep
110	NE	Tampa Bay, FL	COA	1-h	Least toxic (79.4+/-9.9% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.45+/-0.587		Long 1993
113		***TEL***								
113	*	Puget Sound, WA	AETA	15-min	1986 Puget Sound AET	Microtox (Photobacterium phosphoreum)		1		Bellar et al. 1986
124 +/-285	*	Galveston Bay, TX	COA		Moderate abundance (58.3+/-16.2 N/0.00203 sq.m.)	Oligochaeta		0.632+/-0.274	7.93+/-5.6	Carr 1992
131 +/-70.3	NE	Puget Sound, WA	COA	15-min	Not significantly toxic (EC50; 0.283+/-0.168% extract)	Microtox (Photobacterium phosphoreum)		1.39+/-0.37		Pastorok & Becker 1990
136 +/-107	NE	San Francisco Bay, CA	COA	48-h	Least toxic (23.3+/-7.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
137 +/-279	*	Galveston Bay, TX	COA	1-h	Toxic (20.4+/-18.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	1.26+/-0.47	14.6+/-10.1	Carr 1992
153 +/-307	NE	Southern California	COA	10-d	Not significantly toxic (23.2% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
155 +/-279	NE	Galveston Bay, TX	COA		Low species (11.2+/-1.94 S/0.00203 sq.m.)	Benthic species		0.642+/-0.356	13.4+/-8.65	Carr 1992
167	*	Puget Sound, WA	AETA	48-h	1986 Puget Sound AET	Crassostrea gigas (oyster)	LAR	1		Bellar et al. 1986
170	NE	Burrard Inlet, BC	SQO		Sediment Quality Objectives	Aquatic biota				Swain & Nijman 1991

Table 23. A summary of the available data on the biological effects associated with sediment-sorbed FLUORANTHENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Fluoranthene	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
179	+/-351	NE	Galveston Bay, TX	COA		High abundance (154+/-30.2 N/0.00203 sq.m.)	Benthic invertebrates		0.47+/-0.27	9.07+/-2.94	Carr 1992
198	+/-134	NE	Tampa Bay, FL	COA	10-d	Not significantly toxic (14.6+/-7.67% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.63+/-0.596		Long 1993
220		NE	Puget Sound, WA	COA		Not toxic (10% prevalence of idiopathic degeneration/necrosis)	Parophrys vetulus (English sole)				Malins et al. 1985
220		NE	Puget Sound, WA	COA		Not toxic (17.5% prevalence of steatosis and hemosiderosis)	Parophrys vetulus (English sole)				Malins et al. 1985
220		NE	Puget Sound, WA	COA		Not toxic (0% occurrence of hepatic cellular alterations)	Parophrys vetulus (English sole)				Malins et al. 1985
220		NE	Puget Sound, WA	COA		Not toxic (5% prevalence of hepatocellular regenerative foci)	Parophrys vetulus (English sole)				Malins et al. 1985
220		NE	Puget Sound, WA	COA		Not toxic (0% prevalence of hepatic cellular alterations)	Parophrys vetulus (English sole)				Malins et al. 1985
220		NE	Puget Sound, WA	COA		Not toxic (32.5% prevalence of hepatic idiopathic lesions)	Parophrys vetulus (English sole)				Malins et al. 1985
260		*	Puget Sound, WA	AETA	10-d	1986 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT	1		Bellar et al. 1986
279	+/-23.5	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-7.99% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.14+/-0.352	6.09+/-5.38	Bricker et al. 1993
>290		-	Southern California	AETA	10-d	Southern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
329	+/-55.7	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.5+/-11.4% mortality)	Mulinia lateralis (bivalve)	LAR	2.33+/-0.364	26.8+/-9.42	Bricker et al. 1993
337	+/-51	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.061+/-0.038 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.8+/-0.477	8.52+/-10.7	Bricker et al. 1993
338	+/-347	NE	Jetty Island Pier, Everett Marina, WA	COA	10-d	Not toxic (12.3+/-2.87% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.08+/-0.66		Hart Crowser & Associates Inc. 1986
339	+/-423	NE	Narragansett Bay, RI	COA	10-d	Not significantly toxic (5.28+/-3.04% mortality))	Ampelisca abdita (amphipod)	ADT			Munns et al. 1991
348	+/-52	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (39.5+/-18.2% mortality)	Ampelisca abidta (amphipod)	SUB ADT	2.06+/-0.523	20.1+/-13.9	Bricker et al. 1993
360	+/-20.2	NE	Burrard Inlet, BC	COA	10-d	Not toxic (4.5+/-3.02% emergence)	Rhepoxynius abronius (amphipod)	ADT	2.66+/-2.15		McLeay et al. 1991
360	+/-20.2	NE	Burrard Inlet, BC	COA	10-d	Not toxic (5.21+/-3.61% emergence)	Corophium volutator (amphipod)	ADT	3.18+/-2.1		McLeay et al. 1991
371	+/-111	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.3+/-2.22% normal development)	Mulinia lateralis (bivalve)	LAR	2.18+/-0.531	19.1+/-12.5	Bricker et al. 1993
380	+/-528	NE	Oahu, Hawaii	COA	10-d	Not significantly toxic (7.2+/-1.89% mortality)	Eohaustorius estuarius (amphipod)	ADT	1.93+/-1.94	10.3+/-12.4	Lamberson et al. 1993
380	+/-528	NE	Oahu, Hawaii	COA	10-d	Not significantly toxic (10.1+/-4.01% mortality)	Corophium acherusicum (amphipod)	ADT	1.93+/-1.94	10.3+/-12.4	Lamberson et al. 1993
382	+/-8.24	*	Southern California	COA	10-d	Significantly toxicity (51.7% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
390		*	Northern California	AETA		Northern California AET Values	Benthic species				Becker et al. 1990
400	+/-480	NE	Tampa Bay, FL	COA		Not significantly toxic (EC50; 0.066+/-0.033 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.89+/-0.902		Long 1993
401	+/-250	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.167+/-0.198 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.59+/-1.09	4.67+/-6.99	Bricker et al. 1993
407	+/-402	*	Tampa Bay, FL	COA	1-h	Moderately toxic (15.3+/-10.6% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.94+/-0.908		Long 1993
420		*	Puget Sound, WA	AETA		1986 Puget Sound AET	Benthic species		1		Bellar et al. 1986
435	+/-233	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (19.3+/-5.86% mortality)	Ampelisca abidta (amphipod)	SUB ADT	1.82+/-0.225	6.3+/-6.2	Bricker et al. 1993
437	+/-118	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.125+/-0.084 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.25+/-0.468	1.98+/-2.25	Bricker et al. 1993
451	+/-562	*	San Francisco Bay, CA	COA	48-h	Moderately toxic (59.4+/-11.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
462	+/-272	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (15.2+/-9.21% mortality)	Mulinia lateralis (bivalve)	LAR	2.17+/-0.663	18.4+/-19.9	Bricker et al. 1993
472	+/-287	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.014+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.51+/-0.45	29.6+/-15.7	Bricker et al. 1993
489	+/-492	NE	Commencement Bay, WA	COA	48-h	Least toxic (15.1+/-3.1% abnormality)	Oyster	LAR			Tetra Tech 1985
497	+/-145	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (25.9+/-5.01% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.21+/-0.444	2.41+/-2.32	Bricker et al. 1993
500		NC	Puget Sound, WA	COA	2-d	Significantly toxic (3.8% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.5		Pastorok & Becker 1990
509	+/-481	NC	San Francisco Bay, CA	COA	10-d	Moderately toxic (33.8+/-4.7% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
523	+/-416	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.096+/-0.101 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.37+/-0.759	6.93+/-6.83	Bricker et al. 1993
539	+/-842	NE	San Francisco Bay, CA	COA	10-d	Least toxic (18+/-6.6% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
547	+/-437	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (12.3+/-14.5% mortality)	Mulinia lateralis (bivalve)	LAR	1.53+/-0.743	15.7+/-23.2	Bricker et al. 1993
<548	+/-167	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (6.8+/-7.31% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
<548	+/-167	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (8.5+/-6.06% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
<548	+/-167	NE	Halifax Harbour, NS	COA	20-d	Not significantly toxic (0.7+/-1.63% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990

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Fluoranthene Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
554 +/-490	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.074+/-0.043 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.27+/-0.626	6.21+/-5.41	Bricker et al. 1993
562 +/-505	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99.3+/-0.827% normal development)	Mulinia lateralis (bivalve)	LAR	1.43+/-0.738	14.7+/-24	Bricker et al. 1993
572 +/-880	NE	San Francisco Bay, CA	COA	10-d	Not significantly toxic (18.4+/-6.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
574 +/-527	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (23.3+/-6.14% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.738		Word et al. 1988
580	*	California	AETA		California AET Values	Benthic species				Becker et al. 1990
580	*	Southern California	AETA		Southern California AET Values	Benthic species				Becker et al. 1990
584 +/-789	SG	San Francisco Bay, CA	COA	10-d	Significantly toxic (42.9+/-19.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
585 +/-490	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (10.4+/-6.3% mortality)	Nephtys caecoides (polychaete)		1.63+/-0.657		Word et al. 1988
585 +/-490	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (0.2+/-0.6% mortality)	Macoma nasuta (clam)		1.63+/-0.657		Word et al. 1988
600	*	Eagle Harbor, WA	COA	4-d	LC50	Rhepoxynius abronius (amphipod)	ADT			Swartz et al. 1989
626 +/-904	NE	Elizabeth River, VA	COA	96-h	No significant change in respiration rate	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
630	NE	Puget Sound, WA	AETA		PSDDA Screening level concentration	Aquatic biota				USACOE 1988
630 +/-356	SG	Oakland Harbor, CA	COA	10-d	Significantly toxic (35.3+/-2.5% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.56+/-0.07		Word et al. 1988
644	*	United States	SLCA		National Screening Level Concentration-Marine	Benthic species		1		Neff et al. 1987
650 +/-636	SG	Jetty Island Pier, Everett Marina, WA	COA	10-d	Toxic (19.5+/-0.707% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.15+/-0.071		Hart Crowser & Associates Inc. 1986
653 +/-725	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-6.07% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.71+/-0.9	15.3+/-23.2	Bricker et al. 1993
682 +/-1043	*	San Francisco Bay, CA	COA	48-h	Significantly toxic (55.7+/-22.7% abnormal)	Bivalve	LAR			Long & Morgan 1990
690 +/-666	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (6.48+/-10.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
690 +/-666	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99+/-0.862% normal development)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
691 +/-519	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (17+/-16.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.99+/-1	21.6+/-24.5	Bricker et al. 1993
696 +/-539	*	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (30.5+/-16.4% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.62+/-0.777	17.7+/-26.3	Bricker et al. 1993
703 +/-524	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.1+/-2.78% normal development)	Mulinia lateralis (bivalve)	LAR	2.12+/-1.04	22.9+/-23.7	Bricker et al. 1993
725 +/-610	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (96+/-1.66% normal development)	Mulinia lateralis (bivalve)	LAR	2.52+/-0.997	35+/-42.9	Bricker et al. 1993
738 +/-772	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (13.8+/-4.09% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.47+/-0.306		Pastorok & Becker 1990
794 +/-1210	SG	San Francisco Bay, CA	COA	10-d	Highly toxic (67+/-11.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
799 +/-949	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (6.67+/-8.07% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.51+/-0.330		Pastorok & Becker 1990
815 +/-676	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (34.9+/-15.7% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.23+/-1.04	25.4+/-25.5	Bricker et al. 1993
869 +/-795	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (23+/-4.24% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.46+/-1.22	40+/-55.1	Bricker et al. 1993
869 +/-537	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (29.8+/-13.9% mortality)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.07	32.1+/-28.4	Bricker et al. 1993
916 +/-473	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (96.6+/-3.79% normal development)	Mulinia lateralis (bivalve)	LAR	2.87+/-0.94	35.1+/-25.9	Bricker et al. 1993
921 +/-462	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (38+/-13% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.92+/-0.937	34.6+/-23.9	Bricker et al. 1993
923 +/-865	NE	Commencement Bay, WA	COA	10-d	Least toxic (12.5+/-4.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
925 +/-864	SG	Commencement Bay, WA	COA	10-d	Moderately toxic (26+/-5.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
945 +/-762	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.013+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.79+/-0.744	37.6+/-25.3	Bricker et al. 1993
971 +/-988	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.1+/-13.3% mortality)	Mulinia lateralis (bivalve)	LAR	2.68+/-0.955	31.8+/-24.4	Bricker et al. 1993
972 +/-866	NE	Elizabeth River, VA	COA	96-h	Not significantly toxic (4.5+/-3.24% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
1009 +/-328	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (75.1+/-10.6% mortality)	Mulinia lateralis (bivalve)	LAR	3.32+/-0.317	42.3+/-19.2	Bricker et al. 1993
1046 +/-655	*	Commencement Bay, WA	COA	48-h	Moderately toxic (23+/-2.3% abnormality)	Oyster	LAR			Tetra Tech 1985
1056 +/-1308	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.016+/-0.007 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.26+/-0.936	43.4+/-35.6	Bricker et al. 1993
1077 +/-407	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.011+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.28+/-0.363	45.3+/-21.4	Bricker et al. 1993
1331 +/-654	*	Elizabeth River, VA	COA	96-h	Significant decrease in respiration rates	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
1352 +/-595	SG	Elizabeth River, VA	COA	96-h	Significantly toxic (50.7+/-39% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987

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1367	+/-1499	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (21.5+/-6.36% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.35+/-1.05	10.5+/-13.4	Bricker et al. 1993
1387	+/-1531	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (91.5+/-7.28% normal development)	Mulinia lateralis (bivalve)	LAR	2.6+/-0.899	36.8+/-34.9	Bricker et al. 1993
1494			***PEL***								
1500		NE	Laboratory	SSBA	10-d	Not significantly toxic	Rhepoxynius abronius (amphipod)	ADT	0.18		Swartz et al. 1990
1545	+/-231	NE	Burrard Inlet, BC	COA	10-d	Not toxic (8.9+/-2.99% mortality)	Corophium volutator (amphipod)	ADT	2.8+/-1.96		McLeay et al. 1991
1545	+/-231	NE	Burrard Inlet, BC	COA	10-d	Not toxic (97.2+/-2.84% reburial)	Rhepoxynius abronius (amphipod)	ADT	2.8+/-1.96		McLeay et al. 1991
1578	+/-1201	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.008+/-0.001 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.19+/-1.27	12+/-11.3	Bricker et al. 1993
1600		*	United States	EqPA		99% Chronic Marine Criteria	Aquatic organisms		1		Pavlou et al. 1987
1600		*	Puget Sound, WA	SQG		Chemical Criteria	Benthic community		1		WDE 1989
1655	+/-2029	*	Commencement Bay, WA	COA	48-h	Highly toxic (44.5+/-19% abnormality)	Oyster	LAR			Tetra Tech 1985
1700		*	Puget Sound, WA	AETA	15-min	1988 Puget Sound AET	Microtox (Photobacterium phosphoreum)				PTI 1988
1829	+/-1943	*	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (88.5+/-8.39% normal development)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.05	38.1+/-38.9	Bricker et al. 1993
1950	+/-2008	*	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (51.3+/-6.95% mortality)	Mulinia lateralis (bivalve)	LAR	1.8+/-1.71	29.6+/-46.3	Bricker et al. 1993
<1986	+/-93.3	NE	Halifax Harbour, NS	COA	20-d	Not significantly toxic (1+/-2% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
<1986	+/-93.3	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (5.2+/-3.5% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
2000		*	San Francisco Bay, CA	AETA	48-h	San Francisco Bay AET	Oyster; mussel	LAR			Long & Morgan 1990
2050	+/-260	NE	Burrard Inlet, BC	COA	10-d	Not toxic (7.9+/-5.12% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.64+/-2.14		McLeay et al. 1991
2360	+/-3330	*	Commencement Bay, WA	COA	10-d	Highly toxic (78.5+/-19.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
2500		*	Puget Sound, WA	AETA	48-h	1988 Puget Sound AET	Crassostrea gigas (oyster)	LAR			PTI 1988
<2647	+/-108	*	Halifax Harbour, NS	COA	10-d	Significantly toxic (61.7+/-12.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
2730	+/-3440	*	Tampa Bay, FL	COA	1-h	Most toxic (0.091+/-0.187% fertilization)	Arbacia punctulata (sea urchin)	GAM	2.96+/-1.49		Long 1993
2737	+/-1617	*	San Francisco Bay, CA	COA	48-h	Highly toxic (92.4+/-4.5% abnormal)	Bivalve	LAR			Long & Morgan 1990
2900		*	Laboratory	SSBA	10-d	LC10	Rhepoxynius abronius (amphipod)	ADT	0.25		Swartz et al. 1988
3000		*	Laboratory	SSBA	10-d	Not significantly toxic	Corophium spinicorne (amphipod)	ADT	0.18		Swartz et al. 1990
3000		NE	Laboratory	SSBA	10-d	Not significantly toxic	Rhepoxynius abronius (amphipod)	ADT	0.31		Swartz et al. 1990
3000		NE	Laboratory	SSBA	10-d	Not significantly toxic	Rhepoxynius abronius (amphipod)	ADT	0.48		Swartz et al. 1990
3100		*	United States	EqPA		95% Chronic Marine Criteria	Aquatic organisms		1		Pavlou et al. 1987
3400		*	Laboratory	SSBA	10-d	LC50	Rhepoxynius abronius (amphipod)	ADT	0.18		Swartz et al. 1990
3600		*	United States	EqPA		EPA Chronic Marine EP Threshold	Aquatic biota		1		Lyman et al. 1987
3600		*	United States	EqPA		Chronic Marine Sediment Safe Level Criteria					Pavlou 1987
3700		*	San Francisco Bay, CA	AETA	10-d	San Francisco Bay AET	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
>3700		-	Northern California	AETA	10-d	Northern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
>3700		-	California	AETA	10-d	California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
3740	+/-3570	*	Tampa Bay, FL	COA	10-d	Significantly toxic (35.2+/-17.5% mortality)	Ampelisca abdita (amphipod)	SUB ADT	3.53+/-1.35		Long 1993
3980	+/-3810	*	Tampa Bay, FL	COA		Significantly toxic (EC50; 0.017+/-0.012 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.47+/-1.49		Long 1993
4200		*	Laboratory	SSBA	10-d	LC50	Rhepoxynius abronius (amphipod)	ADT	0.25		Swartz et al. 1988
5100		*	Laboratory	SSBA	10-d	LC50	Corophium spinicorne (amphipod)	ADT	0.18		Swartz et al. 1990
5100	+/-350	*	Laboratory	SSBA	10-d	LC50	Rhepoxynius abronius (amphipod)	ADT			DeWitt et al. 1989
5100		*	Burrard Inlet, BC	COA	10-d	Highly toxic (23% emergence)	Corophium volutator (amphipod)	ADT	3.5		McLeay et al. 1991
5100		*	Burrard Inlet, BC	COA	10-d	Highly toxic (30.5% emergence)	Rhepoxynius abronius (amphipod)	ADT	3.5		McLeay et al. 1991
6300		*	Puget Sound, WA	AETA		PSDDA Maximum Level Criteria	Aquatic biota				USACOE 1988
6500		*	Laboratory	SSBA	10-d	LC100	Rhepoxynius abronius (amphipod)	ADT	0.18		Swartz et al. 1990

Table 23. A summary of the available data on the biological effects associated with sediment-sorbed FLUORANTHENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Fluoranthene	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
6500		*	Laboratory	SSBA	10-d	LC50	Rhepoxynius abronius (amphipod)	ADT	0.31		Swartz et al. 1990
6500		NE	Laboratory	SSBA	10-d	Not significantly toxic	Corophium spinicorne (amphipod)	ADT	0.31		Swartz et al. 1990
8504	+/-16500	NE	Puget Sound, WA	COA	20-d	Not significantly toxic (5+/-3.86% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.46+/-0.26		Pastorok & Becker 1990
8889	+/-15596	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (4.43+/-2.1% mortality)	Panope generosa (geoduck)	JUV	1.51+/-0.261		Pastorok & Becker 1990
8895	+/-10337	NC	Eagle Harbor, WA	COA	10-d	Moderately toxic (41+/-9% mortality)	Rhepoxynius abronius (amphipod)	ADT			CH2M Hill 1989
9000		*	United States	EqPA		EPA Acute Marine EP Threshold	Aquatic biota		1		Lyman et al. 1987
10700		*	Laboratory	SSBA	10-d	LC50	Rhepoxynius abronius (amphipod)	ADT	0.48		Swartz et al. 1990
10700	+/-675	*	Laboratory	SSBA	10-d	LC50	Eohaustorius estuarius (amphipod)	ADT			DeWitt et al. 1989
11800	+/-575	*	Laboratory	SSBA	10-d	LC50	Eohaustorius estuarius (amphipod)	ADT			DeWitt et al. 1989
12080	+/-51889	*	Eagle Harbor, WA	COA	10-d	Least toxic (13+/-7% mortality)	Rhepoxynius abronius (amphipod)	ADT			CH2M Hill 1989
13400	+/-565	*	United States	EqPA		Sediment Quality Criteria					Hansen et al. 1991e
<13600		*	Laboratory	SSBA	10-d	LC50	Corophium spinicorne (amphipod)	ADT	0.31		Swartz et al. 1990
13600		*	Laboratory	SSBA	10-d	LC100	Rhepoxynius abronius (amphipod)	ADT	0.31		Swartz et al. 1990
15523	+/-15185	*	Puget Sound, WA	COA		Toxic (71.6+/-14.6% prevalence of idiopathic degeneration/necrosis)	Parophrys vetulus (English sole)				Malins et al. 1985
15523	+/-15185	*	Puget Sound, WA	COA		Toxic (51.4+/-21.1% prevalence of steatosis and hemosiderosis)	Parophrys vetulus (English sole)				Malins et al. 1985
15523	+/-15185	*	Puget Sound, WA	COA		Toxic (19+/-6.15% prevalence of hepatocellular regenerative foci)	Parophrys vetulus (English sole)				Malins et al. 1985
15523	+/-15185	*	Puget Sound, WA	COA		Toxic (26.7+/-6.43% prevalence of hepatic neoplasms)	Parophrys vetulus (English sole)				Malins et al. 1985
15523	+/-15185	*	Puget Sound, WA	COA		Toxic (88+/-3.65% prevalence of hepatic idiopathic lesions)	Parophrys vetulus (English sole)				Malins et al. 1985
15523	+/-15185	*	Puget Sound, WA	COA		Toxic (44.2+/-8.5% prevalence of hepatic cellular alterations)	Parophrys vetulus (English sole)				Malins et al. 1985
18802	+/-38307	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (2.09+/-1.73% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.56+/-0.329		Pastorok & Becker 1990
21171	+/-37887	*	Puget Sound, WA	COA	15-min	Significantly toxic (EC50; 0.065+/-0.043% extract)	Microtox (Photobacterium phosphoreum)		1.58+/-0.255		Pastorok & Becker 1990
24000		*	Puget Sound, WA	AETA		1988 Puget Sound AET	Benthic community				PTI 1988
27739	+/-42182	*	Puget Sound, WA	COA	2-d	Significantly toxic (60.4+/-46.5% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.57+/-0.287		Pastorok & Becker 1990
30000		*	Puget Sound, WA	AETA	10-d	1988 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT			PTI 1988
<37303	+/-10320	NE	Sidney Tar Pond, NS	COA	20-d	Not significantly toxic (8+/-5.66% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
41300	+/-46742	*	Puget Sound, WA	COA	10-d	Significantly toxic (80.8+/-30.6% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.266		Pastorok & Becker 1990
50800	+/-69151	*	Puget Sound, WA	COA	20-d	Significantly toxic (37.3+/-22% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.87+/-0.208		Pastorok & Becker 1990
71988	+/-95713	*	Eagle Harbor, WA	COA	10-d	Highly toxic (95.5+/-8.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			CH2M Hill 1989
74600		*	Sidney Tar Pond, NS	COA	10-d	Significantly toxic (100% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
74600		*	Sidney Tar Pond, NS	COA	10-d	Significantly toxic (100% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
130000		*	Puget Sound, WA	COA	10-d	Significantly toxic (56% mortality)	Panope generosa (geoduck)	JUV	2.1		Pastorok & Becker 1990
386000		*	Sidney Tar Pond, NS	COA	20-d	Significantly toxic (52% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990

Table 24. A summary of the available data on the biological effects associated with sediment-sorbed PYRENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Pyrene Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.29	NC	Mobile Bay, AL	COA		Significantly toxic (10% mortality)	Mysidopsis bahia (mysid shrimp)		0.009	0.004	EMAP Louisiana Province 1991
0.545 +/-0.342	NE	Chandeleur Sound, LA	COA		Not significantly toxic (1.03+/-2.05% mortality)	Mysidopsis bahia (mysid shrimp)		0.824+/-0.915	1.69+/-0.920	EMAP Louisiana Province 1991
0.555 +/-0.049	NE	Apalachee Bay, FL	COA	10-d	Not significantly toxic (3.3+/-3.25% mortality)	Ampelisca abdita (amphipod)		0.643+/-0.455	0.390+/-0.410	EMAP Louisiana Province 1991
0.64 +/-0.309	NC	Chandeleur Sound, LA	COA	10-d	Significantly toxic (11.5+/-4.86% mortality)	Ampelisca abdita (amphipod)		0.811+/-0.711	1.87+/-0.973	EMAP Louisiana Province 1991
0.713 +/-0.184	NE	Apalachee Bay, FL	COA		Not significantly toxic (0.75+/-1.5% mortality)	Mysidopsis bahia (mysid shrimp)		0.540+/-0.385	0.405+/-0.417	EMAP Louisiana Province 1991
0.832 +/-0.353	SG	Chandeleur Sound, LA	COA		Significantly toxic (7.6+/-1.32% mortality)	Mysidopsis bahia (mysid shrimp)		0.624+/-0.197	2.07+/-1.19	EMAP Louisiana Province 1991
0.833 +/-0.492	NE	Chandeleur Sound, LA	COA	10-d	Not significantly toxic (2.87+/-4.05% mortality)	Ampelisca abdita (amphipod)		0.517+/-0.166	2.02+/-1.38	EMAP Louisiana Province 1991
0.87	SG	Apalachee Bay, FL	COA	10-d	Significantly toxic (15.6% mortality)	Ampelisca abdita (amphipod)		0.438+/-0.442	0.421+/-0.593	EMAP Louisiana Province 1991
0.915 +/-0.94	NC	Mississippi Sound, MS	COA	10-d	Significantly toxic (11.6+/-3.39% mortality)	Ampelisca abdita (amphipod)		0.111+/-0.045	0.03	EMAP Louisiana Province 1991
<5	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (3% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
<5	NE	Sidney Tar Pond, NS	COA	10-d	Not significantly toxic (4% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
<5	NE	Sidney Tar Pond, NS	COA	10-d	Not significantly toxic (3% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
5.3	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (0.33+/-0.516% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
5.3	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (2.33+/-1.03% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
5.3	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (15.3+/-11.0% mortality)	Hyalella azteca (amphipod)	JUV	0.648+/-0.641	1.74+/-1.39	Hall et al. 1992
5.3	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1% mortality)	Streblospio benedicti (polychaete worm)		1.38	3.25	Hall et al. 1992
5.3	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (16.5+/-9.19% mortality)	Streblospio benedicti (polychaete worm)		0.783+/-0.845	4.83+/-2.23	Hall et al. 1992
5.3	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.367+/-0.085 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
5.3	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.0005 mg/day growth)	Streblospio benedicti (polychaete worm)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
5.3	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.003+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.316+/-0.120	2.13+/-2.46	Hall et al. 1992
5.3	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (7.2+/-1.92% mortality)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
5.3	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.6+/-0.55% reburial)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
5.3	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
5.3	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
5.3	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.001+/-0.001 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.555+/-0.471	2.68+/-2.3	Hall et al. 1992
5.3	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1.83+/-1.6% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
5.3	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (3.5+/-1.87% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
5.3	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (9.25+/-5.32% mortality)	Lepidactylus dytiscus (amphipod)		0.638+/-0.768	1.65+/-1.62	Hall et al. 1992
5.3	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (22.3+/-7.37% mortality)	Hyalella azteca (amphipod)	JUV	0.788+/-0.866	2.04+/-1.75	Hall et al. 1992
5.3	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (8.8+/-7.12% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
5.3	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (14+/-9.22% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
5.3	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.1+/-0.865% reburial)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
5.3	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<20% emergence)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
5.3	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
5.3	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (-0.057+/-0.04 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
5.3	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.001mg/day growth)	Streblospio benedicti (polychaete worm)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
5.3	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.016 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
5.3	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.005+/-0.0004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
5.3	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (55.0+/-22.6% mortality)	Hyalella azteca (amphipod)	JUV	0.338+/-0.133	2.9+/-3.11	Hall et al. 1992
5.3	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29.8+/-11.1% mortality)	Streblospio benedicti (polychaete worm)		0.316+/-0.12	2.13+/-2.46	Hall et al. 1992
5.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (55.0+/-19.5% mortality)	Streblospio benedicti (polychaete worm)		0.349+/-0.11	1.07+/-0.66	Hall et al. 1992
5.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.003 mg/day growth)	Lepidactylus dytiscus (amphipod)		1.38	3.25	Hall et al. 1992

Table 24. A summary of the available data on the biological effects associated with sediment-sorbed PYRENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Pyrene Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
5.3	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29% mortality)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
5.3	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (89.7% reburial)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
5.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
5.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	6.41	Hall et al. 1992
5.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
5.3	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (45.5+/-12% mortality)	Lepidactylus dytiscus (amphipod)		0.383+/-0.279	3.61+/-2.79	Hall et al. 1992
5.3	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (63.0+/-24.3% mortality)	Hyalella azteca (amphipod)	JUV	0.317+/-0.228	2.57+/-2.67	Hall et al. 1992
5.3	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (22% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
5.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (28% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
5.3	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (82.9% reburial)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
5.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>20% emergence)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
5.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	5.58	Hall et al. 1992
5.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.008+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.4	Hall et al. 1992
5.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.003 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
5.76 +/-2.63	NC	Mississippi Sound, MS	COA		Significantly toxic (12.2+/-4.42% mortality)	Mysidopsis bahia (mysid shrimp)		0.939+/-0.335	2.63+/-2.3	EMAP Louisiana Province 1991
8.89 +/-9.19	NE	Mississippi Sound, MS	COA		Not significantly toxic (0.789+/-1.59% mortality)	Mysidopsis bahia (mysid shrimp)		0.827+/-0.757	1.46+/-1.58	EMAP Louisiana Province 1991
9.2 +/-7.79	NE	Mississippi Sound, MS	COA	10-d	Not significantly toxic (1.4+/-1.73% mortality)	Ampelisca abdita (amphipod)		0.998+/-0.602	2.01+/-1.82	EMAP Louisiana Province 1991
9.98 +/-2.53	NE	Galveston Bay, TX	COA		High abundance (155+/-49.5 N/0.00203 sq.m.)	Oligochaeta		1.2+/-1.27	4.27+/-3.85	Carr 1992
10.5 +/-3.09	NE	Galveston Bay, TX	COA		High abundance (27.3+/-10 N/0.00203 sq.m.)	Mollusca		1.64+/-0.4	1.39+/-0.17	Carr 1992
11.2 +/-15.4	NC	Mobile Bay, AL	COA	10-d	Significantly toxic (46+/-49.3% mortality)	Ampelisca abdita (amphipod)		0.22+/-0.298	3.84+/-5.43	EMAP Louisiana Province 1991
12.8 +/-5.25	NE	Galveston Bay, TX	COA		High species richness (24.5+/-3.7 S/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
12.8 +/-5.25	NE	Galveston Bay, TX	COA		High abundance (359+/-92.8 N/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
15.2 +/-12.1	NE	Matagorda Bay, TX	COA		Not significantly toxic (1.58+/-1.82% mortality)	Mysidopsis bahia (mysid shrimp)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
15.2 +/-12.1	NE	Matagorda Bay, TX	COA	10-d	Not significantly toxic (2.33+/-4.65% mortality)	Ampelisca abdita (amphipod)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
18.9 +/-9.99	NE	Galveston Bay, TX	COA		High abundance (156+/-22.9 N/0.00203 sq.m.)	Polychaeta		0.916+/-0.661	2.94+/-2.3	Carr 1992
19.4 +/-15.7	NC	Mississippi River, MS, LA	COA	10-d	Significantly toxic (15.9+/-6.65% mortality)	Ampelisca abdita (amphipod)		1.22+/-0.717	0.235+/-0.276	EMAP Louisiana Province 1991
19.4 +/-9.57	NE	Mobile Bay, AL	COA	10-d	Not significantly toxic (0.5+/-0.778% mortality)	Ampelisca abdita (amphipod)		1.24+/-0.948	8.51+/-4.76	EMAP Louisiana Province 1991
20.3 +/-6.94	NE	Mobile Bay, AL	COA		Not significantly toxic (1.07+/-1.85% mortality)	Mysidopsis bahia (mysid shrimp)		0.968+/-0.815	8.23+/-3.4	EMAP Louisiana Province 1991
20.4 +/-15.8	NE	Galveston Bay, TX	COA		High abundance (16.2+/-6.19 N/0.00203 sq.m.)	Copepoda		0.844+/-0.524	4.73+/-3.1	Carr 1992
22.1 +/-11.8	NC	Mississippi River, MS, LA	COA		Significantly toxic (32.9+/-36.4% mortality)	Mysidopsis bahia (mysid shrimp)		1.07+/-0.924	1.41+/-1.93	EMAP Louisiana Province 1991
23.3 +/-26.4	NE	Galveston Bay, TX	COA	48-h	Not toxic (98.1+/-1.79% normal development)	Arbacia punctulata (sea urchin)	EMB	.748+/-0.476	4.16+/-3.45	Carr 1992
26.5 +/-25.7	NE	Mississippi River, MS, LA	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		1.3+/-0.83	1.14+/-1	EMAP Louisiana Province 1991
28.2 +/-31.7	NE	Galveston Bay, TX	COA	1-h	Not toxic (92.5+/-6.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	0.77+/-0.448	6.37+/-6.58	Carr 1992
29.2 +/-21.8	NE	Mississippi River, MS, LA	COA	10-d	Not significantly toxic (7.8+/-1.63% mortality)	Ampelisca abdita (amphipod)		1.15+/-1.04	2.31+/-0.651	EMAP Louisiana Province 1991
36.7 +/-36.2	*	Galveston Bay, TX	COA		Low abundance (4.21+/-5.66 N/0.00203 sq.m.)	Oligochaeta		0.895+/-0.453	7.85+/-8.8	Carr 1992
42.3 +/-64.2	NC	Galveston Bay, TX	COA		Significantly toxic (13.4+/-9.11% mortality)	Mysidopsis bahia (mysid shrimp)		0.778+/-0.482	1.21+/-0.778	EMAP Louisiana Province 1991
46.3 +/-53	NE	Galveston Bay, TX	COA	10-d	Not significantly toxic (1.35+/-1.45% mortality)	Ampelisca abdita (amphipod)		0.961+/-0.537	1.17+/-0.640	EMAP Louisiana Province 1991
46.9 +/-61.5	SG	Galveston Bay, TX	COA	10-d	Significantly toxic (15.8+/-3.89% mortality)	Ampelisca abdita (amphipod)		0.647+/-0.606	0.160+/-0.184	EMAP Louisiana Province 1991
47.7 +/-105	NC	Galveston Bay, TX	COA		Low abundance (0.3+/-0.651 N/0.00203 sq.m.)	Amphipoda		0.859+/-0.487	7.67+/-8.12	Carr 1992
50.8 +/-44	NE	Galveston Bay, TX	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		0.934+/-0.657	0.457+/-0.530	EMAP Louisiana Province 1991
53.2 +/-108	*	Galveston Bay, TX	COA		Low abundance (1.86+/-2.59 N/0.00203 sq.m.)	Mollusca		0.784+/-0.421	8.29+/-8.13	Carr 1992
54.4 +/-110	*	Galveston Bay, TX	COA		Low species richness (10+/-3.73 S/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992

Table 24. A summary of the available data on the biological effects associated with sediment-sorbed PYRENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Pyrene Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
54.4 +/-110	*	Galveston Bay, TX	COA		Low abundance (89+/-60.7 N/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
59.3 +/-118	*	Galveston Bay, TX	COA		Low abundance (41.7+/-21.8 N/0.00203 sq.m.)	Polychaeta		0.848+/-0.427	9.21+/-8.61	Carr 1992
60	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (18% mortality)	Ampelisca abdita (amphipod)		0.028	9 ug/g	Windom In Prep
60	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (0% mortality)	Arbacia punctulata (sea urchin)		0.03	19 ug/g	Windom In Prep
67.5 +/-2.89	NE	Brunswick Harbor Entrance, GA	COA	48-h	Not significantly toxic (86.6+/-4.25% normal development)	Arbacia punctulata (sea urchin)		0.181+/-0.162	182+/-208 ug/g	Windom In Prep
68.3 +/-2.89	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (28.3+/-6.11% mortality)	Mysidopsis bahia (mysid)		0.246+/-0.051	127+/-24 ug/g	Windom In Prep
68.9 +/-131	*	Galveston Bay, TX	COA		Low abundance (2.05+/-1.58 N/0.00203 sq.m.)	Copepoda		0.879+/-0.47	9.63+/-9.65	Carr 1992
70 +/-9.57	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (91.3+/-2.91% normal development)	Arbacia punctulata (sea urchin)		0.299+/-0.251	114+/-68.4 ug/g	Windom In Prep
70.6 +/-10.4	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (9.78+/-5.33% mortality)	Mysidopsis bahia (mysid)		0.24+/-0.247	91.9+/-73.4 ug/g	Windom In Prep
70.6 +/-11.2	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (4+/-2.83% mortality)	Menidia beryllina (silverside)		0.243+/-0.264	90.5+/-78.4 ug/g	Windom In Prep
71.7 +/-12.9	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (27.5+/-10.6% mortality)	Mysidopsis bahia (mysid)		0.237+/-0.311	74.6+/-85.5 ug/g	Windom In Prep
71.7 +/-9.31	SG	Savannah River Entrance Channel, GA	COA	48-h	Significantly toxic (25.4+/-7.66% mortality)	Arbacia punctulata (sea urchin)		0.344+/-0.242	129.5+/-59.3 ug/g	Windom In Prep
71.9 +/-10.3	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (11.6+/-4.33% mortality)	Ampelisca abdita (amphipod)		0.267+/-0.25	102+/-71.1 ug/g	Windom In Prep
72 +/-88.8	NE	Galveston Bay, TX	COA		High Abundance (6+/-1.41 N/0.00203 sq.m.)	Amphipoda		0.955+/-0.629	7.21+/-8.2	Carr 1992
75.7 +/-63.6	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (5.8+/-3.7% mortality)	Rhepoxynius abronius (amphipod)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
75.7 +/-63.6	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (3.4+/-1.82% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
75.7 +/-63.6	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (11.2+/-3.7% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
75.7 +/-63.6	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (3.52+/-1.66% mortality)	Macoma nasuta (clam)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
81.2 +/-74.6	NC	Galveston Bay, TX	COA		Low abundance (53+/-33.9 N/0.00203 sq.m.)	Benthic invertebrates		0.985+/-0.247	22+/-11.2	Carr 1992
90.6 +/-24.3	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (10.6+/-3.17% mortality)	Ampelisca abdita (amphipod)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
90.6 +/-24.3	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (8.00+/-2.92% mortality)	Mysidopsis bahia (mysid)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
92.2 +/-160	*	Galveston Bay, TX	COA	48-h	Toxic (4.65+/-16.1% normal development)	Arbacia punctulata (sea urchin)	EMB	1.06+/-0.449	14.5+/-9.2	Carr 1992
92.9 +/-25.6	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (5.43+/-3.21% mortality)	Mysidopsis bahia (mysid)		1.21+/-1.13	9096+/-13378 ug/g	Windom In Prep
92.9 +/-25.6	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (9.61+/-2.7% mortality)	Menidia beryllina (silverside)		1.22+/-1.13	9172+/-13363 ug/g	Windom In Prep
93	NE	Puget Sound, WA	COA		Not toxic (10% prevalence of idiopathic degeneration/necrosis)	Parophrys vetulus (English sole)				Malins et al. 1985
93	NE	Puget Sound, WA	COA		Not toxic (17.5% prevalence of steatosis and hemosiderosis)	Parophrys vetulus (English sole)				Malins et al. 1985
93	NE	Puget Sound, WA	COA		Not toxic (0% occurrence of hepatic cellular alterations)	Parophrys vetulus (English sole)				Malins et al. 1985
93	NE	Puget Sound, WA	COA		Not toxic (5% prevalence of hepatocellular regenerative foci)	Parophrys vetulus (English sole)				Malins et al. 1985
93	NE	Puget Sound, WA	COA		Not toxic (0% prevalence of hepatic cellular alterations)	Parophrys vetulus (English sole)				Malins et al. 1985
93	NE	Puget Sound, WA	COA		Not toxic (32.5% prevalence of hepatic idiopathic lesions)	Parophrys vetulus (English sole)				Malins et al. 1985
100	SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (16% mortality)	Mysidopsis bahia (mysid)		1.8	7095 ug/g	Windom In Prep
100	SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (22.3% mortality)	Menidia beryllina (silverside)		1.71	6562 ug/g	Windom In Prep
109 +/-14.7	SG	Brunswick Harbor Entrance, GA	COA	48-h	Significantly toxic (14.6+/-18.9% normal development)	Arbacia punctulata (sea urchin)		1.99+/-0.562	14009+/-13434 ug/g	Windom In Prep
113 +/-232	*	Galveston Bay, TX	COA		Moderate abundance (58.3+/-16.2 N/0.00203 sq.m.)	Oligochaeta		0.632+/-0.274	7.93+/-5.6	Carr 1992
124 +/-98	NE	Laboratory	SSBA	~4-m	No significant change in liver somatic indices	Pseudopleuronectes americanus (flounder)	ADT			Payne et al. 1988
131 +/-228	NE	Galveston Bay, TX	COA		Low species (11.2+/-1.94 S/0.00203 sq.m.)	Benthic species		0.642+/-0.356	13.4+/-8.65	Carr 1992
138 +/-221	*	Galveston Bay, TX	COA	1-h	Toxic (20.4+/-18.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	1.26+/-0.47	14.6+/-10.1	Carr 1992
150 +/-51	NE	Puget Sound, WA	COA	15-min	Not significantly toxic (EC50; 0.283+/-0.168% extract)	Microtox (Photobacterium phosphoreum)		1.39+/-0.37		Pastorok & Becker 1990
153		***TEL***								
156 +/-287	NE	Galveston Bay, TX	COA		High abundance (154+/-30.2 N/0.00203 sq.m.)	Benthic invertebrates		0.47+/-0.27	9.07+/-2.94	Carr 1992
173	*	Puget Sound, WA	AETA	15-min	1986 Puget Sound AET	Microtox (Photobacterium phosphoreum)		1		Bellar et al. 1986
184 +/-318	NE	Southern California	COA	10-d	Not significantly toxic (23.2% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988

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Pyrene	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
216	+/-102	NE	San Francisco Bay, CA	COA	48-h	Least toxic (23.3+/-7.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
220		*	Puget Sound, WA	AETA	48-h	1986 Puget Sound AET	Crassostrea gigas (oyster)	LAR	1		Bellar et al. 1986
260		NE	Burrard Inlet, BC	SQO		Sediment Quality Objectives	Aquatic biota				Swain & Nijman 1991
271	+/-25.5	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-7.99% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.14+/-0.352	6.09+/-5.38	Bricker et al. 1993
287		*	Puget Sound, WA	AETA	10-d	1986 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT	1		Bellar et al. 1986
305	+/-49	NE	Tampa Bay, FL	COA	1-h	Least toxic (79.4+/-9.9% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.45+/-0.587		Long 1993
314	+/-46.1	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.5+/-11.4% mortality)	Mulinia lateralis (bivalve)	LAR	2.33+/-0.364	26.8+/-9.42	Bricker et al. 1993
317	+/-400	NE	Narragansett Bay, RI	COA	10-d	Not significantly toxic (5.28+/-3.04% mortality))	Ampelisca abdita (amphipod)	ADT			Munns et al. 1991
328	+/-47.6	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.061+/-0.038 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.8+/-0.477	8.52+/-10.7	Bricker et al. 1993
335	+/-44.7	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (39.5+/-18.2% mortality)	Ampelisca abidta (amphipod)	SUB ADT	2.06+/-0.523	20.1+/-13.9	Bricker et al. 1993
348	+/-77.3	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.3+/-2.22% normal development)	Mulinia lateralis (bivalve)	LAR	2.18+/-0.531	19.1+/-12.5	Bricker et al. 1993
350		*	Eagle Harbor, WA	COA	4-d	LC50	Rhepoxynius abronius (amphipod)	ADT			Swartz et al. 1989
353	+/-362	NE	Jetty Island Pier, Everett Marina, WA	COA	10-d	Not toxic (12.3+/-2.87% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.08+/-0.66		Hart Crowser & Associates Inc. 1986
384	+/-160	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (19.3+/-5.86% mortality)	Ampelisca abidta (amphipod)	SUB ADT	1.82+/-0.225	6.3+/-6.2	Bricker et al. 1993
394	+/-241	NE	Tampa Bay, FL	COA	10-d	Not significantly toxic (14.6+/-7.67% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.63+/-0.596		Long 1993
419	+/-207	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (15.2+/-9.21% mortality)	Mulinia lateralis (bivalve)	LAR	2.17+/-0.663	18.4+/-19.9	Bricker et al. 1993
421	+/-220	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.014+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.51+/-0.45	29.6+/-15.7	Bricker et al. 1993
423	+/-102	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.125+/-0.084 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.25+/-0.468	1.98+/-2.25	Bricker et al. 1993
430		NE	Puget Sound, WA	AETA		PSDDA Screening level concentration	Aquatic biota				USACOE 1988
434	+/-442	NE	Commencement Bay, WA	COA	48-h	Least toxic (15.1+/-3.1% abnormality)	Oyster	LAR			Tetra Tech 1985
438	+/-322	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.167+/-0.198 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.59+/-1.09	4.67+/-6.99	Bricker et al. 1993
446	+/-645	NE	Oahu, Hawaii	COA	10-d	Not significantly toxic (7.2+/-1.89% mortality)	Eohaustorius estuarius (amphipod)	ADT	1.93+/-1.94	10.3+/-12.4	Lamberson et al. 1993
446	+/-645	NE	Oahu, Hawaii	COA	10-d	Not significantly toxic (10.1+/-4.01% mortality)	Corophium acherusicum (amphipod)	ADT	1.93+/-1.94	10.3+/-12.4	Lamberson et al. 1993
<476	+/-504	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (6.8+/-7.31% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
<476	+/-504	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (8.5+/-6.06% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
<476	+/-504	NE	Halifax Harbour, NS	COA	20-d	Not significantly toxic (0.7+/-1.63% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
478	+/-132	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (25.9+/-5.01% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.21+/-0.444	2.41+/-2.32	Bricker et al. 1993
>487		-	Puget Sound, WA	AETA		1986 Puget Sound AET	Benthic species		1		Bellar et al. 1986
490		*	California	AETA	48-h	California AET Values	Mytilus edulis (bivalve)	LAR			Becker et al. 1990
490		*	Northern California	AETA		Northern California AET Values	Benthic species				Becker et al. 1990
490		NC	Puget Sound, WA	COA	2-d	Significantly toxic (3.8% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.5		Pastorok & Becker 1990
501	+/-358	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (12.3+/-14.5% mortality)	Mulinia lateralis (bivalve)	LAR	1.53+/-0.743	15.7+/-23.2	Bricker et al. 1993
501	+/-386	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.096+/-0.101 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.37+/-0.759	6.93+/-6.83	Bricker et al. 1993
519	+/-437	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99.3+/-0.827% normal development)	Mulinia lateralis (bivalve)	LAR	1.43+/-0.738	14.7+/-24	Bricker et al. 1993
523	+/-444	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.074+/-0.043 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.27+/-0.626	6.21+/-5.41	Bricker et al. 1993
527	+/-446	NE	Burrard Inlet, BC	COA	10-d	Not toxic (4.5+/-3.02% emergence)	Rhepoxynius abronius (amphipod)	ADT	2.66+/-2.15		McLeay et al. 1991
527	+/-446	NE	Burrard Inlet, BC	COA	10-d	Not toxic (5.21+/-3.61% emergence)	Corophium volutator (amphipod)	ADT	3.18+/-2.1		McLeay et al. 1991
532	+/-372	*	Southern California	COA	10-d	Significantly toxicity (51.7% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
597	+/-434	SG	Tampa Bay, FL	COA	1-h	Moderately toxic (15.3+/-10.6% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.94+/-0.908		Long 1993
610	+/-570	NE	Tampa Bay, FL	COA		Not significantly toxic (EC50; 0.066+/-0.033 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.89+/-0.902		Long 1993
612	+/-668	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-6.07% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.71+/-0.9	15.3+/-23.2	Bricker et al. 1993
616	+/-483	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (96+/-1.66% normal development)	Mulinia lateralis (bivalve)	LAR	2.52+/-0.997	35+/-42.9	Bricker et al. 1993

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638 +/-461	*	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (30.5+/-16.4% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.62+/-0.777	17.7+/-26.3	Bricker et al. 1993
649 +/-589	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (6.48+/-10.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
649 +/-589	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99+/-0.862% normal development)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
662 +/-522	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (17+/-16.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.99+/-1	21.6+/-24.5	Bricker et al. 1993
665	*	United States	SLCA		National Screening Level Concentration-Marine	Benthic species		1		Neff et al. 1987
696 +/-544	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.1+/-2.78% normal development)	Mulinia lateralis (bivalve)	LAR	2.12+/-1.04	22.9+/-23.7	Bricker et al. 1993
700	*	California	AETA		California AET Values	Benthic species				Becker et al. 1990
700	*	Southern California	AETA		Southern California AET Values	Benthic species				Becker et al. 1990
701 +/-866	NE	San Francisco Bay, CA	COA	10-d	Least toxic (18+/-6.6% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
724 +/-939	*	San Francisco Bay, CA	COA	48-h	Moderately toxic (59.4+/-11.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
743 +/-902	NE	San Francisco Bay, CA	COA	10-d	Not significantly toxic (18.4+/-6.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
773 +/-892	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (6.67+/-8.07% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.51+/-0.330		Pastorok & Becker 1990
777 +/-908	SG	San Francisco Bay, CA	COA	10-d	Highly toxic (67+/-11.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
792 +/-610	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (34.9+/-15.7% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.23+/-1.04	25.4+/-25.5	Bricker et al. 1993
806 +/-975	SG	San Francisco Bay, CA	COA	48-h	Significantly toxic (55.7+/-22.7% abnormal)	Bivalve	LAR			Long & Morgan 1990
828 +/-740	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (13.8+/-4.09% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.47+/-0.306		Pastorok & Becker 1990
830 +/-806	*	Jetty Island Pier, Everett Marina, WA	COA	10-d	Toxic (19.5+/-0.707% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.15+/-0.071		Hart Crowser & Associates Inc. 1986
>840	-	Southern California	AETA	10-d	Southern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
850	*	United States	EqPA		99% Chronic Marine Criteria	Aquatic organisms		1		Pavlou et al. 1987
854 +/-951	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.016+/-0.007 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.26+/-0.936	43.4+/-35.6	Bricker et al. 1993
865 +/-719	NC	Commencement Bay, WA	COA	10-d	Moderately toxic (26+/-5.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
892 +/-821	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (23+/-4.24% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.46+/-1.22	40+/-55.1	Bricker et al. 1993
896 +/-870	SG	San Francisco Bay, CA	COA	10-d	Significantly toxic (42.9+/-19.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
910 +/-657	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (29.8+/-13.9% mortality)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.07	32.1+/-28.4	Bricker et al. 1993
910 +/-683	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.013+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.79+/-0.744	37.6+/-25.3	Bricker et al. 1993
920 +/-954	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (23.3+/-6.14% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.738		Word et al. 1988
941 +/-793	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.1+/-13.3% mortality)	Mulinia lateralis (bivalve)	LAR	2.68+/-0.955	31.8+/-24.4	Bricker et al. 1993
969 +/-942	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (10.4+/-6.3% mortality)	Nephtys caecoides (polychaete)		1.63+/-0.657		Word et al. 1988
969 +/-942	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (0.2+/-0.6% mortality)	Macoma nasuta (clam)		1.63+/-0.657		Word et al. 1988
978 +/-996	NE	Commencement Bay, WA	COA	10-d	Least toxic (12.5+/-4.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
979 +/-581	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (96.6+/-3.79% normal development)	Mulinia lateralis (bivalve)	LAR	2.87+/-0.94	35.1+/-25.9	Bricker et al. 1993
987 +/-1122	NE	Laboratory	SSBA	~4-m	No significant change in kidney MFO induction	Pseudopleuronectes americanus (flounder)	ADT			Payne et al. 1988
988 +/-581	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (38+/-13% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.92+/-0.937	34.6+/-23.9	Bricker et al. 1993
1068 +/-405	NC	Elizabeth River, VA	COA	96-h	Significantly toxic (50.7+/-39% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
1078 +/-806	*	Commencement Bay, WA	COA	48-h	Moderately toxic (23+/-2.3% abnormality)	Oyster	LAR			Tetra Tech 1985
1110 +/-904	*	San Francisco Bay, CA	COA	10-d	Moderately toxic (33.8+/-4.7% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
1111 +/-1105	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (91.5+/-7.28% normal development)	Mulinia lateralis (bivalve)	LAR	2.6+/-0.899	36.8+/-34.9	Bricker et al. 1993
1115 +/-399	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (75.1+/-10.6% mortality)	Mulinia lateralis (bivalve)	LAR	3.32+/-0.317	42.3+/-19.2	Bricker et al. 1993
1148 +/-543	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.011+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.28+/-0.363	45.3+/-21.4	Bricker et al. 1993
1165 +/-1003	SG	Oakland Harbor, CA	COA	10-d	Significantly toxic (35.3+/-2.5% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.56+/-0.07		Word et al. 1988
1246 +/-1322	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (21.5+/-6.36% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.35+/-1.05	10.5+/-13.4	Bricker et al. 1993
1278 +/-2197	NE	Elizabeth River, VA	COA	96-h	No significant change in respiration rate	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987

Table 24. A summary of the available data on the biological effects associated with sediment-sorbed PYRENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Pyrene	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
1346	+/-838	SG	Elizabeth River, VA	COA	96-h	Significant decrease in respiration rates	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
1384	+/-1051	NE	Laboratory	SSBA	~4-m	No significant change in spleen condition indices	Pseudopleuronectes americanus (flounder)	ADT			Payne et al. 1988
1396	+/-1621	NE	Elizabeth River, VA	COA	96-h	Not significantly toxic (4.5+/-3.24% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
1398			***PEL***								
1439	+/-1050	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.008+/-0.001 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.19+/-1.27	12+/-11.3	Bricker et al. 1993
1442	+/-1383	*	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (88.5+/-8.39% normal development)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.05	38.1+/-38.9	Bricker et al. 1993
<1486	+/-1082	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (5.2+/-3.5% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
<1486	+/-1082	NE	Halifax Harbour, NS	COA	20-d	Not significantly toxic (1+/-2% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
1538	+/-1501	*	Commencement Bay, WA	COA	48-h	Highly toxic (44.5+/-19% abnormality)	Oyster	LAR			Tetra Tech 1985
1580	+/-1489	*	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (51.3+/-6.95% mortality)	Mulinia lateralis (bivalve)	LAR	1.8+/-1.71	29.6+/-46.3	Bricker et al. 1993
1820	+/-2252	*	Commencement Bay, WA	COA	10-d	Highly toxic (78.5+/-19.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
1900		*	United States	EqPA		95% Chronic Marine Criteria	Aquatic organisms		1		Pavlou et al. 1987
1900		*	Puget Sound, WA	SQG		Low Abundance Threshold Concentration	Praxillella gracilis (polycheata)		3.0		Tetra Tech 1986
1900		*	Puget Sound, WA	SQG		Low Abundance Threshold Concentration	Euphilomedes producta (ostracoda)		7.0		Tetra Tech 1986
1980	+/-283	*	Laboratory	SSBA	~4-m	Significant change in liver somatic indices	Pseudopleuronectes americanus (flounder)	ADT			Payne et al. 1988
<1980	+/-540	*	Halifax Harbour, NS	COA	10-d	Significantly toxic (61.7+/-12.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
2180		*	Laboratory	SSBA	~4-m	Significant increase in kidney MFO induction	Pseudopleuronectes americanus (flounder)	ADT			Payne et al. 1988
2188	+/-776	*	San Francisco Bay, CA	COA	48-h	Highly toxic (92.4+/-4.5% abnormal)	Bivalve	LAR			Long & Morgan 1990
2600		*	Puget Sound, WA	AETA	15-min	1988 Puget Sound AET	Microtox (Photobacterium phosphoreum)				PTI 1988
2600		*	San Francisco Bay, CA	AETA	10-d	San Francisco Bay AET	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
2600		*	Northern California	AETA	10-d	Northern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
2600		*	California	AETA	10-d	California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
2930	+/-3330	*	Tampa Bay, FL	COA	1-h	Most toxic (0.091+/-0.187% fertilization)	Arbacia punctulata (sea urchin)	GAM	2.96+/-1.49		Long 1993
3300		*	Puget Sound, WA	AETA	48-h	1988 Puget Sound AET	Crassostrea gigas (oyster)	LAR			PTI 1988
3300		*	Puget Sound, WA	SQG		Low Abundance Threshold Concentration	Nucula tenuis (pelecypoda)		4.0		Tetra Tech 1986
3395	+/-5748	NE	Burrard Inlet, BC	COA	10-d	Not toxic (8.9+/-2.99% mortality)	Corophium volutator (amphipod)	ADT	2.8+/-1.96		McLeay et al. 1991
3395	+/-5748	NE	Burrard Inlet, BC	COA	10-d	Not toxic (97.2+/-2.84% reburial)	Rhepoxynius abronius (amphipod)	ADT	2.8+/-1.96		McLeay et al. 1991
3400		*	San Francisco Bay, CA	AETA	48-h	San Francisco Bay AET	Oyster; mussel	LAR			Long & Morgan 1990
3930	+/-3410	*	Tampa Bay, FL	COA	10-d	Significantly toxic (35.2+/-17.5% mortality)	Ampelisca abdita (amphipod)	SUB ADT	3.53+/-1.35		Long 1993
4160	+/-3640	*	Tampa Bay, FL	COA		Significantly toxic (EC50; 0.017+/-0.012 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.47+/-1.49		Long 1993
4520	+/-6478	NE	Burrard Inlet, BC	COA	10-d	Not toxic (7.9+/-5.12% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.64+/-2.14		McLeay et al. 1991
5963	+/-10429	NE	Puget Sound, WA	COA	20-d	Not significantly toxic (5+/-3.86% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.46+/-0.26		Pastorok & Becker 1990
7204	+/-11200	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (4.43+/-2.1% mortality)	Panope generosa (geoduck)	JUV	1.51+/-0.261		Pastorok & Becker 1990
7300		*	Puget Sound, WA	AETA		PSDDA Maximum Level Criteria	Aquatic biota				USACOE 1988
10000		*	Puget Sound, WA	SQG		Chemical Criteria	Benthic community		1		WDE 1989
11377	+/-9095	*	Puget Sound, WA	COA		Toxic (71.6+/-14.6% prevalence of idiopathic degeneration/necrosis)	Parophrys vetulus (English sole)				Malins et al. 1985
11377	+/-9095	*	Puget Sound, WA	COA		Toxic (51.4+/-21.1% prevalence of steatosis and hemosiderosis)	Parophrys vetulus (English sole)				Malins et al. 1985
11377	+/-9095	*	Puget Sound, WA	COA		Toxic (19+/-6.15% prevalence of hepatocellular regenerative foci)	Parophrys vetulus (English sole)				Malins et al. 1985
11377	+/-9095	*	Puget Sound, WA	COA		Toxic (26.7+/-6.43% prevalence of hepatic neoplasms)	Parophrys vetulus (English sole)				Malins et al. 1985
11377	+/-9095	*	Puget Sound, WA	COA		Toxic (88+/-3.65% prevalence of hepatic idiopathic lesions)	Parophrys vetulus (English sole)				Malins et al. 1985
11377	+/-9095	*	Puget Sound, WA	COA		Toxic (44.2+/-8.5% prevalence of hepatic cellular alterations)	Parophrys vetulus (English sole)				Malins et al. 1985
12000		*	Burrard Inlet, BC	COA	10-d	Highly toxic (23% emergence)	Corophium volutator (amphipod)	ADT	3.5		McLeay et al. 1991

Table 24. A summary of the available data on the biological effects associated with sediment-sorbed PYRENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Pyrene	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
12000		*	Burrard Inlet, BC	COA	10-d	Highly toxic (30.5% emergence)	Rhepoxynius abronius (amphipod)	ADT	3.5		McLeay et al. 1991
13648	+/-24109	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (2.09+/-1.73% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.56+/-0.329		Pastorok & Becker 1990
15117	+/-23685	*	Puget Sound, WA	COA	15-min	Significantly toxic (EC50; 0.065+/-0.043% extract)	Microtox (Photobacterium phosphoreum)		1.58+/-0.255		Pastorok & Becker 1990
16000		*	Puget Sound, WA	AETA		1988 Puget Sound AET	Benthic community				PTI 1988
16000		*	Puget Sound, WA	AETA	10-d	1988 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT			PTI 1988
19690	+/-26032	*	Puget Sound, WA	COA	2-d	Significantly toxic (60.4+/-46.5% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.57+/-0.287		Pastorok & Becker 1990
29067	+/-27707	*	Puget Sound, WA	COA	10-d	Significantly toxic (80.8+/-30.6% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.266		Pastorok & Becker 1990
<33303	+/-47090	NE	Sidney Tar Pond, NS	COA	20-d	Not significantly toxic (8+/-5.66% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
36767	+/-40249	*	Puget Sound, WA	COA	20-d	Significantly toxic (37.3+/-22% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.87+/-0.208		Pastorok & Becker 1990
49500		*	United States	EqPA		EPA Acute Marine EP Threshold	Aquatic biota		1		Lyman et al. 1987
49500		*	United States	EqPA		Chronic Marine EqP Threshold	Aquatic biota		1		Bolton et al. 1985
66600		*	Sidney Tar Pond, NS	COA	10-d	Significantly toxic (100% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
66600		*	Sidney Tar Pond, NS	COA	10-d	Significantly toxic (100% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
81000		*	Puget Sound, WA	COA	10-d	Significantly toxic (56% mortality)	Panope generosa (geoduck)	JUV	2.1		Pastorok & Becker 1990
330000		*	Sidney Tar Pond, NS	COA	20-d	Significantly toxic (52% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990

Table 25. A summary of the available data on the biological effects associated with sediment-sorbed TOTAL HIGH MOLECULAR WEIGHT PAHs (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Total HMW PAHs Std Dev		Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.92		NC	Mobile Bay, AL	COA		Significantly toxic (10% mortality)	Mysidopsis bahia (mysid shrimp)		0.009	0.004	EMAP Louisiana Province 1991
2.58	+/-0.042	NE	Apalachee Bay, FL	COA	10-d	Not significantly toxic (3.3+/-3.25% mortality)	Ampelisca abdita (amphipod)		0.643+/-0.455	0.390+/-0.410	EMAP Louisiana Province 1991
2.8	+/-0.422	NE	Apalachee Bay, FL	COA		Not significantly toxic (0.75+/-1.5% mortality)	Mysidopsis bahia (mysid shrimp)		0.540+/-0.385	0.405+/-0.417	EMAP Louisiana Province 1991
3.02	+/-0.587	SG	Apalachee Bay, FL	COA	10-d	Significantly toxic (15.6% mortality)	Ampelisca abdita (amphipod)		0.438+/-0.442	0.421+/-0.593	EMAP Louisiana Province 1991
5.86	+/-5.87	NC	Mississippi Sound, MS	COA	10-d	Significantly toxic (11.6+/-3.39% mortality)	Ampelisca abdita (amphipod)		0.111+/-0.045	0.03	EMAP Louisiana Province 1991
11		NC	Gulf of Mexico	COA		Most toxic (100 TU/g)	Microtox (Photobacterium phosphoreum)		0.4		Chapman et al. 1991
11.5	+/-5.65	NE	Chandeleur Sound, LA	COA		Not significantly toxic (1.03+/-2.05% mortality)	Mysidopsis bahia (mysid shrimp)		0.824+/-0.915	1.69+/-0.920	EMAP Louisiana Province 1991
14.8	+/-7.21	NC	Chandeleur Sound, LA	COA	10-d	Significantly toxic (11.5+/-4.86% mortality)	Ampelisca abdita (amphipod)		0.811+/-0.711	1.87+/-0.973	EMAP Louisiana Province 1991
19.3	+/-12.7	NC	Gulf of Mexico	COA	10-d	Significantly toxic (41.75+/-38.9% mortality)	Rhepoxynius abronius (amphipod)	ADT	0.45+/-0.058		Chapman et al. 1991
24.9	+/-15.4	*	Chandeleur Sound, LA	COA		Significantly toxic (7.6+/-1.32% mortality)	Mysidopsis bahia (mysid shrimp)		0.624+/-0.197	2.07+/-1.19	EMAP Louisiana Province 1991
26	+/-13	NE	Gulf of Mexico	COA	10-d	Not toxic (0.36+/-0.261% emergence/d)	Rhepoxynius abronius (amphipod)	ADT	0.42+/-0.13		Chapman et al. 1991
26.8	+/-16	NE	Gulf of Mexico	COA	48-h	Not significantly toxic (7.76+/-1.89% abnormality)	Crassostrea gigas (oyster)	LAR	0.425+/-0.128		Chapman et al. 1991
27.3	+/-20.9	NE	Chandeleur Sound, LA	COA	10-d	Not significantly toxic (2.87+/-4.05% mortality)	Ampelisca abdita (amphipod)		0.517+/-0.166	2.02+/-1.38	EMAP Louisiana Province 1991
27.8	+/-2.55	NE	Galveston Bay, TX	COA		High abundance (155+/-49.5 N/0.00203 sq.m.)	Oligochaeta		1.2+/-1.27	4.27+/-3.85	Carr 1992
28.1	+/-16.8	NE	Gulf of Mexico	COA	48-h	Not toxic (4.54+/-5.37% mortality)	Crassostrea gigas (oyster)	LAR	0.443+/-0.127		Chapman et al. 1991
33.5	+/-14.5	NE	Galveston Bay, TX	COA		High abundance (27.3+/-10 N/0.00203 sq.m.)	Mollusca		1.64+/-0.4	1.39+/-0.17	Carr 1992
49.6	+/-34.4	NE	Galveston Bay, TX	COA		High species richness (24.5+/-3.7 S/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
49.6	+/-34.4	NE	Galveston Bay, TX	COA		High abundance (359+/-92.8 N/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
50		NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (3% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
50		NE	Sidney Tar Pond, NS	COA	10-d	Not significantly toxic (3% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
55		NE	Sidney Tar Pond, NS	COA	10-d	Not significantly toxic (4% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
60.8	+/-26.8	NC	Mississippi Sound, MS	COA		Significantly toxic (12.2+/-4.42% mortality)	Mysidopsis bahia (mysid shrimp)		0.939+/-0.335	2.63+/-2.3	EMAP Louisiana Province 1991
68.7	+/-32.1	NE	Galveston Bay, TX	COA		High abundance (156+/-22.9 N/0.00203 sq.m.)	Polychaeta		0.916+/-0.661	2.94+/-2.3	Carr 1992
70.6	+/-76.6	NE	Galveston Bay, TX	COA		High abundance (16.2+/-6.19 N/0.00203 sq.m.)	Copepoda		0.844+/-0.524	4.73+/-3.1	Carr 1992
73.7		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (0.33+/-0.516% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
73.7		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (2.33+/-1.03% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
73.7		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (15.3+/-11.0% mortality)	Hyalella azteca (amphipod)	JUV	0.648+/-0.641	1.74+/-1.39	Hall et al. 1992
73.7		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1% mortality)	Streblospio benedicti (polychaete worm)		1.38	3.25	Hall et al. 1992
73.7		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (16.5+/-9.19% mortality)	Streblospio benedicti (polychaete worm)		0.783+/-0.845	4.83+/-2.23	Hall et al. 1992
73.7		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.367+/-0.085 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
73.7		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.0005 mg/day growth)	Streblospio benedicti (polychaete worm)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
73.7		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.003+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.316+/-0.120	2.13+/-2.46	Hall et al. 1992
73.7		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (7.2+/-1.92% mortality)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
73.7		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.6+/-0.55% reburial)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
73.7		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
73.7		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
73.7		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.001+/-0.001 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.555+/-0.471	2.68+/-2.3	Hall et al. 1992
73.7		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1.83+/-1.6% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
73.7		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (3.5+/-1.87% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
73.7		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (9.25+/-5.32% mortality)	Lepidactylus dytiscus (amphipod)		0.638+/-0.768	1.65+/-1.62	Hall et al. 1992
73.7		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (22.3+/-7.37% mortality)	Hyalella azteca (amphipod)	JUV	0.788+/-0.866	2.04+/-1.75	Hall et al. 1992
73.7		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (8.8+/-7.12% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992

Table 25. A summary of the available data on the biological effects associated with sediment-sorbed TOTAL HIGH MOLECULAR WEIGHT PAHs (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Total HMW PAHs Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
73.7	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (14+/-9.22% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
73.7	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.1+/-0.865% reburial)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
73.7	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<20% emergence)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
73.7	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
73.7	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (-0.057+/-0.04 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
73.7	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.001mg/day growth)	Streblospio benedicti (polychaete worm)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
73.7	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.016 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
73.7	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.005+/-0.0004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
73.7	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (55.0+/-22.6% mortality)	Hyalella azteca (amphipod)	JUV	0.338+/-0.133	2.9+/-3.11	Hall et al. 1992
73.7	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29.8+/-11.1% mortality)	Streblospio benedicti (polychaete worm)		0.316+/-0.12	2.13+/-2.46	Hall et al. 1992
73.7	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (55.0+/-19.5% mortality)	Streblospio benedicti (polychaete worm)		0.349+/-0.11	1.07+/-0.66	Hall et al. 1992
73.7	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.003 mg/day growth)	Lepidactylus dytiscus (amphipod)		1.38	3.25	Hall et al. 1992
73.7	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29% mortality)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
73.7	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (89.7% reburial)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
73.7	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
73.7	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	6.41	Hall et al. 1992
73.7	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
73.7	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (45.5+/-12% mortality)	Lepidactylus dytiscus (amphipod)		0.383+/-0.279	3.61+/-2.79	Hall et al. 1992
73.7	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (63.0+/-24.3% mortality)	Hyalella azteca (amphipod)	JUV	0.317+/-0.228	2.57+/-2.67	Hall et al. 1992
73.7	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (22% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
73.7	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (28% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
73.7	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (82.9% reburial)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
73.7	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>20% emergence)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
73.7	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	5.58	Hall et al. 1992
73.7	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.008+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.4	Hall et al. 1992
73.7	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.003 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
74.5 +/-61.6	NE	Matagorda Bay, TX	COA		Not significantly toxic (1.58+/-1.82% mortality)	Mysidopsis bahia (mysid shrimp)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
74.5 +/-61.6	NE	Matagorda Bay, TX	COA	10-d	Not significantly toxic (2.33+/-4.65% mortality)	Ampelisca abdita (amphipod)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
75.9 +/-82.2	NE	Galveston Bay, TX	COA	48-h	Not toxic (98.1+/-1.79% normal development)	Arbacia punctulata (sea urchin)	EMB	.748+/-0.476	4.16+/-3.45	Carr 1992
77 +/-108	NC	Mobile Bay, AL	COA	10-d	Significantly toxic (46+/-49.3% mortality)	Ampelisca abdita (amphipod)		0.22+/-0.298	3.84+/-5.43	EMAP Louisiana Province 1991
80.6 +/-72.9	NE	Mississippi Sound, MS	COA		Not significantly toxic (0.789+/-1.59% mortality)	Mysidopsis bahia (mysid shrimp)		0.827+/-0.757	1.46+/-1.58	EMAP Louisiana Province 1991
86.9 +/-59.8	NE	Mississippi Sound, MS	COA	10-d	Not significantly toxic (1.4+/-1.73% mortality)	Ampelisca abdita (amphipod)		0.998+/-0.602	2.01+/-1.82	EMAP Louisiana Province 1991
121 +/-188	NE	Galveston Bay, TX	COA	1-h	Not toxic (92.5+/-6.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	0.77+/-0.448	6.37+/-6.58	Carr 1992
145 +/-200	*	Galveston Bay, TX	COA		Low abundance (4.21+/-5.66 N/0.00203 sq.m.)	Oligochaeta		0.895+/-0.453	7.85+/-8.8	Carr 1992
161 +/-26.9	NE	Mobile Bay, AL	COA		Not significantly toxic (1.07+/-1.85% mortality)	Mysidopsis bahia (mysid shrimp)		0.968+/-0.815	8.23+/-3.4	EMAP Louisiana Province 1991
165 +/-36.9	NE	Mobile Bay, AL	COA	10-d	Not significantly toxic (0.5+/-0.778% mortality)	Ampelisca abdita (amphipod)		1.24+/-0.948	8.51+/-4.76	EMAP Louisiana Province 1991
183 +/-144	NC	Mississippi River, MS, LA	COA	10-d	Significantly toxic (15.9+/-6.65% mortality)	Ampelisca abdita (amphipod)		1.22+/-0.717	0.235+/-0.276	EMAP Louisiana Province 1991
189 +/-196	NC	Galveston Bay, TX	COA	10-d	Significantly toxic (15.8+/-3.89% mortality)	Ampelisca abdita (amphipod)		0.647+/-0.606	0.160+/-0.184	EMAP Louisiana Province 1991
198 +/-557	NE	Gulf of Mexico	COA		Not toxic (3.21+/-0.239 diversity index)	Benthic species		0.464+/-0.143		Chapman et al. 1991
212 +/-186	NE	Mississippi River, MS, LA	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		1.3+/-0.83	1.14+/-1	EMAP Louisiana Province 1991
214 +/-544	NC	Galveston Bay, TX	COA		Low abundance (0.3+/-0.651 N/0.00203 sq.m.)	Amphipoda		0.859+/-0.487	7.67+/-8.12	Carr 1992
216 +/-298	NC	Galveston Bay, TX	COA		Significantly toxic (13.4+/-9.11% mortality)	Mysidopsis bahia (mysid shrimp)		0.778+/-0.482	1.21+/-0.778	EMAP Louisiana Province 1991

Table 25. A summary of the available data on the biological effects associated with sediment-sorbed TOTAL HIGH MOLECULAR WEIGHT PAHs (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Total HMW PAHs Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
217 +/-584	NE	Gulf of Mexico	COA		Least toxic (6.32+/-3.68 TU/g)	Microtox (Photobacterium phosphoreum)		0.47+/-0.149		Chapman et al. 1991
217 +/-272	NE	Galveston Bay, TX	COA		High Abundance (6+/-1.41 N/0.00203 sq.m.)	Amphipoda		0.955+/-0.629	7.21+/-8.2	Carr 1992
227 +/-154	NE	Galveston Bay, TX	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		0.934+/-0.657	0.457+/-0.530	EMAP Louisiana Province 1991
233 +/-553	*	Galveston Bay, TX	COA		Low abundance (1.86+/-2.59 N/0.00203 sq.m.)	Mollusca		0.784+/-0.421	8.29+/-8.13	Carr 1992
236 +/-68.2	SG	Mississippi River, MS, LA	COA		Significantly toxic (32.9+/-36.4% mortality)	Mysidopsis bahia (mysid shrimp)		1.07+/-0.924	1.41+/-1.93	EMAP Louisiana Province 1991
238 +/-563	*	Galveston Bay, TX	COA		Low species richness (10+/-3.73 S/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
238 +/-563	*	Galveston Bay, TX	COA		Low abundance (89+/-60.7 N/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
238 +/-247	NE	Galveston Bay, TX	COA	10-d	Not significantly toxic (1.35+/-1.45% mortality)	Ampelisca abdita (amphipod)		0.961+/-0.537	1.17+/-0.640	EMAP Louisiana Province 1991
263 +/-606	*	Galveston Bay, TX	COA		Low abundance (41.7+/-21.8 N/0.00203 sq.m.)	Polychaeta		0.848+/-0.427	9.21+/-8.61	Carr 1992
266 +/-110	NE	Mississippi River, MS, LA	COA	10-d	Not significantly toxic (7.8+/-1.63% mortality)	Ampelisca abdita (amphipod)		1.15+/-1.04	2.31+/-0.651	EMAP Louisiana Province 1991
301 +/-696	NE	Gulf of Mexico	COA	10-d	Not significantly toxic (9+/-3.96% mortality)	Rhepoxynius abronius (amphipod)	ADT	0.471+/-0.18		Chapman et al. 1991
312 +/-673	*	Galveston Bay, TX	COA		Low abundance (2.05+/-1.58 N/0.00203 sq.m.)	Copepoda		0.879+/-0.47	9.63+/-9.65	Carr 1992
342 +/-753	SG	Gulf of Mexico	COA	10-d	Highly toxic (2.5+/-1.05% emergence/d)	Rhepoxynius abronius (amphipod)	ADT	0.5+/-0.155		Chapman et al. 1991
360 +/-285	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (5.8+/-3.7% mortality)	Rhepoxynius abronius (amphipod)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
360 +/-285	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (3.4+/-1.82% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
360 +/-285	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (11.2+/-3.7% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
360 +/-285	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (3.52+/-1.66% mortality)	Macoma nasuta (clam)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
464 +/-821	*	Galveston Bay, TX	COA	48-h	Toxic (4.65+/-16.1% normal development)	Arbacia punctulata (sea urchin)	EMB	1.06+/-0.449	14.5+/-9.2	Carr 1992
497 +/-922	*	Gulf of Mexico	COA	48-h	Highly toxic (59.4+/-15.5% mortality)	Crassostrea gigas (oyster)	LAR	0.5+/-0.18		Chapman et al. 1991
540	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (18% mortality)	Ampelisca abdita (amphipod)		0.028	9 ug/g	Windom In Prep
554 +/-1172	*	Galveston Bay, TX	COA		Moderate abundance (58.3+/-16.2 N/0.00203 sq.m.)	Oligochaeta		0.632+/-0.274	7.93+/-5.6	Carr 1992
565	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (0% mortality)	Arbacia punctulata (sea urchin)		0.03	19 ug/g	Windom In Prep
608 +/-26	NE	Brunswick Harbor Entrance, GA	COA	48-h	Not significantly toxic (86.6+/-4.25% normal development)	Arbacia punctulata (sea urchin)		0.181+/-0.162	182+/-208 ug/g	Windom In Prep
615 +/-26	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (28.3+/-6.11% mortality)	Mysidopsis bahia (mysid)		0.246+/-0.051	127+/-24 ug/g	Windom In Prep
632 +/-82.4	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (91.3+/-2.91% normal development)	Arbacia punctulata (sea urchin)		0.299+/-0.251	114+/-68.4 ug/g	Windom In Prep
637 +/-91.3	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (9.78+/-5.33% mortality)	Mysidopsis bahia (mysid)		0.24+/-0.247	91.9+/-73.4 ug/g	Windom In Prep
639 +/-97.4	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (4+/-2.83% mortality)	Menidia beryllina (silverside)		0.243+/-0.264	90.5+/-78.4 ug/g	Windom In Prep
641 1134	*	Galveston Bay, TX	COA	1-h	Toxic (20.4+/-18.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	1.26+/-0.47	14.6+/-10.1	Carr 1992
643 +/-84.2	SG	Savannah River Entrance Channel, GA	COA	48-h	Significantly toxic (25.4+/-7.66% mortality)	Arbacia punctulata (sea urchin)		0.344+/-0.242	129.5+/-59.3 ug/g	Windom In Prep
648 +/-112	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (27.5+/-10.6% mortality)	Mysidopsis bahia (mysid)		0.237+/-0.311	74.6+/-85.5 ug/g	Windom In Prep
649 +/-89.6	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (11.6+/-4.33% mortality)	Ampelisca abdita (amphipod)		0.267+/-0.25	102+/-71.1 ug/g	Windom In Prep
654 +/-427	NC	Galveston Bay, TX	COA		Low abundance (53+/-33.9 N/0.00203 sq.m.)	Benthic invertebrates		0.985+/-0.247	22+/-11.2	Carr 1992
655		***TEL***								
656 +/-1059	*	Gulf of Mexico	COA	48-h	Significantly toxic (32.6+/-14.2% abnormality)	Crassostrea gigas (oyster)	LAR	0.567+/-0.153		Chapman et al. 1991
670 +/-206	NE	Puget Sound, WA	COA	15-min	Not significantly toxic (EC50; 0.283+/-0.168% extract)	Microtox (Photobacterium phosphoreum)		1.39+/-0.37		Pastorok & Becker 1990
727 +/-1144	NE	Galveston Bay, TX	COA		Low species (11.2+/-1.94 S/0.00203 sq.m.)	Benthic species		0.642+/-0.356	13.4+/-8.65	Carr 1992
763 +/-1455	NE	Galveston Bay, TX	COA		High abundance (154+/-30.2 N/0.00203 sq.m.)	Benthic invertebrates		0.47+/-0.27	9.07+/-2.94	Carr 1992
786	NE	Puget Sound, WA	COA		Not toxic (10% prevalence of idiopathic degeneration/necrosis)	Parophrys vetulus (English sole)				Malins et al. 1985
786	NE	Puget Sound, WA	COA		Not toxic (17.5% prevalence of steatosis and hemosiderosis)	Parophrys vetulus (English sole)				Malins et al. 1985
786	NE	Puget Sound, WA	COA		Not toxic (0% occurrence of hepatic cellular alterations)	Parophrys vetulus (English sole)				Malins et al. 1985
786	NE	Puget Sound, WA	COA		Not toxic (5% prevalence of hepatocellular regenerative foci)	Parophrys vetulus (English sole)				Malins et al. 1985
786	NE	Puget Sound, WA	COA		Not toxic (0% prevalence of hepatic cellular alterations)	Parophrys vetulus (English sole)				Malins et al. 1985

Table 25. A summary of the available data on the biological effects associated with sediment-sorbed TOTAL HIGH MOLECULAR WEIGHT PAHs (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Total HMW PAHs	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
786		NE	Puget Sound, WA	COA		Not toxic (32.5% prevalence of hepatic idiopathic lesions)	Parophrys vetulus (English sole)				Malins et al. 1985
788	+/-446	NE	San Francisco Bay, CA	COA	48-h	Least toxic (23.3+/-7.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
800		*	Puget Sound, WA	AETA	15-min	1986 Puget Sound AET	Microtox (Photobacterium phosphoreum)		1		Bellar et al. 1986
815	+/-219	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (10.6+/-3.17% mortality)	Ampelisca abdita (amphipod)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
815	+/-219	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (8.00+/-2.92% mortality)	Mysidopsis bahia (mysid)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
826		NE	Southern California	COA	10-d	Not significantly toxic (23.2% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
836	+/-231	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (5.43+/-3.21% mortality)	Mysidopsis bahia (mysid)		1.21+/-1.13	9096+/-13378 ug/g	Windom In Prep
836	+/-231	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (9.61+/-2.7% mortality)	Menidia beryllina (silverside)		1.22+/-1.13	9172+/-13363 ug/g	Windom In Prep
900		SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (16% mortality)	Mysidopsis bahia (mysid)		1.8	7095 ug/g	Windom In Prep
900		SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (22.3% mortality)	Menidia beryllina (silverside)		1.71	6562 ug/g	Windom In Prep
981	+/-133	SG	Brunswick Harbor Entrance, GA	COA	48-h	Significantly toxic (14.6+/-18.9% normal development)	Arbacia punctulata (sea urchin)		1.99+/-0.562	14009+/-13434 ug/g	Windom In Prep
1084	+/-665	NC	San Francisco Bay, CA	COA	48-h	Moderately toxic (57.1+/-13.6% mortality)	Mussel	LAR	1.14+/-.33		Chapman et al. 1987a
1100	+/-1132	NE	Jetty Island Pier, Everett Marina, WA	COA	10-d	Not toxic (12.3+/-2.87% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.08+/-0.66		Hart Crowser & Associates Inc. 1986
1133		*	Puget Sound, WA	AETA	48-h	1986 Puget Sound AET	Crassostrea gigas (oyster)	LAR	1		Bellar et al. 1986
1160		*	Eagle Harbor, WA	COA	4-d	LC50	Rhepoxynius abronius (amphipod)	ADT			Swartz et al. 1989
1200		*	Puget Sound, WA	AETA	10-d	1986 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT	1		Bellar et al. 1986
1200		NE	Burrard Inlet, BC	SQO		Sediment Quality Objectives	Aquatic biota				Swain & Nijman 1991
1345	+/-459	NE	San Francisco Bay, CA	COA	4-wk	Least toxic (116+/-4.3 young produced)	Tigriopus californicus (copepod)	ADT	1.23+/-.09		Chapman et al. 1987a
1421	+/-1729	NC	San Francisco Bay, CA	COA	10-d	Moderately toxic (33.8+/-4.7% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
1480	+/-1630	SG	San Francisco Bay, CA	COA	48-h	Moderately toxic (59.4+/-11.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
1536	+/-1410	NE	San Francisco Bay, CA	COA	48-h	Least toxic (18+/-8.01% abnormal)	Mussel	LAR	1.2+/-.38		Chapman et al. 1987a
1700		*	California	AETA	48-h	California AET Values	Mytilus edulis (bivalve)	LAR			Becker et al. 1990
1700		*	Northern California	AETA		Northern California AET Values	Benthic species				Becker et al. 1990
1729	+/-211	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-7.99% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.14+/-0.352	6.09+/-5.38	Bricker et al. 1993
1740		NE	Burrard Inlet, BC	COA	10-d	Not toxic (4.5+/-3.02% emergence)	Rhepoxynius abronius (amphipod)	ADT	2.66+/-2.15		McLeay et al. 1991
1740		NE	Burrard Inlet, BC	COA	10-d	Not toxic (5.21+/-3.61% emergence)	Corophium volutator (amphipod)	ADT	3.18+/-2.1		McLeay et al. 1991
1800		NE	Puget Sound, WA	AETA		PSDDA Screening level concentration	Aquatic biota				USACOE 1988
1927	+/-3325	NE	San Francisco Bay, CA	COA	10-d	Least toxic (18+/-6.6% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
1996		NE	Narragansett Bay, RI	COA	10-d	Not significantly toxic (5.28+/-3.04% mortality))	Ampelisca abdita (amphipod)	ADT			Munns et al. 1991
2016	+/-197	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.5+/-11.4% mortality)	Mulinia lateralis (bivalve)	LAR	2.33+/-0.364	26.8+/-9.42	Bricker et al. 1993
2050	+/-49	NE	Tampa Bay, FL	COA	1-h	Least toxic (79.4+/-9.9% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.45+/-0.587		Long 1993
2085	+/-3696	NE	San Francisco Bay, CA	COA	10-d	Not significantly toxic (18.4+/-6.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
2085	+/-353	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.061+/-0.038 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.8+/-0.477	8.52+/-10.7	Bricker et al. 1993
2123	+/-292	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (39.5+/-18.2% mortality)	Ampelisca abidta (amphipod)	SUB ADT	2.06+/-0.523	20.1+/-13.9	Bricker et al. 1993
2225	+/-449	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.3+/-2.22% normal development)	Mulinia lateralis (bivalve)	LAR	2.18+/-0.531	19.1+/-12.5	Bricker et al. 1993
2330	+/-615	NE	Tampa Bay, FL	COA	10-d	Not significantly toxic (14.6+/-7.67% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.63+/-0.596		Long 1993
2373	+/-1836	SG	San Francisco Bay, CA	COA	48-h	Moderately toxic (25.1+/-6.61% abnormal)	Mussel	LAR	1.26+/-0.17		Chapman et al. 1987a
2394	+/-947	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (19.3+/-5.86% mortality)	Ampelisca abidta (amphipod)	SUB ADT	1.82+/-0.225	6.3+/-6.2	Bricker et al. 1993
2473	+/-3695	NE	Oahu, Hawaii	COA	10-d	Not significantly toxic (7.2+/-1.89% mortality)	Eohaustorius estuarius (amphipod)	ADT	1.93+/-1.94	10.3+/-12.4	Lamberson et al. 1993
2473	+/-3695	NE	Oahu, Hawaii	COA	10-d	Not significantly toxic (10.1+/-4.01% mortality)	Corophium acherusicum (amphipod)	ADT	1.93+/-1.94	10.3+/-12.4	Lamberson et al. 1993
2482	+/-3201	SG	San Francisco Bay, CA	COA	10-d	Significantly toxic (42.9+/-19.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
2586	+/-4113	NE	San Francisco Bay, CA	COA	10-d	Least toxic (13.6+/-7.76% mortality)	Amphipod	ADT	1.4 +/- 0.79		Chapman et al. 1987a

Table 25. A summary of the available data on the biological effects associated with sediment-sorbed TOTAL HIGH MOLECULAR WEIGHT PAHs (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Total HMW PAHs	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
2594	+/-3478	*	San Francisco Bay, CA	COA	48-h	Significantly toxic (55.7+/-22.7% abnormal)	Bivalve	LAR			Long & Morgan 1990
2664	+/-601	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.125+/-0.084 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.25+/-0.468	1.98+/-2.25	Bricker et al. 1993
2670	+/-1328	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (15.2+/-9.21% mortality)	Mulinia lateralis (bivalve)	LAR	2.17+/-0.663	18.4+/-19.9	Bricker et al. 1993
2686	+/-2631	NE	Commencement Bay, WA	COA	48-h	Least toxic (15.1+/-3.1% abnormality)	Oyster	LAR			Tetra Tech 1985
2690		NE	Puget Sound, WA	SBA		EPA/ACOE Puget Sound Interim Criteria	Aquatic biota				USACOE 1988
2697	+/-1391	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.014+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.51+/-0.45	29.6+/-15.7	Bricker et al. 1993
2791	+/-2757	*	Jetty Island Pier, Everett Marina, WA	COA	10-d	Toxic (19.5+/-0.707% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.15+/-0.071		Hart Crowser & Associates Inc. 1986
2823	+/-3867	NE	San Francisco Bay, CA	COA	10-d	Least Toxic (4.63+/-2.91% avoidance)	Amphipod	ADT	1.44+/-.74		Chapman et al. 1987a
2841	+/-2228	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.167+/-0.198 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.59+/-1.09	4.67+/-6.99	Bricker et al. 1993
2931		*	Southern California	COA	10-d	Significantly toxicity (51.7% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
3000		NC	Puget Sound, WA	COA	2-d	Significantly toxic (3.8% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.5		Pastorok & Becker 1990
3013	+/-826	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (25.9+/-5.01% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.21+/-0.444	2.41+/-2.32	Bricker et al. 1993
3168	+/-2469	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.096+/-0.101 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.37+/-0.759	6.93+/-6.83	Bricker et al. 1993
3238		NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (6.8+/-7.31% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
3238		NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (8.5+/-6.06% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
3238		NE	Halifax Harbour, NS	COA	20-d	Not significantly toxic (0.7+/-1.63% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
3310	+/-2240	NE	Tampa Bay, FL	COA		Not significantly toxic (EC50; 0.066+/-0.033 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.89+/-0.902		Long 1993
3314	+/-2800	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.074+/-0.043 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.27+/-0.626	6.21+/-5.41	Bricker et al. 1993
3330	+/-2020	SG	Tampa Bay, FL	COA	1-h	Moderately toxic (15.3+/-10.6% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.94+/-0.908		Long 1993
3351	+/-2628	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (12.3+/-14.5% mortality)	Mulinia lateralis (bivalve)	LAR	1.53+/-0.743	15.7+/-23.2	Bricker et al. 1993
>3400		-	Puget Sound, WA	AETA		1986 Puget Sound AET	Benthic species		1		Bellar et al. 1986
3424	+/-3013	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99.3+/-0.827% normal development)	Mulinia lateralis (bivalve)	LAR	1.43+/-0.738	14.7+/-24	Bricker et al. 1993
3462	+/-4052	SG	San Francisco Bay, CA	COA	10-d	Highly toxic (67+/-11.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
3854	+/-3897	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (23.3+/-6.14% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.738		Word et al. 1988
3930	+/-3161	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (96+/-1.66% normal development)	Mulinia lateralis (bivalve)	LAR	2.52+/-0.997	35+/-42.9	Bricker et al. 1993
4039	+/-3807	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (10.4+/-6.3% mortality)	Nephtys caecoides (polychaete)		1.63+/-0.657		Word et al. 1988
4039	+/-3807	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (0.2+/-0.6% mortality)	Macoma nasuta (clam)		1.63+/-0.657		Word et al. 1988
4064	+/-4547	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-6.07% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.71+/-0.9	15.3+/-23.2	Bricker et al. 1993
4102	+/-3726	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (6.48+/-10.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
4102	+/-3726	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99+/-0.862% normal development)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
4240	+/-3204	*	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (30.5+/-16.4% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.62+/-0.777	17.7+/-26.3	Bricker et al. 1993
4400	+/-3650	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (17+/-16.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.99+/-1	21.6+/-24.5	Bricker et al. 1993
4546	+/-4299	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (13.8+/-4.09% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.47+/-0.306		Pastorok & Becker 1990
4552	+/-5323	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (6.67+/-8.07% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.51+/-0.330		Pastorok & Becker 1990
4714	+/-3900	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.1+/-2.78% normal development)	Mulinia lateralis (bivalve)	LAR	2.12+/-1.04	22.9+/-23.7	Bricker et al. 1993
4781	+/-3867	SG	Oakland Harbor, CA	COA	10-d	Significantly toxic (35.3+/-2.5% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.56+/-0.07		Word et al. 1988
4865	+/-4800	NE	Commencement Bay, WA	COA	10-d	Least toxic (12.5+/-4.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
5200		*	California	AETA		California AET Values	Benthic species				Becker et al. 1990
5200		*	Southern California	AETA		Southern California AET Values	Benthic species				Becker et al. 1990
5323	+/-4169	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (34.9+/-15.7% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.23+/-1.04	25.4+/-25.5	Bricker et al. 1993
5660	+/-5673	*	San Francisco Bay, CA	COA	10-d	Moderately toxic (28.3+/-7.51% mortality)	Amphipod	ADT	2.01+/-.98		Chapman et al. 1987a
5698	+/-5777	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.016+/-0.007 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.26+/-0.936	43.4+/-35.6	Bricker et al. 1993

Table 25. A summary of the available data on the biological effects associated with sediment-sorbed TOTAL HIGH MOLECULAR WEIGHT PAHs (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Total HMW PAHs	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
5838	+/-4042	*	Commencement Bay, WA	COA	48-h	Moderately toxic (23+/-2.3% abnormality)	Oyster	LAR			Tetra Tech 1985
6178	+/-6439	SG	Commencement Bay, WA	COA	10-d	Moderately toxic (26+/-5.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
6201	+/-4660	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (29.8+/-13.9% mortality)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.07	32.1+/-28.4	Bricker et al. 1993
6255	+/-4648	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.013+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.79+/-0.744	37.6+/-25.3	Bricker et al. 1993
6427	+/-5170	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.1+/-13.3% mortality)	Mulinia lateralis (bivalve)	LAR	2.68+/-0.955	31.8+/-24.4	Bricker et al. 1993
6477		NE	Halifax Harbour, NS	COA	20-d	Not significantly toxic (1+/-2% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
6479		NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (5.2+/-3.5% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
6651	+/-6556	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (23+/-4.24% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.46+/-1.22	40+/-55.1	Bricker et al. 1993
6676			***PEL***								
6847	+/-6314	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (91.5+/-7.28% normal development)	Mulinia lateralis (bivalve)	LAR	2.6+/-0.899	36.8+/-34.9	Bricker et al. 1993
6906	+/-4347	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (96.6+/-3.79% normal development)	Mulinia lateralis (bivalve)	LAR	2.87+/-0.94	35.1+/-25.9	Bricker et al. 1993
6932	+/-4312	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (38+/-13% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.92+/-0.937	34.6+/-23.9	Bricker et al. 1993
7447		NC	Elizabeth River, VA	COA	96-h	Significantly toxic (50.7+/-39% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
7914	+/-8341	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (21.5+/-6.36% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.35+/-1.05	10.5+/-13.4	Bricker et al. 1993
8176	+/-4079	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.011+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.28+/-0.363	45.3+/-21.4	Bricker et al. 1993
8314	+/-3529	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (75.1+/-10.6% mortality)	Mulinia lateralis (bivalve)	LAR	3.32+/-0.317	42.3+/-19.2	Bricker et al. 1993
8500		NE	San Francisco Bay, CA	COA	48-h	Least toxic (17.3% mortality)	Mussel	LAR	1.25		Chapman et al. 1987a
8620		*	Halifax Harbour, NS	COA	10-d	Significantly toxic (61.7+/-12.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
8791	+/-7782	*	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (88.5+/-8.39% normal development)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.05	38.1+/-38.9	Bricker et al. 1993
9042	+/-9573	*	Commencement Bay, WA	COA	48-h	Highly toxic (44.5+/-19% abnormality)	Oyster	LAR			Tetra Tech 1985
9133	+/-6617	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.008+/-0.001 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.19+/-1.27	12+/-11.3	Bricker et al. 1993
9374	+/-8691	*	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (51.3+/-6.95% mortality)	Mulinia lateralis (bivalve)	LAR	1.8+/-1.71	29.6+/-46.3	Bricker et al. 1993
9455	+/-4313	*	San Francisco Bay, CA	COA	48-h	Highly toxic (92.4+/-4.5% abnormal)	Bivalve	LAR			Long & Morgan 1990
9457	+/-4312	*	San Francisco Bay, CA	COA	4-wk	Moderately toxic (94.9+/-10.1 young produced)	Tigriopus californicus (copepod)	ADT	2.87+/-1.07		Chapman et al. 1987a
9457	+/-4312	SG	San Francisco Bay, CA	COA	48-h	Highly toxic (92.3+/-5.5% mortality)	Mussel	LAR	2.87+/-1.32		Chapman et al. 1987a
9600		*	Puget Sound, WA	SQG		Chemical Criteria	Benthic community		1		WDE 1989
9794	+/-12821	*	Commencement Bay, WA	COA	10-d	Highly toxic (78.5+/-19.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
10083		NC	Elizabeth River, VA	COA	96-h	Significant decrease in respiration rates	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
>11000		-	Northern California	AETA	10-d	Northern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
>11000		-	California	AETA	10-d	California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
11230		NE	Elizabeth River, VA	COA	96-h	No significant change in respiration rate	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
11459	+/-14895	NE	Puget Sound, WA	COA	28-d	Not significantly toxic (1.44 +/-1.74% mortality)	Dendraster exentricus (sand dollar)	JUV			Casillas et al. 1992
11459	+/-14895	NE	Puget Sound, WA	COA	28-d	Not significantly toxic (0.055+/-0.024% growth mm/d)	Dendraster exentricus (sand dollar)	JUV			Casillas et al. 1992
11460		NE	Elizabeth River, VA	COA	96-h	Not significantly toxic (4.5+/-3.24% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
11485		NE	Burrard Inlet, BC	COA	10-d	Not toxic (8.9+/-2.99% mortality)	Corophium volutator (amphipod)	ADT	2.8+/-1.96		McLeay et al. 1991
11485		NE	Burrard Inlet, BC	COA	10-d	Not toxic (97.2+/-2.84% reburial)	Rhepoxynius abronius (amphipod)	ADT	2.8+/-1.96		McLeay et al. 1991
11950		*	San Francisco Bay, CA	COA	48-h	Highly toxic (66.8% abnormal)	Mussel	LAR	3.59		Chapman et al. 1987a
12000		*	Puget Sound, WA	AETA	15-min	1988 Puget Sound AET	Microtox (Photobacterium phosphoreum)				PTI 1988
12060		*	San Francisco Bay, CA	COA	10-d	Most toxic (95% mortality)	Amphipod	ADT	4.03		Chapman et al. 1987a
12060		*	San Francisco Bay, CA	COA	10-d	Highly toxic (37% avoidance)	Amphipod	ADT	4.03		Chapman et al. 1987a
14100	+/-15400	*	Tampa Bay, FL	COA	1-h	Most toxic (0.091+/-0.187% fertilization)	Arbacia punctulata (sea urchin)	GAM	2.96+/-1.49		Long 1993
15340		NE	Burrard Inlet, BC	COA	10-d	Not toxic (7.9+/-5.12% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.64+/-2.14		McLeay et al. 1991

Table 25. A summary of the available data on the biological effects associated with sediment-sorbed TOTAL HIGH MOLECULAR WEIGHT PAHs (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Total HMW PAHs	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
17000		*	Puget Sound, WA	AETA	48-h	1988 Puget Sound AET	Crassostrea gigas (oyster)	LAR			PTI 1988
19970	+/-16830	*	Tampa Bay, FL	COA		Significantly toxic (EC50; 0.017+/-0.012 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.47+/-1.49		Long 1993
21409	+/-35247	NE	Puget Sound, WA	COA	20-d	Not significantly toxic (5+/-3.86% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.46+/-0.26		Pastorok & Becker 1990
25994	+/-37939	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (4.43+/-2.1% mortality)	Panope generosa (geoduck)	JUV	1.51+/-0.261		Pastorok & Becker 1990
40100		*	Burrard Inlet, BC	COA	10-d	Highly toxic (23% emergence)	Corophium volutator (amphipod)	ADT	3.5		McLeay et al. 1991
40100		*	Burrard Inlet, BC	COA	10-d	Highly toxic (30.5% emergence)	Rhepoxynius abronius (amphipod)	ADT	3.5		McLeay et al. 1991
43376		*	Puget Sound, WA	COA		Toxic (71.6+/-14.6% prevalence of idiopathic degeneration/necrosis)	Parophrys vetulus (English sole)				Malins et al. 1985
43376		*	Puget Sound, WA	COA		Toxic (51.4+/-21.1% prevalence of steatosis and hemosiderosis)	Parophrys vetulus (English sole)				Malins et al. 1985
43376		*	Puget Sound, WA	COA		Toxic (19+/-6.15% prevalence of hepatocellular regenerative foci)	Parophrys vetulus (English sole)				Malins et al. 1985
43376		*	Puget Sound, WA	COA		Toxic (26.7+/-6.43% prevalence of hepatic neoplasms)	Parophrys vetulus (English sole)				Malins et al. 1985
43376		*	Puget Sound, WA	COA		Toxic (88+/-3.65% prevalence of hepatic idiopathic lesions)	Parophrys vetulus (English sole)				Malins et al. 1985
43376		*	Puget Sound, WA	COA		Toxic (44.2+/-8.5% prevalence of hepatic cellular alterations)	Parophrys vetulus (English sole)				Malins et al. 1985
48451	+/-82648	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (2.09+/-1.73% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.56+/-0.329		Pastorok & Becker 1990
51000		*	Puget Sound, WA	AETA		PSDDA Maximum Level Criteria	Aquatic biota				USACOE 1988
53492	+/-81035	*	Puget Sound, WA	COA	15-min	Significantly toxic (EC50; 0.065+/-0.043% extract)	Microtox (Photobacterium phosphoreum)		1.58+/-0.255		Pastorok & Becker 1990
68511	+/-89485	*	Puget Sound, WA	COA	2-d	Significantly toxic (60.4+/-46.5% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.57+/-0.287		Pastorok & Becker 1990
69000		*	Puget Sound, WA	AETA		1988 Puget Sound AET	Benthic community				PTI 1988
69000		*	Puget Sound, WA	AETA	10-d	1988 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT			PTI 1988
100500	+/-95536	*	Puget Sound, WA	COA	10-d	Significantly toxic (80.8+/-30.6% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.266		Pastorok & Becker 1990
129000	+/-136898	*	Puget Sound, WA	COA	20-d	Significantly toxic (37.3+/-22% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.87+/-0.208		Pastorok & Becker 1990
131578		NE	Sidney Tar Pond, NS	COA	20-d	Not significantly toxic (8+/-5.66% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
189000	+/-15700	*	Tampa Bay, FL	COA	10-d	Significantly toxic (35.2+/-17.5% mortality)	Ampelisca abdita (amphipod)	SUB ADT	3.53+/-1.35		Long 1993
263013		*	Sidney Tar Pond, NS	COA	10-d	Significantly toxic (100% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
278824	+/-429690	*	Puget Sound, WA	COA	28-d	Significantly toxic (69.5+/-33.3% mortality)	Dendraster exentricus (sand dollar)	JUV			Casillas et al. 1992
278824	+/-429690	*	Puget Sound, WA	COA	28-d	Significantly toxic (0.013+/-0.006% growth mm/d)	Dendraster exentricus (sand dollar)	JUV			Casillas et al. 1992
280000		*	Puget Sound, WA	COA	10-d	Significantly toxic (56% mortality)	Panope generosa (geoduck)	JUV	2.1		Pastorok & Becker 1990
1349000		*	Sidney Tar Pond, NS	COA	20-d	Significantly toxic (52% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990

Table 26. A summary of the available data on the biological effects associated with sediment-sorbed TOTAL PAHs (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Total PAHs Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
12.7	NC	Mobile Bay, AL	COA		Significantly toxic (10% mortality)	Mysidopsis bahia (mysid shrimp)		0.009	0.004	EMAP Louisiana Province 1991
35.9 +/-4.07	NE	Galveston Bay, TX	COA		High abundance (155+/-49.5 N/0.00203 sq.m.)	Oligochaeta		1.2+/-1.27	4.27+/-3.85	Carr 1992
38.8 +/-7.28	NE	Apalachee Bay, FL	COA	10-d	Not significantly toxic (3.3+/-3.25% mortality)	Ampelisca abdita (amphipod)		0.643+/-0.455	0.390+/-0.410	EMAP Louisiana Province 1991
41.4 +/-17.4	NE	Galveston Bay, TX	COA		High abundance (27.3+/-10 N/0.00203 sq.m.)	Mollusca		1.64+/-0.4	1.39+/-0.17	Carr 1992
44 +/-7.64	NE	Apalachee Bay, FL	COA		Not significantly toxic (0.75+/-1.5% mortality)	Mysidopsis bahia (mysid shrimp)		0.540+/-0.385	0.405+/-0.417	EMAP Louisiana Province 1991
49.2 +/-3.79	SG	Apalachee Bay, FL	COA	10-d	Significantly toxic (15.6% mortality)	Ampelisca abdita (amphipod)		0.438+/-0.442	0.421+/-0.593	EMAP Louisiana Province 1991
51.7 +/-38.6	NE	Chandeleur Sound, LA	COA		Not significantly toxic (1.03+/-2.05% mortality)	Mysidopsis bahia (mysid shrimp)		0.824+/-0.915	1.69+/-0.920	EMAP Louisiana Province 1991
52.1 +/-30	NC	Chandeleur Sound, LA	COA	10-d	Significantly toxic (11.5+/-4.86% mortality)	Ampelisca abdita (amphipod)		0.811+/-0.711	1.87+/-0.973	EMAP Louisiana Province 1991
59.9 +/-39.6	NE	Galveston Bay, TX	COA		High species richness (24.5+/-3.7 S/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
59.9 +/-39.6	NE	Galveston Bay, TX	COA		High abundance (359+/-92.8 N/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
62.3 +/-19.4	SG	Chandeleur Sound, LA	COA		Significantly toxic (7.6+/-1.32% mortality)	Mysidopsis bahia (mysid shrimp)		0.624+/-0.197	2.07+/-1.19	EMAP Louisiana Province 1991
68.6 +/-24.5	NE	Chandeleur Sound, LA	COA	10-d	Not significantly toxic (2.87+/-4.05% mortality)	Ampelisca abdita (amphipod)		0.517+/-0.166	2.02+/-1.38	EMAP Louisiana Province 1991
70.9 +/-35.6	NC	Mississippi Sound, MS	COA	10-d	Significantly toxic (11.6+/-3.39% mortality)	Ampelisca abdita (amphipod)		0.111+/-0.045	0.03	EMAP Louisiana Province 1991
<80	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (3% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
<80	NE	Sidney Tar Pond, NS	COA	10-d	Not significantly toxic (3% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
84 +/-39.7	NE	Galveston Bay, TX	COA		High abundance (156+/-22.9 N/0.00203 sq.m.)	Polychaeta		0.916+/-0.661	2.94+/-2.3	Carr 1992
87.2 +/-87.6	NE	Galveston Bay, TX	COA		High abundance (16.2+/-6.19 N/0.00203 sq.m.)	Copepoda		0.844+/-0.524	4.73+/-3.1	Carr 1992
97.4 +/-111	NE	Galveston Bay, TX	COA	48-h	Not toxic (98.1+/-1.79% normal development)	Arbacia punctulata (sea urchin)	EMB	.748+/-0.476	4.16+/-3.45	Carr 1992
<100	NE	Sidney Tar Pond, NS	COA	10-d	Not significantly toxic (4% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
108	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (0.33+/-0.516% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
108	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (2.33+/-1.03% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
108	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (15.3+/-11.0% mortality)	Hyalella azteca (amphipod)	JUV	0.648+/-0.641	1.74+/-1.39	Hall et al. 1992
108	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1% mortality)	Streblospio benedicti (polychaete worm)		1.38	3.25	Hall et al. 1992
108	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (16.5+/-9.19% mortality)	Streblospio benedicti (polychaete worm)		0.783+/-0.845	4.83+/-2.23	Hall et al. 1992
108	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.367+/-0.085 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
108	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.0005 mg/day growth)	Streblospio benedicti (polychaete worm)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
108	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.003+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.316+/-0.120	2.13+/-2.46	Hall et al. 1992
108	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (7.2+/-1.92% mortality)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
108	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.6+/-0.55% reburial)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
108	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
108	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
108	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.001+/-0.001 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.555+/-0.471	2.68+/-2.3	Hall et al. 1992
108	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1.83+/-1.6% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
108	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (3.5+/-1.87% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
108	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (9.25+/-5.32% mortality)	Lepidactylus dytiscus (amphipod)		0.638+/-0.768	1.65+/-1.62	Hall et al. 1992
108	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (22.3+/-7.37% mortality)	Hyalella azteca (amphipod)	JUV	0.788+/-0.866	2.04+/-1.75	Hall et al. 1992
108	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (8.8+/-7.12% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
108	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (14+/-9.22% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
108	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.1+/-0.865% reburial)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
108	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<20% emergence)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
108	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
108	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (-0.057+/-0.04 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992

Table 26. A summary of the available data on the biological effects associated with sediment-sorbed TOTAL PAHs (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Total PAHs			Analysis	Test			Life			
Std Dev	Hit	Area	Type	Type	End-Point Measured	Species	Stage	TOC (%)	AVS (umol/g)	Reference
108	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.001mg/day growth)	Streblospio benedicti (polychaete worm)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
108	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.016 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
108	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.005+/-0.0004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
108	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (55.0+/-22.6% mortality)	Hyalella azteca (amphipod)	JUV	0.338+/-0.133	2.9+/-3.11	Hall et al. 1992
108	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29.8+/-11.1% mortality)	Streblospio benedicti (polychaete worm)		0.316+/-0.12	2.13+/-2.46	Hall et al. 1992
108	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (55.0+/-19.5% mortality)	Streblospio benedicti (polychaete worm)		0.349+/-0.11	1.07+/-0.66	Hall et al. 1992
108	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.003 mg/day growth)	Lepidactylus dytiscus (amphipod)		1.38	3.25	Hall et al. 1992
108	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29% mortality)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
108	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (89.7% reburial)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
108	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
108	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	6.41	Hall et al. 1992
108	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
108	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (45.5+/-12% mortality)	Lepidactylus dytiscus (amphipod)		0.383+/-0.279	3.61+/-2.79	Hall et al. 1992
108	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (63.0+/-24.3% mortality)	Hyalella azteca (amphipod)	JUV	0.317+/-0.228	2.57+/-2.67	Hall et al. 1992
108	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (22% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
108	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (28% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
108	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (82.9% reburial)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
108	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>20% emergence)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
108	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	5.58	Hall et al. 1992
108	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.008+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.4	Hall et al. 1992
108	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.003 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
151 +/-239	NE	Galveston Bay, TX	COA	1-h	Not toxic (92.5+/-6.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	0.77+/-0.448	6.37+/-6.58	Carr 1992
180 +/-256	*	Galveston Bay, TX	COA		Low abundance (4.21+/-5.66 N/0.00203 sq.m.)	Oligochaeta		0.895+/-0.453	7.85+/-8.8	Carr 1992
189 +/-249	NC	Mobile Bay, AL	COA	10-d	Significantly toxic (46+/-49.3% mortality)	Ampelisca abdita (amphipod)		0.22+/-0.298	3.84+/-5.43	EMAP Louisiana Province 1991
193 +/-136	NE	Mississippi Sound, MS	COA		Not significantly toxic (0.789+/-1.59% mortality)	Mysidopsis bahia (mysid shrimp)		0.827+/-0.757	1.46+/-1.58	EMAP Louisiana Province 1991
210 +/-65	NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (9+/-1.73% mortality)	Nereis virens (polychaetes)	ADT			EG&G Bionomics 1980
210 +/-65	NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (13+/- 3.61% mortality)	Penaeus duorarum (pink shrimp)	ADT			EG&G Bionomics 1980
210 +/-65	NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (11.3+/-3.21% mortality)	Crassostrea virginica (oyster)	ADT			EG&G Bionomics 1980
210 +/-86.3	SG	Mississippi Sound, MS	COA		Significantly toxic (12.2+/-4.42% mortality)	Mysidopsis bahia (mysid shrimp)		0.939+/-0.335	2.63+/-2.3	EMAP Louisiana Province 1991
221 +/-115	NE	Mississippi Sound, MS	COA	10-d	Not significantly toxic (1.4+/-1.73% mortality)	Ampelisca abdita (amphipod)		0.998+/-0.602	2.01+/-1.82	EMAP Louisiana Province 1991
235 +/-248	NE	Laboratory	SSBA	~4-m	No significant change in liver somatic indices	Pseudopleuronectes americanus (flounder)	ADT			Payne et al. 1988
253 +/-619	NC	Galveston Bay, TX	COA		Low abundance (0.3+/-0.651 N/0.00203 sq.m.)	Amphipoda		0.859+/-0.487	7.67+/-8.12	Carr 1992
278 +/-630	*	Galveston Bay, TX	COA		Low abundance (1.86+/-2.59 N/0.00203 sq.m.)	Mollusca		0.784+/-0.421	8.29+/-8.13	Carr 1992
283 +/-641	*	Galveston Bay, TX	COA		Low species richness (10+/-3.73 S/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
283 +/-641	*	Galveston Bay, TX	COA		Low abundance (89+/-60.7 N/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
294 +/-374	NE	Galveston Bay, TX	COA		High Abundance (6+/-1.41 N/0.00203 sq.m.)	Amphipoda		0.955+/-0.629	7.21+/-8.2	Carr 1992
313 +/-690	*	Galveston Bay, TX	COA		Low abundance (41.7+/-21.8 N/0.00203 sq.m.)	Polychaeta		0.848+/-0.427	9.21+/-8.61	Carr 1992
371 +/-766	*	Galveston Bay, TX	COA		Low abundance (2.05+/-1.58 N/0.00203 sq.m.)	Copepoda		0.879+/-0.47	9.63+/-9.65	Carr 1992
393 +/-107	NE	Mobile Bay, AL	COA		Not significantly toxic (1.07+/-1.85% mortality)	Mysidopsis bahia (mysid shrimp)		0.968+/-0.815	8.23+/-3.4	EMAP Louisiana Province 1991
404 +/-279	NE	Matagorda Bay, TX	COA		Not significantly toxic (1.58+/-1.82% mortality)	Mysidopsis bahia (mysid shrimp)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
404 +/-279	NE	Matagorda Bay, TX	COA	10-d	Not significantly toxic (2.33+/-4.65% mortality)	Ampelisca abdita (amphipod)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
407 +/-148	NE	Mobile Bay, AL	COA	10-d	Not significantly toxic (0.5+/-0.778% mortality)	Ampelisca abdita (amphipod)		1.24+/-0.948	8.51+/-4.76	EMAP Louisiana Province 1991

Table 26. A summary of the available data on the biological effects associated with sediment-sorbed TOTAL PAHs (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Total PAHs	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
417	+/-321	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (5.8+/-3.7% mortality)	Rhepoxynius abronius (amphipod)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
417	+/-321	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (3.4+/-1.82% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
417	+/-321	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (11.2+/-3.7% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
417	+/-321	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (3.52+/-1.66% mortality)	Macoma nasuta (clam)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
454	+/-393	NC	Mississippi River, MS, LA	COA	10-d	Significantly toxic (15.9+/-6.65% mortality)	Ampelisca abdita (amphipod)		1.22+/-0.717	0.235+/-0.276	EMAP Louisiana Province 1991
537	+/-510	NE	Mississippi River, MS, LA	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		1.3+/-0.83	1.14+/-1	EMAP Louisiana Province 1991
538	+/-932	*	Galveston Bay, TX	COA	48-h	Toxic (4.65+/-16.1% normal development)	Arbacia punctulata (sea urchin)	EMB	1.06+/-0.449	14.5+/-9.2	Carr 1992
551	+/-255	SG	Mississippi River, MS, LA	COA		Significantly toxic (32.9+/-36.4% mortality)	Mysidopsis bahia (mysid shrimp)		1.07+/-0.924	1.41+/-1.93	EMAP Louisiana Province 1991
569	+/-464	NC	Galveston Bay, TX	COA	10-d	Significantly toxic (15.8+/-3.89% mortality)	Ampelisca abdita (amphipod)		0.647+/-0.606	0.160+/-0.184	EMAP Louisiana Province 1991
630	+/-1317	*	Galveston Bay, TX	COA		Moderate abundance (58.3+/-16.2 N/0.00203 sq.m.)	Oligochaeta		0.632+/-0.274	7.93+/-5.6	Carr 1992
634	+/-372	NE	Mississippi River, MS, LA	COA	10-d	Not significantly toxic (7.8+/-1.63% mortality)	Ampelisca abdita (amphipod)		1.15+/-1.04	2.31+/-0.651	EMAP Louisiana Province 1991
727	+/-1276	*	Galveston Bay, TX	COA	1-h	Toxic (20.4+/-18.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	1.26+/-0.47	14.6+/-10.1	Carr 1992
788	+/-1179	NC	Galveston Bay, TX	COA		Significantly toxic (13.4+/-9.11% mortality)	Mysidopsis bahia (mysid shrimp)		0.778+/-0.482	1.21+/-0.778	EMAP Louisiana Province 1991
803	+/-601	NC	Galveston Bay, TX	COA		Low abundance (53+/-33.9 N/0.00203 sq.m.)	Benthic invertebrates		0.985+/-0.247	22+/-11.2	Carr 1992
806	+/-302	NE	Puget Sound, WA	COA	15-min	Not significantly toxic (EC50; 0.283+/-0.168% extract)	Microtox (Photobacterium phosphoreum)		1.39+/-0.37		Pastorok & Becker 1990
845	+/-1295	NE	Galveston Bay, TX	COA		Low species (11.2+/-1.94 S/0.00203 sq.m.)	Benthic species		0.642+/-0.356	13.4+/-8.65	Carr 1992
866	+/-1635	NE	Galveston Bay, TX	COA		High abundance (154+/-30.2 N/0.00203 sq.m.)	Benthic invertebrates		0.47+/-0.27	9.07+/-2.94	Carr 1992
923	+/-696	NE	Galveston Bay, TX	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		0.934+/-0.657	0.457+/-0.530	EMAP Louisiana Province 1991
941	+/-429	NE	San Francisco Bay, CA	COA	48-h	Least toxic (23.3+/-7.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
999	+/-1051	NE	Galveston Bay, TX	COA	10-d	Not significantly toxic (1.35+/-1.45% mortality)	Ampelisca abdita (amphipod)		0.961+/-0.537	1.17+/-0.640	EMAP Louisiana Province 1991
1020		NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (18% mortality)	Ampelisca abdita (amphipod)		0.028	9 ug/g	Windom In Prep
1095		NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (0% mortality)	Arbacia punctulata (sea urchin)		0.03	19 ug/g	Windom In Prep
1144		NE	Puget Sound, WA	COA		Not toxic (10% prevalence of idiopathic degeneration/necrosis)	Parophrys vetulus (English sole)				Malins et al. 1985
1144		NE	Puget Sound, WA	COA		Not toxic (17.5% prevalence of steatosis and hemosiderosis)	Parophrys vetulus (English sole)				Malins et al. 1985
1144		NE	Puget Sound, WA	COA		Not toxic (0% occurrence of hepatic cellular alterations)	Parophrys vetulus (English sole)				Malins et al. 1985
1144		NE	Puget Sound, WA	COA		Not toxic (5% prevalence of hepatocellular regenerative foci)	Parophrys vetulus (English sole)				Malins et al. 1985
1144		NE	Puget Sound, WA	COA		Not toxic (0% prevalence of hepatic cellular alterations)	Parophrys vetulus (English sole)				Malins et al. 1985
1144		NE	Puget Sound, WA	COA		Not toxic (32.5% prevalence of hepatic idiopathic lesions)	Parophrys vetulus (English sole)				Malins et al. 1985
1148	+/-49.1	NE	Brunswick Harbor Entrance, GA	COA	48-h	Not significantly toxic (86.6+/-4.25% normal development)	Arbacia punctulata (sea urchin)		0.181+/-0.162	182+/-208 ug/g	Windom In Prep
1162	+/-49.1	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (28.3+/-6.11% mortality)	Mysidopsis bahia (mysid)		0.246+/-0.051	127+/-24 ug/g	Windom In Prep
1196	+/-153	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (91.3+/-2.91% normal development)	Arbacia punctulata (sea urchin)		0.299+/-0.251	114+/-68.4 ug/g	Windom In Prep
1204	+/-170	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (9.78+/-5.33% mortality)	Mysidopsis bahia (mysid)		0.24+/-0.247	91.9+/-73.4 ug/g	Windom In Prep
1210	+/-181	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (4+/-2.83% mortality)	Menidia beryllina (silverside)		0.243+/-0.264	90.5+/-78.4 ug/g	Windom In Prep
1213	+/-160	SG	Savannah River Entrance Channel, GA	COA	48-h	Significantly toxic (25.4+/-7.66% mortality)	Arbacia punctulata (sea urchin)		0.344+/-0.242	129.5+/-59.3 ug/g	Windom In Prep
1226	+/-209	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (27.5+/-10.6% mortality)	Mysidopsis bahia (mysid)		0.237+/-0.311	74.6+/-85.5 ug/g	Windom In Prep
1228	+/-166	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (11.6+/-4.33% mortality)	Ampelisca abdita (amphipod)		0.267+/-0.25	102+/-71.1 ug/g	Windom In Prep
1539	+/-413	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (10.6+/-3.17% mortality)	Ampelisca abdita (amphipod)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
1539	+/-413	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (8.00+/-2.92% mortality)	Mysidopsis bahia (mysid)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
1579	+/-436	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (5.43+/-3.21% mortality)	Mysidopsis bahia (mysid)		1.21+/-1.13	9096+/-13378 ug/g	Windom In Prep
1579	+/-436	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (9.61+/-2.7% mortality)	Menidia beryllina (silverside)		1.22+/-1.13	9172+/-13363 ug/g	Windom In Prep
1684			***TEL***								
1700		SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (16% mortality)	Mysidopsis bahia (mysid)		1.8	7095 ug/g	Windom In Prep

Table 26. A summary of the available data on the biological effects associated with sediment-sorbed TOTAL PAHs (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Total PAHs	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
1700		SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (22.3% mortality)	Menidia beryllina (silverside)		1.71	6562 ug/g	Windom In Prep
1853	+/-251	SG	Brunswick Harbor Entrance, GA	COA	48-h	Significantly toxic (14.6+/-18.9% normal development)	Arbacia punctulata (sea urchin)		1.99+/-0.562	14009+/-13434 ug/g	Windom In Prep
1993	+/-249	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-7.99% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.14+/-0.352	6.09+/-5.38	Bricker et al. 1993
2242	+/-3961	NE	Southern California	COA	10-d	Not significantly toxic (23.2% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
2407	+/-291	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.5+/-11.4% mortality)	Mulinia lateralis (bivalve)	LAR	2.33+/-0.364	26.8+/-9.42	Bricker et al. 1993
2417	+/-420	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.061+/-0.038 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.8+/-0.477	8.52+/-10.7	Bricker et al. 1993
2447	+/-1837	NE	Burrard Inlet, BC	COA	10-d	Not toxic (4.5+/-3.02% emergence)	Rhepoxynius abronius (amphipod)	ADT	2.66+/-2.15		McLeay et al. 1991
2447	+/-1837	NE	Burrard Inlet, BC	COA	10-d	Not toxic (5.21+/-3.61% emergence)	Corophium volutator (amphipod)	ADT	3.18+/-2.1		McLeay et al. 1991
2494	+/-370	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (39.5+/-18.2% mortality)	Ampelisca abidta (amphipod)	SUB ADT	2.06+/-0.523	20.1+/-13.9	Bricker et al. 1993
2550	+/-49	NE	Tampa Bay, FL	COA	1-h	Least toxic (79.4+/-9.9% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.45+/-0.587		Long 1993
2590		*	Eagle Harbor, WA	COA	4-d	LC50	Rhepoxynius abronius (amphipod)	ADT			Swartz et al. 1989
2601	+/-501	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.3+/-2.22% normal development)	Mulinia lateralis (bivalve)	LAR	2.18+/-0.531	19.1+/-12.5	Bricker et al. 1993
2739	+/-4054	NE	Oahu, Hawaii	COA	10-d	Not significantly toxic (7.2+/-1.89% mortality)	Eohaustorius estuarius (amphipod)	ADT	1.93+/-1.94	10.3+/-12.4	Lamberson et al. 1993
2739	+/-4054	NE	Oahu, Hawaii	COA	10-d	Not significantly toxic (10.1+/-4.01% mortality)	Corophium acherusicum (amphipod)	ADT	1.93+/-1.94	10.3+/-12.4	Lamberson et al. 1993
2750	+/-1023	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (19.3+/-5.86% mortality)	Ampelisca abidta (amphipod)	SUB ADT	1.82+/-0.225	6.3+/-6.2	Bricker et al. 1993
2840	+/-616	NE	Tampa Bay, FL	COA	10-d	Not significantly toxic (14.6+/-7.67% mortality)	Ampelisca abdita (amphipod)	SUBADT	1.63+/-0.596		Long 1993
3065	+/-1458	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (15.2+/-9.21% mortality)	Mulinia lateralis (bivalve)	LAR	2.17+/-0.663	18.4+/-19.9	Bricker et al. 1993
3082	+/-694	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.125+/-0.084 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.25+/-0.468	1.98+/-2.25	Bricker et al. 1993
3132	+/-1508	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.014+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.51+/-0.45	29.6+/-15.7	Bricker et al. 1993
3323	+/-4337	NE	San Francisco Bay, CA	COA	10-d	Least toxic (18+/-6.6% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
3343	+/-4039	*	San Francisco Bay, CA	COA	48-h	Moderately toxic (59.4+/-11.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
3362	+/-2720	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.167+/-0.198 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.59+/-1.09	4.67+/-6.99	Bricker et al. 1993
3440		NC	Puget Sound, WA	COA	2-d	Significantly toxic (3.8% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.5		Pastorok & Becker 1990
3495	+/-986	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (25.9+/-5.01% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.21+/-0.444	2.41+/-2.32	Bricker et al. 1993
3527	+/-4520	NE	San Francisco Bay, CA	COA	10-d	Not significantly toxic (18.4+/-6.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
3683	+/-2889	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.096+/-0.101 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.37+/-0.759	6.93+/-6.83	Bricker et al. 1993
<=3800		*	San Francisco Bay, CA	SQAV	SQTA	Significantly Toxic Triad Minimum Bioeffects	Benthic species				Chapman et al. 1987b
3832	+/-3927	SG	San Francisco Bay, CA	COA	10-d	Significantly toxic (42.9+/-19.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
3838	+/-3259	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.074+/-0.043 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.27+/-0.626	6.21+/-5.41	Bricker et al. 1993
3874	+/-3040	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (12.3+/-14.5% mortality)	Mulinia lateralis (bivalve)	LAR	1.53+/-0.743	15.7+/-23.2	Bricker et al. 1993
3880	+/-2360	NE	Tampa Bay, FL	COA		Not significantly toxic (EC50; 0.066+/-0.033 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.89+/-0.902		Long 1993
3920	+/-2110	SG	Tampa Bay, FL	COA	1-h	Moderately toxic (15.3+/-10.6% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.94+/-0.908		Long 1993
3962	+/-3494	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99.3+/-0.827% normal development)	Mulinia lateralis (bivalve)	LAR	1.43+/-0.738	14.7+/-24	Bricker et al. 1993
3966	+/-3524	SG	San Francisco Bay, CA	COA	10-d	Moderately toxic (33.8+/-4.7% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
4022	+/-4908	*	San Francisco Bay, CA	COA	48-h	Significantly toxic (55.7+/-22.7% abnormal)	Bivalve	LAR			Long & Morgan 1990
4227	+/-5025	SG	San Francisco Bay, CA	COA	10-d	Highly toxic (67+/-11.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
<4273	+/-4204	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (6.8+/-7.31% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
<4273	+/-4204	NE	Halifax Harbour, NS	COA	20-d	Not significantly toxic (0.7+/-1.63% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
<4306	+/-4172	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (8.5+/-6.06% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
4439	+/-3471	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (96+/-1.66% normal development)	Mulinia lateralis (bivalve)	LAR	2.52+/-0.997	35+/-42.9	Bricker et al. 1993
4740	+/-4266	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (6.48+/-10.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
4740	+/-4266	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99+/-0.862% normal development)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993

Table 26. A summary of the available data on the biological effects associated with sediment-sorbed TOTAL PAHs (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Total PAHs	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
4746	+/-5360	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-6.07% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.71+/-0.9	15.3+/-23.2	Bricker et al. 1993
4774	+/-90579	NE	Puget Sound, WA	COA	20-d	Not significantly toxic (5+/-3.86% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.46+/-0.26		Pastorok & Becker 1990
5140	+/-4344	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (17+/-16.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.99+/-1	21.6+/-24.5	Bricker et al. 1993
5140	+/-4877	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (13.8+/-4.09% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.47+/-0.306		Pastorok & Becker 1990
5185	+/-6047	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (6.67+/-8.07% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.51+/-0.330		Pastorok & Becker 1990
5566	+/-4700	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.1+/-2.78% normal development)	Mulinia lateralis (bivalve)	LAR	2.12+/-1.04	22.9+/-23.7	Bricker et al. 1993
6312	+/-5091	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (34.9+/-15.7% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.23+/-1.04	25.4+/-25.5	Bricker et al. 1993
6753	+/-7080	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.016+/-0.007 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.26+/-0.936	43.4+/-35.6	Bricker et al. 1993
7365	+/-5679	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (29.8+/-13.9% mortality)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.07	32.1+/-28.4	Bricker et al. 1993
7440	+/-5672	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.013+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.79+/-0.744	37.6+/-25.3	Bricker et al. 1993
7761	+/-21968	NE	Mississippi Sound, MS	COA	96-h	Not significantly toxic (7.3+/-8.7% mortality)	Mysidopsis almyra (mysid)		2.51 +/-3.16		Lytle & Lytle 1985
7787	+/-6390	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.1+/-13.3% mortality)	Mulinia lateralis (bivalve)	LAR	2.68+/-0.955	31.8+/-24.4	Bricker et al. 1993
8060	+/-8071	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (23+/-4.24% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.46+/-1.22	40+/-55.1	Bricker et al. 1993
8145	+/-7887	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (91.5+/-7.28% normal development)	Mulinia lateralis (bivalve)	LAR	2.6+/-0.899	36.8+/-34.9	Bricker et al. 1993
8282	+/-5369	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (96.6+/-3.79% normal development)	Mulinia lateralis (bivalve)	LAR	2.87+/-0.94	35.1+/-25.9	Bricker et al. 1993
8305	+/-5329	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (38+/-13% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.92+/-0.937	34.6+/-23.9	Bricker et al. 1993
8364	+/-7087	*	Southern California	COA	10-d	Significantly toxicity (51.7% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
9096	+/-9537	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (21.5+/-6.36% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.35+/-1.05	10.5+/-13.4	Bricker et al. 1993
>=9500		*	San Francisco Bay, CA	SQAV	SQTA	Significantly Toxic Triad Significant Bioeffects	Benthic species				Chapman et al. 1987b
<9795	+/-10916	NE	Halifax Harbour, NS	COA	20-d	Not significantly toxic (1+/-2% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
9819	+/-5086	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.011+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.28+/-0.363	45.3+/-21.4	Bricker et al. 1993
<9845	+/-10861	NE	Halifax Harbour, NS	COA	10-d	Not significantly toxic (5.2+/-3.5% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
10114	+/-4508	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (75.1+/-10.6% mortality)	Mulinia lateralis (bivalve)	LAR	3.32+/-0.317	42.3+/-19.2	Bricker et al. 1993
10200	+/-9950	NE	Forth Estuary	COA		High meiofaunal density (3757+/-1804/10 sq.cm.)	various				Long 1987
10541	+/-7495	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.008+/-0.001 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.19+/-1.27	12+/-11.3	Bricker et al. 1993
10615	+/-9772	*	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (88.5+/-8.39% normal development)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.05	38.1+/-38.9	Bricker et al. 1993
11326	+/-10705	*	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (51.3+/-6.95% mortality)	Mulinia lateralis (bivalve)	LAR	1.8+/-1.71	29.6+/-46.3	Bricker et al. 1993
11735	+/-5499	*	San Francisco Bay, CA	COA	48-h	Highly toxic (92.4+/-4.5% abnormal)	Bivalve	LAR			Long & Morgan 1990
11800	+/-9700	SG	Forth Estuary	COA		Moderate meiofaunal density (1335+/-396/10 sq.cm.)	various				Long 1987
11924	+/-25733	NE	Mississippi Sound, MS	COA	96-h	Not significantly toxic (15.2 +/-6.74% mortality)	Gammarus mucronatus (amphipod)	ADT	2.90 +/-3.42		Lytle & Lytle 1985
12325	+/-10425	NC	Hampton Roads Harbor, VA	COA	96-h	Moderately toxic (8.8+/-1.8% mortality)	Palaemonetes pugio (shrimp)	ADT			Alden & Butt 1987
<12793	+/-11171	*	Halifax Harbour, NS	COA	10-d	Significantly toxic (61.7+/-12.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
13033	+/-21225	NE	Burrard Inlet, BC	COA	10-d	Not toxic (8.9+/-2.99% mortality)	Corophium volutator (amphipod)	ADT	2.8+/-1.96		McLeay et al. 1991
13033	+/-21225	NE	Burrard Inlet, BC	COA	10-d	Not toxic (97.2+/-2.84% reburial)	Rhepoxynius abronius (amphipod)	ADT	2.8+/-1.96		McLeay et al. 1991
13422		NE	Elizabeth River, VA	COA	96-h	No significant change in respiration rate	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
13656		NE	Elizabeth River, VA	COA	96-h	Not significantly toxic (4.5+/-3.24% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
13855	+/-19014	NE	Laboratory	SSBA	~4-m	No significant change in kidney MFO induction	Pseudopleuronectes americanus (flounder)	ADT			Payne et al. 1988
15000		*	San Francisco Bay, CA	AETA	10-d	San Francisco Bay AET	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
16200	+/-17700	*	Tampa Bay, FL	COA	1-h	Most toxic (0.091+/-0.187% fertilization)	Arbacia punctulata (sea urchin)	GAM	2.96+/-1.49		Long 1993
16771			***PEL***								
16921	+/-20976	NE	Hampton Roads Harbor, VA	COA	96-h	Least toxic (2.2+/-1.8% mortality)	Palaemonetes pugio (shrimp)				Alden & Butt 1987
17253	+/-23850	NE	Burrard Inlet, BC	COA	10-d	Not toxic (7.9+/-5.12% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.64+/-2.14		McLeay et al. 1991

Table 26. A summary of the available data on the biological effects associated with sediment-sorbed TOTAL PAHs (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Total PAHs	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
18300	+/-5515	NE	Bayou Casotte, MS	COA	96-h	Not significantly toxic	Mysidipsis almyra (mysid shrimp)		2.77		Lytle & Lytle 1983
19993		SG	Elizabeth River, VA	COA	96-h	Significant decrease in respiration rates	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
21467	+/-31160	NE	Hudson-Raritan Bay, NY	COA	14-d	Not toxic (increased growth rate)	Chromadorina germanica (nematode)				Tietjen & Lee 1984
21500	+/-18200	*	Tampa Bay, FL	COA	10-d	Significantly toxic (35.2+/-17.5% mortality)	Ampelisca abdita (amphipod)	SUBADT	3.53+/-1.35		Long 1993
22860	+/-19410	*	Tampa Bay, FL	COA		Significantly toxic (EC50; 0.017+/-0.012 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.47+/-1.49		Long 1993
24003	+/-22130	NE	Laboratory	SSBA	~4-m	No significant change in spleen condition indices	Pseudopleuronectes americanus (flounder)	ADT			Payne et al. 1988
29197	+/-31882	*	Elizabeth River, VA	COA	96-h	Significantly toxic (50.7+/-39% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Alden & Butt 1987
35700	+/-42181	*	Hampton Roads Harbor, VA	COA	96-h	Highly toxic (70+/-20.3% mortality)	Palaemonetes pugio (shrimp)				Alden & Butt 1987
36239	+/-68844	*	Mississippi Sound, MS	COA	96-h	Significantly toxic (81.4 +/-19.6% mortality)	Gammarus mucronatus (amphipod)	ADT	4.54 +/-3.52		Lytle & Lytle 1985
37555	+/-59921	*	Mississippi Sound, MS	COA	96-h	Significantly toxic (76.7 +/-21.3% mortality)	Mysidopsis almyra (mysid)		4.85+/-3.83		Lytle & Lytle 1985
42769	+/-46084	*	Hudson-Raritan Bay, NY	COA	14-d	Significantly toxic (reduced growth rate)	Chromadorina germanica (nematode)				Tietjen & Lee 1984
44790		*	Burrard Inlet, BC	COA	10-d	Highly toxic (23% emergence)	Corophium volutator (amphipod)	ADT	3.5		McLeay et al. 1991
44790		*	Burrard Inlet, BC	COA	10-d	Highly toxic (30.5% emergence)	Rhepoxynius abronius (amphipod)	ADT	3.5		McLeay et al. 1991
49926	+/-85601	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (4.43+/-2.1% mortality)	Panope generosa (geoduck)	JUV	1.51+/-0.261		Pastorok & Becker 1990
75459		*	Puget Sound, WA	COA		Toxic (71.6+/-14.6% prevalence of idiopathic degeneration/necrosis)	Parophrys vetulus (English sole)				Malins et al. 1985
75459		*	Puget Sound, WA	COA		Toxic (51.4+/-21.1% prevalence of steatosis and hemosiderosis)	Parophrys vetulus (English sole)				Malins et al. 1985
75459		*	Puget Sound, WA	COA		Toxic (19+/-6.15% prevalence of hepatocellular regenerative foci)	Parophrys vetulus (English sole)				Malins et al. 1985
75459		*	Puget Sound, WA	COA		Toxic (26.7+/-6.43% prevalence of hepatic neoplasms)	Parophrys vetulus (English sole)				Malins et al. 1985
75459		*	Puget Sound, WA	COA		Toxic (88+/-3.65% prevalence of hepatic idiopathic lesions)	Parophrys vetulus (English sole)				Malins et al. 1985
75459		*	Puget Sound, WA	COA		Toxic (44.2+/-8.5% prevalence of hepatic cellular alterations)	Parophrys vetulus (English sole)				Malins et al. 1985
83800	+/-57900	*	Forth Estuary	COA		Low meiofaunal density (112+/-123/10 sq.cm.)	various				Long 1987
106807	+/-217012	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (2.09+/-1.73% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.56+/-0.329		Pastorok & Becker 1990
119712	+/-214430	*	Puget Sound, WA	COA	15-min	Significantly toxic (EC50; 0.065+/-0.043% extract)	Microtox (Photobacterium phosphoreum)		1.58+/-0.255		Pastorok & Becker 1990
156428	+/-239056	*	Puget Sound, WA	COA	2-d	Significantly toxic (60.4+/-46.5% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.57+/-0.287		Pastorok & Becker 1990
205000		*	Mississippi Sound, MS	AETA		Mississippi AET	Gammarus mucronatus (amphipod)				Lytle & Lytle 1985
205000		*	Mississippi Sound, MS	AETA		Mississippi AET	Mysidopsis almyra (mysid)		3.91+/-1.29		Lytle & Lytle 1985
<217860	+/-306960	NE	Sidney Tar Pond, NS	COA	20-d	Not significantly toxic (8+/-5.66% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
228725	+/-261387	*	Laboratory	SSBA	~4-m	Significant change in liver somatic indices	Pseudopleuronectes americanus (flounder)	ADT			Payne et al. 1988
232117	+/-266104	*	Puget Sound, WA	COA	10-d	Significantly toxic (80.8+/-30.6% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.266		Pastorok & Becker 1990
288667	+/-393802	*	Puget Sound, WA	COA	20-d	Significantly toxic (37.3+/-22% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.87+/-0.208		Pastorok & Becker 1990
295867	+/-274658	*	Laboratory	SSBA	~4-m	Significant increase in kidney MFO induction	Pseudopleuronectes americanus (flounder)	ADT			Payne et al. 1988
421650	+/-236527	*	Laboratory	SSBA	~4-m	Significant change in spleen condition indices	Pseudopleuronectes americanus (flounder)	ADT			Payne et al. 1988
<434910		*	Sidney Tar Pond, NS	COA	10-d	Significantly toxic (100% mortality)	Corophium volutator (amphipod)	ADT			Tay et al. 1990
<434910		*	Sidney Tar Pond, NS	COA	10-d	Significantly toxic (100% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tay et al. 1990
507200	+/-696924	NE	Bayou Casotte, MS	COA	96-h	Not significantly toxic	Gammarus mucronatus (amphipod)		2.1		Lytle & Lytle 1983
684000		*	Bayou Casotte, MS	COA	96-h	Significantly toxic	Gammarus mucronatus (amphipod)		2.61		Lytle & Lytle 1983
740000		*	Puget Sound, WA	COA	10-d	Significantly toxic (56% mortality)	Panope generosa (geoduck)	JUV	2.1		Pastorok & Becker 1990
842000	+/-223446	*	Bayou Casotte, MS	COA	96-h	Significantly toxic	Mysidipsis almyra (mysid shrimp)		2.72		Lytle & Lytle 1983
<2538420		*	Sidney Tar Pond, NS	COA	20-d	Significantly toxic (52% mortality)	Neanthes sp. (polychaete)	JUV			Tay et al. 1990
3900000		*	Elizabeth River, VA	COA	28-d	High toxicity (100% fin erosion)	Leiostomus xanthurus (spot)				Hargis et al. 1984
3900000		*	Elizabeth River, VA	COA	28-d	Significantly toxic (56% mortality)	Leiostomus xanthurus (spot)				Hargis et al. 1984

Table 27. A summary of the available data on the biological effects associated with sediment-sorbed TOTAL POLYCHLORINATED BIPHENYLS (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Total PCBs	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.3		NE	Massachusetts Bay, MA	COA		High density (4135 N/0.1 sq.m.)	Annelida	VAR			Gilbert et al. 1976
0.64		*	United States	EqPA		EPA Chronic Marine EP Threshold	Aquatic biota		1		Lyman et al. 1987
0.664	+/-0.563	NE	Massachusetts Bay, MA	COA		High density (201+/-33.4 N/0.1 sq.m.)	Mollusca	VAR			Gilbert et al. 1976
1		NE	Puget Sound, WA	COA		Not toxic (10% prevalence of idiopathic degeneration/necrosis)	Parophrys vetulus (English sole)				Malins et al. 1985
1		NE	Puget Sound, WA	COA		Not toxic (17.5% prevalence of steatosis and hemosiderosis)	Parophrys vetulus (English sole)				Malins et al. 1985
1		NE	Puget Sound, WA	COA		Not toxic (0% occurrence of hepatic cellular alterations)	Parophrys vetulus (English sole)				Malins et al. 1985
1		NE	Puget Sound, WA	COA		Not toxic (5% prevalence of hepatocellular regenerative foci)	Parophrys vetulus (English sole)				Malins et al. 1985
1		NE	Puget Sound, WA	COA		Not toxic (0% prevalence of hepatic cellular alterations)	Parophrys vetulus (English sole)				Malins et al. 1985
1		NE	Puget Sound, WA	COA		Not toxic (32.5% prevalence of hepatic idiopathic lesions)	Parophrys vetulus (English sole)				Malins et al. 1985
1		NE	Massachusetts Bay, MA	COA		High density (24 N/0.1 sq.m.)	Echinodermata	VAR			Gilbert et al. 1976
1.47	+/-1.46	NE	Massachusetts Bay, MA	COA		High species richness (102+/-4.73 S/0.1 sq.m.)	Benthic species	VAR			Gilbert et al. 1976
2.05	+/-1.48	NE	Massachusetts Bay, MA	COA		High density (299+/-40.3 N/0.1 sq.m.)	Arthropoda	VAR			Gilbert et al. 1976
2.5		NE	Matagorda Ship Channel, TX	COA	10-d	Not toxic (7.2+/-2.77% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1985a
2.5		NE	Matagorda Ship Channel, TX	COA	10-d	Not toxic (10.6+/-5.18% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1985a
2.5		NE	Matagorda Ship Channel, TX	COA	10-d	Not toxic (0.2+/-0.447% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1985a
3.3		NE	Massachusetts Bay, MA	COA		High density (22 N/0.1 sq.m.)	Rhynchocoela	VAR			Gilbert et al. 1976
3.47	+/-3.83	SG	Massachusetts Bay, MA	COA		Low density (7.14+/-4.23 N/0.1 sq.m.)	Rhynchocoela	VAR			Gilbert et al. 1976
3.53	+/-3.81	*	Massachusetts Bay, MA	COA		Low density (2.76+/-2.7 N/0.1 sq.m.)	Echinodermata	VAR			Gilbert et al. 1976
3.54	+/-3.86	SG	Massachusetts Bay, MA	COA		Low density (61.1+/-36.6 N/0.1 sq.m.)	Arthropoda	VAR			Gilbert et al. 1976
3.62	+/-3.87	*	Massachusetts Bay, MA	COA		Low species richness (57.2+/-12.2 S/0.1 sq.m.)	Benthic species	VAR			Gilbert et al. 1976
3.76	+/-3.86	*	Massachusetts Bay, MA	COA		Low density (39.1+/-30.8 N/0.1 sq.m.)	Mollusca	VAR			Gilbert et al. 1976
5		NC	Galveston Bay, TX	COA		Low abundance (53+/-33.9 N/0.00203 sq.m.)	Benthic invertebrates		0.985+/-0.247	22+/-11.2	Carr 1992
5		NE	Freeport Harbor, TX	COA	10-d	Not toxic (2+/-1% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1985b
5		NE	Freeport Harbor, TX	COA	10-d	Not toxic (9.6+/-4.22% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1985b
5		NE	Freeport Harbor, TX	COA	10-d	Not toxic (0% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1985b
5		NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (6+/-2.35% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1983b
5		NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (2.6+/-2.97% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1983b
5		NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (1.8+/-1.79% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1983b
5.15	+/-6.5	*	Massachusetts Bay, MA	COA		Low density (1316+/-768 N/0.1 sq.m.)	Annelida	VAR			Gilbert et al. 1976
6.25	+/-2.31	NE	Galveston Bay, TX	COA		High abundance (156+/-22.9 N/0.00203 sq.m.)	Polychaeta		0.916+/-0.661	2.94+/-2.3	Carr 1992
6.67	+/-2.89	NE	Galveston Bay, TX	COA		High abundance (27.3+/-10 N/0.00203 sq.m.)	Mollusca		1.64+/-0.4	1.39+/-0.17	Carr 1992
7.5	+/-2.89	NE	Galveston Bay, TX	COA		High species richness (24.5+/-3.7 S/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
7.5	+/-2.89	NE	Galveston Bay, TX	COA		High abundance (359+/-92.8 N/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
7.5	+/-3.54	NE	Galveston Bay, TX	COA		High Abundance (6+/-1.41 N/0.00203 sq.m.)	Amphipoda		0.955+/-0.629	7.21+/-8.2	Carr 1992
8.86	+/-8.3	NE	Galveston Bay, TX	COA	48-h	Not toxic (98.1+/-1.79% normal development)	Arbacia punctulata (sea urchin)	EMB	.748+/-0.476	4.16+/-3.45	Carr 1992
9		*	Puget Sound, WA	AETA	15-min	1986 Puget Sound AET	Microtox (Photobacterium phosphoreum)		1		Bellar et al. 1986
10	+/-7.75	NE	Galveston Bay, TX	COA		Low species (11.2+/-1.94 S/0.00203 sq.m.)	Benthic species		0.642+/-0.356	13.4+/-8.65	Carr 1992
10.4	+/-0.1	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (4.8+/-2.28% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1983a
10.4	+/-0.1	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (15.8+/-4.21% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1983a
10.4	+/-0.1	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (1.2+/-.447% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1983a

Table 27. A summary of the available data on the biological effects associated with sediment-sorbed TOTAL POLYCHLORINATED BIPHENYLS (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Total PCBs Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
10.8 +/-11.8	NC	Galveston Bay, TX	COA		Low abundance (4.21+/-5.66 N/0.00203 sq.m.)	Oligochaeta		0.895+/-0.453	7.85+/-8.8	Carr 1992
11.1	NE	San Francisco Bay, CA	COA	48-h	Least toxic (17.3% mortality)	Mussel	LAR	1.25		Chapman et al. 1987a
11.5 +/-10.7	NE	Galveston Bay, TX	COA		High abundance (16.2+/-6.19 N/0.00203 sq.m.)	Copepoda		0.844+/-0.524	4.73+/-3.1	Carr 1992
11.8 +/-12.7	SG	Galveston Bay, TX	COA		Low abundance (2.05+/-1.58 N/0.00203 sq.m.)	Copepoda		0.879+/-0.47	9.63+/-9.65	Carr 1992
12 +/-12.1	*	Galveston Bay, TX	COA		Low abundance (0.3+/-0.651 N/0.00203 sq.m.)	Amphipoda		0.859+/-0.487	7.67+/-8.12	Carr 1992
12.2 +/-12.2	SG	Galveston Bay, TX	COA		Low abundance (1.86+/-2.59 N/0.00203 sq.m.)	Mollusca		0.784+/-0.421	8.29+/-8.13	Carr 1992
12.3 +/-12.4	SG	Galveston Bay, TX	COA		Low species richness (10+/-3.73 S/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
12.3 +/-12.4	SG	Galveston Bay, TX	COA		Low abundance (89+/-60.7 N/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
12.5 +/-8.66	NE	Galveston Bay, TX	COA		High abundance (154+/-30.2 N/0.00203 sq.m.)	Benthic invertebrates		0.47+/-0.27	9.07+/-2.94	Carr 1992
13.5 +/-13.1	SG	Galveston Bay, TX	COA		Low abundance (41.7+/-21.8 N/0.00203 sq.m.)	Polychaeta		0.848+/-0.427	9.21+/-8.61	Carr 1992
13.8 +/-5.77	*	Puget Sound, WA	COA		Toxic (71.6+/-14.6% prevalence of idiopathic degeneration/necrosis)	Parophrys vetulus (English sole)				Malins et al. 1985
13.8 +/-5.77	*	Puget Sound, WA	COA		Toxic (51.4+/-21.1% prevalence of steatosis and hemosiderosis)	Parophrys vetulus (English sole)				Malins et al. 1985
13.8 +/-5.77	*	Puget Sound, WA	COA		Toxic (19+/-6.15% prevalence of hepatocellular regenerative foci)	Parophrys vetulus (English sole)				Malins et al. 1985
13.8 +/-5.77	*	Puget Sound, WA	COA		Toxic (26.7+/-6.43% prevalence of hepatic neoplasms)	Parophrys vetulus (English sole)				Malins et al. 1985
13.8 +/-5.77	*	Puget Sound, WA	COA		Toxic (88+/-3.65% prevalence of hepatic idiopathic lesions)	Parophrys vetulus (English sole)				Malins et al. 1985
13.8 +/-5.77	*	Puget Sound, WA	COA		Toxic (44.2+/-8.5% prevalence of hepatic cellular alterations)	Parophrys vetulus (English sole)				Malins et al. 1985
13.9 +/-0.125	NE	Chandeleur Sound, LA	COA	10-d	Not significantly toxic (2.87+/-4.05% mortality)	Ampelisca abdita (amphipod)		0.517+/-0.166	2.02+/-1.38	EMAP Louisiana Province 1991
14 +/-0.149	NC	Chandeleur Sound, LA	COA		Significantly toxic (7.6+/-1.32% mortality)	Mysidopsis bahia (mysid shrimp)		0.624+/-0.197	2.07+/-1.19	EMAP Louisiana Province 1991
14 +/-0.219	NE	Apalachee Bay, FL	COA	10-d	Not significantly toxic (3.3+/-3.25% mortality)	Ampelisca abdita (amphipod)		0.643+/-0.455	0.390+/-0.410	EMAP Louisiana Province 1991
14.2	NC	Mobile Bay, AL	COA		Significantly toxic (10% mortality)	Mysidopsis bahia (mysid shrimp)		0.009	0.004	EMAP Louisiana Province 1991
14.2 +/-13.9	NC	Galveston Bay, TX	COA		Moderate abundance (58.3+/-16.2 N/0.00203 sq.m.)	Oligochaeta		0.632+/-0.274	7.93+/-5.6	Carr 1992
14.3 +/-0.095	NE	Chandeleur Sound, LA	COA		Not significantly toxic (1.03+/-2.05% mortality)	Mysidopsis bahia (mysid shrimp)		0.824+/-0.915	1.69+/-0.920	EMAP Louisiana Province 1991
14.3 +/-0.115	SG	Chandeleur Sound, LA	COA	10-d	Significantly toxic (11.5+/-4.86% mortality)	Ampelisca abdita (amphipod)		0.811+/-0.711	1.87+/-0.973	EMAP Louisiana Province 1991
14.6 +/-0.76	NE	Apalachee Bay, FL	COA		Not significantly toxic (0.75+/-1.5% mortality)	Mysidopsis bahia (mysid shrimp)		0.540+/-0.385	0.405+/-0.417	EMAP Louisiana Province 1991
14.8 +/-0.277	NC	Mississippi Sound, MS	COA		Significantly toxic (12.2+/-4.42% mortality)	Mysidopsis bahia (mysid shrimp)		0.939+/-0.335	2.63+/-2.3	EMAP Louisiana Province 1991
15 +/-7.07	NE	Galveston Bay, TX	COA		High abundance (155+/-49.5 N/0.00203 sq.m.)	Oligochaeta		1.2+/-1.27	4.27+/-3.85	Carr 1992
15.2 +/-0.219	SG	Apalachee Bay, FL	COA	10-d	Significantly toxic (15.6% mortality)	Ampelisca abdita (amphipod)		0.438+/-0.442	0.421+/-0.593	EMAP Louisiana Province 1991
15.3 +/-2.02	NE	Mississippi Sound, MS	COA	10-d	Not significantly toxic (1.4+/-1.73% mortality)	Ampelisca abdita (amphipod)		0.998+/-0.602	2.01+/-1.82	EMAP Louisiana Province 1991
15.6 +/-1.99	NC	Mobile Bay, AL	COA	10-d	Significantly toxic (46+/-49.3% mortality)	Ampelisca abdita (amphipod)		0.22+/-0.298	3.84+/-5.43	EMAP Louisiana Province 1991
15.7 +/-1.45	NE	Matagorda Bay, TX	COA		Not significantly toxic (1.58+/-1.82% mortality)	Mysidopsis bahia (mysid shrimp)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
15.7 +/-1.45	NE	Matagorda Bay, TX	COA	10-d	Not significantly toxic (2.33+/-4.65% mortality)	Ampelisca abdita (amphipod)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
15.8 +/-15.2	SG	Galveston Bay, TX	COA	48-h	Toxic (4.65+/-16.1% normal development)	Arbacia punctulata (sea urchin)	EMB	1.06+/-0.449	14.5+/-9.2	Carr 1992
16.4 +/-3.79	NE	Mississippi Sound, MS	COA		Not significantly toxic (0.789+/-1.59% mortality)	Mysidopsis bahia (mysid shrimp)		0.827+/-0.757	1.46+/-1.58	EMAP Louisiana Province 1991
17.2 +/-4.39	NE	Mississippi River, MS, LA	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		1.3+/-0.83	1.14+/-1	EMAP Louisiana Province 1991
17.4 +/-0.399	NE	Mobile Bay, AL	COA		Not significantly toxic (1.07+/-1.85% mortality)	Mysidopsis bahia (mysid shrimp)		0.968+/-0.815	8.23+/-3.4	EMAP Louisiana Province 1991
17.5 +/-0.382	NE	Mobile Bay, AL	COA	10-d	Not significantly toxic (0.5+/-0.778% mortality)	Ampelisca abdita (amphipod)		1.24+/-0.948	8.51+/-4.76	EMAP Louisiana Province 1991
18.8 +/-2.16	NE	Mississippi River, MS, LA	COA	10-d	Not significantly toxic (7.8+/-1.63% mortality)	Ampelisca abdita (amphipod)		1.15+/-1.04	2.31+/-0.651	EMAP Louisiana Province 1991
19.3 +/-7.37	SG	Mississippi Sound, MS	COA	10-d	Significantly toxic (11.6+/-3.39% mortality)	Ampelisca abdita (amphipod)		0.111+/-0.045	0.03	EMAP Louisiana Province 1991
19.8 +/-7.99	SG	Mississippi River, MS, LA	COA	10-d	Significantly toxic (15.9+/-6.65% mortality)	Ampelisca abdita (amphipod)		1.22+/-0.717	0.235+/-0.276	EMAP Louisiana Province 1991
20	NE	Miami River/Seybold Canal, FL	COA	10-d	Not significantly toxic (2.3+/-1.51% mortality)	Mercenaria mercenaria (atlantic quahog)	ADT			Vittor & Associates 1988

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20		NE	Miami River/Seybold Canal, FL	COA	10-d	Not significantly toxic (6.7+/-2.31% mortality)	Pennaeus aztecus aztecus (brown shrimp)	ADT			Vittor & Associates 1988
20	+/-20	NE	Southern California	COA		High abundance (191+/-70.1 N/0.1 sq.m.)	Echinoderm				Word & Mearns 1979 (As cited in L&M 1990)
21.4	+/-5.76	SG	Mississippi River, MS, LA	COA		Significantly toxic (32.9+/-36.4% mortality)	Mysidopsis bahia (mysid shrimp)		1.07+/-0.924	1.41+/-1.93	EMAP Louisiana Province 1991
21.5			***TEL***								
21.7	+/-19.1	*	Galveston Bay, TX	COA	1-h	Toxic (20.4+/-18.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	1.26+/-0.47	14.6+/-10.1	Carr 1992
22.7	+/-11.7	*	San Francisco Bay, CA	COA	48-h	Moderately toxic (57.1+/-13.6% mortality)	Mussel	LAR	1.14+/-.33		Chapman et al. 1987a
25		NE	San Diego Bay, CA	COA	96-h	Not significantly toxic (4% mortality)	Citharichthys stigmaeus (sanddab)				Salazar & Salazar 1985
25		NE	San Diego Bay, CA	COA	10-d	Not significantly toxic (14% mortality)	Acanthomysis sculpta (mysid)				Salazar & Salazar 1985
25		NE	San Diego Bay, CA	COA	20-d	Not significantly toxic (13% mortality)	Neanthes arenaceodentata (polycheate)				Salazar & Salazar 1985
25		NE	San Diego Bay, CA	COA	20-d	Not significantly toxic (1% mortality)	Macoma nasuta (clam)				Salazar & Salazar 1985
25		NE	San Diego Bay, CA	COA	96-h	Not significantly toxic (0% mortality)	Acanthomysis sculpta (mysid)				Salazar & Salazar 1985
25		NE	San Diego Bay, CA	COA	96-h	Not significantly toxic (18% mortality)	Acartia tonsa (copepod)				Salazar & Salazar 1985
25.4	+/-10.6	NE	San Francisco Bay, CA	COA	4-wk	Least toxic (116+/-4.3 young produced)	Tigriopus californicus (copepod)	ADT	1.23+/-.09		Chapman et al. 1987a
25.7	+/-16.3	NE	San Francisco Bay, CA	COA	48-h	Least toxic (23.3+/-7.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
26	+/-17.3	NE	San Francisco Bay, CA	COA	48-h	Least toxic (18+/-8.01% abnormal)	Mussel	LAR	1.2+/-.38		Chapman et al. 1987a
26.5	+/-14.9	NE	Galveston Bay, TX	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		0.934+/-0.657	0.457+/-0.530	EMAP Louisiana Province 1991
26.9	+/-19.9	NE	Galveston Bay, TX	COA	10-d	Not significantly toxic (1.35+/-1.45% mortality)	Ampelisca abdita (amphipod)		0.961+/-0.537	1.17+/-0.640	EMAP Louisiana Province 1991
28.3	+/-27.1	NE	Commencement Bay, WA	COA	48-h	Least toxic (15.1+/-3.1% abnormality)	Oyster	LAR			Tetra Tech 1985
28.3	+/-24.1	SG	Galveston Bay, TX	COA		Significantly toxic (13.4+/-9.11% mortality)	Mysidopsis bahia (mysid shrimp)		0.778+/-0.482	1.21+/-0.778	EMAP Louisiana Province 1991
28.4	+/-20.6	SG	Galveston Bay, TX	COA	10-d	Significantly toxic (15.8+/-3.89% mortality)	Ampelisca abdita (amphipod)		0.647+/-0.606	0.160+/-0.184	EMAP Louisiana Province 1991
30		NE	Burrard Inlet, BC	SQO		Sediment Quality Objectives	Aquatic biota				Swain & Nijman 1991
30	+/-50	SG	Southern California	COA		Moderate abundance (56.2+/-23 N/0.1 sq.m.)	Echinoderm				Word & Mearns 1979 (As cited in L&M 1990)
36.6		*	United States	SLCA		National Screening Level Concentration-Marine	Benthic species		1		Neff et al. 1987
37	+/-19	NE	Puget Sound, WA	COA	15-min	Not significantly toxic (EC50; 0.283+/-0.168% extract)	Microtox (Photobacterium phosphoreum)		1.39+/-0.37		Pastorok & Becker 1990
37	+/-17.6	SG	San Francisco Bay, CA	COA	48-h	Moderately toxic (25.1+/-6.61% abnormal)	Mussel	LAR	1.26+/-0.17		Chapman et al. 1987a
38	+/-31.6	NC	Commencement Bay, WA	COA	10-d	Highly toxic (78.5+/-19.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
47.6	+/-43.9	NE	Tampa Bay, FL	COA	1-h	Least toxic (79.4+/-9.9% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.45+/-0.587		Long 1993
50		NE	Georgetown Harbor, SC	COA		Not toxic (species richness or abundance)	Benthic species		0.12		Van Dolah et al. 1984
54		*	San Francisco Bay, CA	AETA	48-h	San Francisco Bay AET	Oyster; mussel	LAR			Long & Morgan 1990
54.3	+/-89.3	NE	San Francisco Bay, CA	COA	10-d	Least toxic (13.6+/-7.76% mortality)	Amphipod	ADT	1.4 +/- 0.79		Chapman et al. 1987a
54.7	+/-82.6	NE	San Francisco Bay, CA	COA	10-d	Least Toxic (4.63+/-2.91% avoidance)	Amphipod	ADT	1.44+/-.74		Chapman et al. 1987a
56		NC	Puget Sound, WA	COA	2-d	Significantly toxic (3.8% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.5		Pastorok & Becker 1990
60	+/-70	NC	Southern California	COA		Moderate abundance (72.6+/-6.8 N/0.1 sq.m.)	Arthropods				Word & Mearns 1979 (As cited in L&M 1990)
60.5	+/-87.8	NE	Commencement Bay, WA	COA	10-d	Least toxic (12.5+/-4.5% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
70		*	United States	EqPA		Chronic Marine EqP Threshold	Aquatic biota		1		Bolton et al. 1985
73		*	Puget Sound, WA	AETA	48-h	1986 Puget Sound AET	Crassostrea gigas (oyster)	LAR	1		Bellar et al. 1986
73		*	Puget Sound, WA	AETA		1986 Puget Sound AET	Benthic species		1		Bellar et al. 1986
79.5	+/-60.8	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (6.67+/-8.07% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.51+/-0.330		Pastorok & Becker 1990
80	+/-140	NE	Southern California	COA		Moderate abundance (75.6+/-12.7 N/0.1 sq.m.)	Benthic species				Word & Mearns 1979 (As cited in L&M 1990)
80	+/-100	NE	Southern California	COA		High abundance (148+/-58 N/0.1 sq.m.)	Arthropods				Word & Mearns 1979 (As cited in L&M 1990)

Table 27. A summary of the available data on the biological effects associated with sediment-sorbed TOTAL POLYCHLORINATED BIPHENYLS (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Total PCBs	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
88		*	California	AETA	48-h	California AET Values	Mytilus edulis (bivalve)	LAR			Becker et al. 1990
88		*	Northern California	AETA		Northern California AET Values	Benthic species				Becker et al. 1990
93.7	+/-147	NE	San Francisco Bay, CA	COA	10-d	Least toxic (18+/-6.6% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
<=100		*	San Francisco Bay, CA	SQAV	SQTA	Significantly Toxic Triad Minimum Bioeffects	Benthic species				Chapman et al. 1987b
101	+/-153	NE	San Francisco Bay, CA	COA	10-d	Not significantly toxic (18.4+/-6.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
103	+/-59.1	NE	Tampa Bay, FL	COA	10-d	Not significantly toxic (14.6+/-7.67% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.63+/-0.596		Long 1993
110	+/-127	*	San Francisco Bay, CA	COA	10-d	Moderately toxic (28.3+/-7.51% mortality)	Amphipod	ADT	2.01+/-.98		Chapman et al. 1987a
120		*	Puget Sound, WA	SQG		Chemical Criteria	Benthic community		1		WDE 1989
127	+/-171	NC	San Francisco Bay, CA	COA	48-h	Significantly toxic (55.7+/-22.7% abnormal)	Bivalve	LAR			Long & Morgan 1990
130		*	Puget Sound, WA	AETA	15-min	1988 Puget Sound AET	Microtox (Photobacterium phosphoreum)				PTI 1988
130		NE	Puget Sound, WA	AETA		PSDDA Screening level concentration	Aquatic biota				USACOE 1988
131	+/-124	NE	Tampa Bay, FL	COA		Not significantly toxic (EC50; 0.066+/-0.033 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.89+/-0.902		Long 1993
135	+/-125	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (13.8+/-4.09% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.47+/-0.306		Pastorok & Becker 1990
140	+/-262	*	Commencement Bay, WA	COA	48-h	Moderately toxic (23+/-2.3% abnormality)	Oyster	LAR			Tetra Tech 1985
146	+/-218	*	San Francisco Bay, CA	COA	10-d	Significantly toxic (42.9+/-19.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
151	+/-260	*	San Francisco Bay, CA	COA	10-d	Moderately toxic (33.8+/-4.7% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
>=160		*	San Francisco Bay, CA	SQAV	SQTA	Significantly Toxic Triad Significant Bioeffects	Benthic species				Chapman et al. 1987b
160	+/-430	NC	Southern California	COA		Low abundance (57.6+/-13.6 N/0.1 sq.m.)	Benthic species				Word & Mearns 1979 (As cited in L&M 1990)
164	+/-99.9	*	San Francisco Bay, CA	COA	48-h	Highly toxic (92.4+/-4.5% abnormal)	Bivalve	LAR			Long & Morgan 1990
164	+/-99.9	*	San Francisco Bay, CA	COA	48-h	Highly toxic (92.3+/-5.5% mortality)	Mussel	LAR	2.87+/-1.32		Chapman et al. 1987a
164	+/-99.9	*	San Francisco Bay, CA	COA	4-wk	Moderately toxic (94.9+/-10.1 young produced)	Tigriopus californicus (copepod)	ADT	2.87+/-1.07		Chapman et al. 1987a
165	+/-232	*	San Francisco Bay, CA	COA	48-h	Moderately toxic (59.4+/-11.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
167		*	Puget Sound, WA	AETA	10-d	1986 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT	1		Bellar et al. 1986
169	+/-171	NE	San Francisco Bay, CA	COA	10-d	Highly toxic (67+/-11.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
169	+/-154	NE	Narragansett Bay, RI	COA	10-d	Not significantly toxic (5.28+/-3.04% mortality))	Ampelisca abdita (amphipod)	ADT			Munns et al. 1991
180		*	San Francisco Bay, CA	COA	10-d	Most toxic (95% mortality)	Amphipod	ADT	4.03		Chapman et al. 1987a
180		*	San Francisco Bay, CA	COA	10-d	Highly toxic (37% avoidance)	Amphipod	ADT	4.03		Chapman et al. 1987a
180	+/-160	NE	Baltimore Harbor, MD	COA	48-h	Least toxic; TLm	Fundulus heteroclitus (mummichog)				Tsai et al. 1979
180	+/-160	NE	Baltimore Harbor, MD	COA	48-h	Least toxic; TLm	Leiostomus xanthurus (spot)				Tsai et al. 1979
189			***PEL***								
193	+/-230	NE	Puget Sound, WA	COA	20-d	Not significantly toxic (5+/-3.86% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.46+/-0.26		Pastorok & Becker 1990
200		*	Miami River/Seybold Canal, FL	COA	10-d	Significantly toxic (24.7+/-15% mortality)	Pennaeus aztecus (brown shrimp)	ADT			Vittor & Associates 1988
209	+/-272	NE	Puget Sound, WA	COA	28-d	Not significantly toxic (1.44 +/-1.74% mortality)	Dendraster exentricus (sand dollar)	JUV			Casillas et al. 1992
209	+/-272	NE	Puget Sound, WA	COA	28-d	Not significantly toxic (0.055+/-0.024% growth mm/d)	Dendraster exentricus (sand dollar)	JUV			Casillas et al. 1992
216	+/-376	NE	San Francisco Bay, CA	COA	48-h	Not significantly toxic (31.9+/-15.5% abnormal)	Bivalve	LAR			Long & Morgan 1990
218		*	San Francisco Bay, CA	COA	48-h	Highly toxic (66.8% abnormal)	Mussel	LAR	3.59		Chapman et al. 1987a
218	+/-161	*	Tampa Bay, FL	COA	1-h	Moderately toxic (15.3+/-10.6% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.94+/-0.908		Long 1993
220	+/-540	NE	Southern California	COA		High species richness (96.3+/-22.3 S/0.1 sq.m.)	Benthic species				Word & Mearns 1979 (As cited in L&M 1990)
251	+/-556	NC	Commencement Bay, WA	COA	10-d	Moderately toxic (26+/-5.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Tetra Tech 1985
260		*	San Francisco Bay, CA	AETA	10-d	San Francisco Bay AET	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990

Table 27. A summary of the available data on the biological effects associated with sediment-sorbed TOTAL POLYCHLORINATED BIPHENYLS (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Total PCBs	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
260		*	Northern California	AETA	10-d	Northern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
271	+/-217	NC	Southern California	COA	10-d	Significantly toxicity (51.7% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
290	+/-502	NE	Hudson-Raritan Bay, NY	COA	14-d	Not toxic (increased growth rate)	Chromadorina germanica (nematode)				Tietjen & Lee 1984
298	+/-456	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (4.43+/-2.1% mortality)	Panope generosa (geoduck)	JUV	1.51+/-0.261		Pastorok & Becker 1990
349	+/-490	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (2.09+/-1.73% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.56+/-0.329		Pastorok & Becker 1990
360		*	California	AETA		California AET Values	Benthic species				Becker et al. 1990
360		*	Southern California	AETA		Southern California AET Values	Benthic species				Becker et al. 1990
368	+/-695	*	Commencement Bay, WA	COA	48-h	Highly toxic (44.5+/-19% abnormality)	Oyster	LAR			Tetra Tech 1985
380		NE	Puget Sound, WA	SBA		EPA/ACOE Puget Sound Interim Criteria	Aquatic biota				USACOE 1988
388	+/-475	*	Puget Sound, WA	COA	15-min	Significantly toxic (EC50; 0.065+/-0.043% extract)	Microtox (Photobacterium phosphoreum)		1.58+/-0.255		Pastorok & Becker 1990
400	+/-600	SG	Southern California	COA		Moderate species richness (72+/-3.3 S/0.1 sq.m.)	Benthic species				Word & Mearns 1979 (As cited in L&M 1990)
477	+/-524	*	Puget Sound, WA	COA	2-d	Significantly toxic (60.4+/-46.5% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.57+/-0.287		Pastorok & Becker 1990
480	+/-724	NE	Southern California	COA	10-d	Not significantly toxic (23.2% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
490	+/-413	NE	Miami River, FL	COA	10-d	Not toxic (18.6+/-7.27% mortality)	Pennaeus aztecus aztecus (brown shrimp)	ADT			ERCO 1985
490	+/-413	NE	Miami River, FL	COA	10-d	Not toxic (1.2+/-.837% mortality)	Mercenaria mercenaria (atlantic quahog)	ADT			ERCO 1985
490	+/-413	NE	Miami River, FL	COA	10-d	Not toxic (3.6+/-1.67% mortality)	Nereis virens (sandworm)	ADT			ERCO 1985
590		SG	Puget Sound, WA	COA	10-d	Significantly toxic (56% mortality)	Panope generosa (geoduck)	JUV	2.1		Pastorok & Becker 1990
592	+/-617	*	Puget Sound, WA	COA	10-d	Significantly toxic (80.8+/-30.6% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.266		Pastorok & Becker 1990
638	+/-512	*	Hudson-Raritan Bay, NY	COA	14-d	Significantly toxic (reduced growth rate)	Chromadorina germanica (nematode)				Tietjen & Lee 1984
817	+/-795	*	Puget Sound, WA	COA	20-d	Significantly toxic (37.3+/-22% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.87+/-0.208		Pastorok & Becker 1990
838	+/-930	*	Puget Sound, WA	COA	28-d	Significantly toxic (69.5+/-33.3% mortality)	Dendraster exentricus (sand dollar)	JUV			Casillas et al. 1992
838	+/-930	*	Puget Sound, WA	COA	28-d	Significantly toxic (0.013+/-0.006% growth mm/d)	Dendraster exentricus (sand dollar)	JUV			Casillas et al. 1992
911	+/-8.06	NE	Galveston Bay, TX	COA	1-h	Not toxic (92.5+/-6.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	0.77+/-0.448	6.37+/-6.58	Carr 1992
>960		-	Southern California	AETA	10-d	Southern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
>960		-	California	AETA	10-d	California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
1000		*	Puget Sound, WA	AETA		1988 Puget Sound AET	Benthic community				PTI 1988
1000	+/-2400	*	Southern California	COA		Low abundance (35.3+/-15.8 N/0.1 sq.m.)	Arthropods				Word & Mearns 1979 (As cited in L&M 1990)
1100		*	Puget Sound, WA	AETA	48-h	1988 Puget Sound AET	Crassostrea gigas (oyster)	LAR			PTI 1988
1100	+/-800	*	Baltimore Harbor, MD	COA	48-h	Most toxic; TLm	Fundulus heteroclitus (mummichog)				Tsai et al. 1979
1100	+/-800	*	Baltimore Harbor, MD	COA	48-h	Most toxic; TLm	Leiostomus xanthurus (spot)				Tsai et al. 1979
1110	+/-2610	NC	Southern California	COA		Low species richness (51.2+/-8.6 S/0.1 sq.m.)	Benthic species				Word & Mearns 1979 (As cited in L&M 1990)
1167	+/-2434	*	Tampa Bay, FL	COA	1-h	Most toxic (0.091+/-0.187% fertilization)	Arbacia punctulata (sea urchin)	GAM	2.96+/-1.49		Long 1993
1300	+/-2700	*	Southern California	COA		Low abundance (6.1+/-7.2 N/0.1 sq.m.)	Echinoderm				Word & Mearns 1979 (As cited in L&M 1990)
1596	+/-2777	*	Tampa Bay, FL	COA	10-d	Significantly toxic (35.2+/-17.5% mortality)	Ampelisca abdita (amphipod)	SUB ADT	3.53+/-1.35		Long 1993
1773	+/-2948	*	Tampa Bay, FL	COA		Significantly toxic (EC50; 0.017+/-0.012 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.47+/-1.49		Long 1993
2260	+/-3530	NE	Southern California	COA		High abundance (88.9+/-35.4 N/0.1 sq.m.)	Benthic species				Word & Mearns 1979 (As cited in L&M 1990)
2500		*	Puget Sound, WA	AETA		PSDDA Maximum Level Criteria	Aquatic biota				USACOE 1988
3100		*	Puget Sound, WA	AETA	10-d	1988 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT			PTI 1988
6700		*	Laboratory	SSBA	10-d	LC10	Rhepoxynius abronius (amphipod)	ADT	0.25		Swartz et al. 1988
10800		*	Laboratory	SSBA	10-d	LC50	Rhepoxynius abronius (amphipod)	ADT	0.25		Swartz et al. 1988

Table 27. A summary of the available data on the biological effects associated with sediment-sorbed TOTAL POLYCHLORINATED BIPHENYLS (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Total PCBs Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
53600 +/-29256	NE	Galveston Harbor, TX	COA	10-d	Not toxic (2.4+/-1.52% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Grieco 1984
53600 +/-29256	NE	Galveston Harbor, TX	COA	10-d	Not toxic (0% mortality)	Mercenaria mercenaria (hard clams)	ADT			Grieco 1984
53600 +/-29256	NE	Galveston Harbor, TX	COA	10-d	Not toxic (2.8+/-2.17% mortality)	Nereis virens (sandworm)	ADT			Grieco 1984

Table 28. A summary of the available data on the biological effects associated with sediment-sorbed ALDRIN (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Aldrin Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.02 +/-0.015	NE	Mobile Bay, AL	COA		Not significantly toxic (1.07+/-1.85% mortality)	Mysidopsis bahia (mysid shrimp)		0.968+/-0.815	8.23+/-3.4	EMAP Louisiana Province 1991
0.03 +/-0.014	NE	Mobile Bay, AL	COA	10-d	Not significantly toxic (0.5+/-0.778% mortality)	Ampelisca abdita (amphipod)		1.24+/-0.948	8.51+/-4.76	EMAP Louisiana Province 1991
0.05 +/-0.049	SG	Mobile Bay, AL	COA	10-d	Significantly toxic (46+/-49.3% mortality)	Ampelisca abdita (amphipod)		0.22+/-0.298	3.84+/-5.43	EMAP Louisiana Province 1991
0.06 +/-0.031	NE	Mississippi Sound, MS	COA		Not significantly toxic (0.789+/-1.59% mortality)	Mysidopsis bahia (mysid shrimp)		0.827+/-0.757	1.46+/-1.58	EMAP Louisiana Province 1991
0.07 +/-0.03	NE	Matagorda Bay, TX	COA		Not significantly toxic (1.58+/-1.82% mortality)	Mysidopsis bahia (mysid shrimp)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
0.07 +/-0.03	NE	Matagorda Bay, TX	COA	10-d	Not significantly toxic (2.33+/-4.65% mortality)	Ampelisca abdita (amphipod)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
0.07 +/-0.028	NE	Mississippi Sound, MS	COA	10-d	Not significantly toxic (1.4+/-1.73% mortality)	Ampelisca abdita (amphipod)		0.998+/-0.602	2.01+/-1.82	EMAP Louisiana Province 1991
0.08	NE	Apalachee Bay, FL	COA		Not significantly toxic (0.75+/-1.5% mortality)	Mysidopsis bahia (mysid shrimp)		0.540+/-0.385	0.405+/-0.417	EMAP Louisiana Province 1991
0.08	NG	Apalachee Bay, FL	COA	10-d	Significantly toxic (15.6% mortality)	Ampelisca abdita (amphipod)		0.438+/-0.442	0.421+/-0.593	EMAP Louisiana Province 1991
0.08	NE	Apalachee Bay, FL	COA	10-d	Not significantly toxic (3.3+/-3.25% mortality)	Ampelisca abdita (amphipod)		0.643+/-0.455	0.390+/-0.410	EMAP Louisiana Province 1991
0.08	NE	Chandeleur Sound, LA	COA		Not significantly toxic (1.03+/-2.05% mortality)	Mysidopsis bahia (mysid shrimp)		0.824+/-0.915	1.69+/-0.920	EMAP Louisiana Province 1991
0.08	NG	Chandeleur Sound, LA	COA		Significantly toxic (7.6+/-1.32% mortality)	Mysidopsis bahia (mysid shrimp)		0.624+/-0.197	2.07+/-1.19	EMAP Louisiana Province 1991
0.08	NE	Chandeleur Sound, LA	COA	10-d	Not significantly toxic (2.87+/-4.05% mortality)	Ampelisca abdita (amphipod)		0.517+/-0.166	2.02+/-1.38	EMAP Louisiana Province 1991
0.08	NG	Chandeleur Sound, LA	COA	10-d	Significantly toxic (11.5+/-4.86% mortality)	Ampelisca abdita (amphipod)		0.811+/-0.711	1.87+/-0.973	EMAP Louisiana Province 1991
0.08	NE	Galveston Bay, TX	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		0.934+/-0.657	0.457+/-0.530	EMAP Louisiana Province 1991
0.08	NG	Galveston Bay, TX	COA		Significantly toxic (13.4+/-9.11% mortality)	Mysidopsis bahia (mysid shrimp)		0.778+/-0.482	1.21+/-0.778	EMAP Louisiana Province 1991
0.08	NE	Galveston Bay, TX	COA	10-d	Not significantly toxic (1.35+/-1.45% mortality)	Ampelisca abdita (amphipod)		0.961+/-0.537	1.17+/-0.640	EMAP Louisiana Province 1991
0.08	NG	Galveston Bay, TX	COA	10-d	Significantly toxic (15.8+/-3.89% mortality)	Ampelisca abdita (amphipod)		0.647+/-0.606	0.160+/-0.184	EMAP Louisiana Province 1991
0.08	NE	Mississippi River, MS, LA	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		1.3+/-0.83	1.14+/-1	EMAP Louisiana Province 1991
0.08	NG	Mississippi River, MS, LA	COA		Significantly toxic (32.9+/-36.4% mortality)	Mysidopsis bahia (mysid shrimp)		1.07+/-0.924	1.41+/-1.93	EMAP Louisiana Province 1991
0.08	NE	Mississippi River, MS, LA	COA	10-d	Not significantly toxic (7.8+/-1.63% mortality)	Ampelisca abdita (amphipod)		1.15+/-1.04	2.31+/-0.651	EMAP Louisiana Province 1991
0.08	NG	Mississippi River, MS, LA	COA	10-d	Significantly toxic (15.9+/-6.65% mortality)	Ampelisca abdita (amphipod)		1.22+/-0.717	0.235+/-0.276	EMAP Louisiana Province 1991
0.08	SG	Mississippi Sound, MS	COA		Significantly toxic (12.2+/-4.42% mortality)	Mysidopsis bahia (mysid shrimp)		0.939+/-0.335	2.63+/-2.3	EMAP Louisiana Province 1991
0.08	SG	Mississippi Sound, MS	COA	10-d	Significantly toxic (11.6+/-3.39% mortality)	Ampelisca abdita (amphipod)		0.111+/-0.045	0.03	EMAP Louisiana Province 1991
0.08	*	Mobile Bay, AL	COA		Significantly toxic (10% mortality)	Mysidopsis bahia (mysid shrimp)		0.009	0.004	EMAP Louisiana Province 1991
0.1 +/-0.4	NC	San Francisco Bay, CA	COA	48-h	Significantly toxic (55.7+/-22.7% abnormal)	Bivalve	LAR			Long & Morgan 1990
0.1	NG	San Francisco Bay, CA	COA	10-d	Moderately toxic (33.8+/-4.7% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
0.1	NE	Freeport Harbor, TX	COA	10-d	Not toxic (2+/-1% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1985b
0.1	NE	Freeport Harbor, TX	COA	10-d	Not toxic (9.6+/-4.22% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1985b
0.1	NE	Freeport Harbor, TX	COA	10-d	Not toxic (0% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1985b
0.1	NE	Matagorda Ship Channel, TX	COA	10-d	Not toxic (7.2+/-2.77% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1985a
0.1	NE	Matagorda Ship Channel, TX	COA	10-d	Not toxic (10.6+/-5.18% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1985a
0.1	NE	Matagorda Ship Channel, TX	COA	10-d	Not toxic (0.2+/-0.447% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1985a
0.1	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (4.8+/-2.28% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1983a
0.1	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (15.8+/-4.21% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1983a
0.1	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (1.2+/-.447% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1983a
0.1	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (6+/-2.35% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1983b
0.1	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (2.6+/-2.97% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1983b
0.1	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (1.8+/-1.79% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1983b
0.14 +/-0.35	NC	San Francisco Bay, CA	COA	10-d	Significantly toxic (42.9+/-19.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990

Table 28. A summary of the available data on the biological effects associated with sediment-sorbed ALDRIN (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Aldrin Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.2 +/-0.4	NC	San Francisco Bay, CA	COA	48-h	Moderately toxic (59.4+/-11.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
0.21	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-6.07% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.71+/-0.9	15.3+/-23.2	Bricker et al. 1993
0.21	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.1+/-13.3% mortality)	Mulinia lateralis (bivalve)	LAR	2.68+/-0.955	31.8+/-24.4	Bricker et al. 1993
0.21	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (91.5+/-7.28% normal development)	Mulinia lateralis (bivalve)	LAR	2.6+/-0.899	36.8+/-34.9	Bricker et al. 1993
0.21	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (21.5+/-6.36% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.35+/-1.05	10.5+/-13.4	Bricker et al. 1993
0.21	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-7.99% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.14+/-0.352	6.09+/-5.38	Bricker et al. 1993
0.21	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (51.3+/-6.95% mortality)	Mulinia lateralis (bivalve)	LAR	1.8+/-1.71	29.6+/-46.3	Bricker et al. 1993
0.21	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (88.5+/-8.39% normal development)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.05	38.1+/-38.9	Bricker et al. 1993
0.21	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (19.3+/-5.86% mortality)	Ampelisca abidta (amphipod)	SUB ADT	1.82+/-0.225	6.3+/-6.2	Bricker et al. 1993
0.21	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.5+/-11.4% mortality)	Mulinia lateralis (bivalve)	LAR	2.33+/-0.364	26.8+/-9.42	Bricker et al. 1993
0.21	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (96+/-1.66% normal development)	Mulinia lateralis (bivalve)	LAR	2.52+/-0.997	35+/-42.9	Bricker et al. 1993
0.21	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (23+/-4.24% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.46+/-1.22	40+/-55.1	Bricker et al. 1993
0.21	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (75.1+/-10.6% mortality)	Mulinia lateralis (bivalve)	LAR	3.32+/-0.317	42.3+/-19.2	Bricker et al. 1993
0.21	NC	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.013+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.79+/-0.744	37.6+/-25.3	Bricker et al. 1993
0.21	NC	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.014+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.51+/-0.45	29.6+/-15.7	Bricker et al. 1993
0.21	NC	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.011+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.28+/-0.363	45.3+/-21.4	Bricker et al. 1993
0.21	NC	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.016+/-0.007 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.26+/-0.936	43.4+/-35.6	Bricker et al. 1993
0.21	NC	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.008+/-0.001 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.19+/-1.27	12+/-11.3	Bricker et al. 1993
0.26 +/-0.45	*	San Francisco Bay, CA	COA	10-d	Highly toxic (67+/-11.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
0.3	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
0.3 +/-0.684	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.1+/-2.78% normal development)	Mulinia lateralis (bivalve)	LAR	2.12+/-1.04	22.9+/-23.7	Bricker et al. 1993
0.3	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (0.33+/-0.516% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
0.3	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (2.33+/-1.03% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
0.3	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (55.0+/-22.6% mortality)	Hyalella azteca (amphipod)	JUV	0.338+/-0.133	2.9+/-3.11	Hall et al. 1992
0.3	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (15.3+/-11.0% mortality)	Hyalella azteca (amphipod)	JUV	0.648+/-0.641	1.74+/-1.39	Hall et al. 1992
0.3	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29.8+/-11.1% mortality)	Streblospio benedicti (polychaete worm)		0.316+/-0.12	2.13+/-2.46	Hall et al. 1992
0.3	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1% mortality)	Streblospio benedicti (polychaete worm)		1.38	3.25	Hall et al. 1992
0.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (55.0+/-19.5% mortality)	Streblospio benedicti (polychaete worm)		0.349+/-0.11	1.07+/-0.66	Hall et al. 1992
0.3	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (16.5+/-9.19% mortality)	Streblospio benedicti (polychaete worm)		0.783+/-0.845	4.83+/-2.23	Hall et al. 1992
0.3	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.367+/-0.085 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
0.3	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.0005 mg/day growth)	Streblospio benedicti (polychaete worm)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
0.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.003 mg/day growth)	Lepidactylus dytiscus (amphipod)		1.38	3.25	Hall et al. 1992
0.3	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.003+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.316+/-0.120	2.13+/-2.46	Hall et al. 1992
0.3	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29% mortality)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
0.3	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (7.2+/-1.92% mortality)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
0.3	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (89.7% reburial)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
0.3	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.6+/-0.55% reburial)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
0.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
0.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	6.41	Hall et al. 1992
0.3	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.56+/-0.47	1.5+/-1.13	Hall et al. 1992

Table 28. A summary of the available data on the biological effects associated with sediment-sorbed ALDRIN (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Aldrin Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
0.3	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.001+/-0.001 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.555+/-0.471	2.68+/-2.3	Hall et al. 1992
0.3	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1.83+/-1.6% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
0.3	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (3.5+/-1.87% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
0.3	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (45.5+/-12% mortality)	Lepidactylus dytiscus (amphipod)		0.383+/-0.279	3.61+/-2.79	Hall et al. 1992
0.3	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (9.25+/-5.32% mortality)	Lepidactylus dytiscus (amphipod)		0.638+/-0.768	1.65+/-1.62	Hall et al. 1992
0.3	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (63.0+/-24.3% mortality)	Hyalella azteca (amphipod)	JUV	0.317+/-0.228	2.57+/-2.67	Hall et al. 1992
0.3	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (22.3+/-7.37% mortality)	Hyalella azteca (amphipod)	JUV	0.788+/-0.866	2.04+/-1.75	Hall et al. 1992
0.3	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (22% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
0.3	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (8.8+/-7.12% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
0.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (28% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
0.3	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (14+/-9.22% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
0.3	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (82.9% reburial)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
0.3	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.1+/-0.865% reburial)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
0.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>20% emergence)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
0.3	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<20% emergence)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
0.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	5.58	Hall et al. 1992
0.3	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
0.3	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (-0.057+/-0.04 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
0.3	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.001mg/day growth)	Streblospio benedicti (polychaete worm)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
0.3	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.016 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
0.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.008+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.4	Hall et al. 1992
0.3	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.003 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
0.3	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.005+/-0.0004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
0.32 +/-0.752	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (17+/-16.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.99+/-1	21.6+/-24.5	Bricker et al. 1993
0.32 +/-0.76	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (34.9+/-15.7% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.23+/-1.04	25.4+/-25.5	Bricker et al. 1993
0.4 +/-0.984	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.096+/-0.101 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.37+/-0.759	6.93+/-6.83	Bricker et al. 1993
0.43 +/-1.06	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (12.3+/-14.5% mortality)	Mulinia lateralis (bivalve)	LAR	1.53+/-0.743	15.7+/-23.2	Bricker et al. 1993
0.43 +/-1.06	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99.3+/-0.827% normal development)	Mulinia lateralis (bivalve)	LAR	1.43+/-0.738	14.7+/-24	Bricker et al. 1993
0.46 +/-1.14	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (96.6+/-3.79% normal development)	Mulinia lateralis (bivalve)	LAR	2.87+/-0.94	35.1+/-25.9	Bricker et al. 1993
0.48 +/-1.19	*	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (38+/-13% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.92+/-0.937	34.6+/-23.9	Bricker et al. 1993
0.48 +/-1.2	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.074+/-0.043 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.27+/-0.626	6.21+/-5.41	Bricker et al. 1993
0.5 +/-1.23	*	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (30.5+/-16.4% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.62+/-0.777	17.7+/-26.3	Bricker et al. 1993
0.5 +/-1.0	NE	San Francisco Bay, CA	COA	48-h	Least toxic (23.3+/-7.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
0.58 +/-1.39	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (29.8+/-13.9% mortality)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.07	32.1+/-28.4	Bricker et al. 1993
0.61 +/-1.44	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.3+/-2.22% normal development)	Mulinia lateralis (bivalve)	LAR	2.18+/-0.531	19.1+/-12.5	Bricker et al. 1993
0.66 +/-0.236	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (5.8+/-3.7% mortality)	Rhepoxynius abronius (amphipod)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
0.66 +/-0.236	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (3.4+/-1.82% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
0.66 +/-0.236	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (11.2+/-3.7% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
0.66 +/-0.236	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (3.52+/-1.66% mortality)	Macoma nasuta (clam)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992

Table 28. A summary of the available data on the biological effects associated with sediment-sorbed ALDRIN (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Aldrin Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.73 +/-1.65	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (15.2+/-9.21% mortality)	Mulinia lateralis (bivalve)	LAR	2.17+/-0.663	18.4+/-19.9	Bricker et al. 1993
0.79 +/-1.74	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (6.48+/-10.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
0.79 +/-1.74	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99+/-0.862% normal development)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
0.86 +/-1.84	*	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (39.5+/-18.2% mortality)	Ampelisca abidta (amphipod)	SUB ADT	2.06+/-0.523	20.1+/-13.9	Bricker et al. 1993
0.95 +/-1.34	NE	San Francisco Bay, CA	COA	10-d	Not significantly toxic (18.4+/-6.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
0.95 +/-1.97	*	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (25.9+/-5.01% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.21+/-0.444	2.41+/-2.32	Bricker et al. 1993
0.95 +/-1.97	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.125+/-0.084 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.25+/-0.468	1.98+/-2.25	Bricker et al. 1993
1 1.3	NE	San Francisco Bay, CA	COA	48-h	Not significantly toxic (31.9+/-15.5% abnormal)	Bivalve	LAR			Long & Morgan 1990
1	NC	Puget Sound, WA	COA	2-d	Significantly toxic (3.8% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.5		Pastorok & Becker 1990
1	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (18% mortality)	Ampelisca abdita (amphipod)		0.028	9 ug/g	Windom In Prep
1	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (0% mortality)	Arbacia punctulata (sea urchin)		0.03	19 ug/g	Windom In Prep
1.08 +/-2.13	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.061+/-0.038 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.8+/-0.477	8.52+/-10.7	Bricker et al. 1993
1.16 +/-0.048	NE	Brunswick Harbor Entrance, GA	COA	48-h	Not significantly toxic (86.6+/-4.25% normal development)	Arbacia punctulata (sea urchin)		0.181+/-0.162	182+/-208 ug/g	Windom In Prep
1.16 +/-0.072	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (28.3+/-6.11% mortality)	Mysidopsis bahia (mysid)		0.246+/-0.051	127+/-24 ug/g	Windom In Prep
1.2 +/-0.283	NE	Tampa Bay, FL	COA	1-h	Least toxic (79.4+/-9.9% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.45+/-0.587		Long 1993
1.2 +/-0.193	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (9.78+/-5.33% mortality)	Mysidopsis bahia (mysid)		0.24+/-0.247	91.9+/-73.4 ug/g	Windom In Prep
1.2 +/-0.206	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (4+/-2.83% mortality)	Menidia beryllina (silverside)		0.243+/-0.264	90.5+/-78.4 ug/g	Windom In Prep
1.2 +/-0.191	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (91.3+/-2.91% normal development)	Arbacia punctulata (sea urchin)		0.299+/-0.251	114+/-68.4 ug/g	Windom In Prep
1.23 +/-0.19	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (11.6+/-4.33% mortality)	Ampelisca abdita (amphipod)		0.267+/-0.25	102+/-71.1 ug/g	Windom In Prep
1.23 +/-0.236	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (27.5+/-10.6% mortality)	Mysidopsis bahia (mysid)		0.237+/-0.311	74.6+/-85.5 ug/g	Windom In Prep
1.24 +/-0.184	SG	Savannah River Entrance Channel, GA	COA	48-h	Significantly toxic (25.4+/-7.66% mortality)	Arbacia punctulata (sea urchin)		0.344+/-0.242	129.5+/-59.3 ug/g	Windom In Prep
1.25 +/-2.33	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.167+/-0.198 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.59+/-1.09	4.67+/-6.99	Bricker et al. 1993
1.54 +/-1.17	NE	Tampa Bay, FL	COA	10-d	Not significantly toxic (14.6+/-7.67% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.63+/-0.596		Long 1993
1.55 +/-0.415	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (10.6+/-3.17% mortality)	Ampelisca abdita (amphipod)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
1.55 +/-0.415	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (8.00+/-2.92% mortality)	Mysidopsis bahia (mysid)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
1.59 +/-0.444	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (5.43+/-3.21% mortality)	Mysidopsis bahia (mysid)		1.21+/-1.13	9096+/-13378 ug/g	Windom In Prep
1.59 +/-0.444	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (9.61+/-2.7% mortality)	Menidia beryllina (silverside)		1.22+/-1.13	9172+/-13363 ug/g	Windom In Prep
1.7	SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (16% mortality)	Mysidopsis bahia (mysid)		1.8	7095 ug/g	Windom In Prep
1.7	SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (22.3% mortality)	Menidia beryllina (silverside)		1.71	6562 ug/g	Windom In Prep
1.8 +/-1.43	NE	Tampa Bay, FL	COA		Not significantly toxic (EC50; 0.066+/-0.033 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.89+/-0.902		Long 1993
1.86 +/-0.268	SG	Brunswick Harbor Entrance, GA	COA	48-h	Significantly toxic (14.6+/-18.9% normal development)	Arbacia punctulata (sea urchin)		1.99+/-0.562	14009+/-13434 ug/g	Windom In Prep
1.88 +/-1.51	NC	Puget Sound, WA	COA	15-min	Significantly toxic (EC50; 0.065+/-0.043% extract)	Microtox (Photobacterium phosphoreum)		1.58+/-0.255		Pastorok & Becker 1990
1.9	*	San Francisco Bay, CA	AETA	10-d	San Francisco Bay AET	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
1.9	*	San Francisco Bay, CA	AETA	48-h	San Francisco Bay AET	Oyster; mussel	LAR			Long & Morgan 1990
2 +/-1.51	NE	Puget Sound, WA	COA	20-d	Not significantly toxic (5+/-3.86% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.46+/-0.26		Pastorok & Becker 1990
2.17 +/-1.94	NC	Puget Sound, WA	COA	10-d	Significantly toxic (80.8+/-30.6% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.266		Pastorok & Becker 1990
2.17 +/-1.66	NC	Puget Sound, WA	COA	2-d	Significantly toxic (60.4+/-46.5% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.57+/-0.287		Pastorok & Becker 1990
2.18 +/-1.71	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (4.43+/-2.1% mortality)	Panope generosa (geoduck)	JUV	1.51+/-0.261		Pastorok & Becker 1990
2.22 +/-1.54	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (13.8+/-4.09% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.47+/-0.306		Pastorok & Becker 1990
2.25 +/-1.78	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (6.67+/-8.07% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.51+/-0.330		Pastorok & Becker 1990

Table 28. A summary of the available data on the biological effects associated with sediment-sorbed ALDRIN (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Aldrin Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
2.46 +/-1.72	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (2.09+/-1.73% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.56+/-0.329		Pastorok & Becker 1990
2.5	NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (9+/-1.73% mortality)	Nereis virens (polychaetes)	ADT			EG&G Bionomics 1980
2.5	NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (13+/- 3.61% mortality)	Penaeus duorarum (pink shrimp)	ADT			EG&G Bionomics 1980
2.5	NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (11.3+/-3.21% mortality)	Crassostrea virginica (oyster)	ADT			EG&G Bionomics 1980
2.5	SG	Puget Sound, WA	COA	10-d	Significantly toxic (56% mortality)	Panope generosa (geoduck)	JUV	2.1		Pastorok & Becker 1990
3 +/-2.29	SG	Puget Sound, WA	COA	20-d	Significantly toxic (37.3+/-22% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.87+/-0.208		Pastorok & Becker 1990
3.43 +/-5.84	*	Tampa Bay, FL	COA	1-h	Most toxic (0.091+/-0.187% fertilization)	Arbacia punctulata (sea urchin)	GAM	2.96+/-1.49		Long 1993
3.5 +/-2.19	*	Tampa Bay, FL	COA	1-h	Moderately toxic (15.3+/-10.6% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.94+/-0.908		Long 1993
3.5 +/-1.47	NE	Puget Sound, WA	COA	15-min	Not significantly toxic (EC50; 0.283+/-0.168% extract)	Microtox (Photobacterium phosphoreum)		1.39+/-0.37		Pastorok & Becker 1990
4.3	*	United States	EqPA		99% Chronic Marine Criteria	Aquatic organisms		1		Pavlou et al. 1987
4.79 +/-6.63	*	Tampa Bay, FL	COA	10-d	Significantly toxic (35.2+/-17.5% mortality)	Ampelisca abdita (amphipod)	SUB ADT	3.53+/-1.35		Long 1993
4.91 +/-7.13	*	Tampa Bay, FL	COA		Significantly toxic (EC50; 0.017+/-0.012 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.47+/-1.49		Long 1993
5	NE	Puget Sound, WA	AETA		PSDDA Screening level concentration	Aquatic biota				USACOE 1988
5.25	*	United States	EqPA		Chronic Marine EqP Threshold	Aquatic biota		1		Bolton et al. 1985
8.4	NE	United States	EqPA		95% Chronic Marine Criteria	Aquatic organisms		1		Pavlou et al. 1987
<50	NE	Georgetown Harbor, SC	COA		Not toxic (species richness or abundance)	Benthic species		0.12		Van Dolah et al. 1984
84	*	New York State	EqPA		New York State Sediment Criteria Value			1		Newell 1989
2150 +/- 589	NE	Galveston Harbor, TX	COA	10-d	Not toxic (2.4+/-1.52% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Grieco 1984
2150 +/- 589	NE	Galveston Harbor, TX	COA	10-d	Not toxic (0% mortality)	Mercenaria mercenaria (hard clams)	ADT			Grieco 1984
2150 +/- 589	NE	Galveston Harbor, TX	COA	10-d	Not toxic (2.8+/-2.17% mortality)	Nereis virens (sandworm)	ADT			Grieco 1984

Table 29. A summary of the available data on the biological effects associated with sediment-sorbed CHLORDANE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Chlordane Std Dev		Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.1		NE	San Francisco Bay, CA	COA	10-d	Least toxic (18+/-6.6% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
0.1		NE	Matagorda Ship Channel, TX	COA	10-d	Not toxic (7.2+/-2.77% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1985a
0.1		NE	Matagorda Ship Channel, TX	COA	10-d	Not toxic (10.6+/-5.18% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1985a
0.1		NE	Matagorda Ship Channel, TX	COA	10-d	Not toxic (0.2+/-0.447% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1985a
0.12		NC	Apalachee Bay, FL	COA	10-d	Significantly toxic (15.6% mortality)	Ampelisca abdita (amphipod)		0.438+/-0.442	0.421+/-0.593	EMAP Louisiana Province 1991
0.212	+/-0.047	NE	Mobile Bay, AL	COA		Not significantly toxic (1.07+/-1.85% mortality)	Mysidopsis bahia (mysid shrimp)		0.968+/-0.815	8.23+/-3.4	EMAP Louisiana Province 1991
0.225	+/-0.121	NE	Apalachee Bay, FL	COA		Not significantly toxic (0.75+/-1.5% mortality)	Mysidopsis bahia (mysid shrimp)		0.540+/-0.385	0.405+/-0.417	EMAP Louisiana Province 1991
0.228	+/-0.053	NE	Mobile Bay, AL	COA	10-d	Not significantly toxic (0.5+/-0.778% mortality)	Ampelisca abdita (amphipod)		1.24+/-0.948	8.51+/-4.76	EMAP Louisiana Province 1991
0.247	+/-0.133	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-7.99% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.14+/-0.352	6.09+/-5.38	Bricker et al. 1993
0.255	+/-0.106	SG	Mobile Bay, AL	COA	10-d	Significantly toxic (46+/-49.3% mortality)	Ampelisca abdita (amphipod)		0.22+/-0.298	3.84+/-5.43	EMAP Louisiana Province 1991
0.297	+/-0.046	NE	Mississippi Sound, MS	COA	10-d	Not significantly toxic (1.4+/-1.73% mortality)	Ampelisca abdita (amphipod)		0.998+/-0.602	2.01+/-1.82	EMAP Louisiana Province 1991
0.3		*	United States	EqPA		99% Chronic Marine Criteria	Aquatic organisms		1		Pavlou et al. 1987
0.301	+/-0.045	NE	Mississippi Sound, MS	COA		Not significantly toxic (0.789+/-1.59% mortality)	Mysidopsis bahia (mysid shrimp)		0.827+/-0.757	1.46+/-1.58	EMAP Louisiana Province 1991
0.306	+/-0.048	SG	Mississippi Sound, MS	COA		Significantly toxic (12.2+/-4.42% mortality)	Mysidopsis bahia (mysid shrimp)		0.939+/-0.335	2.63+/-2.3	EMAP Louisiana Province 1991
0.316	+/-0.03	NE	Matagorda Bay, TX	COA		Not significantly toxic (1.58+/-1.82% mortality)	Mysidopsis bahia (mysid shrimp)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
0.316	+/-0.03	NE	Matagorda Bay, TX	COA	10-d	Not significantly toxic (2.33+/-4.65% mortality)	Ampelisca abdita (amphipod)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
0.33		NC	Galveston Bay, TX	COA	10-d	Significantly toxic (15.8+/-3.89% mortality)	Ampelisca abdita (amphipod)		0.647+/-0.606	0.160+/-0.184	EMAP Louisiana Province 1991
0.33		NE	Apalachee Bay, FL	COA	10-d	Not significantly toxic (3.3+/-3.25% mortality)	Ampelisca abdita (amphipod)		0.643+/-0.455	0.390+/-0.410	EMAP Louisiana Province 1991
0.33		NE	Chandeleur Sound, LA	COA		Not significantly toxic (1.03+/-2.05% mortality)	Mysidopsis bahia (mysid shrimp)		0.824+/-0.915	1.69+/-0.920	EMAP Louisiana Province 1991
0.33		NE	Chandeleur Sound, LA	COA	10-d	Not significantly toxic (2.87+/-4.05% mortality)	Ampelisca abdita (amphipod)		0.517+/-0.166	2.02+/-1.38	EMAP Louisiana Province 1991
0.33		NE	Mississippi River, MS, LA	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		1.3+/-0.83	1.14+/-1	EMAP Louisiana Province 1991
0.33		NE	Mississippi River, MS, LA	COA	10-d	Not significantly toxic (7.8+/-1.63% mortality)	Ampelisca abdita (amphipod)		1.15+/-1.04	2.31+/-0.651	EMAP Louisiana Province 1991
0.33		NG	Chandeleur Sound, LA	COA		Significantly toxic (7.6+/-1.32% mortality)	Mysidopsis bahia (mysid shrimp)		0.624+/-0.197	2.07+/-1.19	EMAP Louisiana Province 1991
0.33		NG	Chandeleur Sound, LA	COA	10-d	Significantly toxic (11.5+/-4.86% mortality)	Ampelisca abdita (amphipod)		0.811+/-0.711	1.87+/-0.973	EMAP Louisiana Province 1991
0.33		SG	Mississippi Sound, MS	COA	10-d	Significantly toxic (11.6+/-3.39% mortality)	Ampelisca abdita (amphipod)		0.111+/-0.045	0.03	EMAP Louisiana Province 1991
0.33		SG	Mobile Bay, AL	COA		Significantly toxic (10% mortality)	Mysidopsis bahia (mysid shrimp)		0.009	0.004	EMAP Louisiana Province 1991
0.445	+/-0.163	SG	Mississippi River, MS, LA	COA		Significantly toxic (32.9+/-36.4% mortality)	Mysidopsis bahia (mysid shrimp)		1.07+/-0.924	1.41+/-1.93	EMAP Louisiana Province 1991
0.45	+/-0.163	SG	Mississippi River, MS, LA	COA	10-d	Significantly toxic (15.9+/-6.65% mortality)	Ampelisca abdita (amphipod)		1.22+/-0.717	0.235+/-0.276	EMAP Louisiana Province 1991
0.453	+/-0.214	NE	Galveston Bay, TX	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		0.934+/-0.657	0.457+/-0.530	EMAP Louisiana Province 1991
0.462	+/-0.452	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.061+/-0.038 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.8+/-0.477	8.52+/-10.7	Bricker et al. 1993
0.5		NE	Freeport Harbor, TX	COA	10-d	Not toxic (2+/-1% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1985b
0.5		NE	Freeport Harbor, TX	COA	10-d	Not toxic (9.6+/-4.22% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1985b
0.5		NE	Freeport Harbor, TX	COA	10-d	Not toxic (0% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1985b
0.5		NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (6+/-2.35% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1983b
0.5		NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (2.6+/-2.97% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1983b
0.5		NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (1.8+/-1.79% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1983b
0.5	+/-1.0	NE	San Francisco Bay, CA	COA	48-h	Least toxic (23.3+/-7.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
0.529	+/-0.714	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.167+/-0.198 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.59+/-1.09	4.67+/-6.99	Bricker et al. 1993
0.558	+/-0.429	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.125+/-0.084 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.25+/-0.468	1.98+/-2.25	Bricker et al. 1993
0.6		*	United States	EqPA		95% Chronic Marine Criteria	Aquatic organisms		1		Pavlou et al. 1987

Table 29. A summary of the available data on the biological effects associated with sediment-sorbed CHLORDANE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Chlordane Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.6 +/-0.294	NE	Puget Sound, WA	COA	15-min	Not significantly toxic (EC50; 0.283+/-0.168% extract)	Microtox (Photobacterium phosphoreum)		1.39+/-0.37		Pastorok & Becker 1990
0.627 +/-0.414	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (25.9+/-5.01% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.21+/-0.444	2.41+/-2.32	Bricker et al. 1993
0.667 +/-0.289	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (4.8+/-2.28% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1983a
0.667 +/-0.289	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (15.8+/-4.21% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1983a
0.667 +/-0.289	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (1.2+/-.447% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1983a
0.699 +/-0.565	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (19.3+/-5.86% mortality)	Ampelisca abidta (amphipod)	SUB ADT	1.82+/-0.225	6.3+/-6.2	Bricker et al. 1993
0.781 +/-0.705	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (6.48+/-10.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
0.781 +/-0.705	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99+/-0.862% normal development)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
0.786 +/-0.54	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (39.5+/-18.2% mortality)	Ampelisca abidta (amphipod)	SUB ADT	2.06+/-0.523	20.1+/-13.9	Bricker et al. 1993
0.797 +/-0.526	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.3+/-2.22% normal development)	Mulinia lateralis (bivalve)	LAR	2.18+/-0.531	19.1+/-12.5	Bricker et al. 1993
0.798 +/-0.741	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (15.2+/-9.21% mortality)	Mulinia lateralis (bivalve)	LAR	2.17+/-0.663	18.4+/-19.9	Bricker et al. 1993
0.81 +/-0.734	NE	Galveston Bay, TX	COA	10-d	Not significantly toxic (1.35+/-1.45% mortality)	Ampelisca abdita (amphipod)		0.961+/-0.537	1.17+/-0.640	EMAP Louisiana Province 1991
0.847 +/-0.895	SG	Galveston Bay, TX	COA		Significantly toxic (13.4+/-9.11% mortality)	Mysidopsis bahia (mysid shrimp)		0.778+/-0.482	1.21+/-0.778	EMAP Louisiana Province 1991
1 +/-1.4	NE	San Francisco Bay, CA	COA	48-h	Not significantly toxic (31.9+/-15.5% abnormal)	Bivalve	LAR			Long & Morgan 1990
1 +/-1.4	NE	San Francisco Bay, CA	COA	10-d	Not significantly toxic (18.4+/-6.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
1.03 +/-0.336	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.5+/-11.4% mortality)	Mulinia lateralis (bivalve)	LAR	2.33+/-0.364	26.8+/-9.42	Bricker et al. 1993
1.04 +/-2.14	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (12.3+/-14.5% mortality)	Mulinia lateralis (bivalve)	LAR	1.53+/-0.743	15.7+/-23.2	Bricker et al. 1993
1.05 +/-2.07	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.096+/-0.101 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.37+/-0.759	6.93+/-6.83	Bricker et al. 1993
1.15 +/-0.596	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.014+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.51+/-0.45	29.6+/-15.7	Bricker et al. 1993
1.18 +/-2.49	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.074+/-0.043 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.27+/-0.626	6.21+/-5.41	Bricker et al. 1993
1.2 +/-0.99	NE	Tampa Bay, FL	COA	1-h	Least toxic (79.4+/-9.9% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.45+/-0.587		Long 1993
1.26 +/-0.896	NE	Puget Sound, WA	COA	20-d	Not significantly toxic (5+/-3.86% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.46+/-0.26		Pastorok & Becker 1990
1.32 +/-1.48	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (21.5+/-6.36% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.35+/-1.05	10.5+/-13.4	Bricker et al. 1993
1.37 +/-2.92	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99.3+/-0.827% normal development)	Mulinia lateralis (bivalve)	LAR	1.43+/-0.738	14.7+/-24	Bricker et al. 1993
1.39 +/-1.28	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (96+/-1.66% normal development)	Mulinia lateralis (bivalve)	LAR	2.52+/-0.997	35+/-42.9	Bricker et al. 1993
1.4 +/-1.21	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (91.5+/-7.28% normal development)	Mulinia lateralis (bivalve)	LAR	2.6+/-0.899	36.8+/-34.9	Bricker et al. 1993
1.4 +/-1.45	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (88.5+/-8.39% normal development)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.05	38.1+/-38.9	Bricker et al. 1993
1.47 +/-1.18	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (13.8+/-4.09% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.47+/-0.306		Pastorok & Becker 1990
1.56 +/-1.14	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.008+/-0.001 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.19+/-1.27	12+/-11.3	Bricker et al. 1993
1.63 +/-1.37	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (6.67+/-8.07% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.51+/-0.330		Pastorok & Becker 1990
1.66 +/-2.35	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (17+/-16.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.99+/-1	21.6+/-24.5	Bricker et al. 1993
1.69 +/-3.44	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-6.07% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.71+/-0.9	15.3+/-23.2	Bricker et al. 1993
1.86 +/-3.51	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.016+/-0.007 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.26+/-0.936	43.4+/-35.6	Bricker et al. 1993
1.88 +/-3.31	*	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (30.5+/-16.4% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.62+/-0.777	17.7+/-26.3	Bricker et al. 1993
2	*	San Francisco Bay, CA	AETA	10-d	San Francisco Bay AET	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
2	*	San Francisco Bay, CA	AETA	48-h	San Francisco Bay AET	Oyster; mussel	LAR			Long & Morgan 1990
2	NC	Puget Sound, WA	COA	10-d	Significantly toxic (56% mortality)	Panope generosa (geoduck)	JUV	2.1		Pastorok & Becker 1990
2	NC	Puget Sound, WA	COA	2-d	Significantly toxic (3.8% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.5		Pastorok & Becker 1990
2.26		***TEL***								
2.29 +/-3.86	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.1+/-2.78% normal development)	Mulinia lateralis (bivalve)	LAR	2.12+/-1.04	22.9+/-23.7	Bricker et al. 1993

Table 29. A summary of the available data on the biological effects associated with sediment-sorbed CHLORDANE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Chlordane Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
2.3 +/-3.27	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (4.43+/-2.1% mortality)	Panope generosa (geoduck)	JUV	1.51+/-0.261		Pastorok & Becker 1990
2.48 +/-3.5	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (2.09+/-1.73% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.56+/-0.329		Pastorok & Becker 1990
2.5	NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (9+/-1.73% mortality)	Nereis virens (polychaetes)	ADT			EG&G Bionomics 1980
2.5	NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (13+/- 3.61% mortality)	Penaeus duorarum (pink shrimp)	ADT			EG&G Bionomics 1980
2.5	NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (11.3+/-3.21% mortality)	Crassostrea virginica (oyster)	ADT			EG&G Bionomics 1980
2.5	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (0.33+/-0.516% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
2.5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (2.33+/-1.03% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
2.5	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (15.3+/-11.0% mortality)	Hyalella azteca (amphipod)	JUV	0.648+/-0.641	1.74+/-1.39	Hall et al. 1992
2.5	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1% mortality)	Streblospio benedicti (polychaete worm)		1.38	3.25	Hall et al. 1992
2.5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (16.5+/-9.19% mortality)	Streblospio benedicti (polychaete worm)		0.783+/-0.845	4.83+/-2.23	Hall et al. 1992
2.5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.367+/-0.085 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
2.5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.0005 mg/day growth)	Streblospio benedicti (polychaete worm)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
2.5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.003+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.316+/-0.120	2.13+/-2.46	Hall et al. 1992
2.5	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (7.2+/-1.92% mortality)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
2.5	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.6+/-0.55% reburial)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
2.5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
2.5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
2.5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.001+/-0.001 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.555+/-0.471	2.68+/-2.3	Hall et al. 1992
2.5	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1.83+/-1.6% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
2.5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (3.5+/-1.87% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
2.5	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (9.25+/-5.32% mortality)	Lepidactylus dytiscus (amphipod)		0.638+/-0.768	1.65+/-1.62	Hall et al. 1992
2.5	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (22.3+/-7.37% mortality)	Hyalella azteca (amphipod)	JUV	0.788+/-0.866	2.04+/-1.75	Hall et al. 1992
2.5	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (8.8+/-7.12% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
2.5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (14+/-9.22% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
2.5	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.1+/-0.865% reburial)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
2.5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<20% emergence)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
2.5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
2.5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (-0.057+/-0.04 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
2.5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.001mg/day growth)	Streblospio benedicti (polychaete worm)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
2.5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.016 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
2.5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.005+/-0.0004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
2.5	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (55.0+/-22.6% mortality)	Hyalella azteca (amphipod)	JUV	0.338+/-0.133	2.9+/-3.11	Hall et al. 1992
2.5	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29.8+/-11.1% mortality)	Streblospio benedicti (polychaete worm)		0.316+/-0.12	2.13+/-2.46	Hall et al. 1992
2.5	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (55.0+/-19.5% mortality)	Streblospio benedicti (polychaete worm)		0.349+/-0.11	1.07+/-0.66	Hall et al. 1992
2.5	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.003 mg/day growth)	Lepidactylus dytiscus (amphipod)		1.38	3.25	Hall et al. 1992
2.5	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29% mortality)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
2.5	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (89.7% reburial)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
2.5	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
2.5	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	6.41	Hall et al. 1992
2.5	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992

Table 29. A summary of the available data on the biological effects associated with sediment-sorbed CHLORDANE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Chlordane Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
2.5	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (45.5+/-12% mortality)	Lepidactylus dytiscus (amphipod)		0.383+/-0.279	3.61+/-2.79	Hall et al. 1992
2.5	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (63.0+/-24.3% mortality)	Hyalella azteca (amphipod)	JUV	0.317+/-0.228	2.57+/-2.67	Hall et al. 1992
2.5	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (22% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
2.5	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (28% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
2.5	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (82.9% reburial)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
2.5	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>20% emergence)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
2.5	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	5.58	Hall et al. 1992
2.5	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.008+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.4	Hall et al. 1992
2.5	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.003 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
2.5 +/-3.99	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (34.9+/-15.7% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.23+/-1.04	25.4+/-25.5	Bricker et al. 1993
2.7 +/-3.42	*	Puget Sound, WA	COA	15-min	Significantly toxic (EC50; 0.065+/-0.043% extract)	Microtox (Photobacterium phosphoreum)		1.58+/-0.255		Pastorok & Becker 1990
2.71 +/-3.96	SG	Puget Sound, WA	COA	2-d	Significantly toxic (60.4+/-46.5% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.57+/-0.287		Pastorok & Becker 1990
2.99 +/-1.81	NE	Tampa Bay, FL	COA	10-d	Not significantly toxic (14.6+/-7.67% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.63+/-0.596		Long 1993
3.02 +/-2.96	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (29.8+/-13.9% mortality)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.07	32.1+/-28.4	Bricker et al. 1993
3.15 +/-4.45	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.013+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.79+/-0.744	37.6+/-25.3	Bricker et al. 1993
3.4 +/-6.25	*	San Francisco Bay, CA	COA	10-d	Significantly toxic (42.9+/-19.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
3.49 +/-4.76	*	Puget Sound, WA	COA	10-d	Significantly toxic (80.8+/-30.6% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.266		Pastorok & Becker 1990
3.5 +/-6.3	*	San Francisco Bay, CA	COA	48-h	Significantly toxic (55.7+/-22.7% abnormal)	Bivalve	LAR			Long & Morgan 1990
3.84 +/-5.18	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (38+/-13% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.92+/-0.937	34.6+/-23.9	Bricker et al. 1993
3.98 +/-6.19	*	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.1+/-13.3% mortality)	Mulinia lateralis (bivalve)	LAR	2.68+/-0.955	31.8+/-24.4	Bricker et al. 1993
4.02 +/-5.24	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (96.6+/-3.79% normal development)	Mulinia lateralis (bivalve)	LAR	2.87+/-0.94	35.1+/-25.9	Bricker et al. 1993
4.1 +/-6.6	*	San Francisco Bay, CA	COA	48-h	Moderately toxic (59.4+/-11.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
4.11 +/-5.94	*	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (51.3+/-6.95% mortality)	Mulinia lateralis (bivalve)	LAR	1.8+/-1.71	29.6+/-46.3	Bricker et al. 1993
4.23 +/-12.5	NE	Narragansett Bay, RI	COA	10-d	Not significantly toxic (5.28+/-3.04% mortality))	Ampelisca abdita (amphipod)	ADT			Munns et al. 1991
4.24 +/-3.5	NE	Tampa Bay, FL	COA		Not significantly toxic (EC50; 0.066+/-0.033 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.89+/-0.902		Long 1993
4.79		***PEL***								
5	*	United States	EqPA		Chronic Marine EqP Threshold	Aquatic biota		1		Bolton et al. 1985
5	NE	Puget Sound, WA	AETA		PSDDA Screening level concentration	Aquatic biota				USACOE 1988
5	NE	Galveston Bay, TX	COA	1-h	Not toxic (92.5+/-6.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	0.77+/-0.448	6.37+/-6.58	Carr 1992
5	NE	Galveston Bay, TX	COA	48-h	Not toxic (98.1+/-1.79% normal development)	Arbacia punctulata (sea urchin)	EMB	.748+/-0.476	4.16+/-3.45	Carr 1992
5	NE	Galveston Bay, TX	COA		High species richness (24.5+/-3.7 S/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
5	NE	Galveston Bay, TX	COA		High abundance (359+/-92.8 N/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
5	NE	Galveston Bay, TX	COA		High abundance (156+/-22.9 N/0.00203 sq.m.)	Polychaeta		0.916+/-0.661	2.94+/-2.3	Carr 1992
5	NE	Galveston Bay, TX	COA		High abundance (155+/-49.5 N/0.00203 sq.m.)	Oligochaeta		1.2+/-1.27	4.27+/-3.85	Carr 1992
5	NE	Galveston Bay, TX	COA		High abundance (27.3+/-10 N/0.00203 sq.m.)	Mollusca		1.64+/-0.4	1.39+/-0.17	Carr 1992
5	NE	Galveston Bay, TX	COA		High Abundance (6+/-1.41 N/0.00203 sq.m.)	Amphipoda		0.955+/-0.629	7.21+/-8.2	Carr 1992
5	NE	Galveston Bay, TX	COA		High abundance (16.2+/-6.19 N/0.00203 sq.m.)	Copepoda		0.844+/-0.524	4.73+/-3.1	Carr 1992
5	NE	Galveston Bay, TX	COA		Low species (11.2+/-1.94 S/0.00203 sq.m.)	Benthic species		0.642+/-0.356	13.4+/-8.65	Carr 1992
5	NE	Galveston Bay, TX	COA		High abundance (154+/-30.2 N/0.00203 sq.m.)	Benthic invertebrates		0.47+/-0.27	9.07+/-2.94	Carr 1992
5	NG	Galveston Bay, TX	COA	1-h	Toxic (20.4+/-18.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	1.26+/-0.47	14.6+/-10.1	Carr 1992

Table 29. A summary of the available data on the biological effects associated with sediment-sorbed CHLORDANE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Chlordane Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
5	NG	Galveston Bay, TX	COA	48-h	Toxic (4.65+/-16.1% normal development)	Arbacia punctulata (sea urchin)	EMB	1.06+/-0.449	14.5+/-9.2	Carr 1992
5	NG	Galveston Bay, TX	COA		Low species richness (10+/-3.73 S/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
5	NG	Galveston Bay, TX	COA		Low abundance (89+/-60.7 N/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
5	NG	Galveston Bay, TX	COA		Low abundance (41.7+/-21.8 N/0.00203 sq.m.)	Polychaeta		0.848+/-0.427	9.21+/-8.61	Carr 1992
5	NG	Galveston Bay, TX	COA		Low abundance (4.21+/-5.66 N/0.00203 sq.m.)	Oligochaeta		0.895+/-0.453	7.85+/-8.8	Carr 1992
5	NG	Galveston Bay, TX	COA		Moderate abundance (58.3+/-16.2 N/0.00203 sq.m.)	Oligochaeta		0.632+/-0.274	7.93+/-5.6	Carr 1992
5	NG	Galveston Bay, TX	COA		Low abundance (1.86+/-2.59 N/0.00203 sq.m.)	Mollusca		0.784+/-0.421	8.29+/-8.13	Carr 1992
5	NG	Galveston Bay, TX	COA		Low abundance (0.3+/-0.651 N/0.00203 sq.m.)	Amphipoda		0.859+/-0.487	7.67+/-8.12	Carr 1992
5	NG	Galveston Bay, TX	COA		Low abundance (2.05+/-1.58 N/0.00203 sq.m.)	Copepoda		0.879+/-0.47	9.63+/-9.65	Carr 1992
5	NG	Galveston Bay, TX	COA		Low abundance (53+/-33.9 N/0.00203 sq.m.)	Benthic invertebrates		0.985+/-0.247	22+/-11.2	Carr 1992
5.12 +/-5.58	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.011+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.28+/-0.363	45.3+/-21.4	Bricker et al. 1993
5.37 +/-4.12	*	Tampa Bay, FL	COA	1-h	Moderately toxic (15.3+/-10.6% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.94+/-0.908		Long 1993
5.77 +/-7.78	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (23+/-4.24% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.46+/-1.22	40+/-55.1	Bricker et al. 1993
6.04 +/-8.09	*	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (75.1+/-10.6% mortality)	Mulinia lateralis (bivalve)	LAR	3.32+/-0.317	42.3+/-19.2	Bricker et al. 1993
6.33 +/-5.86	*	Puget Sound, WA	COA	20-d	Significantly toxic (37.3+/-22% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.87+/-0.208		Pastorok & Becker 1990
6.4 +/-7.5	*	San Francisco Bay, CA	COA	10-d	Highly toxic (67+/-11.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
9	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (18% mortality)	Ampelisca abdita (amphipod)		0.028	9 ug/g	Windom In Prep
9	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (0% mortality)	Arbacia punctulata (sea urchin)		0.03	19 ug/g	Windom In Prep
10.2 +/-0.58	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (28.3+/-6.11% mortality)	Mysidopsis bahia (mysid)		0.246+/-0.051	127+/-24 ug/g	Windom In Prep
10.6 +/-1.72	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (9.78+/-5.33% mortality)	Mysidopsis bahia (mysid)		0.24+/-0.247	91.9+/-73.4 ug/g	Windom In Prep
10.6 +/-1.71	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (91.3+/-2.91% normal development)	Arbacia punctulata (sea urchin)		0.299+/-0.251	114+/-68.4 ug/g	Windom In Prep
10.7 +/-1.84	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (4+/-2.83% mortality)	Menidia beryllina (silverside)		0.243+/-0.264	90.5+/-78.4 ug/g	Windom In Prep
10.8 +/-1.72	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (11.6+/-4.33% mortality)	Ampelisca abdita (amphipod)		0.267+/-0.25	102+/-71.1 ug/g	Windom In Prep
10.9 +/-2.1	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (27.5+/-10.6% mortality)	Mysidopsis bahia (mysid)		0.237+/-0.311	74.6+/-85.5 ug/g	Windom In Prep
10.9 +/-1.7	SG	Savannah River Entrance Channel, GA	COA	48-h	Significantly toxic (25.4+/-7.66% mortality)	Arbacia punctulata (sea urchin)		0.344+/-0.242	129.5+/-59.3 ug/g	Windom In Prep
11.4 +/-2.9	NE	Brunswick Harbor Entrance, GA	COA	48-h	Not significantly toxic (86.6+/-4.25% normal development)	Arbacia punctulata (sea urchin)		0.181+/-0.162	182+/-208 ug/g	Windom In Prep
14.1 +/-3.43	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (10.6+/-3.17% mortality)	Ampelisca abdita (amphipod)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
14.1 +/-3.43	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (8.00+/-2.92% mortality)	Mysidopsis bahia (mysid)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
14.5 +/-3.54	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (5.43+/-3.21% mortality)	Mysidopsis bahia (mysid)		1.21+/-1.13	9096+/-13378 ug/g	Windom In Prep
14.5 +/-3.54	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (9.61+/-2.7% mortality)	Menidia beryllina (silverside)		1.22+/-1.13	9172+/-13363 ug/g	Windom In Prep
15	SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (16% mortality)	Mysidopsis bahia (mysid)		1.8	7095 ug/g	Windom In Prep
15	SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (22.3% mortality)	Menidia beryllina (silverside)		1.71	6562 ug/g	Windom In Prep
16.2 +/-2.14	SG	Brunswick Harbor Entrance, GA	COA	48-h	Significantly toxic (14.6+/-18.9% normal development)	Arbacia punctulata (sea urchin)		1.99+/-0.562	14009+/-13434 ug/g	Windom In Prep
31.6 +/-11.3	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (5.8+/-3.7% mortality)	Rhepoxynius abronius (amphipod)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
31.6 +/-11.3	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (3.4+/-1.82% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
31.6 +/-11.3	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (11.2+/-3.7% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
31.6 +/-11.3	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (3.52+/-1.66% mortality)	Macoma nasuta (clam)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
43.5 +/-92.7	*	Tampa Bay, FL	COA	1-h	Most toxic (0.091+/-0.187% fertilization)	Arbacia punctulata (sea urchin)	GAM	2.96+/-1.49		Long 1993
<50	NE	Georgetown Harbor, SC	COA		Not toxic (species richness or abundance)	Benthic species		0.12		Van Dolah et al. 1984
59.2 +/-106	*	Tampa Bay, FL	COA	10-d	Significantly toxic (35.2+/-17.5% mortality)	Ampelisca abdita (amphipod)	SUB ADT	3.53+/-1.35		Long 1993

Table 29. A summary of the available data on the biological effects associated with sediment-sorbed CHLORDANE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Chlordane Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
65.6 +/-113	*	Tampa Bay, FL	COA		Significantly toxic (EC50; 0.017+/-0.012 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.47+/-1.49		Long 1993
967 +/-325	NE	Galveston Harbor, TX	COA	10-d	Not toxic (2.4+/-1.52% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Grieco 1984
967 +/-325	NE	Galveston Harbor, TX	COA	10-d	Not toxic (0% mortality)	Mercenaria mercenaria (hard clams)	ADT			Grieco 1984
967 +/-325	NE	Galveston Harbor, TX	COA	10-d	Not toxic (2.8+/-2.17% mortality)	Nereis virens (sandworm)	ADT			Grieco 1984
<=5800	*	Laboratory	SSBA	288-h	LC50	Nereis virens (sandworm)		2		McLeese et al. 1982

Table 30. A summary of the available data on the biological effects associated with sediment-sorbed CHLORPYRIFOS (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine e

Chlorpyrifos Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
4.4	*	United States	EqPA		Interim Marine Sediment Quality Criteria (FCV)	Benthic community	1			EPA 1988

Table 31. A summary of the available data on the biological effects associated with sediment-sorbed p,p'-DDD (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

p,p'-DDD	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.103	+/-0.027	NC	Mississippi Sound, MS	COA		Significantly toxic (12.2+/-4.42% mortality)	Mysidopsis bahia (mysid shrimp)		0.939+/-0.335	2.63+/-2.3	EMAP Louisiana Province 1991
0.107	+/-0.049	NE	Mississippi Sound, MS	COA	10-d	Not significantly toxic (1.4+/-1.73% mortality)	Ampelisca abdita (amphipod)		0.998+/-0.602	2.01+/-1.82	EMAP Louisiana Province 1991
0.109	+/-0.033	NE	Chandeleur Sound, LA	COA		Not significantly toxic (1.03+/-2.05% mortality)	Mysidopsis bahia (mysid shrimp)		0.824+/-0.915	1.69+/-0.920	EMAP Louisiana Province 1991
0.113	+/-0.052	NE	Mississippi Sound, MS	COA		Not significantly toxic (0.789+/-1.59% mortality)	Mysidopsis bahia (mysid shrimp)		0.827+/-0.757	1.46+/-1.58	EMAP Louisiana Province 1991
0.114	+/-0.027	NC	Chandeleur Sound, LA	COA	10-d	Significantly toxic (11.5+/-4.86% mortality)	Ampelisca abdita (amphipod)		0.811+/-0.711	1.87+/-0.973	EMAP Louisiana Province 1991
0.125		NC	Mobile Bay, AL	COA		Significantly toxic (10% mortality)	Mysidopsis bahia (mysid shrimp)		0.009	0.004	EMAP Louisiana Province 1991
0.125		NE	Apalachee Bay, FL	COA		Not significantly toxic (0.75+/-1.5% mortality)	Mysidopsis bahia (mysid shrimp)		0.540+/-0.385	0.405+/-0.417	EMAP Louisiana Province 1991
0.125		NE	Apalachee Bay, FL	COA	10-d	Not significantly toxic (3.3+/-3.25% mortality)	Ampelisca abdita (amphipod)		0.643+/-0.455	0.390+/-0.410	EMAP Louisiana Province 1991
0.125		NE	Chandeleur Sound, LA	COA	10-d	Not significantly toxic (2.87+/-4.05% mortality)	Ampelisca abdita (amphipod)		0.517+/-0.166	2.02+/-1.38	EMAP Louisiana Province 1991
0.125		NG	Apalachee Bay, FL	COA	10-d	Significantly toxic (15.6% mortality)	Ampelisca abdita (amphipod)		0.438+/-0.442	0.421+/-0.593	EMAP Louisiana Province 1991
0.125		SG	Chandeleur Sound, LA	COA		Significantly toxic (7.6+/-1.32% mortality)	Mysidopsis bahia (mysid shrimp)		0.624+/-0.197	2.07+/-1.19	EMAP Louisiana Province 1991
0.125		SG	Mississippi Sound, MS	COA	10-d	Significantly toxic (11.6+/-3.39% mortality)	Ampelisca abdita (amphipod)		0.111+/-0.045	0.03	EMAP Louisiana Province 1991
0.13		*	Puget Sound, WA	AETA		1986 Puget Sound AET	Benthic species		1		Bellar et al. 1986
0.138	+/-0.018	NC	Galveston Bay, TX	COA	10-d	Significantly toxic (15.8+/-3.89% mortality)	Ampelisca abdita (amphipod)		0.647+/-0.606	0.160+/-0.184	EMAP Louisiana Province 1991
0.138	+/-0.099	NE	Matagorda Bay, TX	COA		Not significantly toxic (1.58+/-1.82% mortality)	Mysidopsis bahia (mysid shrimp)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
0.138	+/-0.099	NE	Matagorda Bay, TX	COA	10-d	Not significantly toxic (2.33+/-4.65% mortality)	Ampelisca abdita (amphipod)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
0.195	+/-0.100	NE	Galveston Bay, TX	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		0.934+/-0.657	0.457+/-0.530	EMAP Louisiana Province 1991
0.23		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.001+/-0.001 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.555+/-0.471	2.68+/-2.3	Hall et al. 1992
0.235		NC	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (55.0+/-22.6% mortality)	Hyalella azteca (amphipod)	JUV	0.338+/-0.133	2.9+/-3.11	Hall et al. 1992
0.235		NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.003 mg/day growth)	Lepidactylus dytiscus (amphipod)		1.38	3.25	Hall et al. 1992
0.235		NC	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29% mortality)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
0.235		NC	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (89.7% reburial)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
0.235		NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
0.235		NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	6.41	Hall et al. 1992
0.235		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1% mortality)	Streblospio benedicti (polychaete worm)		1.38	3.25	Hall et al. 1992
0.235		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (16.5+/-9.19% mortality)	Streblospio benedicti (polychaete worm)		0.783+/-0.845	4.83+/-2.23	Hall et al. 1992
0.235		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1.83+/-1.6% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
0.235		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (3.5+/-1.87% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
0.235		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (9.25+/-5.32% mortality)	Lepidactylus dytiscus (amphipod)		0.638+/-0.768	1.65+/-1.62	Hall et al. 1992
0.235		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (22.3+/-7.37% mortality)	Hyalella azteca (amphipod)	JUV	0.788+/-0.866	2.04+/-1.75	Hall et al. 1992
0.235		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (8.8+/-7.12% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
0.235		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (14+/-9.22% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
0.235		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.1+/-0.865% reburial)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
0.235		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<20% emergence)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
0.235		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
0.235		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (-0.057+/-0.04 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
0.235		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.001mg/day growth)	Streblospio benedicti (polychaete worm)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
0.235		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.016 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
0.235		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.005+/-0.0004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
0.235		NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (45.5+/-12% mortality)	Lepidactylus dytiscus (amphipod)		0.383+/-0.279	3.61+/-2.79	Hall et al. 1992

Table 31. A summary of the available data on the biological effects associated with sediment-sorbed p,p'-DDD (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

p,p'-DDD Std Dev		Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.235		NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (63.0+/-24.3% mortality)	Hyalella azteca (amphipod)	JUV	0.317+/-0.228	2.57+/-2.67	Hall et al. 1992
0.235		NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (22% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
0.235		NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (28% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
0.235		NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (82.9% reburial)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
0.235		NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>20% emergence)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
0.235		NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	5.58	Hall et al. 1992
0.235		NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.008+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.4	Hall et al. 1992
0.235		NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.003 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
0.25		NE	Freeport Harbor, TX	COA	10-d	Not toxic (2+/-1% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1985b
0.25		NE	Freeport Harbor, TX	COA	10-d	Not toxic (9.6+/-4.22% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1985b
0.25		NE	Freeport Harbor, TX	COA	10-d	Not toxic (0% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1985b
0.25		NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (4.8+/-2.28% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1983a
0.25		NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (15.8+/-4.21% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1983a
0.25		NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (1.2+/-.447% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1983a
0.25		NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (6+/-2.35% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1983b
0.25		NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (2.6+/-2.97% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1983b
0.25		NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (1.8+/-1.79% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1983b
0.289	+/-0.132	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (0.33+/-0.516% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
0.289	+/-0.13	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.367+/-0.085 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
0.289	+/-0.13	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.0005 mg/day growth)	Streblospio benedicti (polychaete worm)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
0.29	+/-0.132	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (2.33+/-1.03% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
0.293	+/-0.237	NC	Mobile Bay, AL	COA	10-d	Significantly toxic (46+/-49.3% mortality)	Ampelisca abdita (amphipod)		0.22+/-0.298	3.84+/-5.43	EMAP Louisiana Province 1991
0.299	+/-0.145	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.003+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.316+/-0.120	2.13+/-2.46	Hall et al. 1992
0.299	+/-0.145	SG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29.8+/-11.1% mortality)	Streblospio benedicti (polychaete worm)		0.316+/-0.12	2.13+/-2.46	Hall et al. 1992
0.3	+/-0.15	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (7.2+/-1.92% mortality)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
0.3	+/-0.15	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.6+/-0.55% reburial)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
0.3	+/-0.15	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
0.3	+/-0.15	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
0.316	+/-0.16	SG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (55.0+/-19.5% mortality)	Streblospio benedicti (polychaete worm)		0.349+/-0.11	1.07+/-0.66	Hall et al. 1992
0.343	+/-0.187	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (15.3+/-11.0% mortality)	Hyalella azteca (amphipod)	JUV	0.648+/-0.641	1.74+/-1.39	Hall et al. 1992
0.425	+/-0.219	NE	Mobile Bay, AL	COA	10-d	Not significantly toxic (0.5+/-0.778% mortality)	Ampelisca abdita (amphipod)		1.24+/-0.948	8.51+/-4.76	EMAP Louisiana Province 1991
0.435	+/-0.504	NE	Galveston Bay, TX	COA	10-d	Not significantly toxic (1.35+/-1.45% mortality)	Ampelisca abdita (amphipod)		0.961+/-0.537	1.17+/-0.640	EMAP Louisiana Province 1991
0.437	+/-0.156	NE	Mobile Bay, AL	COA		Not significantly toxic (1.07+/-1.85% mortality)	Mysidopsis bahia (mysid shrimp)		0.968+/-0.815	8.23+/-3.4	EMAP Louisiana Province 1991
0.465	+/-0.502	NE	Mississippi River, MS, LA	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		1.3+/-0.83	1.14+/-1	EMAP Louisiana Province 1991
0.477	+/-0.609	*	Galveston Bay, TX	COA		Significantly toxic (13.4+/-9.11% mortality)	Mysidopsis bahia (mysid shrimp)		0.778+/-0.482	1.21+/-0.778	EMAP Louisiana Province 1991
0.559		*	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
0.6	+/-0.7	NG	San Francisco Bay, CA	COA	10-d	Moderately toxic (33.8+/-4.7% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
0.62	+/-0.283	NE	Mississippi River, MS, LA	COA	10-d	Not significantly toxic (7.8+/-1.63% mortality)	Ampelisca abdita (amphipod)		1.15+/-1.04	2.31+/-0.651	EMAP Louisiana Province 1991
0.923	+/-0.332	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (5.8+/-3.7% mortality)	Rhepoxynius abronius (amphipod)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
0.923	+/-0.332	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (3.4+/-1.82% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992

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p,p'-DDD	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.923	+/-0.332	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (11.2+/-3.7% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
0.923	+/-0.332	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (3.52+/-1.66% mortality)	Macoma nasuta (clam)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
0.94	+/-1.6	NG	San Francisco Bay, CA	COA	10-d	Significantly toxic (42.9+/-19.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
1.22			***TEL***								
1.25	+/-0.739	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-7.99% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.14+/-0.352	6.09+/-5.38	Bricker et al. 1993
1.3	+/-0.3	NC	San Francisco Bay, CA	COA	48-h	Highly toxic (92.4+/-4.5% abnormal)	Bivalve	LAR			Long & Morgan 1990
1.3	+/-1.2	NE	San Francisco Bay, CA	COA	10-d	Least toxic (18+/-6.6% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
1.3	+/-2.1	NG	San Francisco Bay, CA	COA	10-d	Highly toxic (67+/-11.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
1.36	+/-0.885	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.125+/-0.084 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.25+/-0.468	1.98+/-2.25	Bricker et al. 1993
1.45	+/-1.9	*	Mississippi River, MS, LA	COA	10-d	Significantly toxic (15.9+/-6.65% mortality)	Ampelisca abdita (amphipod)		1.22+/-0.717	0.235+/-0.276	EMAP Louisiana Province 1991
1.45	+/-0.64	NE	Tampa Bay, FL	COA	1-h	Least toxic (79.4+/-9.9% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.45+/-0.587		Long 1993
1.46	+/-0.777	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (25.9+/-5.01% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.21+/-0.444	2.41+/-2.32	Bricker et al. 1993
1.61	+/-1.68	*	Mississippi River, MS, LA	COA		Significantly toxic (32.9+/-36.4% mortality)	Mysidopsis bahia (mysid shrimp)		1.07+/-0.924	1.41+/-1.93	EMAP Louisiana Province 1991
1.71	+/-1.41	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (6.48+/-10.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
1.71	+/-1.41	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99+/-0.862% normal development)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
1.76	+/-0.853	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.061+/-0.038 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.8+/-0.477	8.52+/-10.7	Bricker et al. 1993
1.95		NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (18% mortality)	Ampelisca abdita (amphipod)		0.028	9 ug/g	Windom In Prep
2		NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (0% mortality)	Arbacia punctulata (sea urchin)		0.03	19 ug/g	Windom In Prep
2.16	+/-0.489	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (39.5+/-18.2% mortality)	Ampelisca abidta (amphipod)	SUB ADT	2.06+/-0.523	20.1+/-13.9	Bricker et al. 1993
2.23	+/-0.115	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (28.3+/-6.11% mortality)	Mysidopsis bahia (mysid)		0.246+/-0.051	127+/-24 ug/g	Windom In Prep
2.23	+/-2.32	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.167+/-0.198 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.59+/-1.09	4.67+/-6.99	Bricker et al. 1993
2.24	+/-0.095	NE	Brunswick Harbor Entrance, GA	COA	48-h	Not significantly toxic (86.6+/-4.25% normal development)	Arbacia punctulata (sea urchin)		0.181+/-0.162	182+/-208 ug/g	Windom In Prep
2.29	+/-0.355	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.5+/-11.4% mortality)	Mulinia lateralis (bivalve)	LAR	2.33+/-0.364	26.8+/-9.42	Bricker et al. 1993
2.33	+/-0.37	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (9.78+/-5.33% mortality)	Mysidopsis bahia (mysid)		0.24+/-0.247	91.9+/-73.4 ug/g	Windom In Prep
2.33	+/-0.359	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (91.3+/-2.91% normal development)	Arbacia punctulata (sea urchin)		0.299+/-0.251	114+/-68.4 ug/g	Windom In Prep
2.34	+/-0.395	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (4+/-2.83% mortality)	Menidia beryllina (silverside)		0.243+/-0.264	90.5+/-78.4 ug/g	Windom In Prep
2.35	+/-0.07	NE	San Francisco Bay, CA	COA	10-d	Not significantly toxic (18.4+/-6.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
2.38	+/-1.19	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.3+/-2.22% normal development)	Mulinia lateralis (bivalve)	LAR	2.18+/-0.531	19.1+/-12.5	Bricker et al. 1993
2.38	+/-0.364	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (11.6+/-4.33% mortality)	Ampelisca abdita (amphipod)		0.267+/-0.25	102+/-71.1 ug/g	Windom In Prep
2.38	+/-0.452	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (27.5+/-10.6% mortality)	Mysidopsis bahia (mysid)		0.237+/-0.311	74.6+/-85.5 ug/g	Windom In Prep
2.38	+/-0.36	SG	Savannah River Entrance Channel, GA	COA	48-h	Significantly toxic (25.4+/-7.66% mortality)	Arbacia punctulata (sea urchin)		0.344+/-0.242	129.5+/-59.3 ug/g	Windom In Prep
2.45	+/-2.35	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.096+/-0.101 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.37+/-0.759	6.93+/-6.83	Bricker et al. 1993
2.5		NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (9+/-1.73% mortality)	Nereis virens (polychaetes)	ADT			EG&G Bionomics 1980
2.5		NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (13+/- 3.61% mortality)	Penaeus duorarum (pink shrimp)	ADT			EG&G Bionomics 1980
2.5		NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (11.3+/-3.21% mortality)	Crassostrea virginica (oyster)	ADT			EG&G Bionomics 1980
2.56	+/-3.21	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (21.5+/-6.36% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.35+/-1.05	10.5+/-13.4	Bricker et al. 1993
2.58	+/-2.64	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.074+/-0.043 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.27+/-0.626	6.21+/-5.41	Bricker et al. 1993
2.7	+/-2.65	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (19.3+/-5.86% mortality)	Ampelisca abidta (amphipod)	SUB ADT	1.82+/-0.225	6.3+/-6.2	Bricker et al. 1993
2.83	+/-2.93	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (51.3+/-6.95% mortality)	Mulinia lateralis (bivalve)	LAR	1.8+/-1.71	29.6+/-46.3	Bricker et al. 1993
2.86	+/-1.67	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (88.5+/-8.39% normal development)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.05	38.1+/-38.9	Bricker et al. 1993

Table 31. A summary of the available data on the biological effects associated with sediment-sorbed p,p'-DDD (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

p,p'-DDD Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
2.88 +/-2.01	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (15.2+/-9.21% mortality)	Mulinia lateralis (bivalve)	LAR	2.17+/-0.663	18.4+/-19.9	Bricker et al. 1993
2.9 +/-2.72	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.008+/-0.001 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.19+/-1.27	12+/-11.3	Bricker et al. 1993
2.96 +/-3.65	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (12.3+/-14.5% mortality)	Mulinia lateralis (bivalve)	LAR	1.53+/-0.743	15.7+/-23.2	Bricker et al. 1993
2.96 +/-3.72	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99.3+/-0.827% normal development)	Mulinia lateralis (bivalve)	LAR	1.43+/-0.738	14.7+/-24	Bricker et al. 1993
2.98 +/-0.787	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (10.6+/-3.17% mortality)	Ampelisca abdita (amphipod)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
2.98 +/-0.787	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (8.00+/-2.92% mortality)	Mysidopsis bahia (mysid)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
3	*	Puget Sound, WA	AETA	10-d	1986 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT	1		Bellar et al. 1986
3.04 +/-0.846	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (5.43+/-3.21% mortality)	Mysidopsis bahia (mysid)		1.21+/-1.13	9096+/-13378 ug/g	Windom In Prep
3.04 +/-0.846	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (9.61+/-2.7% mortality)	Menidia beryllina (silverside)		1.22+/-1.13	9172+/-13363 ug/g	Windom In Prep
3.3	SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (16% mortality)	Mysidopsis bahia (mysid)		1.8	7095 ug/g	Windom In Prep
3.3	SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (22.3% mortality)	Menidia beryllina (silverside)		1.71	6562 ug/g	Windom In Prep
3.3 +/-1.79	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.014+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.51+/-0.45	29.6+/-15.7	Bricker et al. 1993
3.5 +/-2.2	NE	Tampa Bay, FL	COA	10-d	Not significantly toxic (14.6+/-7.67% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.63+/-0.596		Long 1993
3.58 +/-0.482	SG	Brunswick Harbor Entrance, GA	COA	48-h	Significantly toxic (14.6+/-18.9% normal development)	Arbacia punctulata (sea urchin)		1.99+/-0.562	14009+/-13434 ug/g	Windom In Prep
3.59 +/-2.31	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (91.5+/-7.28% normal development)	Mulinia lateralis (bivalve)	LAR	2.6+/-0.899	36.8+/-34.9	Bricker et al. 1993
3.64 +/-4.77	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-6.07% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.71+/-0.9	15.3+/-23.2	Bricker et al. 1993
3.7 +/-4.1	*	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (30.5+/-16.4% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.62+/-0.777	17.7+/-26.3	Bricker et al. 1993
3.81 +/-5.21	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.016+/-0.007 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.26+/-0.936	43.4+/-35.6	Bricker et al. 1993
4.24 +/-4.25	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (17+/-16.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.99+/-1	21.6+/-24.5	Bricker et al. 1993
4.58 +/-7.83	NE	Narragansett Bay, RI	COA	10-d	Not significantly toxic (5.28+/-3.04% mortality))	Ampelisca abdita (amphipod)	ADT			Munns et al. 1991
4.69 +/-3.43	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (96+/-1.66% normal development)	Mulinia lateralis (bivalve)	LAR	2.52+/-0.997	35+/-42.9	Bricker et al. 1993
4.93 +/-5.35	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.1+/-2.78% normal development)	Mulinia lateralis (bivalve)	LAR	2.12+/-1.04	22.9+/-23.7	Bricker et al. 1993
5.3 +/-5.5	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (34.9+/-15.7% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.23+/-1.04	25.4+/-25.5	Bricker et al. 1993
6.18 +/-5.89	NE	Tampa Bay, FL	COA		Not significantly toxic (EC50; 0.066+/-0.033 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.89+/-0.902		Long 1993
6.4 +/-6.41	*	Tampa Bay, FL	COA	1-h	Moderately toxic (15.3+/-10.6% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.94+/-0.908		Long 1993
6.7 +/-7.29	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.1+/-13.3% mortality)	Mulinia lateralis (bivalve)	LAR	2.68+/-0.955	31.8+/-24.4	Bricker et al. 1993
6.72 +/-6.02	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.013+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.79+/-0.744	37.6+/-25.3	Bricker et al. 1993
7.14 +/-5.14	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (29.8+/-13.9% mortality)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.07	32.1+/-28.4	Bricker et al. 1993
7.81		***PEL***								
8.3 +/-11.3	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (23+/-4.24% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.46+/-1.22	40+/-55.1	Bricker et al. 1993
8.59 +/-6.54	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (96.6+/-3.79% normal development)	Mulinia lateralis (bivalve)	LAR	2.87+/-0.94	35.1+/-25.9	Bricker et al. 1993
8.63 +/-6.35	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (38+/-13% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.92+/-0.937	34.6+/-23.9	Bricker et al. 1993
10 +/-7.4	NE	San Francisco Bay, CA	COA	48-h	Least toxic (23.3+/-7.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
10.6 +/-6.15	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.011+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.28+/-0.363	45.3+/-21.4	Bricker et al. 1993
11.5 +/-8.39	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (75.1+/-10.6% mortality)	Mulinia lateralis (bivalve)	LAR	3.32+/-0.317	42.3+/-19.2	Bricker et al. 1993
12.5 +/-8.5	NE	San Francisco Bay, CA	COA	48-h	Not significantly toxic (31.9+/-15.5% abnormal)	Bivalve	LAR			Long & Morgan 1990
13.3 +/-21	SG	San Francisco Bay, CA	COA	48-h	Significantly toxic (55.7+/-22.7% abnormal)	Bivalve	LAR			Long & Morgan 1990
16	*	Puget Sound, WA	AETA		1988 Puget Sound AET	Benthic community				PTI 1988
16	*	San Francisco Bay, CA	AETA	10-d	San Francisco Bay AET	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
16	*	San Francisco Bay, CA	AETA	48-h	San Francisco Bay AET	Oyster; mussel	LAR			Long & Morgan 1990

Table 31. A summary of the available data on the biological effects associated with sediment-sorbed p,p'-DDD (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

p,p'-DDD Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
16.1 +/-23.2	SG	San Francisco Bay, CA	COA	48-h	Moderately toxic (59.4+/-11.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
17	*	Northern California	AETA	10-d	Northern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
17	*	California	AETA	48-h	California AET Values	Mytilus edulis (bivalve)	LAR			Becker et al. 1990
>17	-	Northern California	AETA		Northern California AET Values	Benthic species				Becker et al. 1990
43	*	Puget Sound, WA	AETA	10-d	1988 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT			PTI 1988
<50	NE	Georgetown Harbor, SC	COA		Not toxic (species richness or abundance)	Benthic species		0.12		Van Dolah et al. 1984
97.8 +/-231	*	Tampa Bay, FL	COA	1-h	Most toxic (0.091+/-0.187% fertilization)	Arbacia punctulata (sea urchin)	GAM	2.96+/-1.49		Long 1993
134 +/-266	*	Tampa Bay, FL	COA	10-d	Significantly toxic (35.2+/-17.5% mortality)	Ampelisca abdita (amphipod)	SUB ADT	3.53+/-1.35		Long 1993
149 +/-284	*	Tampa Bay, FL	COA		Significantly toxic (EC50; 0.017+/-0.012 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.47+/-1.49		Long 1993
210	*	California	AETA		California AET Values	Benthic species				Becker et al. 1990
210	*	Southern California	AETA		Southern California AET Values	Benthic species				Becker et al. 1990
417 +/-289	NE	Galveston Harbor, TX	COA	10-d	Not toxic (2.4+/-1.52% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Grieco 1984
417 +/-289	NE	Galveston Harbor, TX	COA	10-d	Not toxic (0% mortality)	Mercenaria mercenaria (hard clams)	ADT			Grieco 1984
417 +/-289	NE	Galveston Harbor, TX	COA	10-d	Not toxic (2.8+/-2.17% mortality)	Nereis virens (sandworm)	ADT			Grieco 1984
>1700	-	California	AETA	10-d	California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
>1700	-	Southern California	AETA	10-d	Southern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
3632 +/-8121	NE	Oahu, Hawaii	COA	10-d	Not significantly toxic (7.2+/-1.89% mortality)	Eohaustorius estuarius (amphipod)	ADT	1.93+/-1.94	10.3+/-12.4	Lamberson et al. 1993
3632 +/-8121	NE	Oahu, Hawaii	COA	10-d	Not significantly toxic (10.1+/-4.01% mortality)	Corophium acherusicum (amphipod)	ADT	1.93+/-1.94	10.3+/-12.4	Lamberson et al. 1993

Table 32. A summary of the available data on the biological effects associated with sediment-sorbed p,p'-DDE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

p,p'-DDE	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.01		NC	Mobile Bay, AL	COA		Significantly toxic (10% mortality)	Mysidopsis bahia (mysid shrimp)		0.009	0.004	EMAP Louisiana Province 1991
0.015	+/-0.007	NC	Apalachee Bay, FL	COA	10-d	Significantly toxic (15.6% mortality)	Ampelisca abdita (amphipod)		0.438+/-0.442	0.421+/-0.593	EMAP Louisiana Province 1991
0.057	+/-0.032	NE	Chandeleur Sound, LA	COA	10-d	Not significantly toxic (2.87+/-4.05% mortality)	Ampelisca abdita (amphipod)		0.517+/-0.166	2.02+/-1.38	EMAP Louisiana Province 1991
0.058		NC	Chandeleur Sound, LA	COA		Significantly toxic (7.6+/-1.32% mortality)	Mysidopsis bahia (mysid shrimp)		0.624+/-0.197	2.07+/-1.19	EMAP Louisiana Province 1991
0.1		NE	Matagorda Ship Channel, TX	COA	10-d	Not toxic (7.2+/-2.77% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1985a
0.1		NE	Matagorda Ship Channel, TX	COA	10-d	Not toxic (10.6+/-5.18% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1985a
0.1		NE	Matagorda Ship Channel, TX	COA	10-d	Not toxic (0.2+/-0.447% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1985a
0.196	+/-0.158	NE	Mississippi Sound, MS	COA		Not significantly toxic (0.789+/-1.59% mortality)	Mysidopsis bahia (mysid shrimp)		0.827+/-0.757	1.46+/-1.58	EMAP Louisiana Province 1991
0.22	+/-0.237	NE	Apalachee Bay, FL	COA		Not significantly toxic (0.75+/-1.5% mortality)	Mysidopsis bahia (mysid shrimp)		0.540+/-0.385	0.405+/-0.417	EMAP Louisiana Province 1991
0.228	+/-0.279	NC	Mississippi Sound, MS	COA	10-d	Significantly toxic (11.6+/-3.39% mortality)	Ampelisca abdita (amphipod)		0.111+/-0.045	0.03	EMAP Louisiana Province 1991
0.244	+/-0.198	*	Chandeleur Sound, LA	COA	10-d	Significantly toxic (11.5+/-4.86% mortality)	Ampelisca abdita (amphipod)		0.811+/-0.711	1.87+/-0.973	EMAP Louisiana Province 1991
0.25		NE	Freeport Harbor, TX	COA	10-d	Not toxic (2+/-1% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1985b
0.25		NE	Freeport Harbor, TX	COA	10-d	Not toxic (9.6+/-4.22% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1985b
0.25		NE	Freeport Harbor, TX	COA	10-d	Not toxic (0% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1985b
0.257	+/-0.156	NE	Mississippi Sound, MS	COA	10-d	Not significantly toxic (1.4+/-1.73% mortality)	Ampelisca abdita (amphipod)		0.998+/-0.602	2.01+/-1.82	EMAP Louisiana Province 1991
0.26		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (7.2+/-1.92% mortality)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
0.26		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.6+/-0.55% reburial)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
0.26		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
0.26		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
0.26		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.001+/-0.001 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.555+/-0.471	2.68+/-2.3	Hall et al. 1992
0.264		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (0.33+/-0.516% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
0.264		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (2.33+/-1.03% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
0.264		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (15.3+/-11.0% mortality)	Hyalella azteca (amphipod)	JUV	0.648+/-0.641	1.74+/-1.39	Hall et al. 1992
0.264		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1% mortality)	Streblospio benedicti (polychaete worm)		1.38	3.25	Hall et al. 1992
0.264		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (16.5+/-9.19% mortality)	Streblospio benedicti (polychaete worm)		0.783+/-0.845	4.83+/-2.23	Hall et al. 1992
0.264		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.367+/-0.085 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
0.264		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.0005 mg/day growth)	Streblospio benedicti (polychaete worm)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
0.264		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.003+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.316+/-0.120	2.13+/-2.46	Hall et al. 1992
0.264		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1.83+/-1.6% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
0.264		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (3.5+/-1.87% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
0.264		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (9.25+/-5.32% mortality)	Lepidactylus dytiscus (amphipod)		0.638+/-0.768	1.65+/-1.62	Hall et al. 1992
0.264		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (22.3+/-7.37% mortality)	Hyalella azteca (amphipod)	JUV	0.788+/-0.866	2.04+/-1.75	Hall et al. 1992
0.264		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (8.8+/-7.12% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
0.264		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (14+/-9.22% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
0.264		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.1+/-0.865% reburial)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
0.264		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<20% emergence)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
0.264		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
0.264		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (-0.057+/-0.04 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
0.264		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.001mg/day growth)	Streblospio benedicti (polychaete worm)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
0.264		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.016 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992

Table 32. A summary of the available data on the biological effects associated with sediment-sorbed p,p'-DDE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

p,p'-DDE Std Dev		Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.264		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.005+/-0.0004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
0.264		NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (55.0+/-22.6% mortality)	Hyalella azteca (amphipod)	JUV	0.338+/-0.133	2.9+/-3.11	Hall et al. 1992
0.264		NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29.8+/-11.1% mortality)	Streblospio benedicti (polychaete worm)		0.316+/-0.12	2.13+/-2.46	Hall et al. 1992
0.264		NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (55.0+/-19.5% mortality)	Streblospio benedicti (polychaete worm)		0.349+/-0.11	1.07+/-0.66	Hall et al. 1992
0.264		NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.003 mg/day growth)	Lepidactylus dytiscus (amphipod)		1.38	3.25	Hall et al. 1992
0.264		NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29% mortality)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
0.264		NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (89.7% reburial)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
0.264		NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
0.264		NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	6.41	Hall et al. 1992
0.264		NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
0.264		NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (45.5+/-12% mortality)	Lepidactylus dytiscus (amphipod)		0.383+/-0.279	3.61+/-2.79	Hall et al. 1992
0.264		NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (63.0+/-24.3% mortality)	Hyalella azteca (amphipod)	JUV	0.317+/-0.228	2.57+/-2.67	Hall et al. 1992
0.264		NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (22% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
0.264		NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (28% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
0.264		NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (82.9% reburial)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
0.264		NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>20% emergence)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
0.264		NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	5.58	Hall et al. 1992
0.264		NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.008+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.4	Hall et al. 1992
0.264		NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.003 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
0.282	+/-0.128	NE	Galveston Bay, TX	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		0.934+/-0.657	0.457+/-0.530	EMAP Louisiana Province 1991
0.303	+/-0.173	NC	Galveston Bay, TX	COA	10-d	Significantly toxic (15.8+/-3.89% mortality)	Ampelisca abdita (amphipod)		0.647+/-0.606	0.160+/-0.184	EMAP Louisiana Province 1991
0.31	+/-0.41	NE	Mississippi River, MS, LA	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		1.3+/-0.83	1.14+/-1	EMAP Louisiana Province 1991
0.336	+/-0.178	NE	Chandeleur Sound, LA	COA		Not significantly toxic (1.03+/-2.05% mortality)	Mysidopsis bahia (mysid shrimp)		0.824+/-0.915	1.69+/-0.920	EMAP Louisiana Province 1991
0.38	+/-0.102	SG	Mississippi Sound, MS	COA		Significantly toxic (12.2+/-4.42% mortality)	Mysidopsis bahia (mysid shrimp)		0.939+/-0.335	2.63+/-2.3	EMAP Louisiana Province 1991
0.398	+/-0.507	NE	Galveston Bay, TX	COA	10-d	Not significantly toxic (1.35+/-1.45% mortality)	Ampelisca abdita (amphipod)		0.961+/-0.537	1.17+/-0.640	EMAP Louisiana Province 1991
0.402	+/-0.144	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (5.8+/-3.7% mortality)	Rhepoxynius abronius (amphipod)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
0.402	+/-0.144	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (3.4+/-1.82% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
0.402	+/-0.144	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (11.2+/-3.7% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
0.402	+/-0.144	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (3.52+/-1.66% mortality)	Macoma nasuta (clam)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
0.425		NE	Apalachee Bay, FL	COA	10-d	Not significantly toxic (3.3+/-3.25% mortality)	Ampelisca abdita (amphipod)		0.643+/-0.455	0.390+/-0.410	EMAP Louisiana Province 1991
0.425	+/-0.247	NE	Mississippi River, MS, LA	COA	10-d	Not significantly toxic (7.8+/-1.63% mortality)	Ampelisca abdita (amphipod)		1.15+/-1.04	2.31+/-0.651	EMAP Louisiana Province 1991
0.45	+/-0.607	SG	Galveston Bay, TX	COA		Significantly toxic (13.4+/-9.11% mortality)	Mysidopsis bahia (mysid shrimp)		0.778+/-0.482	1.21+/-0.778	EMAP Louisiana Province 1991
0.6		*	Puget Sound, WA	AETA		1986 Puget Sound AET	Benthic species		1		Bellar et al. 1986
0.6	+/-0.70	NE	San Francisco Bay, CA	COA	10-d	Least toxic (18+/-6.6% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
0.607	+/-0.28	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (4.8+/-2.28% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1983a
0.607	+/-0.28	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (15.8+/-4.21% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1983a
0.607	+/-0.28	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (1.2+/-.447% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1983a
0.68	+/-0.71	NE	San Francisco Bay, CA	COA	10-d	Not significantly toxic (18.4+/-6.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
0.7	+/-0.976	NC	Mobile Bay, AL	COA	10-d	Significantly toxic (46+/-49.3% mortality)	Ampelisca abdita (amphipod)		0.22+/-0.298	3.84+/-5.43	EMAP Louisiana Province 1991
0.7	+/-1.0	NE	San Francisco Bay, CA	COA	48-h	Least toxic (23.3+/-7.3% abnormal)	Bivalve	LAR			Long & Morgan 1990

Table 32. A summary of the available data on the biological effects associated with sediment-sorbed p,p'-DDE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

p,p'-DDE	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.92	+/-1.27	*	Mississippi River, MS, LA	COA	10-d	Significantly toxic (15.9+/-6.65% mortality)	Ampelisca abdita (amphipod)		1.22+/-0.717	0.235+/-0.276	EMAP Louisiana Province 1991
0.933	+/-0.116	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (6+/-2.35% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1983b
0.933	+/-0.116	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (2.6+/-2.97% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1983b
0.933	+/-0.116	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (1.8+/-1.79% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1983b
1		*	Puget Sound, WA	AETA	10-d	1986 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT	1		Bellar et al. 1986
1	+/-0.5	NG	San Francisco Bay, CA	COA	48-h	Highly toxic (92.4+/-4.5% abnormal)	Bivalve	LAR			Long & Morgan 1990
1.01	+/-0.9	NE	Matagorda Bay, TX	COA		Not significantly toxic (1.58+/-1.82% mortality)	Mysidopsis bahia (mysid shrimp)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
1.01	+/-0.9	NE	Matagorda Bay, TX	COA	10-d	Not significantly toxic (2.33+/-4.65% mortality)	Ampelisca abdita (amphipod)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
1.04	+/-1.11	*	Mississippi River, MS, LA	COA		Significantly toxic (32.9+/-36.4% mortality)	Mysidopsis bahia (mysid shrimp)		1.07+/-0.924	1.41+/-1.93	EMAP Louisiana Province 1991
1.2	+/-1.0	NE	San Francisco Bay, CA	COA	48-h	Not significantly toxic (31.9+/-15.5% abnormal)	Bivalve	LAR			Long & Morgan 1990
1.2	+/-1.0	NG	San Francisco Bay, CA	COA	10-d	Moderately toxic (33.8+/-4.7% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
1.7	+/-3.4	NG	San Francisco Bay, CA	COA	48-h	Significantly toxic (55.7+/-22.7% abnormal)	Bivalve	LAR			Long & Morgan 1990
1.95		NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (18% mortality)	Ampelisca abdita (amphipod)		0.028	9 ug/g	Windom In Prep
2		NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (0% mortality)	Arbacia punctulata (sea urchin)		0.03	19 ug/g	Windom In Prep
2.07			***TEL***								
2.1	+/-3.9	*	San Francisco Bay, CA	COA	48-h	Moderately toxic (59.4+/-11.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
2.2		*	San Francisco Bay, CA	AETA	10-d	San Francisco Bay AET	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
2.2		*	San Francisco Bay, CA	AETA	48-h	San Francisco Bay AET	Oyster; mussel	LAR			Long & Morgan 1990
2.23	+/-0.115	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (28.3+/-6.11% mortality)	Mysidopsis bahia (mysid)		0.246+/-0.051	127+/-24 ug/g	Windom In Prep
2.24	+/-0.095	NE	Brunswick Harbor Entrance, GA	COA	48-h	Not significantly toxic (86.6+/-4.25% normal development)	Arbacia punctulata (sea urchin)		0.181+/-0.162	182+/-208 ug/g	Windom In Prep
2.25	+/-3.97	*	San Francisco Bay, CA	COA	10-d	Significantly toxic (42.9+/-19.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
2.33	+/-0.993	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-7.99% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.14+/-0.352	6.09+/-5.38	Bricker et al. 1993
2.33	+/-0.37	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (9.78+/-5.33% mortality)	Mysidopsis bahia (mysid)		0.24+/-0.247	91.9+/-73.4 ug/g	Windom In Prep
2.33	+/-0.359	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (91.3+/-2.91% normal development)	Arbacia punctulata (sea urchin)		0.299+/-0.251	114+/-68.4 ug/g	Windom In Prep
2.34	+/-0.395	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (4+/-2.83% mortality)	Menidia beryllina (silverside)		0.243+/-0.264	90.5+/-78.4 ug/g	Windom In Prep
2.38	+/-0.364	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (11.6+/-4.33% mortality)	Ampelisca abdita (amphipod)		0.267+/-0.25	102+/-71.1 ug/g	Windom In Prep
2.38	+/-0.452	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (27.5+/-10.6% mortality)	Mysidopsis bahia (mysid)		0.237+/-0.311	74.6+/-85.5 ug/g	Windom In Prep
2.38	+/-0.894	NE	Mobile Bay, AL	COA		Not significantly toxic (1.07+/-1.85% mortality)	Mysidopsis bahia (mysid shrimp)		0.968+/-0.815	8.23+/-3.4	EMAP Louisiana Province 1991
2.38	+/-0.36	SG	Savannah River Entrance Channel, GA	COA	48-h	Significantly toxic (25.4+/-7.66% mortality)	Arbacia punctulata (sea urchin)		0.344+/-0.242	129.5+/-59.3 ug/g	Windom In Prep
2.6		*	California	AETA	48-h	California AET Values	Mytilus edulis (bivalve)	LAR			Becker et al. 1990
>2.6		-	Northern California	AETA		Northern California AET Values	Benthic species				Becker et al. 1990
2.88	+/-0.361	NE	Mobile Bay, AL	COA	10-d	Not significantly toxic (0.5+/-0.778% mortality)	Ampelisca abdita (amphipod)		1.24+/-0.948	8.51+/-4.76	EMAP Louisiana Province 1991
2.9		*	Northern California	AETA	10-d	Northern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
2.97	+/-0.712	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (39.5+/-18.2% mortality)	Ampelisca abidta (amphipod)	SUB ADT	2.06+/-0.523	20.1+/-13.9	Bricker et al. 1993
2.98	+/-0.787	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (10.6+/-3.17% mortality)	Ampelisca abdita (amphipod)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
2.98	+/-0.787	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (8.00+/-2.92% mortality)	Mysidopsis bahia (mysid)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
3.04	+/-0.846	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (5.43+/-3.21% mortality)	Mysidopsis bahia (mysid)		1.21+/-1.13	9096+/-13378 ug/g	Windom In Prep
3.04	+/-0.846	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (9.61+/-2.7% mortality)	Menidia beryllina (silverside)		1.22+/-1.13	9172+/-13363 ug/g	Windom In Prep
3.16	+/-0.928	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.125+/-0.084 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.25+/-0.468	1.98+/-2.25	Bricker et al. 1993
3.17	+/-0.947	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (25.9+/-5.01% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.21+/-0.444	2.41+/-2.32	Bricker et al. 1993

Table 32. A summary of the available data on the biological effects associated with sediment-sorbed p,p'-DDE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

p,p'-DDE Std Dev		Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
3.18	+/-0.88	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.061+/-0.038 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.8+/-0.477	8.52+/-10.7	Bricker et al. 1993
3.27	+/-0.969	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.5+/-11.4% mortality)	Mulinia lateralis (bivalve)	LAR	2.33+/-0.364	26.8+/-9.42	Bricker et al. 1993
3.3		SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (16% mortality)	Mysidopsis bahia (mysid)		1.8	7095 ug/g	Windom In Prep
3.3		SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (22.3% mortality)	Menidia beryllina (silverside)		1.71	6562 ug/g	Windom In Prep
3.34	+/-0.841	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.3+/-2.22% normal development)	Mulinia lateralis (bivalve)	LAR	2.18+/-0.531	19.1+/-12.5	Bricker et al. 1993
3.34	+/-1.95	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.167+/-0.198 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.59+/-1.09	4.67+/-6.99	Bricker et al. 1993
3.4	+/-5.2	*	San Francisco Bay, CA	COA	10-d	Highly toxic (67+/-11.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
3.48	+/-0.925	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (15.2+/-9.21% mortality)	Mulinia lateralis (bivalve)	LAR	2.17+/-0.663	18.4+/-19.9	Bricker et al. 1993
3.5	+/-0.754	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (19.3+/-5.86% mortality)	Ampelisca abidta (amphipod)	SUB ADT	1.82+/-0.225	6.3+/-6.2	Bricker et al. 1993
3.56	+/-0.95	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.014+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.51+/-0.45	29.6+/-15.7	Bricker et al. 1993
3.58	+/-0.482	SG	Brunswick Harbor Entrance, GA	COA	48-h	Significantly toxic (14.6+/-18.9% normal development)	Arbacia punctulata (sea urchin)		1.99+/-0.562	14009+/-13434 ug/g	Windom In Prep
3.79	+/-2.97	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.096+/-0.101 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.37+/-0.759	6.93+/-6.83	Bricker et al. 1993
3.85	+/-1.64	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (96+/-1.66% normal development)	Mulinia lateralis (bivalve)	LAR	2.52+/-0.997	35+/-42.9	Bricker et al. 1993
4.02	+/-3.46	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.074+/-0.043 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.27+/-0.626	6.21+/-5.41	Bricker et al. 1993
4.32	+/-3.19	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (6.48+/-10.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
4.32	+/-3.19	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99+/-0.862% normal development)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
4.41	+/-4.14	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99.3+/-0.827% normal development)	Mulinia lateralis (bivalve)	LAR	1.43+/-0.738	14.7+/-24	Bricker et al. 1993
4.49	+/-4.08	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (12.3+/-14.5% mortality)	Mulinia lateralis (bivalve)	LAR	1.53+/-0.743	15.7+/-23.2	Bricker et al. 1993
4.89	+/-5.1	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-6.07% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.71+/-0.9	15.3+/-23.2	Bricker et al. 1993
5		NC	Oakland Harbor, CA	COA	10-d	Significantly toxic (35.3+/-2.5% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.56+/-0.07		Word et al. 1988
5		NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (9+/-1.73% mortality)	Nereis virens (polychaetes)	ADT			EG&G Bionomics 1980
5		NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (13+/- 3.61% mortality)	Penaeus duorarum (pink shrimp)	ADT			EG&G Bionomics 1980
5		NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (11.3+/-3.21% mortality)	Crassostrea virginica (oyster)	ADT			EG&G Bionomics 1980
5.07	+/-8.94	NE	Narragansett Bay, RI	COA	10-d	Not significantly toxic (5.28+/-3.04% mortality))	Ampelisca abdita (amphipod)	ADT			Munns et al. 1991
5.52	+/-3.77	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (91.5+/-7.28% normal development)	Mulinia lateralis (bivalve)	LAR	2.6+/-0.899	36.8+/-34.9	Bricker et al. 1993
5.53	+/-4.73	*	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (30.5+/-16.4% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.62+/-0.777	17.7+/-26.3	Bricker et al. 1993
5.77	+/-4.94	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (17+/-16.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.99+/-1	21.6+/-24.5	Bricker et al. 1993
6.02	+/-5.6	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (51.3+/-6.95% mortality)	Mulinia lateralis (bivalve)	LAR	1.8+/-1.71	29.6+/-46.3	Bricker et al. 1993
6.18	+/-5.48	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.016+/-0.007 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.26+/-0.936	43.4+/-35.6	Bricker et al. 1993
6.25	+/-5.59	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (10.4+/-6.3% mortality)	Nephtys caecoides (polychaete)		1.63+/-0.657		Word et al. 1988
6.25	+/-5.59	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (0.2+/-0.6% mortality)	Macoma nasuta (clam)		1.63+/-0.657		Word et al. 1988
6.38	+/-5.82	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.1+/-2.78% normal development)	Mulinia lateralis (bivalve)	LAR	2.12+/-1.04	22.9+/-23.7	Bricker et al. 1993
6.56	+/-6.25	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (23.3+/-6.14% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.738		Word et al. 1988
6.64	+/-4.74	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (88.5+/-8.39% normal development)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.05	38.1+/-38.9	Bricker et al. 1993
6.93	+/-6.01	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (34.9+/-15.7% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.23+/-1.04	25.4+/-25.5	Bricker et al. 1993
8.05	+/-7.49	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.1+/-13.3% mortality)	Mulinia lateralis (bivalve)	LAR	2.68+/-0.955	31.8+/-24.4	Bricker et al. 1993
8.33	+/-6.49	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.013+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.79+/-0.744	37.6+/-25.3	Bricker et al. 1993
8.34	+/-5.87	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (21.5+/-6.36% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.35+/-1.05	10.5+/-13.4	Bricker et al. 1993
8.39	+/-5.81	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.008+/-0.001 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.19+/-1.27	12+/-11.3	Bricker et al. 1993
8.84	+/-6.19	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (29.8+/-13.9% mortality)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.07	32.1+/-28.4	Bricker et al. 1993

Table 32. A summary of the available data on the biological effects associated with sediment-sorbed p,p'-DDE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

p,p'-DDE	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
9		*	Puget Sound, WA	AETA		1988 Puget Sound AET	Benthic community				PTI 1988
9.99	+/-7.26	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (38+/-13% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.92+/-0.937	34.6+/-23.9	Bricker et al. 1993
10	+/-7.14	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (96.6+/-3.79% normal development)	Mulinia lateralis (bivalve)	LAR	2.87+/-0.94	35.1+/-25.9	Bricker et al. 1993
10.1	+/-8.41	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (23+/-4.24% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.46+/-1.22	40+/-55.1	Bricker et al. 1993
12.1	+/-6.9	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.011+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.28+/-0.363	45.3+/-21.4	Bricker et al. 1993
12.3	+/-8.8	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (75.1+/-10.6% mortality)	Mulinia lateralis (bivalve)	LAR	3.32+/-0.317	42.3+/-19.2	Bricker et al. 1993
15		*	Puget Sound, WA	AETA	10-d	1988 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT			PTI 1988
27.6	+/-61.7	NE	Oahu, Hawaii	COA	10-d	Not significantly toxic (7.2+/-1.89% mortality)	Eohaustorius estuarius (amphipod)	ADT	1.93+/-1.94	10.3+/-12.4	Lamberson et al. 1993
27.6	+/-61.7	NE	Oahu, Hawaii	COA	10-d	Not significantly toxic (10.1+/-4.01% mortality)	Corophium acherusicum (amphipod)	ADT	1.93+/-1.94	10.3+/-12.4	Lamberson et al. 1993
<50		NE	Georgetown Harbor, SC	COA		Not toxic (species richness or abundance)	Benthic species		0.12		Van Dolah et al. 1984
56		NE	Palos Verdes, CA	COA		High density (4.4 N/0.1 sq.m.)	Echinoderm		0.9		Swartz et al. 1985a
56		NE	Palos Verdes, CA	COA		High density (88 N/0.1 sq.m.)	Foraminifera (sponge)		0.9		Swartz et al. 1985a
56		NE	Palos Verdes, CA	COA		High density (132 N/0.1 sq.m.)	Ophiuroidea (brittle star)		0.9		Swartz et al. 1985a
110		NE	Palos Verdes, CA	COA		High density (93.4 N/0.1 sq.m.)	Echinoderm		1.3+/-0.77		Swartz et al. 1986
180		NE	Palos Verdes, CA	COA		High abundance (208 N/0.1 sq.m.)	Echinoderms	VAR			Ferraro et al. 1991
374			***PEL***								
683	+/-252	NE	Galveston Harbor, TX	COA	10-d	Not toxic (2.4+/-1.52% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Grieco 1984
683	+/-252	NE	Galveston Harbor, TX	COA	10-d	Not toxic (0% mortality)	Mercenaria mercenaria (hard clams)	ADT			Grieco 1984
683	+/-252	NE	Galveston Harbor, TX	COA	10-d	Not toxic (2.8+/-2.17% mortality)	Nereis virens (sandworm)	ADT			Grieco 1984
829	+/-713	NE	Palos Verdes, CA	COA		High species richness (80.8+/-13.7 S/0.1 sq.m.)	Macro benthos		2.10+/-1.15		Swartz et al. 1985a
829	+/-713	NE	Palos Verdes, CA	COA		High density (54.5+/-9.91 N/0.1 sq.m.)	Amphipod		2.1+/-1.15		Swartz et al. 1985a
829	+/-713	NE	Palos Verdes, CA	COA		High density (34.3+/-5.67 N/0.1 sq.m.)	Phoxocephalid		2.1+/-1.15		Swartz et al. 1985a
829	+/-713	NE	Palos Verdes, CA	COA		High density (111+/-32 N/0.1 sq.m.)	Crustacea		2.1+/-1.15		Swartz et al. 1985a
865	+/-969	NE	Palos Verdes, CA	COA		High abundance (54.6+/-5.09 N/0.1 sq.m.)	Amphipods	VAR			Ferraro et al. 1991
865	+/-969	NE	Palos Verdes, CA	COA		High abundance (30.7+/-0.99 N/0.1 sq.m.)	Phoxocephalids	VAR			Ferraro et al. 1991
1317	+/-1360	NE	Palos Verdes, CA	COA		High density (20.9+/-0.23 N/0.1 sq.m.)	Amphipod		1.7+/-0.61		Swartz et al. 1986
1317	+/-1360	NE	Palos Verdes, CA	COA		High density (11.2+/-1.64 N/0.1 sq.m.)	Phoxocephalid		1.7+/-0.61		Swartz et al. 1986
1460		NE	Palos Verdes, CA	COA		High density (2177 N/0.1 sq.m.)	Polychaeta		3.2		Swartz et al. 1985a
2580	+/-3550	NE	Palos Verdes, CA	COA		High density (594+/-688 N/0.1 sq.m.)	Mollusca		2.53+/-1.27		Swartz et al. 1985a
2580	+/-3550	NE	Palos Verdes, CA	COA	10-d	Not significantly toxic (8+/-5.7% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.53+/-1.27		Swartz et al. 1985a
2800		*	California	AETA		California AET Values	Benthic species				Becker et al. 1990
2800		*	Southern California	AETA		Southern California AET Values	Benthic species				Becker et al. 1990
3903	+/-3080	NE	Palos Verdes, CA	COA	10-d	Not significantly toxic (9.5+/-5.45% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.42+/-0.88		Swartz et al. 1986
4055	+/-3023	*	Palos Verdes, CA	COA		Low density (365+/-178 N/0.1 sq.m.)	Polychaeta		3.15+/-1.32		Swartz et al. 1985a
4289	+/-2687	*	Palos Verdes, CA	COA		Low density (0.03+/-0.08 N/0.1 sq.m.)	Echinoderm		3.53+/-0.742		Swartz et al. 1985a
4289	+/-2687	*	Palos Verdes, CA	COA		Low density (0.233+/-0.367 N/0.1 sq.m.)	Foraminifera (sponge)		3.53+/-0.742		Swartz et al. 1985a
4289	+/-2687	*	Palos Verdes, CA	COA		Low density (0.3+/-0.8 N/0.1 sq.m.)	Ophiuroidea (brittle star)		3.53+/-0.742		Swartz et al. 1985a
4453	+/-2524	NE	Palos Verdes, CA	COA		High species richness (70.9+/-16.9 S/0.1 sq.m.)	Benthic species	VAR			Ferraro et al. 1991
4662	+/-2747	*	Palos Verdes, CA	COA		Low density (0.2+/-0.14 N/0.1 sq.m.)	Echinoderm		2.64+/-0.77		Swartz et al. 1986
5157	+/-1065	*	Palos Verdes, CA	COA		Low density (21.5+/-11.6 N/0.1 sq.m.)	Mollusca		4+/-0.265		Swartz et al. 1985a

Table 32. A summary of the available data on the biological effects associated with sediment-sorbed p,p'-DDE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

p,p'-DDE	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
5157	+/-1065	*	Palos Verdes, CA	COA	10-d	Significantly toxic (21+/-6.3% mortality)	Rhepoxynius abronius (amphipod)	ADT	4+/-0.265		Swartz et al. 1985a
5378	+/-4860	NC	Palos Verdes, CA	COA		Low abundance (415+/-94.4 N/0.1 sq.m.)	Benthic species	VAR			Ferraro et al. 1991
5461	+/-3687	NE	Palos Verdes, CA	COA	10-d	Not significantly toxic (11.9+/-5.36% mortality)	Rhepoxynius abronius (amphipod)	VAR			Ferraro et al. 1991
5600	+/-547	NE	Palos Verdes, CA	COA		High abundance (944+/-101 N/0.1 sq.m.)	Benthic species	VAR			Ferraro et al. 1991
5826	+/-1596	*	Palos Verdes, CA	COA		Low species richness (26.0+/-11.5 S/0.1 sq.m.)	Macro benthos		3.95+/-0.238		Swartz et al. 1985a
5826	+/-1596	*	Palos Verdes, CA	COA		Low density (1.0+/-1.2 N/0.1 sq.m.)	Amphipod		3.95+/-0.238		Swartz et al. 1985a
5826	+/-1596	*	Palos Verdes, CA	COA		Low density (0 N/0.1 sq.m.)	Phoxocephalid		3.95+/-0.238		Swartz et al. 1985a
5826	+/-1596	*	Palos Verdes, CA	COA		Low density (8.7+/-6.01 N/0.1 sq.m.)	Crustacea		3.95+/-0.238		Swartz et al. 1985a
6216	+/-3247	*	Palos Verdes, CA	COA		Low abundance (2.4+/-5.65 N/0.1 sq.m.)	Echinoderms	VAR			Ferraro et al. 1991
6490	+/-1342	*	Palos Verdes, CA	COA		Low density (5.3+/-3.7 N/0.1 sq.m.)	Amphipod		3.13+/-0.15		Swartz et al. 1986
6490	+/-1342	*	Palos Verdes, CA	COA		Low density (0.13+/-0.23 N/0.1 sq.m.)	Phoxocephalid		3.13+/-0.15		Swartz et al. 1986
6993	+/-2752	*	Palos Verdes, CA	COA		Low abundance (13.8+/-11.4 N/0.1 sq.m.)	Amphipods	VAR			Ferraro et al. 1991
6993	+/-2752	*	Palos Verdes, CA	COA		Low abundance (5.87+/-7.06 N/0.1 sq.m.)	Phoxocephalids	VAR			Ferraro et al. 1991
>7800		-	California	AETA	10-d	California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
>7800		-	Southern California	AETA	10-d	Southern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
12520		*	Palos Verdes, CA	COA		Low species richness (19.2 S/0.1 sq.m.)	Benthic species	VAR			Ferraro et al. 1991

Table 33. A summary of the available data on the biological effects associated with sediment-sorbed p,p'-DDT (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

p,p'-DDT Std Dev		Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.057	+/-0.021	NE	Mobile Bay, AL	COA		Not significantly toxic (1.07+/-1.85% mortality)	Mysidopsis bahia (mysid shrimp)		0.968+/-0.815	8.23+/-3.4	EMAP Louisiana Province 1991
0.065	+/-0.078	NC	Apalachee Bay, FL	COA	10-d	Significantly toxic (15.6% mortality)	Ampelisca abdita (amphipod)		0.438+/-0.442	0.421+/-0.593	EMAP Louisiana Province 1991
0.065	+/-0.021	NE	Mobile Bay, AL	COA	10-d	Not significantly toxic (0.5+/-0.778% mortality)	Ampelisca abdita (amphipod)		1.24+/-0.948	8.51+/-4.76	EMAP Louisiana Province 1991
0.08	+/-0.057	SG	Mobile Bay, AL	COA	10-d	Significantly toxic (46+/-49.3% mortality)	Ampelisca abdita (amphipod)		0.22+/-0.298	3.84+/-5.43	EMAP Louisiana Province 1991
0.093	+/-0.055	NE	Apalachee Bay, FL	COA		Not significantly toxic (0.75+/-1.5% mortality)	Mysidopsis bahia (mysid shrimp)		0.540+/-0.385	0.405+/-0.417	EMAP Louisiana Province 1991
0.1		NE	Matagorda Ship Channel, TX	COA	10-d	Not toxic (7.2+/-2.77% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1985a
0.1		NE	Matagorda Ship Channel, TX	COA	10-d	Not toxic (10.6+/-5.18% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1985a
0.1		NE	Matagorda Ship Channel, TX	COA	10-d	Not toxic (0.2+/-0.447% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1985a
0.12		*	Mobile Bay, AL	COA		Significantly toxic (10% mortality)	Mysidopsis bahia (mysid shrimp)		0.009	0.004	EMAP Louisiana Province 1991
0.12		NC	Galveston Bay, TX	COA	10-d	Significantly toxic (15.8+/-3.89% mortality)	Ampelisca abdita (amphipod)		0.647+/-0.606	0.160+/-0.184	EMAP Louisiana Province 1991
0.12		NE	Apalachee Bay, FL	COA	10-d	Not significantly toxic (3.3+/-3.25% mortality)	Ampelisca abdita (amphipod)		0.643+/-0.455	0.390+/-0.410	EMAP Louisiana Province 1991
0.12		NE	Chandeleur Sound, LA	COA		Not significantly toxic (1.03+/-2.05% mortality)	Mysidopsis bahia (mysid shrimp)		0.824+/-0.915	1.69+/-0.920	EMAP Louisiana Province 1991
0.12		NE	Chandeleur Sound, LA	COA	10-d	Not significantly toxic (2.87+/-4.05% mortality)	Ampelisca abdita (amphipod)		0.517+/-0.166	2.02+/-1.38	EMAP Louisiana Province 1991
0.12		NE	Galveston Bay, TX	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		0.934+/-0.657	0.457+/-0.530	EMAP Louisiana Province 1991
0.12		NE	Mississippi Sound, MS	COA		Not significantly toxic (0.789+/-1.59% mortality)	Mysidopsis bahia (mysid shrimp)		0.827+/-0.757	1.46+/-1.58	EMAP Louisiana Province 1991
0.12		NE	Mississippi Sound, MS	COA	10-d	Not significantly toxic (1.4+/-1.73% mortality)	Ampelisca abdita (amphipod)		0.998+/-0.602	2.01+/-1.82	EMAP Louisiana Province 1991
0.12		NG	Chandeleur Sound, LA	COA		Significantly toxic (7.6+/-1.32% mortality)	Mysidopsis bahia (mysid shrimp)		0.624+/-0.197	2.07+/-1.19	EMAP Louisiana Province 1991
0.12		NG	Chandeleur Sound, LA	COA	10-d	Significantly toxic (11.5+/-4.86% mortality)	Ampelisca abdita (amphipod)		0.811+/-0.711	1.87+/-0.973	EMAP Louisiana Province 1991
0.12		NG	Mississippi Sound, MS	COA		Significantly toxic (12.2+/-4.42% mortality)	Mysidopsis bahia (mysid shrimp)		0.939+/-0.335	2.63+/-2.3	EMAP Louisiana Province 1991
0.12		NG	Mississippi Sound, MS	COA	10-d	Significantly toxic (11.6+/-3.39% mortality)	Ampelisca abdita (amphipod)		0.111+/-0.045	0.03	EMAP Louisiana Province 1991
0.135	+/-0.021	NE	Mississippi River, MS, LA	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		1.3+/-0.83	1.14+/-1	EMAP Louisiana Province 1991
0.135	+/-0.021	NE	Mississippi River, MS, LA	COA	10-d	Not significantly toxic (7.8+/-1.63% mortality)	Ampelisca abdita (amphipod)		1.15+/-1.04	2.31+/-0.651	EMAP Louisiana Province 1991
0.14	+/-0.04	NE	Matagorda Bay, TX	COA		Not significantly toxic (1.58+/-1.82% mortality)	Mysidopsis bahia (mysid shrimp)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
0.14	+/-0.04	NE	Matagorda Bay, TX	COA	10-d	Not significantly toxic (2.33+/-4.65% mortality)	Ampelisca abdita (amphipod)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
0.15	+/-0.06	NE	Galveston Bay, TX	COA	10-d	Not significantly toxic (1.35+/-1.45% mortality)	Ampelisca abdita (amphipod)		0.961+/-0.537	1.17+/-0.640	EMAP Louisiana Province 1991
0.16	+/-0.069	SG	Galveston Bay, TX	COA		Significantly toxic (13.4+/-9.11% mortality)	Mysidopsis bahia (mysid shrimp)		0.778+/-0.482	1.21+/-0.778	EMAP Louisiana Province 1991
0.25		NE	Freeport Harbor, TX	COA	10-d	Not toxic (2+/-1% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1985b
0.25		NE	Freeport Harbor, TX	COA	10-d	Not toxic (9.6+/-4.22% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1985b
0.25		NE	Freeport Harbor, TX	COA	10-d	Not toxic (0% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1985b
0.25		NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (4.8+/-2.28% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1983a
0.25		NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (15.8+/-4.21% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1983a
0.25		NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (1.2+/-.447% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1983a
0.26		*	Puget Sound, WA	AETA	10-d	1986 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT	1		Bellar et al. 1986
0.31		NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (51.3+/-6.95% mortality)	Mulinia lateralis (bivalve)	LAR	1.8+/-1.71	29.6+/-46.3	Bricker et al. 1993
0.5	+/-0.433	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (6+/-2.35% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1983b
0.5	+/-0.433	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (2.6+/-2.97% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1983b
0.5	+/-0.433	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (1.8+/-1.79% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1983b
0.546	+/-0.334	NC	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.008+/-0.001 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.19+/-1.27	12+/-11.3	Bricker et al. 1993
0.594	+/-0.409	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (25.9+/-5.01% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.21+/-0.444	2.41+/-2.32	Bricker et al. 1993
0.6	+/-0.2	NC	San Francisco Bay, CA	COA	48-h	Highly toxic (92.4+/-4.5% abnormal)	Bivalve	LAR			Long & Morgan 1990

Table 33. A summary of the available data on the biological effects associated with sediment-sorbed p,p'-DDT (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

p,p'-DDT	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.715	+/-0.841	*	Mississippi River, MS, LA	COA		Significantly toxic (32.9+/-36.4% mortality)	Mysidopsis bahia (mysid shrimp)		1.07+/-0.924	1.41+/-1.93	EMAP Louisiana Province 1991
0.715	+/-0.841	*	Mississippi River, MS, LA	COA	10-d	Significantly toxic (15.9+/-6.65% mortality)	Ampelisca abdita (amphipod)		1.22+/-0.717	0.235+/-0.276	EMAP Louisiana Province 1991
0.73		*	Puget Sound, WA	AETA		1986 Puget Sound AET	Benthic species		1		Bellar et al. 1986
0.75	+/-0.919	NE	Tampa Bay, FL	COA	1-h	Least toxic (79.4+/-9.9% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.45+/-0.587		Long 1993
0.761	+/-0.428	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.5+/-11.4% mortality)	Mulinia lateralis (bivalve)	LAR	2.33+/-0.364	26.8+/-9.42	Bricker et al. 1993
0.772	+/-0.579	NC	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.016+/-0.007 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.26+/-0.936	43.4+/-35.6	Bricker et al. 1993
0.782	+/-0.764	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (6.48+/-10.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
0.782	+/-0.764	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99+/-0.862% normal development)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
0.8	+/-0.788	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.1+/-13.3% mortality)	Mulinia lateralis (bivalve)	LAR	2.68+/-0.955	31.8+/-24.4	Bricker et al. 1993
0.831	+/-0.438	NC	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.014+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.51+/-0.45	29.6+/-15.7	Bricker et al. 1993
0.849	+/-0.858	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.125+/-0.084 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.25+/-0.468	1.98+/-2.25	Bricker et al. 1993
0.862	+/-0.537	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (39.5+/-18.2% mortality)	Ampelisca abidta (amphipod)	SUB ADT	2.06+/-0.523	20.1+/-13.9	Bricker et al. 1993
0.985	+/-0.354	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (5.8+/-3.7% mortality)	Rhepoxynius abronius (amphipod)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
0.985	+/-0.354	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (3.4+/-1.82% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
0.985	+/-0.354	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (11.2+/-3.7% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
0.985	+/-0.354	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (3.52+/-1.66% mortality)	Macoma nasuta (clam)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
0.996	+/-0.663	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.3+/-2.22% normal development)	Mulinia lateralis (bivalve)	LAR	2.18+/-0.531	19.1+/-12.5	Bricker et al. 1993
1.04	+/-1.07	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (75.1+/-10.6% mortality)	Mulinia lateralis (bivalve)	LAR	3.32+/-0.317	42.3+/-19.2	Bricker et al. 1993
1.05	+/-1	NC	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.013+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.79+/-0.744	37.6+/-25.3	Bricker et al. 1993
1.08	+/-0.870	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-7.99% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.14+/-0.352	6.09+/-5.38	Bricker et al. 1993
1.12	+/-0.443	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (96+/-1.66% normal development)	Mulinia lateralis (bivalve)	LAR	2.52+/-0.997	35+/-42.9	Bricker et al. 1993
1.14	+/-0.69	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (15.2+/-9.21% mortality)	Mulinia lateralis (bivalve)	LAR	2.17+/-0.663	18.4+/-19.9	Bricker et al. 1993
1.17	+/-1.01	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (38+/-13% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.92+/-0.937	34.6+/-23.9	Bricker et al. 1993
1.19			***TEL***								
1.22	+/-3.16	NE	San Francisco Bay, CA	COA	10-d	Not significantly toxic (18.4+/-6.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
1.23	+/-1.19	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (19.3+/-5.86% mortality)	Ampelisca abidta (amphipod)	SUB ADT	1.82+/-0.225	6.3+/-6.2	Bricker et al. 1993
1.24	+/-1.35	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-6.07% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.71+/-0.9	15.3+/-23.2	Bricker et al. 1993
1.29	+/-0.802	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.061+/-0.038 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.8+/-0.477	8.52+/-10.7	Bricker et al. 1993
1.3	+/-2.8	NE	San Francisco Bay, CA	COA	10-d	Least toxic (18+/-6.6% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
1.37	+/-1.34	NC	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.011+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.28+/-0.363	45.3+/-21.4	Bricker et al. 1993
1.39	+/-1.23	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (96.6+/-3.79% normal development)	Mulinia lateralis (bivalve)	LAR	2.87+/-0.94	35.1+/-25.9	Bricker et al. 1993
1.44	+/-1.6	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (21.5+/-6.36% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.35+/-1.05	10.5+/-13.4	Bricker et al. 1993
1.47	+/-0.932	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.167+/-0.198 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.59+/-1.09	4.67+/-6.99	Bricker et al. 1993
1.57	+/-1.3	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (29.8+/-13.9% mortality)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.07	32.1+/-28.4	Bricker et al. 1993
1.6		*	United States	EqPA		Chronic Marine Sediment Safe Level Criteria					Pavlou 1987
1.71		NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.003 mg/day growth)	Lepidactylus dytiscus (amphipod)		1.38	3.25	Hall et al. 1992
1.71		NC	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29% mortality)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
1.71		NC	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (89.7% reburial)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
1.71		NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
1.71		NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	6.41	Hall et al. 1992

Table 33. A summary of the available data on the biological effects associated with sediment-sorbed p,p'-DDT (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

p,p'-DDT Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
1.71	NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
1.71	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (15.3+/-11.0% mortality)	Hyalella azteca (amphipod)	JUV	0.648+/-0.641	1.74+/-1.39	Hall et al. 1992
1.71	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1% mortality)	Streblospio benedicti (polychaete worm)		1.38	3.25	Hall et al. 1992
1.71	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (16.5+/-9.19% mortality)	Streblospio benedicti (polychaete worm)		0.783+/-0.845	4.83+/-2.23	Hall et al. 1992
1.71	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1.83+/-1.6% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
1.71	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (3.5+/-1.87% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
1.71	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (9.25+/-5.32% mortality)	Lepidactylus dytiscus (amphipod)		0.638+/-0.768	1.65+/-1.62	Hall et al. 1992
1.71	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (22.3+/-7.37% mortality)	Hyalella azteca (amphipod)	JUV	0.788+/-0.866	2.04+/-1.75	Hall et al. 1992
1.71	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (8.8+/-7.12% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
1.71	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (14+/-9.22% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
1.71	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.1+/-0.865% reburial)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
1.71	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<20% emergence)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
1.71	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
1.71	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (-0.057+/-0.04 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
1.71	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.001mg/day growth)	Streblospio benedicti (polychaete worm)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
1.71	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.016 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
1.71	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.005+/-0.0004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
1.71	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (45.5+/-12% mortality)	Lepidactylus dytiscus (amphipod)		0.383+/-0.279	3.61+/-2.79	Hall et al. 1992
1.71	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (63.0+/-24.3% mortality)	Hyalella azteca (amphipod)	JUV	0.317+/-0.228	2.57+/-2.67	Hall et al. 1992
1.71	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (22% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
1.71	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (28% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
1.71	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (82.9% reburial)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
1.71	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>20% emergence)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
1.71	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	5.58	Hall et al. 1992
1.71	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.008+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.4	Hall et al. 1992
1.71	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.003 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
1.95	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (18% mortality)	Ampelisca abdita (amphipod)		0.028	9 ug/g	Windom In Prep
2	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (0% mortality)	Arbacia punctulata (sea urchin)		0.03	19 ug/g	Windom In Prep
2.1 +/-3.7	NE	San Francisco Bay, CA	COA	48-h	Least toxic (23.3+/-7.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
2.23 +/-0.115	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (28.3+/-6.11% mortality)	Mysidopsis bahia (mysid)		0.246+/-0.051	127+/-24 ug/g	Windom In Prep
2.24 +/-0.095	NE	Brunswick Harbor Entrance, GA	COA	48-h	Not significantly toxic (86.6+/-4.25% normal development)	Arbacia punctulata (sea urchin)		0.181+/-0.162	182+/-208 ug/g	Windom In Prep
2.29 +/-9.58	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.1+/-2.78% normal development)	Mulinia lateralis (bivalve)	LAR	2.12+/-1.04	22.9+/-23.7	Bricker et al. 1993
2.33 +/-0.37	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (9.78+/-5.33% mortality)	Mysidopsis bahia (mysid)		0.24+/-0.247	91.9+/-73.4 ug/g	Windom In Prep
2.33 +/-0.359	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (91.3+/-2.91% normal development)	Arbacia punctulata (sea urchin)		0.299+/-0.251	114+/-68.4 ug/g	Windom In Prep
2.34 +/-0.395	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (4+/-2.83% mortality)	Menidia beryllina (silverside)		0.243+/-0.264	90.5+/-78.4 ug/g	Windom In Prep
2.38 +/-0.364	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (11.6+/-4.33% mortality)	Ampelisca abdita (amphipod)		0.267+/-0.25	102+/-71.1 ug/g	Windom In Prep
2.38 +/-0.452	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (27.5+/-10.6% mortality)	Mysidopsis bahia (mysid)		0.237+/-0.311	74.6+/-85.5 ug/g	Windom In Prep
2.38 +/-0.36	SG	Savannah River Entrance Channel, GA	COA	48-h	Significantly toxic (25.4+/-7.66% mortality)	Arbacia punctulata (sea urchin)		0.344+/-0.242	129.5+/-59.3 ug/g	Windom In Prep
2.4 +/-2.1	NG	San Francisco Bay, CA	COA	10-d	Moderately toxic (33.8+/-4.7% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
2.44 +/-2.68	NE	Tampa Bay, FL	COA	10-d	Not significantly toxic (14.6+/-7.67% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.63+/-0.596		Long 1993

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p,p'-DDT Std Dev		Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
2.59	+/-2.16	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (0.33+/-0.516% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
2.59	+/-2.16	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (2.33+/-1.03% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
2.59	+/-2.16	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.367+/-0.085 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
2.59	+/-2.16	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.0005 mg/day growth)	Streblospio benedicti (polychaete worm)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
2.77	+/-2.37	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.003+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.316+/-0.120	2.13+/-2.46	Hall et al. 1992
2.77	+/-2.37	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (7.2+/-1.92% mortality)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
2.77	+/-2.37	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.6+/-0.55% reburial)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
2.77	+/-2.37	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
2.77	+/-2.37	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
2.77	+/-2.37	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.001+/-0.001 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.555+/-0.471	2.68+/-2.3	Hall et al. 1992
2.77	+/-2.37	SG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29.8+/-11.1% mortality)	Streblospio benedicti (polychaete worm)		0.316+/-0.12	2.13+/-2.46	Hall et al. 1992
2.98	+/-0.787	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (10.6+/-3.17% mortality)	Ampelisca abdita (amphipod)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
2.98	+/-0.787	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (8.00+/-2.92% mortality)	Mysidopsis bahia (mysid)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
3.04	+/-0.846	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (5.43+/-3.21% mortality)	Mysidopsis bahia (mysid)		1.21+/-1.13	9096+/-13378 ug/g	Windom In Prep
3.04	+/-0.846	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (9.61+/-2.7% mortality)	Menidia beryllina (silverside)		1.22+/-1.13	9172+/-13363 ug/g	Windom In Prep
3.04	+/-2.65	SG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (55.0+/-19.5% mortality)	Streblospio benedicti (polychaete worm)		0.349+/-0.11	1.07+/-0.66	Hall et al. 1992
3.2	+/-5.5	NE	San Francisco Bay, CA	COA	48-h	Not significantly toxic (31.9+/-15.5% abnormal)	Bivalve	LAR			Long & Morgan 1990
3.25	+/-11.6	*	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (34.9+/-15.7% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.23+/-1.04	25.4+/-25.5	Bricker et al. 1993
3.3	+/-11.4	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (17+/-16.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.99+/-1	21.6+/-24.5	Bricker et al. 1993
3.3		SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (16% mortality)	Mysidopsis bahia (mysid)		1.8	7095 ug/g	Windom In Prep
3.3		SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (22.3% mortality)	Menidia beryllina (silverside)		1.71	6562 ug/g	Windom In Prep
3.48	+/-3.06	*	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (55.0+/-22.6% mortality)	Hyalella azteca (amphipod)	JUV	0.338+/-0.133	2.9+/-3.11	Hall et al. 1992
3.53	+/-1.36	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (23+/-4.24% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.46+/-1.22	40+/-55.1	Bricker et al. 1993
3.58	+/-0.482	SG	Brunswick Harbor Entrance, GA	COA	48-h	Significantly toxic (14.6+/-18.9% normal development)	Arbacia punctulata (sea urchin)		1.99+/-0.562	14009+/-13434 ug/g	Windom In Prep
3.7	+/-11.1	NE	Narragansett Bay, RI	COA	10-d	Not significantly toxic (5.28+/-3.04% mortality))	Ampelisca abdita (amphipod)	ADT			Munns et al. 1991
4.09	+/-14.8	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99.3+/-0.827% normal development)	Mulinia lateralis (bivalve)	LAR	1.43+/-0.738	14.7+/-24	Bricker et al. 1993
4.7		*	Northern California	AETA		Northern California AET Values	Benthic species				Becker et al. 1990
4.77			***PEL***								
4.78	+/-14.9	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.096+/-0.101 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.37+/-0.759	6.93+/-6.83	Bricker et al. 1993
5		NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (9+/-1.73% mortality)	Nereis virens (polychaetes)	ADT			EG&G Bionomics 1980
5		NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (13+/- 3.61% mortality)	Penaeus duorarum (pink shrimp)	ADT			EG&G Bionomics 1980
5		NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (11.3+/-3.21% mortality)	Crassostrea virginica (oyster)	ADT			EG&G Bionomics 1980
5.1	+/-15.3	SG	San Francisco Bay, CA	COA	48-h	Significantly toxic (55.7+/-22.7% abnormal)	Bivalve	LAR			Long & Morgan 1990
5.52	+/-16	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (12.3+/-14.5% mortality)	Mulinia lateralis (bivalve)	LAR	1.53+/-0.743	15.7+/-23.2	Bricker et al. 1993
>6		-	Puget Sound, WA	AETA	48-h	1988 Puget Sound AET	Crassostrea gigas (oyster)	LAR			PTI 1988
6.3		*	California	AETA		California AET Values	Benthic species				Becker et al. 1990
6.3		*	Southern California	AETA		Southern California AET Values	Benthic species				Becker et al. 1990
6.6	+/-17.9	*	San Francisco Bay, CA	COA	48-h	Moderately toxic (59.4+/-11.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
6.69	+/-17.9	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.074+/-0.043 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.27+/-0.626	6.21+/-5.41	Bricker et al. 1993
6.98	+/-18.4	*	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (30.5+/-16.4% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.62+/-0.777	17.7+/-26.3	Bricker et al. 1993

Table 33. A summary of the available data on the biological effects associated with sediment-sorbed p,p'-DDT (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

p,p'-DDT Std Dev		Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
7.5	+/-18.3	*	San Francisco Bay, CA	COA	10-d	Significantly toxic (42.9+/-19.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
7.51	+/-14.8	*	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (91.5+/-7.28% normal development)	Mulinia lateralis (bivalve)	LAR	2.6+/-0.899	36.8+/-34.9	Bricker et al. 1993
7.67	+/-15.3	NE	Tampa Bay, FL	COA		Not significantly toxic (EC50; 0.066+/-0.033 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.89+/-0.902		Long 1993
9.6		*	San Francisco Bay, CA	AETA	10-d	San Francisco Bay AET	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
9.6		*	San Francisco Bay, CA	AETA	48-h	San Francisco Bay AET	Oyster; mussel	LAR			Long & Morgan 1990
9.6		*	Northern California	AETA	10-d	Northern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
9.6		*	California	AETA	48-h	California AET Values	Mytilus edulis (bivalve)	LAR			Becker et al. 1990
11.8	+/-19.3	*	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (88.5+/-8.39% normal development)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.05	38.1+/-38.9	Bricker et al. 1993
12.2	+/-24.7	*	San Francisco Bay, CA	COA	10-d	Highly toxic (67+/-11.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
17.4	+/-26.4	*	Tampa Bay, FL	COA	1-h	Moderately toxic (15.3+/-10.6% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.94+/-0.908		Long 1993
34		*	Puget Sound, WA	AETA		1988 Puget Sound AET	Benthic community				PTI 1988
<50		NE	Georgetown Harbor, SC	COA		Not toxic (species richness or abundance)	Benthic species		0.12		Van Dolah et al. 1984
225	+/-630	*	Tampa Bay, FL	COA	1-h	Most toxic (0.091+/-0.187% fertilization)	Arbacia punctulata (sea urchin)	GAM	2.96+/-1.49		Long 1993
>270		-	Puget Sound, WA	AETA	10-d	1988 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT			PTI 1988
313	+/-731	*	Tampa Bay, FL	COA	10-d	Significantly toxic (35.2+/-17.5% mortality)	Ampelisca abdita (amphipod)	SUB ADT	3.53+/-1.35		Long 1993
351	+/-782	*	Tampa Bay, FL	COA		Significantly toxic (EC50; 0.017+/-0.012 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.47+/-1.49		Long 1993
>620		-	California	AETA	10-d	California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
>620		-	Southern California	AETA	10-d	Southern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
1583	+/-1325	NE	Galveston Harbor, TX	COA	10-d	Not toxic (2.4+/-1.52% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Grieco 1984
1583	+/-1325	NE	Galveston Harbor, TX	COA	10-d	Not toxic (0% mortality)	Mercenaria mercenaria (hard clams)	ADT			Grieco 1984
1583	+/-1325	NE	Galveston Harbor, TX	COA	10-d	Not toxic (2.8+/-2.17% mortality)	Nereis virens (sandworm)	ADT			Grieco 1984

Table 34. A summary of the available data on the biological effects associated with sediment-sorbed TOTAL DDT (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Total DDT Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.4	*	United States	EqPA		99% Chronic Marine Criteria	Aquatic organisms		1		Pavlou et al. 1987
0.7	*	United States	EqPA		95% Chronic Marine Criteria	Aquatic organisms		1		Pavlou et al. 1987
0.8	NE	San Francisco Bay, CA	COA	48-h	Least toxic (17.3% mortality)	Mussel	LAR	1.25		Chapman et al. 1987a
0.9 +/-0.42	SG	San Francisco Bay, CA	COA	48-h	Moderately toxic (57.1+/-13.6% mortality)	Mussel	LAR	1.14+/-.33		Chapman et al. 1987a
1.04 +/-0.35	NE	San Francisco Bay, CA	COA	4-wk	Least toxic (116+/-4.3 young produced)	Tigriopus californicus (copepod)	ADT	1.23+/-.09		Chapman et al. 1987a
1.08 +/-0.618	NE	San Francisco Bay, CA	COA	48-h	Least toxic (18+/-8.01% abnormal)	Mussel	LAR	1.2+/-.38		Chapman et al. 1987a
1.27 +/-1.08	NE	San Francisco Bay, CA	COA	10-d	Least toxic (13.6+/-7.76% mortality)	Amphipod	ADT	1.4 +/- 0.79		Chapman et al. 1987a
1.36 +/-0.77	SG	San Francisco Bay, CA	COA	48-h	Moderately toxic (25.1+/-6.61% abnormal)	Mussel	LAR	1.26+/-0.17		Chapman et al. 1987a
1.39 +/-1.06	NE	San Francisco Bay, CA	COA	10-d	Least Toxic (4.63+/-2.91% avoidance)	Amphipod	ADT	1.44+/-.74		Chapman et al. 1987a
1.5	*	United States	EqPA		Chronic Marine EqP Threshold	Aquatic biota		1		Bolton et al. 1985
1.5 +/-0.408	NE	Puget Sound, WA	COA	15-min	Not significantly toxic (EC50; 0.283+/-0.168% extract)	Microtox (Photobacterium phosphoreum)		1.39+/-0.37		Pastorok & Becker 1990
1.58	*	United States	EqPA		Marine Chronic Sediment Criteria	Aquatic biota		1		JRB Associates 1984
1.6	*	United States	EqPA		EPA Chronic Marine EP Threshold	Aquatic biota		1		Lyman et al. 1987
2	NC	Puget Sound, WA	COA	2-d	Significantly toxic (3.8% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.5		Pastorok & Becker 1990
2.18 +/-1.45	SG	San Francisco Bay, CA	COA	10-d	Moderately toxic (28.3+/-7.51% mortality)	Amphipod	ADT	2.01+/-.98		Chapman et al. 1987a
2.92 +/-0.68	*	San Francisco Bay, CA	COA	48-h	Highly toxic (92.3+/-5.5% mortality)	Mussel	LAR	2.87+/-1.32		Chapman et al. 1987a
2.92 +/-0.68	*	San Francisco Bay, CA	COA	4-wk	Moderately toxic (94.9+/-10.1 young produced)	Tigriopus californicus (copepod)	ADT	2.87+/-1.07		Chapman et al. 1987a
2.93	*	San Francisco Bay, CA	COA	10-d	Most toxic (95% mortality)	Amphipod	ADT	4.03		Chapman et al. 1987a
2.93	*	San Francisco Bay, CA	COA	10-d	Highly toxic (37% avoidance)	Amphipod	ADT	4.03		Chapman et al. 1987a
3.27	*	San Francisco Bay, CA	COA	48-h	Highly toxic (66.8% abnormal)	Mussel	LAR	3.59		Chapman et al. 1987a
3.42 +/-2.87	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (6.67+/-8.07% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.51+/-0.330		Pastorok & Becker 1990
3.89		***TEL***								
4.6 +/-3.39	NE	Tampa Bay, FL	COA	1-h	Least toxic (79.4+/-9.9% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.45+/-0.587		Long 1993
4.94 +/-3.56	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (13.8+/-4.09% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.47+/-0.306		Pastorok & Becker 1990
5	NC	Galveston Bay, TX	COA	1-h	Toxic (20.4+/-18.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	1.26+/-0.47	14.6+/-10.1	Carr 1992
5	NC	Galveston Bay, TX	COA	48-h	Toxic (4.65+/-16.1% normal development)	Arbacia punctulata (sea urchin)	EMB	1.06+/-0.449	14.5+/-9.2	Carr 1992
5	NC	Galveston Bay, TX	COA		Low abundance (2.05+/-1.58 N/0.00203 sq.m.)	Copepoda		0.879+/-0.47	9.63+/-9.65	Carr 1992
5	NE	Puget Sound, WA	SBA		EPA/ACOE Puget Sound Interim Criteria	Aquatic biota				USACOE 1988
5	NE	Galveston Bay, TX	COA		High species richness (24.5+/-3.7 S/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
5	NE	Galveston Bay, TX	COA		High abundance (359+/-92.8 N/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
5	NE	Galveston Bay, TX	COA		High abundance (156+/-22.9 N/0.00203 sq.m.)	Polychaeta		0.916+/-0.661	2.94+/-2.3	Carr 1992
5	NE	Galveston Bay, TX	COA		High abundance (155+/-49.5 N/0.00203 sq.m.)	Oligochaeta		1.2+/-1.27	4.27+/-3.85	Carr 1992
5	NE	Galveston Bay, TX	COA		High abundance (27.3+/-10 N/0.00203 sq.m.)	Mollusca		1.64+/-0.4	1.39+/-0.17	Carr 1992
5	NE	Galveston Bay, TX	COA		High Abundance (6+/-1.41 N/0.00203 sq.m.)	Amphipoda		0.955+/-0.629	7.21+/-8.2	Carr 1992
5	NE	Galveston Bay, TX	COA		Low species (11.2+/-1.94 S/0.00203 sq.m.)	Benthic species		0.642+/-0.356	13.4+/-8.65	Carr 1992
5	NE	Galveston Bay, TX	COA		High abundance (154+/-30.2 N/0.00203 sq.m.)	Benthic invertebrates		0.47+/-0.27	9.07+/-2.94	Carr 1992
5	NG	Galveston Bay, TX	COA		Low abundance (4.21+/-5.66 N/0.00203 sq.m.)	Oligochaeta		0.895+/-0.453	7.85+/-8.8	Carr 1992
5	NG	Galveston Bay, TX	COA		Low abundance (53+/-33.9 N/0.00203 sq.m.)	Benthic invertebrates		0.985+/-0.247	22+/-11.2	Carr 1992
5.17 +/-0.93	SG	Galveston Bay, TX	COA		Low abundance (1.86+/-2.59 N/0.00203 sq.m.)	Mollusca		0.784+/-0.421	8.29+/-8.13	Carr 1992

Table 34. A summary of the available data on the biological effects associated with sediment-sorbed TOTAL DDT (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Total DDT Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
5.17 +/-0.913	SG	Galveston Bay, TX	COA		Low abundance (0.3+/-0.651 N/0.00203 sq.m.)	Amphipoda		0.859+/-0.487	7.67+/-8.12	Carr 1992
5.18 +/-0.945	NE	Galveston Bay, TX	COA	1-h	Not toxic (92.5+/-6.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	0.77+/-0.448	6.37+/-6.58	Carr 1992
5.18 +/-0.945	SG	Galveston Bay, TX	COA		Low species richness (10+/-3.73 S/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
5.18 +/-0.945	SG	Galveston Bay, TX	COA		Low abundance (89+/-60.7 N/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
5.21 +/-1.02	SG	Galveston Bay, TX	COA		Low abundance (41.7+/-21.8 N/0.00203 sq.m.)	Polychaeta		0.848+/-0.427	9.21+/-8.61	Carr 1992
5.23 +/-1.07	NE	Galveston Bay, TX	COA	48-h	Not toxic (98.1+/-1.79% normal development)	Arbacia punctulata (sea urchin)	EMB	.748+/-0.476	4.16+/-3.45	Carr 1992
5.38 +/-1.39	NE	Galveston Bay, TX	COA		High abundance (16.2+/-6.19 N/0.00203 sq.m.)	Copepoda		0.844+/-0.524	4.73+/-3.1	Carr 1992
5.83 +/-2.04	SG	Galveston Bay, TX	COA		Moderate abundance (58.3+/-16.2 N/0.00203 sq.m.)	Oligochaeta		0.632+/-0.274	7.93+/-5.6	Carr 1992
6.9	NE	Puget Sound, WA	AETA		PSDDA Screening level concentration	Aquatic biota				USACOE 1988
8.38 +/-11.9	NE	Puget Sound, WA	COA	20-d	Not significantly toxic (5+/-3.86% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.46+/-0.26		Pastorok & Becker 1990
11 +/-7.89	NE	Tampa Bay, FL	COA	10-d	Not significantly toxic (14.6+/-7.67% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.63+/-0.596		Long 1993
11.6 +/-16.4	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (4.43+/-2.1% mortality)	Panope generosa (geoduck)	JUV	1.51+/-0.261		Pastorok & Becker 1990
14.1 +/-18	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (2.09+/-1.73% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.56+/-0.329		Pastorok & Becker 1990
15.4 +/-17.2	*	Puget Sound, WA	COA	15-min	Significantly toxic (EC50; 0.065+/-0.043% extract)	Microtox (Photobacterium phosphoreum)		1.58+/-0.255		Pastorok & Becker 1990
18.8 +/-18.8	*	Puget Sound, WA	COA	2-d	Significantly toxic (60.4+/-46.5% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.57+/-0.287		Pastorok & Becker 1990
22.3	*	Laboratory	SSBA	10-d	LC50	Rhepoxynius abronius (amphipod)	ADT	1.92+/-0.085		Word et al. 1987
22.5 +/-25.9	NE	Tampa Bay, FL	COA		Not significantly toxic (EC50; 0.066+/-0.033 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.89+/-0.902		Long 1993
24	*	Northern California	AETA		Northern California AET Values	Benthic species				Becker et al. 1990
24.2 +/-21.4	*	Puget Sound, WA	COA	10-d	Significantly toxic (80.8+/-30.6% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.266		Pastorok & Becker 1990
27	*	Northern California	AETA	10-d	Northern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
27	*	California	AETA	48-h	California AET Values	Mytilus edulis (bivalve)	LAR			Becker et al. 1990
27	*	Puget Sound, WA	COA	10-d	Significantly toxic (56% mortality)	Panope generosa (geoduck)	JUV	2.1		Pastorok & Becker 1990
29.7 +/-23.1	*	Puget Sound, WA	COA	20-d	Significantly toxic (37.3+/-22% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.87+/-0.208		Pastorok & Becker 1990
33.2 +/-43.5	*	Tampa Bay, FL	COA	1-h	Moderately toxic (15.3+/-10.6% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.94+/-0.908		Long 1993
46.1	*	Laboratory	SSBA	10-d	LC50	Rhepoxynius abronius (amphipod)	ADT	0.58+/-0.121		Word et al. 1987
50 +/-60	NE	Southern California	COA		High abundance (191+/-70.1 N/0.1 sq.m.)	Echinoderm				Word & Mearns 1979 (As cited in L&M 1990)
51.7		***PEL***								
54.5	*	Laboratory	SSBA	10-d	LC50	Rhepoxynius abronius (amphipod)	ADT	0.6+/-0.031		Word et al. 1987
55.2	*	Laboratory	SSBA	10-d	LC50	Rhepoxynius abronius (amphipod)	ADT	0.12+/-0.006		Word et al. 1987
68 +/-71.7	NC	Southern California	COA	10-d	Significantly toxicity (51.7% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
69	*	Puget Sound, WA	AETA		PSDDA Maximum Level Criteria	Aquatic biota				USACOE 1988
90 +/-130	SG	Southern California	COA		Moderate abundance (56.2+/-23 N/0.1 sq.m.)	Echinoderm				Word & Mearns 1979 (As cited in L&M 1990)
100 +/-150	NE	Southern California	COA		High abundance (148+/-58 N/0.1 sq.m.)	Arthropods				Word & Mearns 1979 (As cited in L&M 1990)
125	*	Laboratory	SSBA	10-d	LC50	Rhepoxynius abronius (amphipod)	ADT	0.25+-0.01		Word et al. 1987
210	*	United States	EqPA		EPA Acute Marine EP Threshold	Aquatic biota		1		Lyman et al. 1987
210 +/-490	NC	Southern California	COA		Moderate abundance (75.6+/-12.7 N/0.1 sq.m.)	Benthic species				Word & Mearns 1979 (As cited in L&M 1990)
250 +/-620	NC	Southern California	COA		Moderate species richness (72+/-3.3 S/0.1 sq.m.)	Benthic species				Word & Mearns 1979 (As cited in L&M 1990)
350 +/-710	*	Southern California	COA		Moderate abundance (72.6+/-6.8 N/0.1 sq.m.)	Arthropods				Word & Mearns 1979 (As cited in L&M 1990)
432 +/-1125	*	Tampa Bay, FL	COA	1-h	Most toxic (0.091+/-0.187% fertilization)	Arbacia punctulata (sea urchin)	GAM	2.96+/-1.49		Long 1993

Table 34. A summary of the available data on the biological effects associated with sediment-sorbed TOTAL DDT (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Total DDT Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
505	*	United States	SLCA		National Screening Level Concentration-Marine	Benthic species		1		Neff et al. 1987
596 +/-1302	*	Tampa Bay, FL	COA	10-d	Significantly toxic (35.2+/-17.5% mortality)	Ampelisca abdita (amphipod)	SUB ADT	3.53+/-1.35		Long 1993
665 +/-1391	*	Tampa Bay, FL	COA		Significantly toxic (EC50; 0.017+/-0.012 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.47+/-1.49		Long 1993
1018 +/-2424	NE	Southern California	COA	10-d	Not significantly toxic (23.2% mortality)	Grandidierella japonica (amphipod)	JUV			Anderson et al. 1988
1410 +/-5440	NC	Southern California	COA		Low abundance (57.6+/-13.6 N/0.1 sq.m.)	Benthic species				Word & Mearns 1979 (As cited in L&M 1990)
2170 +/-7190	NE	Southern California	COA		High species richness (96.3+/-22.3 S/0.1 sq.m.)	Benthic species				Word & Mearns 1979 (As cited in L&M 1990)
3000	*	California	AETA		California AET Values	Benthic species				Becker et al. 1990
3000	*	Southern California	AETA		Southern California AET Values	Benthic species				Becker et al. 1990
>9300	-	California	AETA	10-d	California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
>9300	-	Southern California	AETA	10-d	Southern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
13420 +/-37670	*	Southern California	COA		Low abundance (35.3+/-15.8 N/0.1 sq.m.)	Arthropods				Word & Mearns 1979 (As cited in L&M 1990)
14190 +/-40200	*	Southern California	COA		Low species richness (51.2+/-8.6 S/0.1 sq.m.)	Benthic species				Word & Mearns 1979 (As cited in L&M 1990)
16500	*	Laboratory	SSBA	288-h	LC0	Nereis virens (sandworm)		2		McLeese et al. 1982
18260 +/-43080	*	Southern California	COA		Low abundance (6.1+/-7.2 N/0.1 sq.m.)	Echinoderm				Word & Mearns 1979 (As cited in L&M 1990)
35300 +/-59540	NE	Southern California	COA		High abundance (88.9+/-35.4 N/0.1 sq.m.)	Benthic species				Word & Mearns 1979 (As cited in L&M 1990)

Table 35. A summary of the available data on the biological effects associated with sediment-sorbed DIELDRIN (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Dieldrin Std Dev		Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.01		*	United States	EqPA		99% Chronic Marine Criteria	Aquatic organisms		1		Pavlou et al. 1987
0.02		*	United States	EqPA		95% Chronic Marine Criteria	Aquatic organisms		1		Pavlou et al. 1987
0.047	+/-0.015	NE	Mobile Bay, AL	COA		Not significantly toxic (1.07+/-1.85% mortality)	Mysidopsis bahia (mysid shrimp)		0.968+/-0.815	8.23+/-3.4	EMAP Louisiana Province 1991
0.055	+/-0.007	NE	Mobile Bay, AL	COA	10-d	Not significantly toxic (0.5+/-0.778% mortality)	Ampelisca abdita (amphipod)		1.24+/-0.948	8.51+/-4.76	EMAP Louisiana Province 1991
0.055	+/-0.035	NG	Mobile Bay, AL	COA	10-d	Significantly toxic (46+/-49.3% mortality)	Ampelisca abdita (amphipod)		0.22+/-0.298	3.84+/-5.43	EMAP Louisiana Province 1991
0.062	+/-0.025	NC	Chandeleur Sound, LA	COA		Significantly toxic (7.6+/-1.32% mortality)	Mysidopsis bahia (mysid shrimp)		0.624+/-0.197	2.07+/-1.19	EMAP Louisiana Province 1991
0.065	+/-0.023	NC	Chandeleur Sound, LA	COA	10-d	Significantly toxic (11.5+/-4.86% mortality)	Ampelisca abdita (amphipod)		0.811+/-0.711	1.87+/-0.973	EMAP Louisiana Province 1991
0.067	+/-0.023	NE	Chandeleur Sound, LA	COA	10-d	Not significantly toxic (2.87+/-4.05% mortality)	Ampelisca abdita (amphipod)		0.517+/-0.166	2.02+/-1.38	EMAP Louisiana Province 1991
0.07	+/-0.02	NC	Mississippi Sound, MS	COA		Significantly toxic (12.2+/-4.42% mortality)	Mysidopsis bahia (mysid shrimp)		0.939+/-0.335	2.63+/-2.3	EMAP Louisiana Province 1991
0.07	+/-0.020	NE	Chandeleur Sound, LA	COA		Not significantly toxic (1.03+/-2.05% mortality)	Mysidopsis bahia (mysid shrimp)		0.824+/-0.915	1.69+/-0.920	EMAP Louisiana Province 1991
0.073	+/-0.016	NE	Mississippi Sound, MS	COA	10-d	Not significantly toxic (1.4+/-1.73% mortality)	Ampelisca abdita (amphipod)		0.998+/-0.602	2.01+/-1.82	EMAP Louisiana Province 1991
0.075	+/-0.007	NC	Galveston Bay, TX	COA	10-d	Significantly toxic (15.8+/-3.89% mortality)	Ampelisca abdita (amphipod)		0.647+/-0.606	0.160+/-0.184	EMAP Louisiana Province 1991
0.076	+/-0.013	NE	Mississippi Sound, MS	COA		Not significantly toxic (0.789+/-1.59% mortality)	Mysidopsis bahia (mysid shrimp)		0.827+/-0.757	1.46+/-1.58	EMAP Louisiana Province 1991
0.08		NE	Apalachee Bay, FL	COA		Not significantly toxic (0.75+/-1.5% mortality)	Mysidopsis bahia (mysid shrimp)		0.540+/-0.385	0.405+/-0.417	EMAP Louisiana Province 1991
0.08		NE	Apalachee Bay, FL	COA	10-d	Not significantly toxic (3.3+/-3.25% mortality)	Ampelisca abdita (amphipod)		0.643+/-0.455	0.390+/-0.410	EMAP Louisiana Province 1991
0.08		NG	Apalachee Bay, FL	COA	10-d	Significantly toxic (15.6% mortality)	Ampelisca abdita (amphipod)		0.438+/-0.442	0.421+/-0.593	EMAP Louisiana Province 1991
0.08		SG	Mississippi Sound, MS	COA	10-d	Significantly toxic (11.6+/-3.39% mortality)	Ampelisca abdita (amphipod)		0.111+/-0.045	0.03	EMAP Louisiana Province 1991
0.08		SG	Mobile Bay, AL	COA		Significantly toxic (10% mortality)	Mysidopsis bahia (mysid shrimp)		0.009	0.004	EMAP Louisiana Province 1991
0.093	+/-0.032	NE	Galveston Bay, TX	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		0.934+/-0.657	0.457+/-0.530	EMAP Louisiana Province 1991
0.095	+/-0.068	NE	Matagorda Bay, TX	COA		Not significantly toxic (1.58+/-1.82% mortality)	Mysidopsis bahia (mysid shrimp)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
0.095	+/-0.068	NE	Matagorda Bay, TX	COA	10-d	Not significantly toxic (2.33+/-4.65% mortality)	Ampelisca abdita (amphipod)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
0.1		NE	Matagorda Ship Channel, TX	COA	10-d	Not toxic (7.2+/-2.77% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1985a
0.1		NE	Matagorda Ship Channel, TX	COA	10-d	Not toxic (10.6+/-5.18% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1985a
0.1		NE	Matagorda Ship Channel, TX	COA	10-d	Not toxic (0.2+/-0.447% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1985a
0.11	+/-0.085	NE	Mississippi River, MS, LA	COA	10-d	Not significantly toxic (7.8+/-1.63% mortality)	Ampelisca abdita (amphipod)		1.15+/-1.04	2.31+/-0.651	EMAP Louisiana Province 1991
0.125	+/-0.064	NE	Mississippi River, MS, LA	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		1.3+/-0.83	1.14+/-1	EMAP Louisiana Province 1991
0.19	+/-0.188	NE	Galveston Bay, TX	COA	10-d	Not significantly toxic (1.35+/-1.45% mortality)	Ampelisca abdita (amphipod)		0.961+/-0.537	1.17+/-0.640	EMAP Louisiana Province 1991
0.21	+/-0.225	*	Galveston Bay, TX	COA		Significantly toxic (13.4+/-9.11% mortality)	Mysidopsis bahia (mysid shrimp)		0.778+/-0.482	1.21+/-0.778	EMAP Louisiana Province 1991
0.25		NE	Freeport Harbor, TX	COA	10-d	Not toxic (2+/-1% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1985b
0.25		NE	Freeport Harbor, TX	COA	10-d	Not toxic (9.6+/-4.22% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1985b
0.25		NE	Freeport Harbor, TX	COA	10-d	Not toxic (0% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1985b
0.367	+/-0.202	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (6+/-2.35% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1983b
0.367	+/-0.202	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (2.6+/-2.97% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1983b
0.367	+/-0.202	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (1.8+/-1.79% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1983b
0.449		NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.003 mg/day growth)	Lepidactylus dytiscus (amphipod)		1.38	3.25	Hall et al. 1992
0.449		NC	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29% mortality)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
0.449		NC	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (89.7% reburial)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
0.449		NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
0.449		NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	6.41	Hall et al. 1992
0.449		NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992

Table 35. A summary of the available data on the biological effects associated with sediment-sorbed DIELDRIN (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Dieldrin Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.449	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (15.3+/-11.0% mortality)	Hyalella azteca (amphipod)	JUV	0.648+/-0.641	1.74+/-1.39	Hall et al. 1992
0.449	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1% mortality)	Streblospio benedicti (polychaete worm)		1.38	3.25	Hall et al. 1992
0.449	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (16.5+/-9.19% mortality)	Streblospio benedicti (polychaete worm)		0.783+/-0.845	4.83+/-2.23	Hall et al. 1992
0.449	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1.83+/-1.6% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
0.449	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (3.5+/-1.87% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
0.449	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (9.25+/-5.32% mortality)	Lepidactylus dytiscus (amphipod)		0.638+/-0.768	1.65+/-1.62	Hall et al. 1992
0.449	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (22.3+/-7.37% mortality)	Hyalella azteca (amphipod)	JUV	0.788+/-0.866	2.04+/-1.75	Hall et al. 1992
0.449	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (8.8+/-7.12% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
0.449	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (14+/-9.22% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
0.449	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.1+/-0.865% reburial)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
0.449	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<20% emergence)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
0.449	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
0.449	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (-0.057+/-0.04 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
0.449	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.001mg/day growth)	Streblospio benedicti (polychaete worm)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
0.449	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.016 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
0.449	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.005+/-0.0004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
0.449	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (45.5+/-12% mortality)	Lepidactylus dytiscus (amphipod)		0.383+/-0.279	3.61+/-2.79	Hall et al. 1992
0.449	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (63.0+/-24.3% mortality)	Hyalella azteca (amphipod)	JUV	0.317+/-0.228	2.57+/-2.67	Hall et al. 1992
0.449	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (22% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
0.449	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (28% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
0.449	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (82.9% reburial)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
0.449	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>20% emergence)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
0.449	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	5.58	Hall et al. 1992
0.449	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.008+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.4	Hall et al. 1992
0.449	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.003 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
0.5	NC	Puget Sound, WA	COA	2-d	Significantly toxic (3.8% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.5		Pastorok & Becker 1990
0.533 +/-0.179	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (13.8+/-4.09% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.47+/-0.306		Pastorok & Becker 1990
0.558 +/-0.22	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (6.67+/-8.07% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.51+/-0.330		Pastorok & Becker 1990
0.608 +/-0.388	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (0.33+/-0.516% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
0.608 +/-0.388	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (2.33+/-1.03% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
0.608 +/-0.39	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.367+/-0.085 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
0.608 +/-0.39	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.0005 mg/day growth)	Streblospio benedicti (polychaete worm)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
0.613 +/-0.318	NE	Puget Sound, WA	COA	20-d	Not significantly toxic (5+/-3.86% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.46+/-0.26		Pastorok & Becker 1990
0.63 +/-0.226	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (5.8+/-3.7% mortality)	Rhepoxynius abronius (amphipod)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
0.63 +/-0.226	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (3.4+/-1.82% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
0.63 +/-0.226	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (11.2+/-3.7% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
0.63 +/-0.226	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (3.52+/-1.66% mortality)	Macoma nasuta (clam)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
0.633 +/-0.262	NE	Puget Sound, WA	COA	15-min	Not significantly toxic (EC50; 0.283+/-0.168% extract)	Microtox (Photobacterium phosphoreum)		1.39+/-0.37		Pastorok & Becker 1990
0.639 +/-0.425	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.003+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.316+/-0.120	2.13+/-2.46	Hall et al. 1992
0.639 +/-0.425	SG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29.8+/-11.1% mortality)	Streblospio benedicti (polychaete worm)		0.316+/-0.12	2.13+/-2.46	Hall et al. 1992

Table 35. A summary of the available data on the biological effects associated with sediment-sorbed DIELDRIN (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Dieldrin Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.64 +/-0.43	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (7.2+/-1.92% mortality)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
0.64 +/-0.43	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.6+/-0.55% reburial)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
0.64 +/-0.43	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
0.64 +/-0.43	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
0.64 +/-0.43	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.001+/-0.001 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.555+/-0.471	2.68+/-2.3	Hall et al. 1992
0.664 +/-0.381	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (4.43+/-2.1% mortality)	Panope generosa (geoduck)	JUV	1.51+/-0.261		Pastorok & Becker 1990
0.687 +/-0.48	SG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (55.0+/-19.5% mortality)	Streblospio benedicti (polychaete worm)		0.349+/-0.11	1.07+/-0.66	Hall et al. 1992
0.715		***TEL***								
0.755 +/-0.997	*	Mississippi River, MS, LA	COA		Significantly toxic (32.9+/-36.4% mortality)	Mysidopsis bahia (mysid shrimp)		1.07+/-0.924	1.41+/-1.93	EMAP Louisiana Province 1991
0.766	SG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (55.0+/-22.6% mortality)	Hyalella azteca (amphipod)	JUV	0.338+/-0.133	2.9+/-3.11	Hall et al. 1992
0.77 +/-0.976	*	Mississippi River, MS, LA	COA	10-d	Significantly toxic (15.9+/-6.65% mortality)	Ampelisca abdita (amphipod)		1.22+/-0.717	0.235+/-0.276	EMAP Louisiana Province 1991
0.825 +/-0.656	SG	Puget Sound, WA	COA	15-min	Significantly toxic (EC50; 0.065+/-0.043% extract)	Microtox (Photobacterium phosphoreum)		1.58+/-0.255		Pastorok & Becker 1990
0.858 +/-0.655	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (2.09+/-1.73% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.56+/-0.329		Pastorok & Becker 1990
0.939 +/-0.73	SG	Puget Sound, WA	COA	2-d	Significantly toxic (60.4+/-46.5% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.57+/-0.287		Pastorok & Becker 1990
1.09 +/-0.373	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.5+/-11.4% mortality)	Mulinia lateralis (bivalve)	LAR	2.33+/-0.364	26.8+/-9.42	Bricker et al. 1993
1.17 +/-0.816	*	Puget Sound, WA	COA	10-d	Significantly toxic (80.8+/-30.6% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.266		Pastorok & Becker 1990
1.24 +/-0.416	NC	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.014+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.51+/-0.45	29.6+/-15.7	Bricker et al. 1993
1.26 +/-0.421	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (19.3+/-5.86% mortality)	Ampelisca abidta (amphipod)	SUB ADT	1.82+/-0.225	6.3+/-6.2	Bricker et al. 1993
1.26 +/-0.522	NG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (39.5+/-18.2% mortality)	Ampelisca abidta (amphipod)	SUB ADT	2.06+/-0.523	20.1+/-13.9	Bricker et al. 1993
1.32 +/-0.442	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.3+/-2.22% normal development)	Mulinia lateralis (bivalve)	LAR	2.18+/-0.531	19.1+/-12.5	Bricker et al. 1993
1.43 +/-0.888	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-7.99% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.14+/-0.352	6.09+/-5.38	Bricker et al. 1993
1.43 +/-0.817	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (96+/-1.66% normal development)	Mulinia lateralis (bivalve)	LAR	2.52+/-0.997	35+/-42.9	Bricker et al. 1993
1.45 +/-0.476	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (15.2+/-9.21% mortality)	Mulinia lateralis (bivalve)	LAR	2.17+/-0.663	18.4+/-19.9	Bricker et al. 1993
1.45 +/-0.604	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.125+/-0.084 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.25+/-0.468	1.98+/-2.25	Bricker et al. 1993
1.47 +/-0.54	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.061+/-0.038 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.8+/-0.477	8.52+/-10.7	Bricker et al. 1993
1.48 +/-1.03	*	Puget Sound, WA	COA	20-d	Significantly toxic (37.3+/-22% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.87+/-0.208		Pastorok & Becker 1990
1.48 +/-0.939	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.096+/-0.101 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.37+/-0.759	6.93+/-6.83	Bricker et al. 1993
1.5 +/-0.644	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (25.9+/-5.01% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.21+/-0.444	2.41+/-2.32	Bricker et al. 1993
1.56 +/-1.05	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.074+/-0.043 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.27+/-0.626	6.21+/-5.41	Bricker et al. 1993
1.57 +/-0.798	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.167+/-0.198 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.59+/-1.09	4.67+/-6.99	Bricker et al. 1993
1.58 +/-0.862	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (4.8+/-2.28% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1983a
1.58 +/-0.862	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (15.8+/-4.21% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1983a
1.58 +/-0.862	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (1.2+/-.447% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1983a
1.73 +/-0.899	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (91.5+/-7.28% normal development)	Mulinia lateralis (bivalve)	LAR	2.6+/-0.899	36.8+/-34.9	Bricker et al. 1993
1.93 +/-1.06	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (88.5+/-8.39% normal development)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.05	38.1+/-38.9	Bricker et al. 1993
1.95	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (18% mortality)	Ampelisca abdita (amphipod)		0.028	9 ug/g	Windom In Prep
2	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (0% mortality)	Arbacia punctulata (sea urchin)		0.03	19 ug/g	Windom In Prep
2.04 +/-1.64	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (6.48+/-10.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
2.04 +/-1.64	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99+/-0.862% normal development)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
2.19 +/-1.71	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (51.3+/-6.95% mortality)	Mulinia lateralis (bivalve)	LAR	1.8+/-1.71	29.6+/-46.3	Bricker et al. 1993

Table 35. A summary of the available data on the biological effects associated with sediment-sorbed DIELDRIN (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Dieldrin Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
2.19 +/-1.94	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-6.07% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.71+/-0.9	15.3+/-23.2	Bricker et al. 1993
2.23 +/-0.115	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (28.3+/-6.11% mortality)	Mysidopsis bahia (mysid)		0.246+/-0.051	127+/-24 ug/g	Windom In Prep
2.24 +/-0.095	NE	Brunswick Harbor Entrance, GA	COA	48-h	Not significantly toxic (86.6+/-4.25% normal development)	Arbacia punctulata (sea urchin)		0.181+/-0.162	182+/-208 ug/g	Windom In Prep
2.3 +/-3.15	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (12.3+/-14.5% mortality)	Mulinia lateralis (bivalve)	LAR	1.53+/-0.743	15.7+/-23.2	Bricker et al. 1993
2.33 +/-3.17	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99.3+/-0.827% normal development)	Mulinia lateralis (bivalve)	LAR	1.43+/-0.738	14.7+/-24	Bricker et al. 1993
2.33 +/-0.37	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (9.78+/-5.33% mortality)	Mysidopsis bahia (mysid)		0.24+/-0.247	91.9+/-73.4 ug/g	Windom In Prep
2.33 +/-0.359	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (91.3+/-2.91% normal development)	Arbacia punctulata (sea urchin)		0.299+/-0.251	114+/-68.4 ug/g	Windom In Prep
2.34 +/-0.395	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (4+/-2.83% mortality)	Menidia beryllina (silverside)		0.243+/-0.264	90.5+/-78.4 ug/g	Windom In Prep
2.38 +/-2.7	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (17+/-16.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.99+/-1	21.6+/-24.5	Bricker et al. 1993
2.38 +/-0.364	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (11.6+/-4.33% mortality)	Ampelisca abdita (amphipod)		0.267+/-0.25	102+/-71.1 ug/g	Windom In Prep
2.38 +/-0.452	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (27.5+/-10.6% mortality)	Mysidopsis bahia (mysid)		0.237+/-0.311	74.6+/-85.5 ug/g	Windom In Prep
2.38 +/-0.36	SG	Savannah River Entrance Channel, GA	COA	48-h	Significantly toxic (25.4+/-7.66% mortality)	Arbacia punctulata (sea urchin)		0.344+/-0.242	129.5+/-59.3 ug/g	Windom In Prep
2.5	*	Puget Sound, WA	COA	10-d	Significantly toxic (56% mortality)	Panope generosa (geoduck)	JUV	2.1		Pastorok & Becker 1990
2.5	NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (9+/-1.73% mortality)	Nereis virens (polychaetes)	ADT			EG&G Bionomics 1980
2.5	NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (13+/- 3.61% mortality)	Penaeus duorarum (pink shrimp)	ADT			EG&G Bionomics 1980
2.5	NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (11.3+/-3.21% mortality)	Crassostrea virginica (oyster)	ADT			EG&G Bionomics 1980
2.57 +/-3.57	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (30.5+/-16.4% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.62+/-0.777	17.7+/-26.3	Bricker et al. 1993
2.58 +/-2.69	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.1+/-2.78% normal development)	Mulinia lateralis (bivalve)	LAR	2.12+/-1.04	22.9+/-23.7	Bricker et al. 1993
2.66 +/-2.84	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (34.9+/-15.7% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.23+/-1.04	25.4+/-25.5	Bricker et al. 1993
2.93 +/-2.28	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.1+/-13.3% mortality)	Mulinia lateralis (bivalve)	LAR	2.68+/-0.955	31.8+/-24.4	Bricker et al. 1993
2.94 +/-2.54	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (29.8+/-13.9% mortality)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.07	32.1+/-28.4	Bricker et al. 1993
2.98 +/-0.787	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (10.6+/-3.17% mortality)	Ampelisca abdita (amphipod)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
2.98 +/-0.787	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (8.00+/-2.92% mortality)	Mysidopsis bahia (mysid)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
3.04 +/-0.846	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (5.43+/-3.21% mortality)	Mysidopsis bahia (mysid)		1.21+/-1.13	9096+/-13378 ug/g	Windom In Prep
3.04 +/-0.846	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (9.61+/-2.7% mortality)	Menidia beryllina (silverside)		1.22+/-1.13	9172+/-13363 ug/g	Windom In Prep
3.3	SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (16% mortality)	Mysidopsis bahia (mysid)		1.8	7095 ug/g	Windom In Prep
3.3	SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (22.3% mortality)	Menidia beryllina (silverside)		1.71	6562 ug/g	Windom In Prep
3.33 +/-3.17	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.013+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.79+/-0.744	37.6+/-25.3	Bricker et al. 1993
3.38 +/-2.39	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (23+/-4.24% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.46+/-1.22	40+/-55.1	Bricker et al. 1993
3.48 +/-2.5	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (96.6+/-3.79% normal development)	Mulinia lateralis (bivalve)	LAR	2.87+/-0.94	35.1+/-25.9	Bricker et al. 1993
3.49 +/-2.58	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (38+/-13% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.92+/-0.937	34.6+/-23.9	Bricker et al. 1993
3.58 +/-0.482	SG	Brunswick Harbor Entrance, GA	COA	48-h	Significantly toxic (14.6+/-18.9% normal development)	Arbacia punctulata (sea urchin)		1.99+/-0.562	14009+/-13434 ug/g	Windom In Prep
3.92 +/-3.15	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (21.5+/-6.36% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.35+/-1.05	10.5+/-13.4	Bricker et al. 1993
4.01 +/-5.07	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.016+/-0.007 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.26+/-0.936	43.4+/-35.6	Bricker et al. 1993
4.08 +/-2.57	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.011+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.28+/-0.363	45.3+/-21.4	Bricker et al. 1993
4.1 +/-2.89	*	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.008+/-0.001 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.19+/-1.27	12+/-11.3	Bricker et al. 1993
4.3		***PEL***								
4.4 +/-2.3	NC	San Francisco Bay, CA	COA	10-d	Moderately toxic (33.8+/-4.7% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
4.56 +/-2.21	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (75.1+/-10.6% mortality)	Mulinia lateralis (bivalve)	LAR	3.32+/-0.317	42.3+/-19.2	Bricker et al. 1993
5	NE	Puget Sound, WA	AETA		PSDDA Screening level concentration	Aquatic biota				USACOE 1988

Table 35. A summary of the available data on the biological effects associated with sediment-sorbed DIELDRIN (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Dieldrin Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
5.2 +/-1.2	NE	San Francisco Bay, CA	COA	48-h	Least toxic (23.3+/-7.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
5.2 +/-1.2	NE	San Francisco Bay, CA	COA	10-d	Least toxic (18+/-6.6% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
6.2	*	California	AETA		California AET Values	Benthic species				Becker et al. 1990
6.2	*	Northern California	AETA		Northern California AET Values	Benthic species				Becker et al. 1990
6.2 +/-0.6	NE	San Francisco Bay, CA	COA	48-h	Not significantly toxic (31.9+/-15.5% abnormal)	Bivalve	LAR			Long & Morgan 1990
6.2 +/-0.5	NE	San Francisco Bay, CA	COA	10-d	Not significantly toxic (18.4+/-6.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
6.6	*	San Francisco Bay, CA	AETA	10-d	San Francisco Bay AET	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
6.6	*	San Francisco Bay, CA	AETA	48-h	San Francisco Bay AET	Oyster; mussel	LAR			Long & Morgan 1990
6.6	*	Northern California	AETA	10-d	Northern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
6.6	*	California	AETA	48-h	California AET Values	Mytilus edulis (bivalve)	LAR			Becker et al. 1990
7.58 +/-7.0	SG	San Francisco Bay, CA	COA	10-d	Significantly toxic (42.9+/-19.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
7.6 +/-7.5	SG	San Francisco Bay, CA	COA	48-h	Significantly toxic (55.7+/-22.7% abnormal)	Bivalve	LAR			Long & Morgan 1990
8.2 +/-8.1	*	San Francisco Bay, CA	COA	48-h	Moderately toxic (59.4+/-11.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
10.3 +/-9.0	*	San Francisco Bay, CA	COA	10-d	Highly toxic (67+/-11.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
12	*	California	AETA	10-d	California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
>12	-	Southern California	AETA	10-d	Southern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
<50	NE	Georgetown Harbor, SC	COA		Not toxic (species richness or abundance)	Benthic species		0.12		Van Dolah et al. 1984
57.7	*	United States	EqPA		Interim Marine Sediment Quality Criteria (FCV)	Benthic community		1		EPA 1988
84	*	New York State	EqPA		New York State Sediment Criteria Value			1		Newell 1989
170 +/-7.08	*	United States	EqPA		Sediment Quality Criteria					Hansen et al. 1991b
600 +/-50	NE	Galveston Harbor, TX	COA	10-d	Not toxic (2.4+/-1.52% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Grieco 1984
600 +/-50	NE	Galveston Harbor, TX	COA	10-d	Not toxic (0% mortality)	Mercenaria mercenaria (hard clams)	ADT			Grieco 1984
600 +/-50	NE	Galveston Harbor, TX	COA	10-d	Not toxic (2.8+/-2.17% mortality)	Nereis virens (sandworm)	ADT			Grieco 1984
13000	*	Laboratory	SSBA	288-h	LC0	Nereis virens (sandworm)		2		McLeese et al. 1982

Table 36. A summary of the available data on the biological effects associated with sediment-sorbed ENDOSULFAN (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosyst

Endosulfan Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.04	*	New York State	EqPA		New York State Sediment Criteria Value			1		Newell 1989
50	*	South Carolina Tidal Creek, SC	COA	7-d	Significant reduction in colonization (50% reduction)	Streblospio benedicti (polychaete)	LAR			Chandler & Scott 1991
100	NE	South Carolina Tidal Creek, SC	COA	7-d	Not significantly toxic	Nannopus palustris (copepod)	JUV			Chandler & Scott 1991
200	NE	South Carolina Tidal Creek, SC	COA	7-d	Not significantly toxic	Pseudobradya pulchella (copepod)	JUV			Chandler & Scott 1991
200	*	South Carolina Tidal Creek, SC	COA	7-d	Significantly toxic	Nannopus palustris (copepod)	JUV			Chandler & Scott 1991
340	*	Laboratory	SSBA	288-h	LC50	Nereis virens (sandworm)		2		McLeese et al. 1982

Table 37. A summary of the available data on the biological effects associated with sediment-sorbed ENDRIN (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Endrin Std Dev		Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.01		*	United States	EqPA		99% Chronic Marine Criteria	Aquatic organisms		1		Pavlou et al. 1987
0.02		*	United States	EqPA		95% Chronic Marine Criteria	Aquatic organisms		1		Pavlou et al. 1987
0.12	+/-0.05	*	San Francisco Bay, CA	SQAV	SQTA	Significantly Toxic Triad Minimum Bioeffects	Benthic species				Chapman et al. 1987b
0.125		NE	Apalachee Bay, FL	COA		Not significantly toxic (0.75+/-1.5% mortality)	Mysidopsis bahia (mysid shrimp)		0.540+/-0.385	0.405+/-0.417	EMAP Louisiana Province 1991
0.125		NG	Apalachee Bay, FL	COA	10-d	Significantly toxic (15.6% mortality)	Ampelisca abdita (amphipod)		0.438+/-0.442	0.421+/-0.593	EMAP Louisiana Province 1991
0.125		NE	Apalachee Bay, FL	COA	10-d	Not significantly toxic (3.3+/-3.25% mortality)	Ampelisca abdita (amphipod)		0.643+/-0.455	0.390+/-0.410	EMAP Louisiana Province 1991
0.125		NE	Chandeleur Sound, LA	COA		Not significantly toxic (1.03+/-2.05% mortality)	Mysidopsis bahia (mysid shrimp)		0.824+/-0.915	1.69+/-0.920	EMAP Louisiana Province 1991
0.125		NG	Chandeleur Sound, LA	COA		Significantly toxic (7.6+/-1.32% mortality)	Mysidopsis bahia (mysid shrimp)		0.624+/-0.197	2.07+/-1.19	EMAP Louisiana Province 1991
0.125		NE	Chandeleur Sound, LA	COA	10-d	Not significantly toxic (2.87+/-4.05% mortality)	Ampelisca abdita (amphipod)		0.517+/-0.166	2.02+/-1.38	EMAP Louisiana Province 1991
0.125		NE	Galveston Bay, TX	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		0.934+/-0.657	0.457+/-0.530	EMAP Louisiana Province 1991
0.125		NG	Galveston Bay, TX	COA		Significantly toxic (13.4+/-9.11% mortality)	Mysidopsis bahia (mysid shrimp)		0.778+/-0.482	1.21+/-0.778	EMAP Louisiana Province 1991
0.125		NE	Galveston Bay, TX	COA	10-d	Not significantly toxic (1.35+/-1.45% mortality)	Ampelisca abdita (amphipod)		0.961+/-0.537	1.17+/-0.640	EMAP Louisiana Province 1991
0.125		NG	Galveston Bay, TX	COA	10-d	Significantly toxic (15.8+/-3.89% mortality)	Ampelisca abdita (amphipod)		0.647+/-0.606	0.160+/-0.184	EMAP Louisiana Province 1991
0.125		NE	Matagorda Bay, TX	COA		Not significantly toxic (1.58+/-1.82% mortality)	Mysidopsis bahia (mysid shrimp)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
0.125		NE	Matagorda Bay, TX	COA	10-d	Not significantly toxic (2.33+/-4.65% mortality)	Ampelisca abdita (amphipod)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
0.125		NE	Mississippi River, MS, LA	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		1.3+/-0.83	1.14+/-1	EMAP Louisiana Province 1991
0.125		NG	Mississippi River, MS, LA	COA		Significantly toxic (32.9+/-36.4% mortality)	Mysidopsis bahia (mysid shrimp)		1.07+/-0.924	1.41+/-1.93	EMAP Louisiana Province 1991
0.125		NE	Mississippi River, MS, LA	COA	10-d	Not significantly toxic (7.8+/-1.63% mortality)	Ampelisca abdita (amphipod)		1.15+/-1.04	2.31+/-0.651	EMAP Louisiana Province 1991
0.125		NG	Mississippi River, MS, LA	COA	10-d	Significantly toxic (15.9+/-6.65% mortality)	Ampelisca abdita (amphipod)		1.22+/-0.717	0.235+/-0.276	EMAP Louisiana Province 1991
0.125		NE	Mississippi Sound, MS	COA		Not significantly toxic (0.789+/-1.59% mortality)	Mysidopsis bahia (mysid shrimp)		0.827+/-0.757	1.46+/-1.58	EMAP Louisiana Province 1991
0.125		NG	Mississippi Sound, MS	COA		Significantly toxic (12.2+/-4.42% mortality)	Mysidopsis bahia (mysid shrimp)		0.939+/-0.335	2.63+/-2.3	EMAP Louisiana Province 1991
0.125		NE	Mississippi Sound, MS	COA	10-d	Not significantly toxic (1.4+/-1.73% mortality)	Ampelisca abdita (amphipod)		0.998+/-0.602	2.01+/-1.82	EMAP Louisiana Province 1991
0.125		NG	Mississippi Sound, MS	COA	10-d	Significantly toxic (11.6+/-3.39% mortality)	Ampelisca abdita (amphipod)		0.111+/-0.045	0.03	EMAP Louisiana Province 1991
0.125		NE	Mobile Bay, AL	COA		Not significantly toxic (1.07+/-1.85% mortality)	Mysidopsis bahia (mysid shrimp)		0.968+/-0.815	8.23+/-3.4	EMAP Louisiana Province 1991
0.125		NG	Mobile Bay, AL	COA		Significantly toxic (10% mortality)	Mysidopsis bahia (mysid shrimp)		0.009	0.004	EMAP Louisiana Province 1991
0.125		NE	Mobile Bay, AL	COA	10-d	Not significantly toxic (0.5+/-0.778% mortality)	Ampelisca abdita (amphipod)		1.24+/-0.948	8.51+/-4.76	EMAP Louisiana Province 1991
0.125		NG	Mobile Bay, AL	COA	10-d	Significantly toxic (46+/-49.3% mortality)	Ampelisca abdita (amphipod)		0.22+/-0.298	3.84+/-5.43	EMAP Louisiana Province 1991
0.1253		NG	Chandeleur Sound, LA	COA	10-d	Significantly toxic (11.5+/-4.86% mortality)	Ampelisca abdita (amphipod)		0.811+/-0.711	1.87+/-0.973	EMAP Louisiana Province 1991
0.57		NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-6.07% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.71+/-0.9	15.3+/-23.2	Bricker et al. 1993
0.57		NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.1+/-13.3% mortality)	Mulinia lateralis (bivalve)	LAR	2.68+/-0.955	31.8+/-24.4	Bricker et al. 1993
0.57		NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (21.5+/-6.36% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.35+/-1.05	10.5+/-13.4	Bricker et al. 1993
0.57		NG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (25.9+/-5.01% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.21+/-0.444	2.41+/-2.32	Bricker et al. 1993
0.57		NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (6.48+/-10.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
0.57		NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99+/-0.862% normal development)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
0.57		NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-7.99% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.14+/-0.352	6.09+/-5.38	Bricker et al. 1993
0.57		NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (51.3+/-6.95% mortality)	Mulinia lateralis (bivalve)	LAR	1.8+/-1.71	29.6+/-46.3	Bricker et al. 1993
0.57		NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (19.3+/-5.86% mortality)	Ampelisca abidta (amphipod)	SUB ADT	1.82+/-0.225	6.3+/-6.2	Bricker et al. 1993
0.57		NG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (39.5+/-18.2% mortality)	Ampelisca abidta (amphipod)	SUB ADT	2.06+/-0.523	20.1+/-13.9	Bricker et al. 1993
0.57		NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (15.2+/-9.21% mortality)	Mulinia lateralis (bivalve)	LAR	2.17+/-0.663	18.4+/-19.9	Bricker et al. 1993

Table 37. A summary of the available data on the biological effects associated with sediment-sorbed ENDRIN (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Endrin Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.57	NG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.5+/-11.4% mortality)	Mulinia lateralis (bivalve)	LAR	2.33+/-0.364	26.8+/-9.42	Bricker et al. 1993
0.57	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.3+/-2.22% normal development)	Mulinia lateralis (bivalve)	LAR	2.18+/-0.531	19.1+/-12.5	Bricker et al. 1993
0.57	NG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (96+/-1.66% normal development)	Mulinia lateralis (bivalve)	LAR	2.52+/-0.997	35+/-42.9	Bricker et al. 1993
0.57	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (23+/-4.24% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.46+/-1.22	40+/-55.1	Bricker et al. 1993
0.57	NG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (38+/-13% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.92+/-0.937	34.6+/-23.9	Bricker et al. 1993
0.57	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (29.8+/-13.9% mortality)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.07	32.1+/-28.4	Bricker et al. 1993
0.57	NG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (75.1+/-10.6% mortality)	Mulinia lateralis (bivalve)	LAR	3.32+/-0.317	42.3+/-19.2	Bricker et al. 1993
0.57	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (96.6+/-3.79% normal development)	Mulinia lateralis (bivalve)	LAR	2.87+/-0.94	35.1+/-25.9	Bricker et al. 1993
0.57	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.061+/-0.038 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.8+/-0.477	8.52+/-10.7	Bricker et al. 1993
0.57	NG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.014+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.51+/-0.45	29.6+/-15.7	Bricker et al. 1993
0.57	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.167+/-0.198 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.59+/-1.09	4.67+/-6.99	Bricker et al. 1993
0.57	NG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.011+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.28+/-0.363	45.3+/-21.4	Bricker et al. 1993
0.57	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.125+/-0.084 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.25+/-0.468	1.98+/-2.25	Bricker et al. 1993
0.57	NG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.008+/-0.001 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.19+/-1.27	12+/-11.3	Bricker et al. 1993
0.573 +/-0.021	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.1+/-2.78% normal development)	Mulinia lateralis (bivalve)	LAR	2.12+/-1.04	22.9+/-23.7	Bricker et al. 1993
0.575 +/-0.027	NC	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.013+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.79+/-0.744	37.6+/-25.3	Bricker et al. 1993
0.577 +/-0.032	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99.3+/-0.827% normal development)	Mulinia lateralis (bivalve)	LAR	1.43+/-0.738	14.7+/-24	Bricker et al. 1993
0.59 +/-0.056	NC	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.016+/-0.007 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.26+/-0.936	43.4+/-35.6	Bricker et al. 1993
0.62	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (0.33+/-0.516% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
0.62	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (2.33+/-1.03% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
0.62	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (55.0+/-22.6% mortality)	Hyalella azteca (amphipod)	JUV	0.338+/-0.133	2.9+/-3.11	Hall et al. 1992
0.62	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (15.3+/-11.0% mortality)	Hyalella azteca (amphipod)	JUV	0.648+/-0.641	1.74+/-1.39	Hall et al. 1992
0.62	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29.8+/-11.1% mortality)	Streblospio benedicti (polychaete worm)		0.316+/-0.12	2.13+/-2.46	Hall et al. 1992
0.62	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1% mortality)	Streblospio benedicti (polychaete worm)		1.38	3.25	Hall et al. 1992
0.62	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (55.0+/-19.5% mortality)	Streblospio benedicti (polychaete worm)		0.349+/-0.11	1.07+/-0.66	Hall et al. 1992
0.62	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (16.5+/-9.19% mortality)	Streblospio benedicti (polychaete worm)		0.783+/-0.845	4.83+/-2.23	Hall et al. 1992
0.62	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.367+/-0.085 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
0.62	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.0005 mg/day growth)	Streblospio benedicti (polychaete worm)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
0.62	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.003 mg/day growth)	Lepidactylus dytiscus (amphipod)		1.38	3.25	Hall et al. 1992
0.62	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.003+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.316+/-0.120	2.13+/-2.46	Hall et al. 1992
0.62	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29% mortality)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
0.62	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (7.2+/-1.92% mortality)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
0.62	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (89.7% reburial)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
0.62	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.6+/-0.55% reburial)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
0.62	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
0.62	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
0.62	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	6.41	Hall et al. 1992
0.62	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
0.62	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992

Table 37. A summary of the available data on the biological effects associated with sediment-sorbed ENDRIN (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Endrin Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.62	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.001+/-0.001 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.555+/-0.471	2.68+/-2.3	Hall et al. 1992
0.62	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1.83+/-1.6% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
0.62	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (3.5+/-1.87% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
0.62	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (45.5+/-12% mortality)	Lepidactylus dytiscus (amphipod)		0.383+/-0.279	3.61+/-2.79	Hall et al. 1992
0.62	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (9.25+/-5.32% mortality)	Lepidactylus dytiscus (amphipod)		0.638+/-0.768	1.65+/-1.62	Hall et al. 1992
0.62	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (63.0+/-24.3% mortality)	Hyalella azteca (amphipod)	JUV	0.317+/-0.228	2.57+/-2.67	Hall et al. 1992
0.62	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (22.3+/-7.37% mortality)	Hyalella azteca (amphipod)	JUV	0.788+/-0.866	2.04+/-1.75	Hall et al. 1992
0.62	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (22% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
0.62	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (8.8+/-7.12% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
0.62	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (28% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
0.62	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (14+/-9.22% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
0.62	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (82.9% reburial)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
0.62	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.1+/-0.865% reburial)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
0.62	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>20% emergence)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
0.62	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<20% emergence)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
0.62	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	5.58	Hall et al. 1992
0.62	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
0.62	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (-0.057+/-0.04 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
0.62	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.001mg/day growth)	Streblospio benedicti (polychaete worm)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
0.62	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.016 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
0.62	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.008+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.4	Hall et al. 1992
0.62	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.003 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
0.62	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.005+/-0.0004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
0.636 +/-0.433	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (17+/-16.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.99+/-1	21.6+/-24.5	Bricker et al. 1993
0.637 +/-0.438	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (34.9+/-15.7% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.23+/-1.04	25.4+/-25.5	Bricker et al. 1993
0.677 +/-0.567	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.096+/-0.101 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.37+/-0.759	6.93+/-6.83	Bricker et al. 1993
0.702 +/-0.612	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (12.3+/-14.5% mortality)	Mulinia lateralis (bivalve)	LAR	1.53+/-0.743	15.7+/-23.2	Bricker et al. 1993
0.728 +/-0.688	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.074+/-0.043 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.27+/-0.626	6.21+/-5.41	Bricker et al. 1993
0.745 +/-0.706	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (30.5+/-16.4% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.62+/-0.777	17.7+/-26.3	Bricker et al. 1993
1.17 +/-1.34	*	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (91.5+/-7.28% normal development)	Mulinia lateralis (bivalve)	LAR	2.6+/-0.899	36.8+/-34.9	Bricker et al. 1993
1.25 +/-0.354	NE	Tampa Bay, FL	COA	1-h	Least toxic (79.4+/-9.9% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.45+/-0.587		Long 1993
1.57 +/-1.73	*	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (88.5+/-8.39% normal development)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.05	38.1+/-38.9	Bricker et al. 1993
1.74	*	United States	EqPA		Marine Chronic Sediment Criteria	Aquatic biota		1		JRB Associates 1984
1.8 +/-0.645	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (5.8+/-3.7% mortality)	Rhepoxynius abronius (amphipod)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
1.8 +/-0.645	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (3.4+/-1.82% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
1.8 +/-0.645	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (11.2+/-3.7% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
1.8 +/-0.645	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (3.52+/-1.66% mortality)	Macoma nasuta (clam)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
1.95	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (18% mortality)	Ampelisca abdita (amphipod)		0.028	9 ug/g	Windom In Prep
2	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (0% mortality)	Arbacia punctulata (sea urchin)		0.03	19 ug/g	Windom In Prep

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Endrin Std Dev		Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
2.15		*	United States	EqPA		Interim Marine Sediment Quality Criteria (FCV)	Benthic community		1		EPA 1988
2.15		*	New York State	EqPA		New York State Sediment Criteria Value			1		Newell 1989
2.23	+/-0.115	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (28.3+/-6.11% mortality)	Mysidopsis bahia (mysid)		0.246+/-0.051	127+/-24 ug/g	Windom In Prep
2.24	+/-0.095	NE	Brunswick Harbor Entrance, GA	COA	48-h	Not significantly toxic (86.6+/-4.25% normal development)	Arbacia punctulata (sea urchin)		0.181+/-0.162	182+/-208 ug/g	Windom In Prep
2.33	+/-0.37	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (9.78+/-5.33% mortality)	Mysidopsis bahia (mysid)		0.24+/-0.247	91.9+/-73.4 ug/g	Windom In Prep
2.33	+/-0.359	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (91.3+/-2.91% normal development)	Arbacia punctulata (sea urchin)		0.299+/-0.251	114+/-68.4 ug/g	Windom In Prep
2.34	+/-0.395	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (4+/-2.83% mortality)	Menidia beryllina (silverside)		0.243+/-0.264	90.5+/-78.4 ug/g	Windom In Prep
2.38	+/-0.364	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (11.6+/-4.33% mortality)	Ampelisca abdita (amphipod)		0.267+/-0.25	102+/-71.1 ug/g	Windom In Prep
2.38	+/-0.452	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (27.5+/-10.6% mortality)	Mysidopsis bahia (mysid)		0.237+/-0.311	74.6+/-85.5 ug/g	Windom In Prep
2.38	+/-0.36	SG	Savannah River Entrance Channel, GA	COA	48-h	Significantly toxic (25.4+/-7.66% mortality)	Arbacia punctulata (sea urchin)		0.344+/-0.242	129.5+/-59.3 ug/g	Windom In Prep
2.98	+/-0.787	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (10.6+/-3.17% mortality)	Ampelisca abdita (amphipod)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
2.98	+/-0.787	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (8.00+/-2.92% mortality)	Mysidopsis bahia (mysid)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
3.04	+/-0.846	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (5.43+/-3.21% mortality)	Mysidopsis bahia (mysid)		1.21+/-1.13	9096+/-13378 ug/g	Windom In Prep
3.04	+/-0.846	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (9.61+/-2.7% mortality)	Menidia beryllina (silverside)		1.22+/-1.13	9172+/-13363 ug/g	Windom In Prep
3.16	+/-1.44	NE	Tampa Bay, FL	COA	10-d	Not significantly toxic (14.6+/-7.67% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.63+/-0.596		Long 1993
3.3		SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (16% mortality)	Mysidopsis bahia (mysid)		1.8	7095 ug/g	Windom In Prep
3.3		SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (22.3% mortality)	Menidia beryllina (silverside)		1.71	6562 ug/g	Windom In Prep
3.58	+/-0.482	SG	Brunswick Harbor Entrance, GA	COA	48-h	Significantly toxic (14.6+/-18.9% normal development)	Arbacia punctulata (sea urchin)		1.99+/-0.562	14009+/-13434 ug/g	Windom In Prep
4.77	+/-3.77	NE	Tampa Bay, FL	COA		Not significantly toxic (EC50; 0.066+/-0.033 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.89+/-0.902		Long 1993
5		NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (9+/-1.73% mortality)	Nereis virens (polychaetes)	ADT			EG&G Bionomics 1980
5		NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (13+/- 3.61% mortality)	Penaeus duorarum (pink shrimp)	ADT			EG&G Bionomics 1980
5		NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (11.3+/-3.21% mortality)	Crassostrea virginica (oyster)	ADT			EG&G Bionomics 1980
6.6	+/-5.11	*	Tampa Bay, FL	COA	1-h	Moderately toxic (15.3+/-10.6% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.94+/-0.908		Long 1993
7.3	+/-3.15	*	United States	EqPA		Sediment Quality Criteria					Hansen et al. 1991a
49.4	+/-115	*	Tampa Bay, FL	COA	1-h	Most toxic (0.091+/-0.187% fertilization)	Arbacia punctulata (sea urchin)	GAM	2.96+/-1.49		Long 1993
<50		NE	Georgetown Harbor, SC	COA		Not toxic (species richness or abundance)	Benthic species		0.12		Van Dolah et al. 1984
67.6	+/-132	*	Tampa Bay, FL	COA	10-d	Significantly toxic (35.2+/-17.5% mortality)	Ampelisca abdita (amphipod)	SUB ADT	3.53+/-1.35		Long 1993
74.7	+/-141	*	Tampa Bay, FL	COA		Significantly toxic (EC50; 0.017+/-0.012 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.47+/-1.49		Long 1993
28000		*	Laboratory	SSBA	288-h	Significantly toxic (40% mortality)	Nereis virens (sandworm)		2		McLeese et al. 1982

Table 38. A summary of the available data on the biological effects associated with sediment-sorbed HEPTACHLOR (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Heptachlor	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.04		*	United States	EqPA		99% Chronic Marine Criteria	Aquatic organisms		1		Pavlou et al. 1987
0.06		*	United States	EqPA		95% Chronic Marine Criteria	Aquatic organisms		1		Pavlou et al. 1987
0.065	+/-0.049	NE	Mobile Bay, AL	COA	10-d	Not significantly toxic (0.5+/-0.778% mortality)	Ampelisca abdita (amphipod)		1.24+/-0.948	8.51+/-4.76	EMAP Louisiana Province 1991
0.077	+/-0.04	NE	Mobile Bay, AL	COA		Not significantly toxic (1.07+/-1.85% mortality)	Mysidopsis bahia (mysid shrimp)		0.968+/-0.815	8.23+/-3.4	EMAP Louisiana Province 1991
0.1		NE	Apalachee Bay, FL	COA		Not significantly toxic (0.75+/-1.5% mortality)	Mysidopsis bahia (mysid shrimp)		0.540+/-0.385	0.405+/-0.417	EMAP Louisiana Province 1991
0.1		NG	Apalachee Bay, FL	COA	10-d	Significantly toxic (15.6% mortality)	Ampelisca abdita (amphipod)		0.438+/-0.442	0.421+/-0.593	EMAP Louisiana Province 1991
0.1		NE	Apalachee Bay, FL	COA	10-d	Not significantly toxic (3.3+/-3.25% mortality)	Ampelisca abdita (amphipod)		0.643+/-0.455	0.390+/-0.410	EMAP Louisiana Province 1991
0.1		NE	Chandeleur Sound, LA	COA		Not significantly toxic (1.03+/-2.05% mortality)	Mysidopsis bahia (mysid shrimp)		0.824+/-0.915	1.69+/-0.920	EMAP Louisiana Province 1991
0.1		NG	Chandeleur Sound, LA	COA		Significantly toxic (7.6+/-1.32% mortality)	Mysidopsis bahia (mysid shrimp)		0.624+/-0.197	2.07+/-1.19	EMAP Louisiana Province 1991
0.1		NE	Chandeleur Sound, LA	COA	10-d	Not significantly toxic (2.87+/-4.05% mortality)	Ampelisca abdita (amphipod)		0.517+/-0.166	2.02+/-1.38	EMAP Louisiana Province 1991
0.1		NG	Chandeleur Sound, LA	COA	10-d	Significantly toxic (11.5+/-4.86% mortality)	Ampelisca abdita (amphipod)		0.811+/-0.711	1.87+/-0.973	EMAP Louisiana Province 1991
0.1		NE	Galveston Bay, TX	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		0.934+/-0.657	0.457+/-0.530	EMAP Louisiana Province 1991
0.1		NG	Galveston Bay, TX	COA		Significantly toxic (13.4+/-9.11% mortality)	Mysidopsis bahia (mysid shrimp)		0.778+/-0.482	1.21+/-0.778	EMAP Louisiana Province 1991
0.1		NE	Galveston Bay, TX	COA	10-d	Not significantly toxic (1.35+/-1.45% mortality)	Ampelisca abdita (amphipod)		0.961+/-0.537	1.17+/-0.640	EMAP Louisiana Province 1991
0.1		NG	Galveston Bay, TX	COA	10-d	Significantly toxic (15.8+/-3.89% mortality)	Ampelisca abdita (amphipod)		0.647+/-0.606	0.160+/-0.184	EMAP Louisiana Province 1991
0.1		NE	Matagorda Bay, TX	COA		Not significantly toxic (1.58+/-1.82% mortality)	Mysidopsis bahia (mysid shrimp)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
0.1		NE	Matagorda Bay, TX	COA	10-d	Not significantly toxic (2.33+/-4.65% mortality)	Ampelisca abdita (amphipod)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
0.1		NE	Mississippi River, MS, LA	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		1.3+/-0.83	1.14+/-1	EMAP Louisiana Province 1991
0.1		NG	Mississippi River, MS, LA	COA		Significantly toxic (32.9+/-36.4% mortality)	Mysidopsis bahia (mysid shrimp)		1.07+/-0.924	1.41+/-1.93	EMAP Louisiana Province 1991
0.1		NE	Mississippi River, MS, LA	COA	10-d	Not significantly toxic (7.8+/-1.63% mortality)	Ampelisca abdita (amphipod)		1.15+/-1.04	2.31+/-0.651	EMAP Louisiana Province 1991
0.1		NG	Mississippi River, MS, LA	COA	10-d	Significantly toxic (15.9+/-6.65% mortality)	Ampelisca abdita (amphipod)		1.22+/-0.717	0.235+/-0.276	EMAP Louisiana Province 1991
0.1		NE	Mississippi Sound, MS	COA		Not significantly toxic (0.789+/-1.59% mortality)	Mysidopsis bahia (mysid shrimp)		0.827+/-0.757	1.46+/-1.58	EMAP Louisiana Province 1991
0.1		NG	Mississippi Sound, MS	COA		Significantly toxic (12.2+/-4.42% mortality)	Mysidopsis bahia (mysid shrimp)		0.939+/-0.335	2.63+/-2.3	EMAP Louisiana Province 1991
0.1		NE	Mississippi Sound, MS	COA	10-d	Not significantly toxic (1.4+/-1.73% mortality)	Ampelisca abdita (amphipod)		0.998+/-0.602	2.01+/-1.82	EMAP Louisiana Province 1991
0.1		NG	Mississippi Sound, MS	COA	10-d	Significantly toxic (11.6+/-3.39% mortality)	Ampelisca abdita (amphipod)		0.111+/-0.045	0.03	EMAP Louisiana Province 1991
0.1		SG	Mobile Bay, AL	COA		Significantly toxic (10% mortality)	Mysidopsis bahia (mysid shrimp)		0.009	0.004	EMAP Louisiana Province 1991
0.1		SG	Mobile Bay, AL	COA	10-d	Significantly toxic (46+/-49.3% mortality)	Ampelisca abdita (amphipod)		0.22+/-0.298	3.84+/-5.43	EMAP Louisiana Province 1991
0.16	+/-0.156	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (21.5+/-6.36% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.35+/-1.05	10.5+/-13.4	Bricker et al. 1993
0.16	+/-0.156	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (23+/-4.24% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.46+/-1.22	40+/-55.1	Bricker et al. 1993
0.227	+/-0.082	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.125+/-0.084 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.25+/-0.468	1.98+/-2.25	Bricker et al. 1993
0.237	+/-0.074	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (6.48+/-10.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
0.237	+/-0.074	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99+/-0.862% normal development)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
0.24	+/-0.111	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.061+/-0.038 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.8+/-0.477	8.52+/-10.7	Bricker et al. 1993
0.241	+/-0.081	NC	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.016+/-0.007 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.26+/-0.936	43.4+/-35.6	Bricker et al. 1993
0.25		NE	Freeport Harbor, TX	COA	10-d	Not toxic (2+/-1% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1985b
0.25		NE	Freeport Harbor, TX	COA	10-d	Not toxic (9.6+/-4.22% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1985b
0.25		NE	Freeport Harbor, TX	COA	10-d	Not toxic (0% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1985b
0.259	+/-0.026	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (25.9+/-5.01% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.21+/-0.444	2.41+/-2.32	Bricker et al. 1993
0.27		NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (75.1+/-10.6% mortality)	Mulinia lateralis (bivalve)	LAR	3.32+/-0.317	42.3+/-19.2	Bricker et al. 1993

Table 38. A summary of the available data on the biological effects associated with sediment-sorbed HEPTACHLOR (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Heptachlor	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.27		SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.008+/-0.001 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.19+/-1.27	12+/-11.3	Bricker et al. 1993
0.271	+/-0.064	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (30.5+/-16.4% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.62+/-0.777	17.7+/-26.3	Bricker et al. 1993
0.279	+/-0.159	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (12.3+/-14.5% mortality)	Mulinia lateralis (bivalve)	LAR	1.53+/-0.743	15.7+/-23.2	Bricker et al. 1993
0.3		*	New York State	EqPA		New York State Sediment Criteria Value			1		Newell 1989
0.303	+/-.320	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-7.99% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.14+/-0.352	6.09+/-5.38	Bricker et al. 1993
0.306	+/-0.227	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (19.3+/-5.86% mortality)	Ampelisca abidta (amphipod)	SUB ADT	1.82+/-0.225	6.3+/-6.2	Bricker et al. 1993
0.315	+/-0.144	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (15.2+/-9.21% mortality)	Mulinia lateralis (bivalve)	LAR	2.17+/-0.663	18.4+/-19.9	Bricker et al. 1993
0.32	+/-0.168	NC	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.013+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.79+/-0.744	37.6+/-25.3	Bricker et al. 1993
0.323	+/-0.247	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-6.07% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.71+/-0.9	15.3+/-23.2	Bricker et al. 1993
0.323	+/-0.138	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (39.5+/-18.2% mortality)	Ampelisca abidta (amphipod)	SUB ADT	2.06+/-0.523	20.1+/-13.9	Bricker et al. 1993
0.323	+/-0.21	NC	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.011+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.28+/-0.363	45.3+/-21.4	Bricker et al. 1993
0.329	+/-0.083	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (96+/-1.66% normal development)	Mulinia lateralis (bivalve)	LAR	2.52+/-0.997	35+/-42.9	Bricker et al. 1993
0.335	+/-0.156	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.3+/-2.22% normal development)	Mulinia lateralis (bivalve)	LAR	2.18+/-0.531	19.1+/-12.5	Bricker et al. 1993
0.336	+/-0.239	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (34.9+/-15.7% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.23+/-1.04	25.4+/-25.5	Bricker et al. 1993
0.337	+/-0.098	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (91.5+/-7.28% normal development)	Mulinia lateralis (bivalve)	LAR	2.6+/-0.899	36.8+/-34.9	Bricker et al. 1993
0.343	+/-0.126	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (88.5+/-8.39% normal development)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.05	38.1+/-38.9	Bricker et al. 1993
0.344	+/-0.256	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (17+/-16.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.99+/-1	21.6+/-24.5	Bricker et al. 1993
0.371	+/-0.159	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.5+/-11.4% mortality)	Mulinia lateralis (bivalve)	LAR	2.33+/-0.364	26.8+/-9.42	Bricker et al. 1993
0.379	+/-0.348	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (96.6+/-3.79% normal development)	Mulinia lateralis (bivalve)	LAR	2.87+/-0.94	35.1+/-25.9	Bricker et al. 1993
0.396	+/-0.522	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.1+/-2.78% normal development)	Mulinia lateralis (bivalve)	LAR	2.12+/-1.04	22.9+/-23.7	Bricker et al. 1993
0.397	+/-0.136	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.014+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.51+/-0.45	29.6+/-15.7	Bricker et al. 1993
0.4	+/-0.26	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (4.8+/-2.28% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1983a
0.4	+/-0.26	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (15.8+/-4.21% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1983a
0.4	+/-0.26	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (1.2+/-.447% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1983a
0.402	+/-0.356	*	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (38+/-13% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.92+/-0.937	34.6+/-23.9	Bricker et al. 1993
0.41		NC	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29% mortality)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
0.41		NC	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (89.7% reburial)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
0.41		NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
0.41		NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	6.41	Hall et al. 1992
0.41		NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
0.41		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1.83+/-1.6% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
0.41		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (3.5+/-1.87% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
0.41		NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (45.5+/-12% mortality)	Lepidactylus dytiscus (amphipod)		0.383+/-0.279	3.61+/-2.79	Hall et al. 1992
0.41		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (9.25+/-5.32% mortality)	Lepidactylus dytiscus (amphipod)		0.638+/-0.768	1.65+/-1.62	Hall et al. 1992
0.41		NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (63.0+/-24.3% mortality)	Hyalella azteca (amphipod)	JUV	0.317+/-0.228	2.57+/-2.67	Hall et al. 1992
0.41		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (22.3+/-7.37% mortality)	Hyalella azteca (amphipod)	JUV	0.788+/-0.866	2.04+/-1.75	Hall et al. 1992
0.41		NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (22% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
0.41		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (8.8+/-7.12% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
0.41		NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (28% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992

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Heptachlor Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.41	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (14+/-9.22% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
0.41	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (82.9% reburial)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
0.41	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.1+/-0.865% reburial)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
0.41	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>20% emergence)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
0.41	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<20% emergence)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
0.41	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	5.58	Hall et al. 1992
0.41	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
0.41	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (-0.057+/-0.04 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
0.41	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.001mg/day growth)	Streblospio benedicti (polychaete worm)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
0.41	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.016 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
0.41	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.008+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.4	Hall et al. 1992
0.41	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.003 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
0.41	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.005+/-0.0004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
0.42 +/-0.752	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99.3+/-0.827% normal development)	Mulinia lateralis (bivalve)	LAR	1.43+/-0.738	14.7+/-24	Bricker et al. 1993
0.434 +/-0.42	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (29.8+/-13.9% mortality)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.07	32.1+/-28.4	Bricker et al. 1993
0.481 +/-0.726	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.096+/-0.101 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.37+/-0.759	6.93+/-6.83	Bricker et al. 1993
0.483 +/-0.839	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.074+/-0.043 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.27+/-0.626	6.21+/-5.41	Bricker et al. 1993
0.483 +/-0.202	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (13.8+/-4.09% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.47+/-0.306		Pastorok & Becker 1990
0.5	NC	Puget Sound, WA	COA	2-d	Significantly toxic (3.8% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.5		Pastorok & Becker 1990
0.5	NE	Oakland Harbor, CA	COA	10-d	Significantly toxic (35.3+/-2.5% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.56+/-0.07		Word et al. 1988
0.533 +/-0.236	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (6.67+/-8.07% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.51+/-0.330		Pastorok & Becker 1990
0.544 +/-0.927	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.1+/-13.3% mortality)	Mulinia lateralis (bivalve)	LAR	2.68+/-0.955	31.8+/-24.4	Bricker et al. 1993
0.56 +/-0.62	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.167+/-0.198 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.59+/-1.09	4.67+/-6.99	Bricker et al. 1993
0.564 +/-0.345	NC	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29.8+/-11.1% mortality)	Streblospio benedicti (polychaete worm)		0.316+/-0.12	2.13+/-2.46	Hall et al. 1992
0.564 +/-0.345	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.003+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.316+/-0.120	2.13+/-2.46	Hall et al. 1992
0.566 +/-0.27	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (15.3+/-11.0% mortality)	Hyalella azteca (amphipod)	JUV	0.648+/-0.641	1.74+/-1.39	Hall et al. 1992
0.579 +/-0.336	NE	Puget Sound, WA	COA	20-d	Not significantly toxic (5+/-3.86% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.46+/-0.26		Pastorok & Becker 1990
0.602 +/-0.39	NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (55.0+/-19.5% mortality)	Streblospio benedicti (polychaete worm)		0.349+/-0.11	1.07+/-0.66	Hall et al. 1992
0.616 +/-0.334	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (0.33+/-0.516% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
0.616 +/-0.334	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (2.33+/-1.03% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
0.616 +/-0.33	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.367+/-0.085 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
0.616 +/-0.33	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.0005 mg/day growth)	Streblospio benedicti (polychaete worm)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
0.617 +/-0.278	NE	Puget Sound, WA	COA	15-min	Not significantly toxic (EC50; 0.283+/-0.168% extract)	Microtox (Photobacterium phosphoreum)		1.39+/-0.37		Pastorok & Becker 1990
0.645 +/-0.33	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (16.5+/-9.19% mortality)	Streblospio benedicti (polychaete worm)		0.783+/-0.845	4.83+/-2.23	Hall et al. 1992
0.66 +/-0.36	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (7.2+/-1.92% mortality)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
0.66 +/-0.36	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.6+/-0.55% reburial)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
0.66 +/-0.36	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
0.66 +/-0.36	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
0.66 +/-0.36	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.001+/-0.001 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.555+/-0.471	2.68+/-2.3	Hall et al. 1992

Table 38. A summary of the available data on the biological effects associated with sediment-sorbed HEPTACHLOR (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Heptachlor Std Dev		Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.666	+/-0.445	SG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (55.0+/-22.6% mortality)	Hyalella azteca (amphipod)	JUV	0.338+/-0.133	2.9+/-3.11	Hall et al. 1992
0.855	+/-0.307	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (5.8+/-3.7% mortality)	Rhepoxynius abronius (amphipod)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
0.855	+/-0.307	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (3.4+/-1.82% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
0.855	+/-0.307	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (11.2+/-3.7% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
0.855	+/-0.307	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (3.52+/-1.66% mortality)	Macoma nasuta (clam)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
0.88		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1% mortality)	Streblospio benedicti (polychaete worm)		1.38	3.25	Hall et al. 1992
0.88		SG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.003 mg/day growth)	Lepidactylus dytiscus (amphipod)		1.38	3.25	Hall et al. 1992
0.882	+/-1.23	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (4.43+/-2.1% mortality)	Panope generosa (geoduck)	JUV	1.51+/-0.261		Pastorok & Becker 1990
1		NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (18% mortality)	Ampelisca abdita (amphipod)		0.028	9 ug/g	Windom In Prep
1		NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (0% mortality)	Arbacia punctulata (sea urchin)		0.03	19 ug/g	Windom In Prep
1.08	+/-1.39	SG	Puget Sound, WA	COA	15-min	Significantly toxic (EC50; 0.065+/-0.043% extract)	Microtox (Photobacterium phosphoreum)		1.58+/-0.255		Pastorok & Becker 1990
1.12	+/-1.38	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (2.09+/-1.73% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.56+/-0.329		Pastorok & Becker 1990
1.15	+/-1.48	NE	Tampa Bay, FL	COA	1-h	Least toxic (79.4+/-9.9% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.45+/-0.587		Long 1993
1.16	+/-0.048	NE	Brunswick Harbor Entrance, GA	COA	48-h	Not significantly toxic (86.6+/-4.25% normal development)	Arbacia punctulata (sea urchin)		0.181+/-0.162	182+/-208 ug/g	Windom In Prep
1.16	+/-0.072	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (28.3+/-6.11% mortality)	Mysidopsis bahia (mysid)		0.246+/-0.051	127+/-24 ug/g	Windom In Prep
1.2	+/-0.193	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (9.78+/-5.33% mortality)	Mysidopsis bahia (mysid)		0.24+/-0.247	91.9+/-73.4 ug/g	Windom In Prep
1.2	+/-0.206	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (4+/-2.83% mortality)	Menidia beryllina (silverside)		0.243+/-0.264	90.5+/-78.4 ug/g	Windom In Prep
1.2	+/-0.191	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (91.3+/-2.91% normal development)	Arbacia punctulata (sea urchin)		0.299+/-0.251	114+/-68.4 ug/g	Windom In Prep
1.23	+/-0.19	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (11.6+/-4.33% mortality)	Ampelisca abdita (amphipod)		0.267+/-0.25	102+/-71.1 ug/g	Windom In Prep
1.23	+/-0.236	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (27.5+/-10.6% mortality)	Mysidopsis bahia (mysid)		0.237+/-0.311	74.6+/-85.5 ug/g	Windom In Prep
1.24	+/-0.184	SG	Savannah River Entrance Channel, GA	COA	48-h	Significantly toxic (25.4+/-7.66% mortality)	Arbacia punctulata (sea urchin)		0.344+/-0.242	129.5+/-59.3 ug/g	Windom In Prep
1.29	+/-1.57	*	Puget Sound, WA	COA	2-d	Significantly toxic (60.4+/-46.5% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.57+/-0.287		Pastorok & Becker 1990
1.47	+/-2.08	*	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (51.3+/-6.95% mortality)	Mulinia lateralis (bivalve)	LAR	1.8+/-1.71	29.6+/-46.3	Bricker et al. 1993
1.55	+/-0.415	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (10.6+/-3.17% mortality)	Ampelisca abdita (amphipod)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
1.55	+/-0.415	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (8.00+/-2.92% mortality)	Mysidopsis bahia (mysid)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
1.59	+/-0.444	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (5.43+/-3.21% mortality)	Mysidopsis bahia (mysid)		1.21+/-1.13	9096+/-13378 ug/g	Windom In Prep
1.59	+/-0.444	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (9.61+/-2.7% mortality)	Menidia beryllina (silverside)		1.22+/-1.13	9172+/-13363 ug/g	Windom In Prep
1.7		SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (16% mortality)	Mysidopsis bahia (mysid)		1.8	7095 ug/g	Windom In Prep
1.7		SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (22.3% mortality)	Menidia beryllina (silverside)		1.71	6562 ug/g	Windom In Prep
1.75	+/-1.78	*	Puget Sound, WA	COA	10-d	Significantly toxic (80.8+/-30.6% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.266		Pastorok & Becker 1990
1.86	+/-0.268	SG	Brunswick Harbor Entrance, GA	COA	48-h	Significantly toxic (14.6+/-18.9% normal development)	Arbacia punctulata (sea urchin)		1.99+/-0.562	14009+/-13434 ug/g	Windom In Prep
2.04	+/-1.97	NE	Tampa Bay, FL	COA	10-d	Not significantly toxic (14.6+/-7.67% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.63+/-0.596		Long 1993
2.5		NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (9+/-1.73% mortality)	Nereis virens (polychaetes)	ADT			EG&G Bionomics 1980
2.5		NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (13+/- 3.61% mortality)	Penaeus duorarum (pink shrimp)	ADT			EG&G Bionomics 1980
2.5		NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (11.3+/-3.21% mortality)	Crassostrea virginica (oyster)	ADT			EG&G Bionomics 1980
2.5		*	Puget Sound, WA	COA	10-d	Significantly toxic (56% mortality)	Panope generosa (geoduck)	JUV	2.1		Pastorok & Becker 1990
2.63	+/-2.3	*	Puget Sound, WA	COA	20-d	Significantly toxic (37.3+/-22% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.87+/-0.208		Pastorok & Becker 1990
3.28	+/-3.6	NE	Tampa Bay, FL	COA		Not significantly toxic (EC50; 0.066+/-0.033 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.89+/-0.902		Long 1993
4.73	+/-1.85	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (6+/-2.35% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1983b

Table 38. A summary of the available data on the biological effects associated with sediment-sorbed HEPTACHLOR (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Heptachlor Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
4.73 +/-1.85	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (2.6+/-2.97% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1983b
4.73 +/-1.85	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (1.8+/-1.79% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1983b
5	NE	Puget Sound, WA	AETA		PSDDA Screening level concentration	Aquatic biota				USACOE 1988
5	*	United States	EqPA		Chronic Marine EqP Threshold	Aquatic biota		1		Bolton et al. 1985
5.6 +/-1.65	*	Tampa Bay, FL	COA	1-h	Moderately toxic (15.3+/-10.6% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.94+/-0.908		Long 1993
22.2 +/-63.7	*	Tampa Bay, FL	COA	1-h	Most toxic (0.091+/-0.187% fertilization)	Arbacia punctulata (sea urchin)	GAM	2.96+/-1.49		Long 1993
30.9 +/-74.1	*	Tampa Bay, FL	COA	10-d	Significantly toxic (35.2+/-17.5% mortality)	Ampelisca abdita (amphipod)	SUB ADT	3.53+/-1.35		Long 1993
33.4 +/-79.7	*	Tampa Bay, FL	COA		Significantly toxic (EC50; 0.017+/-0.012 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.47+/-1.49		Long 1993
<50	NE	Georgetown Harbor, SC	COA		Not toxic (species richness or abundance)	Benthic species		0.12		Van Dolah et al. 1984
2566 +/-534	NE	Galveston Harbor, TX	COA	10-d	Not toxic (2.4+/-1.52% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Grieco 1984
2566 +/-534	NE	Galveston Harbor, TX	COA	10-d	Not toxic (0% mortality)	Mercenaria mercenaria (hard clams)	ADT			Grieco 1984
2566 +/-534	NE	Galveston Harbor, TX	COA	10-d	Not toxic (2.8+/-2.17% mortality)	Nereis virens (sandworm)	ADT			Grieco 1984

Table 39. A summary of the available data on the biological effects associated with sediment-sorbed HEPTACHLOR EPOXIDE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Heptachlor Epoxide Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.05 +/-0.042	NE	Mobile Bay, AL	COA	10-d	Not significantly toxic (0.5+/-0.778% mortality)	Ampelisca abdita (amphipod)		1.24+/-0.948	8.51+/-4.76	EMAP Louisiana Province 1991
0.06 +/-0.035	NE	Mobile Bay, AL	COA		Not significantly toxic (1.07+/-1.85% mortality)	Mysidopsis bahia (mysid shrimp)		0.968+/-0.815	8.23+/-3.4	EMAP Louisiana Province 1991
0.065 +/-0.021	NC	Mississippi River, MS, LA	COA		Significantly toxic (32.9+/-36.4% mortality)	Mysidopsis bahia (mysid shrimp)		1.07+/-0.924	1.41+/-1.93	EMAP Louisiana Province 1991
0.065 +/-0.021	NC	Mississippi River, MS, LA	COA	10-d	Significantly toxic (15.9+/-6.65% mortality)	Ampelisca abdita (amphipod)		1.22+/-0.717	0.235+/-0.276	EMAP Louisiana Province 1991
0.08	NE	Apalachee Bay, FL	COA		Not significantly toxic (0.75+/-1.5% mortality)	Mysidopsis bahia (mysid shrimp)		0.540+/-0.385	0.405+/-0.417	EMAP Louisiana Province 1991
0.08	NG	Apalachee Bay, FL	COA	10-d	Significantly toxic (15.6% mortality)	Ampelisca abdita (amphipod)		0.438+/-0.442	0.421+/-0.593	EMAP Louisiana Province 1991
0.08	NE	Apalachee Bay, FL	COA	10-d	Not significantly toxic (3.3+/-3.25% mortality)	Ampelisca abdita (amphipod)		0.643+/-0.455	0.390+/-0.410	EMAP Louisiana Province 1991
0.08	NE	Chandeleur Sound, LA	COA		Not significantly toxic (1.03+/-2.05% mortality)	Mysidopsis bahia (mysid shrimp)		0.824+/-0.915	1.69+/-0.920	EMAP Louisiana Province 1991
0.08	NG	Chandeleur Sound, LA	COA		Significantly toxic (7.6+/-1.32% mortality)	Mysidopsis bahia (mysid shrimp)		0.624+/-0.197	2.07+/-1.19	EMAP Louisiana Province 1991
0.08	NE	Chandeleur Sound, LA	COA	10-d	Not significantly toxic (2.87+/-4.05% mortality)	Ampelisca abdita (amphipod)		0.517+/-0.166	2.02+/-1.38	EMAP Louisiana Province 1991
0.08	NG	Chandeleur Sound, LA	COA	10-d	Significantly toxic (11.5+/-4.86% mortality)	Ampelisca abdita (amphipod)		0.811+/-0.711	1.87+/-0.973	EMAP Louisiana Province 1991
0.08	NE	Galveston Bay, TX	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		0.934+/-0.657	0.457+/-0.530	EMAP Louisiana Province 1991
0.08	NC	Galveston Bay, TX	COA	10-d	Significantly toxic (15.8+/-3.89% mortality)	Ampelisca abdita (amphipod)		0.647+/-0.606	0.160+/-0.184	EMAP Louisiana Province 1991
0.08	NE	Matagorda Bay, TX	COA		Not significantly toxic (1.58+/-1.82% mortality)	Mysidopsis bahia (mysid shrimp)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
0.08	NE	Matagorda Bay, TX	COA	10-d	Not significantly toxic (2.33+/-4.65% mortality)	Ampelisca abdita (amphipod)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
0.08	NE	Mississippi River, MS, LA	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		1.3+/-0.83	1.14+/-1	EMAP Louisiana Province 1991
0.08	NE	Mississippi River, MS, LA	COA	10-d	Not significantly toxic (7.8+/-1.63% mortality)	Ampelisca abdita (amphipod)		1.15+/-1.04	2.31+/-0.651	EMAP Louisiana Province 1991
0.08	NE	Mississippi Sound, MS	COA		Not significantly toxic (0.789+/-1.59% mortality)	Mysidopsis bahia (mysid shrimp)		0.827+/-0.757	1.46+/-1.58	EMAP Louisiana Province 1991
0.08	NG	Mississippi Sound, MS	COA		Significantly toxic (12.2+/-4.42% mortality)	Mysidopsis bahia (mysid shrimp)		0.939+/-0.335	2.63+/-2.3	EMAP Louisiana Province 1991
0.08	NE	Mississippi Sound, MS	COA	10-d	Not significantly toxic (1.4+/-1.73% mortality)	Ampelisca abdita (amphipod)		0.998+/-0.602	2.01+/-1.82	EMAP Louisiana Province 1991
0.08	NG	Mississippi Sound, MS	COA	10-d	Significantly toxic (11.6+/-3.39% mortality)	Ampelisca abdita (amphipod)		0.111+/-0.045	0.03	EMAP Louisiana Province 1991
0.08	SG	Mobile Bay, AL	COA		Significantly toxic (10% mortality)	Mysidopsis bahia (mysid shrimp)		0.009	0.004	EMAP Louisiana Province 1991
0.08	SG	Mobile Bay, AL	COA	10-d	Significantly toxic (46+/-49.3% mortality)	Ampelisca abdita (amphipod)		0.22+/-0.298	3.84+/-5.43	EMAP Louisiana Province 1991
0.23	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-6.07% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.71+/-0.9	15.3+/-23.2	Bricker et al. 1993
0.23	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.1+/-2.78% normal development)	Mulinia lateralis (bivalve)	LAR	2.12+/-1.04	22.9+/-23.7	Bricker et al. 1993
0.23	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (21.5+/-6.36% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.35+/-1.05	10.5+/-13.4	Bricker et al. 1993
0.23	NG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (25.9+/-5.01% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.21+/-0.444	2.41+/-2.32	Bricker et al. 1993
0.23	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (6.48+/-10.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
0.23	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99+/-0.862% normal development)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
0.23	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-7.99% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.14+/-0.352	6.09+/-5.38	Bricker et al. 1993
0.23	NG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (30.5+/-16.4% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.62+/-0.777	17.7+/-26.3	Bricker et al. 1993
0.23	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (12.3+/-14.5% mortality)	Mulinia lateralis (bivalve)	LAR	1.53+/-0.743	15.7+/-23.2	Bricker et al. 1993
0.23	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99.3+/-0.827% normal development)	Mulinia lateralis (bivalve)	LAR	1.43+/-0.738	14.7+/-24	Bricker et al. 1993
0.23	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (19.3+/-5.86% mortality)	Ampelisca abidta (amphipod)	SUB ADT	1.82+/-0.225	6.3+/-6.2	Bricker et al. 1993
0.23	NG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (39.5+/-18.2% mortality)	Ampelisca abidta (amphipod)	SUB ADT	2.06+/-0.523	20.1+/-13.9	Bricker et al. 1993
0.23	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.5+/-11.4% mortality)	Mulinia lateralis (bivalve)	LAR	2.33+/-0.364	26.8+/-9.42	Bricker et al. 1993
0.23	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.3+/-2.22% normal development)	Mulinia lateralis (bivalve)	LAR	2.18+/-0.531	19.1+/-12.5	Bricker et al. 1993
0.23	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (23+/-4.24% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.46+/-1.22	40+/-55.1	Bricker et al. 1993
0.23	NG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (38+/-13% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.92+/-0.937	34.6+/-23.9	Bricker et al. 1993

Table 39. A summary of the available data on the biological effects associated with sediment-sorbed HEPTACHLOR EPOXIDE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Heptachlor Epoxide Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.23	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (29.8+/-13.9% mortality)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.07	32.1+/-28.4	Bricker et al. 1993
0.23	NG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (75.1+/-10.6% mortality)	Mulinia lateralis (bivalve)	LAR	3.32+/-0.317	42.3+/-19.2	Bricker et al. 1993
0.23	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (96.6+/-3.79% normal development)	Mulinia lateralis (bivalve)	LAR	2.87+/-0.94	35.1+/-25.9	Bricker et al. 1993
0.23	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.096+/-0.101 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.37+/-0.759	6.93+/-6.83	Bricker et al. 1993
0.23	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.061+/-0.038 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.8+/-0.477	8.52+/-10.7	Bricker et al. 1993
0.23	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.167+/-0.198 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.59+/-1.09	4.67+/-6.99	Bricker et al. 1993
0.23	NG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.011+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.28+/-0.363	45.3+/-21.4	Bricker et al. 1993
0.23	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.074+/-0.043 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.27+/-0.626	6.21+/-5.41	Bricker et al. 1993
0.23	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.125+/-0.084 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.25+/-0.468	1.98+/-2.25	Bricker et al. 1993
0.23	NG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.008+/-0.001 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.19+/-1.27	12+/-11.3	Bricker et al. 1993
0.24 +/-0.072	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (17+/-16.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.99+/-1	21.6+/-24.5	Bricker et al. 1993
0.242 +/-0.086	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (34.9+/-15.7% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.23+/-1.04	25.4+/-25.5	Bricker et al. 1993
0.261 +/-0.128	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.013+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.79+/-0.744	37.6+/-25.3	Bricker et al. 1993
0.269 +/-0.152	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.1+/-13.3% mortality)	Mulinia lateralis (bivalve)	LAR	2.68+/-0.955	31.8+/-24.4	Bricker et al. 1993
0.28 +/-0.157	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (15.2+/-9.21% mortality)	Mulinia lateralis (bivalve)	LAR	2.17+/-0.663	18.4+/-19.9	Bricker et al. 1993
0.285	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (0.33+/-0.516% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
0.285	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (2.33+/-1.03% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
0.285	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (55.0+/-22.6% mortality)	Hyalella azteca (amphipod)	JUV	0.338+/-0.133	2.9+/-3.11	Hall et al. 1992
0.285	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (15.3+/-11.0% mortality)	Hyalella azteca (amphipod)	JUV	0.648+/-0.641	1.74+/-1.39	Hall et al. 1992
0.285	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29.8+/-11.1% mortality)	Streblospio benedicti (polychaete worm)		0.316+/-0.12	2.13+/-2.46	Hall et al. 1992
0.285	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1% mortality)	Streblospio benedicti (polychaete worm)		1.38	3.25	Hall et al. 1992
0.285	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (55.0+/-19.5% mortality)	Streblospio benedicti (polychaete worm)		0.349+/-0.11	1.07+/-0.66	Hall et al. 1992
0.285	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (16.5+/-9.19% mortality)	Streblospio benedicti (polychaete worm)		0.783+/-0.845	4.83+/-2.23	Hall et al. 1992
0.285	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.367+/-0.085 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
0.285	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.0005 mg/day growth)	Streblospio benedicti (polychaete worm)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
0.285	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.003 mg/day growth)	Lepidactylus dytiscus (amphipod)		1.38	3.25	Hall et al. 1992
0.285	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.003+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.316+/-0.120	2.13+/-2.46	Hall et al. 1992
0.285	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29% mortality)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
0.285	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (7.2+/-1.92% mortality)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
0.285	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (89.7% reburial)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
0.285	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.6+/-0.55% reburial)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
0.285	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
0.285	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
0.285	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	6.41	Hall et al. 1992
0.285	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
0.285	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
0.285	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.001+/-0.001 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.555+/-0.471	2.68+/-2.3	Hall et al. 1992
0.285	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1.83+/-1.6% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
0.285	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (3.5+/-1.87% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992

Table 39. A summary of the available data on the biological effects associated with sediment-sorbed HEPTACHLOR EPOXIDE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Heptachlor Epoxide Std Dev		Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.285		NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (45.5+/-12% mortality)	Lepidactylus dytiscus (amphipod)		0.383+/-0.279	3.61+/-2.79	Hall et al. 1992
0.285		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (9.25+/-5.32% mortality)	Lepidactylus dytiscus (amphipod)		0.638+/-0.768	1.65+/-1.62	Hall et al. 1992
0.285		NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (63.0+/-24.3% mortality)	Hyalella azteca (amphipod)	JUV	0.317+/-0.228	2.57+/-2.67	Hall et al. 1992
0.285		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (22.3+/-7.37% mortality)	Hyalella azteca (amphipod)	JUV	0.788+/-0.866	2.04+/-1.75	Hall et al. 1992
0.285		NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (22% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
0.285		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (8.8+/-7.12% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
0.285		NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (28% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
0.285		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (14+/-9.22% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
0.285		NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (82.9% reburial)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
0.285		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.1+/-0.865% reburial)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
0.285		NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>20% emergence)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
0.285		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<20% emergence)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
0.285		NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	5.58	Hall et al. 1992
0.285		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
0.285		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (-0.057+/-0.04 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
0.285		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.001mg/day growth)	Streblospio benedicti (polychaete worm)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
0.285		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.016 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
0.285		NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.008+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.4	Hall et al. 1992
0.285		NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.003 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
0.285		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.005+/-0.0004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
0.285	+/-0.165	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.014+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.51+/-0.45	29.6+/-15.7	Bricker et al. 1993
0.3		*	New York State	EqPA		New York State Sediment Criteria Value			1		Newell 1989
0.303	+/-0.208	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.016+/-0.007 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.26+/-0.936	43.4+/-35.6	Bricker et al. 1993
0.35	+/-0.354	NE	Tampa Bay, FL	COA	1-h	Least toxic (79.4+/-9.9% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.45+/-0.587		Long 1993
0.426	+/-0.339	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (51.3+/-6.95% mortality)	Mulinia lateralis (bivalve)	LAR	1.8+/-1.71	29.6+/-46.3	Bricker et al. 1993
0.426	+/-0.339	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (88.5+/-8.39% normal development)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.05	38.1+/-38.9	Bricker et al. 1993
0.447	+/-0.298	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (91.5+/-7.28% normal development)	Mulinia lateralis (bivalve)	LAR	2.6+/-0.899	36.8+/-34.9	Bricker et al. 1993
0.478	+/-0.351	*	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (96+/-1.66% normal development)	Mulinia lateralis (bivalve)	LAR	2.52+/-0.997	35+/-42.9	Bricker et al. 1993
0.515	+/-0.87	NE	Galveston Bay, TX	COA	10-d	Not significantly toxic (1.35+/-1.45% mortality)	Ampelisca abdita (amphipod)		0.961+/-0.537	1.17+/-0.640	EMAP Louisiana Province 1991
0.625	+/-0.565	NE	Tampa Bay, FL	COA	10-d	Not significantly toxic (14.6+/-7.67% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.63+/-0.596		Long 1993
0.66	+/-1	*	Galveston Bay, TX	COA		Significantly toxic (13.4+/-9.11% mortality)	Mysidopsis bahia (mysid shrimp)		0.778+/-0.482	1.21+/-0.778	EMAP Louisiana Province 1991
0.727	+/-0.261	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (5.8+/-3.7% mortality)	Rhepoxynius abronius (amphipod)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
0.727	+/-0.261	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (3.4+/-1.82% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
0.727	+/-0.261	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (11.2+/-3.7% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
0.727	+/-0.261	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (3.52+/-1.66% mortality)	Macoma nasuta (clam)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
0.81	+/-.53	NE	Oakland Harbor, CA	COA	10-d	Significantly toxic (35.3+/-2.5% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.56+/-0.07		Word et al. 1988
0.844	+/-0.988	NE	Tampa Bay, FL	COA		Not significantly toxic (EC50; 0.066+/-0.033 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.89+/-0.902		Long 1993
1		NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (0% mortality)	Arbacia punctulata (sea urchin)		0.03	19 ug/g	Windom In Prep
1.07	+/-0.751	*	Tampa Bay, FL	COA	1-h	Moderately toxic (15.3+/-10.6% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.94+/-0.908		Long 1993

Table 39. A summary of the available data on the biological effects associated with sediment-sorbed HEPTACHLOR EPOXIDE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Heptachlor Epoxide				Analysis	Test			Life			
Std Dev		Hit	Area	Type	Type	End-Point Measured	Species	Stage	TOC (%)	AVS (umol/g)	Reference
1.16	+/-0.048	NE	Brunswick Harbor Entrance, GA	COA	48-h	Not significantly toxic (86.6+/-4.25% normal development)	Arbacia punctulata (sea urchin)		0.181+/-0.162	182+/-208 ug/g	Windom In Prep
1.29	+/-0.215	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (27.5+/-10.6% mortality)	Mysidopsis bahia (mysid)		0.237+/-0.311	74.6+/-85.5 ug/g	Windom In Prep
1.4		NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (18% mortality)	Ampelisca abdita (amphipod)		0.028	9 ug/g	Windom In Prep
1.55	+/-0.415	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (10.6+/-3.17% mortality)	Ampelisca abdita (amphipod)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
1.55	+/-0.415	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (8.00+/-2.92% mortality)	Mysidopsis bahia (mysid)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
1.59	+/-0.444	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (5.43+/-3.21% mortality)	Mysidopsis bahia (mysid)		1.21+/-1.13	9096+/-13378 ug/g	Windom In Prep
1.59	+/-0.444	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (9.61+/-2.7% mortality)	Menidia beryllina (silverside)		1.22+/-1.13	9172+/-13363 ug/g	Windom In Prep
1.7		SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (16% mortality)	Mysidopsis bahia (mysid)		1.8	7095 ug/g	Windom In Prep
1.7		SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (22.3% mortality)	Menidia beryllina (silverside)		1.71	6562 ug/g	Windom In Prep
1.86	+/-0.268	SG	Brunswick Harbor Entrance, GA	COA	48-h	Significantly toxic (14.6+/-18.9% normal development)	Arbacia punctulata (sea urchin)		1.99+/-0.562	14009+/-13434 ug/g	Windom In Prep
2.12	+/-1.75	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (9.78+/-5.33% mortality)	Mysidopsis bahia (mysid)		0.24+/-0.247	91.9+/-73.4 ug/g	Windom In Prep
2.21	+/-1.85	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (11.6+/-4.33% mortality)	Ampelisca abdita (amphipod)		0.267+/-0.25	102+/-71.1 ug/g	Windom In Prep
2.23	+/-1.84	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (4+/-2.83% mortality)	Menidia beryllina (silverside)		0.243+/-0.264	90.5+/-78.4 ug/g	Windom In Prep
2.33	+/-1.97	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (91.3+/-2.91% normal development)	Arbacia punctulata (sea urchin)		0.299+/-0.251	114+/-68.4 ug/g	Windom In Prep
2.55	+/-2.06	*	Savannah River Entrance Channel, GA	COA	48-h	Significantly toxic (25.4+/-7.66% mortality)	Arbacia punctulata (sea urchin)		0.344+/-0.242	129.5+/-59.3 ug/g	Windom In Prep
3.78	+/-2.45	*	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (28.3+/-6.11% mortality)	Mysidopsis bahia (mysid)		0.246+/-0.051	127+/-24 ug/g	Windom In Prep
4.69	+/-7.37	*	Tampa Bay, FL	COA	1-h	Most toxic (0.091+/-0.187% fertilization)	Arbacia punctulata (sea urchin)	GAM	2.96+/-1.49		Long 1993
6.31	+/-8.16	*	Tampa Bay, FL	COA	10-d	Significantly toxic (35.2+/-17.5% mortality)	Ampelisca abdita (amphipod)	SUB ADT	3.53+/-1.35		Long 1993
6.84	+/-8.64	*	Tampa Bay, FL	COA		Significantly toxic (EC50; 0.017+/-0.012 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.47+/-1.49		Long 1993
<50		NE	Georgetown Harbor, SC	COA		Not toxic (species richness or abundance)	Benthic species		0.12		Van Dolah et al. 1984

Table 40. A summary of the available data on the biological effects associated with sediment-sorbed LINDANE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Lindane	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.01		NC	Apalachee Bay, FL	COA	10-d	Significantly toxic (15.6% mortality)	Ampelisca abdita (amphipod)		0.438+/-0.442	0.421+/-0.593	EMAP Louisiana Province 1991
0.03	+/-0.026	NE	Mobile Bay, AL	COA		Not significantly toxic (1.07+/-1.85% mortality)	Mysidopsis bahia (mysid shrimp)		0.968+/-0.815	8.23+/-3.4	EMAP Louisiana Province 1991
0.04	+/-0.028	NE	Mobile Bay, AL	COA	10-d	Not significantly toxic (0.5+/-0.778% mortality)	Ampelisca abdita (amphipod)		1.24+/-0.948	8.51+/-4.76	EMAP Louisiana Province 1991
0.055	+/-0.052	NE	Apalachee Bay, FL	COA		Not significantly toxic (0.75+/-1.5% mortality)	Mysidopsis bahia (mysid shrimp)		0.540+/-0.385	0.405+/-0.417	EMAP Louisiana Province 1991
0.055	+/-0.064	SG	Mobile Bay, AL	COA	10-d	Significantly toxic (46+/-49.3% mortality)	Ampelisca abdita (amphipod)		0.22+/-0.298	3.84+/-5.43	EMAP Louisiana Province 1991
0.093	+/-0.015	NC	Mississippi Sound, MS	COA		Significantly toxic (12.2+/-4.42% mortality)	Mysidopsis bahia (mysid shrimp)		0.939+/-0.335	2.63+/-2.3	EMAP Louisiana Province 1991
0.093	+/-0.015	NE	Matagorda Bay, TX	COA		Not significantly toxic (1.58+/-1.82% mortality)	Mysidopsis bahia (mysid shrimp)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
0.093	+/-0.015	NE	Matagorda Bay, TX	COA	10-d	Not significantly toxic (2.33+/-4.65% mortality)	Ampelisca abdita (amphipod)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
0.097	+/-0.009	NE	Mississippi Sound, MS	COA	10-d	Not significantly toxic (1.4+/-1.73% mortality)	Ampelisca abdita (amphipod)		0.998+/-0.602	2.01+/-1.82	EMAP Louisiana Province 1991
0.1		*	Mobile Bay, AL	COA		Significantly toxic (10% mortality)	Mysidopsis bahia (mysid shrimp)		0.009	0.004	EMAP Louisiana Province 1991
0.1		NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (91.5+/-7.28% normal development)	Mulinia lateralis (bivalve)	LAR	2.6+/-0.899	36.8+/-34.9	Bricker et al. 1993
0.1		NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (51.3+/-6.95% mortality)	Mulinia lateralis (bivalve)	LAR	1.8+/-1.71	29.6+/-46.3	Bricker et al. 1993
0.1		NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (88.5+/-8.39% normal development)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.05	38.1+/-38.9	Bricker et al. 1993
0.1		NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (96+/-1.66% normal development)	Mulinia lateralis (bivalve)	LAR	2.52+/-0.997	35+/-42.9	Bricker et al. 1993
0.1		NC	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.008+/-0.001 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.19+/-1.27	12+/-11.3	Bricker et al. 1993
0.1		NE	San Francisco Bay, CA	COA	48-h	Least toxic (23.3+/-7.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
0.1		NE	San Francisco Bay, CA	COA	48-h	Not significantly toxic (31.9+/-15.5% abnormal)	Bivalve	LAR			Long & Morgan 1990
0.1		NE	San Francisco Bay, CA	COA	10-d	Not significantly toxic (18.4+/-6.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
0.1		NE	San Francisco Bay, CA	COA	10-d	Least toxic (18+/-6.6% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
0.1		NE	Matagorda Ship Channel, TX	COA	10-d	Not toxic (7.2+/-2.77% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1985a
0.1		NE	Matagorda Ship Channel, TX	COA	10-d	Not toxic (10.6+/-5.18% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1985a
0.1		NE	Matagorda Ship Channel, TX	COA	10-d	Not toxic (0.2+/-0.447% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1985a
0.1		NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (21.5+/-6.36% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.35+/-1.05	10.5+/-13.4	Bricker et al. 1993
0.1		NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (19.3+/-5.86% mortality)	Ampelisca abidta (amphipod)	SUB ADT	1.82+/-0.225	6.3+/-6.2	Bricker et al. 1993
0.1		NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (23+/-4.24% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.46+/-1.22	40+/-55.1	Bricker et al. 1993
0.1		NE	Apalachee Bay, FL	COA	10-d	Not significantly toxic (3.3+/-3.25% mortality)	Ampelisca abdita (amphipod)		0.643+/-0.455	0.390+/-0.410	EMAP Louisiana Province 1991
0.1		NE	Chandeleur Sound, LA	COA		Not significantly toxic (1.03+/-2.05% mortality)	Mysidopsis bahia (mysid shrimp)		0.824+/-0.915	1.69+/-0.920	EMAP Louisiana Province 1991
0.1		NE	Chandeleur Sound, LA	COA	10-d	Not significantly toxic (2.87+/-4.05% mortality)	Ampelisca abdita (amphipod)		0.517+/-0.166	2.02+/-1.38	EMAP Louisiana Province 1991
0.1		NE	Galveston Bay, TX	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		0.934+/-0.657	0.457+/-0.530	EMAP Louisiana Province 1991
0.1		NE	Galveston Bay, TX	COA	10-d	Not significantly toxic (1.35+/-1.45% mortality)	Ampelisca abdita (amphipod)		0.961+/-0.537	1.17+/-0.640	EMAP Louisiana Province 1991
0.1		NE	Mississippi River, MS, LA	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		1.3+/-0.83	1.14+/-1	EMAP Louisiana Province 1991
0.1		NE	Mississippi River, MS, LA	COA	10-d	Not significantly toxic (7.8+/-1.63% mortality)	Ampelisca abdita (amphipod)		1.15+/-1.04	2.31+/-0.651	EMAP Louisiana Province 1991
0.1		NE	Mississippi Sound, MS	COA		Not significantly toxic (0.789+/-1.59% mortality)	Mysidopsis bahia (mysid shrimp)		0.827+/-0.757	1.46+/-1.58	EMAP Louisiana Province 1991
0.1		NG	Chandeleur Sound, LA	COA		Significantly toxic (7.6+/-1.32% mortality)	Mysidopsis bahia (mysid shrimp)		0.624+/-0.197	2.07+/-1.19	EMAP Louisiana Province 1991
0.1		NG	Chandeleur Sound, LA	COA	10-d	Significantly toxic (11.5+/-4.86% mortality)	Ampelisca abdita (amphipod)		0.811+/-0.711	1.87+/-0.973	EMAP Louisiana Province 1991
0.1		NG	Galveston Bay, TX	COA		Significantly toxic (13.4+/-9.11% mortality)	Mysidopsis bahia (mysid shrimp)		0.778+/-0.482	1.21+/-0.778	EMAP Louisiana Province 1991
0.1		NG	Galveston Bay, TX	COA	10-d	Significantly toxic (15.8+/-3.89% mortality)	Ampelisca abdita (amphipod)		0.647+/-0.606	0.160+/-0.184	EMAP Louisiana Province 1991
0.1		NG	Mississippi River, MS, LA	COA		Significantly toxic (32.9+/-36.4% mortality)	Mysidopsis bahia (mysid shrimp)		1.07+/-0.924	1.41+/-1.93	EMAP Louisiana Province 1991
0.1		NG	Mississippi River, MS, LA	COA	10-d	Significantly toxic (15.9+/-6.65% mortality)	Ampelisca abdita (amphipod)		1.22+/-0.717	0.235+/-0.276	EMAP Louisiana Province 1991
0.1		SG	Mississippi Sound, MS	COA	10-d	Significantly toxic (11.6+/-3.39% mortality)	Ampelisca abdita (amphipod)		0.111+/-0.045	0.03	EMAP Louisiana Province 1991

Table 40. A summary of the available data on the biological effects associated with sediment-sorbed LINDANE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Lindane	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.141	+/-0.116	NC	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.016+/-0.007 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.26+/-0.936	43.4+/-35.6	Bricker et al. 1993
0.175	+/-0.16	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-6.07% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.71+/-0.9	15.3+/-23.2	Bricker et al. 1993
0.185	+/-0.198	NC	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (30.5+/-16.4% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.62+/-0.777	17.7+/-26.3	Bricker et al. 1993
0.195	+/-0.194	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (12.3+/-14.5% mortality)	Mulinia lateralis (bivalve)	LAR	1.53+/-0.743	15.7+/-23.2	Bricker et al. 1993
0.195	+/-0.194	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99.3+/-0.827% normal development)	Mulinia lateralis (bivalve)	LAR	1.43+/-0.738	14.7+/-24	Bricker et al. 1993
0.197	+/-0.29	NC	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.014+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.51+/-0.45	29.6+/-15.7	Bricker et al. 1993
0.203	+/-0.207	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.074+/-0.043 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.27+/-0.626	6.21+/-5.41	Bricker et al. 1993
0.21	+/-0.244	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.096+/-0.101 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.37+/-0.759	6.93+/-6.83	Bricker et al. 1993
0.212	+/-0.237	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (15.2+/-9.21% mortality)	Mulinia lateralis (bivalve)	LAR	2.17+/-0.663	18.4+/-19.9	Bricker et al. 1993
0.217	+/-0.285	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (17+/-16.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.99+/-1	21.6+/-24.5	Bricker et al. 1993
0.224	+/-0.329	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.1+/-13.3% mortality)	Mulinia lateralis (bivalve)	LAR	2.68+/-0.955	31.8+/-24.4	Bricker et al. 1993
0.225	+/-0.247	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (6.48+/-10.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
0.225	+/-0.247	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99+/-0.862% normal development)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
0.225	+/-0.196	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-7.99% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.14+/-0.352	6.09+/-5.38	Bricker et al. 1993
0.225	+/-0.332	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.013+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.79+/-0.744	37.6+/-25.3	Bricker et al. 1993
0.229	+/-0.304	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.1+/-2.78% normal development)	Mulinia lateralis (bivalve)	LAR	2.12+/-1.04	22.9+/-23.7	Bricker et al. 1993
0.242	+/-0.377	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (75.1+/-10.6% mortality)	Mulinia lateralis (bivalve)	LAR	3.32+/-0.317	42.3+/-19.2	Bricker et al. 1993
0.243	+/-0.329	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (34.9+/-15.7% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.23+/-1.04	25.4+/-25.5	Bricker et al. 1993
0.25		NE	Freeport Harbor, TX	COA	10-d	Not toxic (2+/-1% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1985b
0.25		NE	Freeport Harbor, TX	COA	10-d	Not toxic (9.6+/-4.22% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1985b
0.25		NE	Freeport Harbor, TX	COA	10-d	Not toxic (0% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1985b
0.252	+/-0.921	NE	Narragansett Bay, RI	COA	10-d	Not significantly toxic (5.28+/-3.04% mortality))	Ampelisca abdita (amphipod)	ADT			Munns et al. 1991
0.253	+/-0.3	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.3+/-2.22% normal development)	Mulinia lateralis (bivalve)	LAR	2.18+/-0.531	19.1+/-12.5	Bricker et al. 1993
0.26	+/-0.274	*	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (25.9+/-5.01% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.21+/-0.444	2.41+/-2.32	Bricker et al. 1993
0.26	+/-0.274	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.125+/-0.084 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.25+/-0.468	1.98+/-2.25	Bricker et al. 1993
0.274	+/-0.389	SG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.5+/-11.4% mortality)	Mulinia lateralis (bivalve)	LAR	2.33+/-0.364	26.8+/-9.42	Bricker et al. 1993
0.287	+/-0.29	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.061+/-0.038 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.8+/-0.477	8.52+/-10.7	Bricker et al. 1993
0.298	+/-0.432	NC	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.011+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.28+/-0.363	45.3+/-21.4	Bricker et al. 1993
0.3	+/-0.7	*	San Francisco Bay, CA	COA	48-h	Significantly toxic (55.7+/-22.7% abnormal)	Bivalve	LAR			Long & Morgan 1990
0.308		NC	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (55.0+/-22.6% mortality)	Hyalella azteca (amphipod)	JUV	0.338+/-0.133	2.9+/-3.11	Hall et al. 1992
0.308		NC	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29.8+/-11.1% mortality)	Streblospio benedicti (polychaete worm)		0.316+/-0.12	2.13+/-2.46	Hall et al. 1992
0.308		NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (55.0+/-19.5% mortality)	Streblospio benedicti (polychaete worm)		0.349+/-0.11	1.07+/-0.66	Hall et al. 1992
0.308		NC	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29% mortality)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
0.308		NC	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (89.7% reburial)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
0.308		NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
0.308		NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	6.41	Hall et al. 1992
0.308		NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
0.308		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.003+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.316+/-0.120	2.13+/-2.46	Hall et al. 1992
0.308		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1.83+/-1.6% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
0.308		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (3.5+/-1.87% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992

Table 40. A summary of the available data on the biological effects associated with sediment-sorbed LINDANE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Lindane	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.308		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (9.25+/-5.32% mortality)	Lepidactylus dytiscus (amphipod)		0.638+/-0.768	1.65+/-1.62	Hall et al. 1992
0.308		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (22.3+/-7.37% mortality)	Hyalella azteca (amphipod)	JUV	0.788+/-0.866	2.04+/-1.75	Hall et al. 1992
0.308		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (8.8+/-7.12% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
0.308		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (14+/-9.22% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
0.308		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.1+/-0.865% reburial)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
0.308		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<20% emergence)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
0.308		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
0.308		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (-0.057+/-0.04 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
0.308		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.001mg/day growth)	Streblospio benedicti (polychaete worm)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
0.308		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.016 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
0.308		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.005+/-0.0004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
0.308		NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (45.5+/-12% mortality)	Lepidactylus dytiscus (amphipod)		0.383+/-0.279	3.61+/-2.79	Hall et al. 1992
0.308		NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (63.0+/-24.3% mortality)	Hyalella azteca (amphipod)	JUV	0.317+/-0.228	2.57+/-2.67	Hall et al. 1992
0.308		NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (22% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
0.308		NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (28% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
0.308		NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (82.9% reburial)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
0.308		NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>20% emergence)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
0.308		NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	5.58	Hall et al. 1992
0.308		NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.008+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.4	Hall et al. 1992
0.308		NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.003 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
0.314	+/-0.113	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (5.8+/-3.7% mortality)	Rhepoxynius abronius (amphipod)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
0.314	+/-0.113	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (3.4+/-1.82% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
0.314	+/-0.113	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (11.2+/-3.7% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
0.314	+/-0.113	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (3.52+/-1.66% mortality)	Macoma nasuta (clam)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
0.322			***TEL***								
0.33	+/-0.65	*	San Francisco Bay, CA	COA	10-d	Significantly toxic (42.9+/-19.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
0.349	+/-0.356	*	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (39.5+/-18.2% mortality)	Ampelisca abidta (amphipod)	SUB ADT	2.06+/-0.523	20.1+/-13.9	Bricker et al. 1993
0.359	+/-0.425	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (96.6+/-3.79% normal development)	Mulinia lateralis (bivalve)	LAR	2.87+/-0.94	35.1+/-25.9	Bricker et al. 1993
0.386	+/-0.439	*	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (38+/-13% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.92+/-0.937	34.6+/-23.9	Bricker et al. 1993
0.393	+/-0.208	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (0.33+/-0.516% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
0.393	+/-0.208	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (2.33+/-1.03% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
0.393	+/-0.21	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.367+/-0.085 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
0.393	+/-0.21	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.0005 mg/day growth)	Streblospio benedicti (polychaete worm)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
0.4	+/-0.7	*	San Francisco Bay, CA	COA	48-h	Moderately toxic (59.4+/-11.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
0.41	+/-0.23	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (7.2+/-1.92% mortality)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
0.41	+/-0.23	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.6+/-0.55% reburial)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
0.41	+/-0.23	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
0.41	+/-0.23	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
0.41	+/-0.23	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.001+/-0.001 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.555+/-0.471	2.68+/-2.3	Hall et al. 1992
0.417	+/-0.449	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (29.8+/-13.9% mortality)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.07	32.1+/-28.4	Bricker et al. 1993

Table 40. A summary of the available data on the biological effects associated with sediment-sorbed LINDANE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Lindane	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.478	+/-0.29	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (15.3+/-11.0% mortality)	Hyalella azteca (amphipod)	JUV	0.648+/-0.641	1.74+/-1.39	Hall et al. 1992
0.5		NC	Puget Sound, WA	COA	2-d	Significantly toxic (3.8% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.5		Pastorok & Becker 1990
0.517	+/-0.185	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (13.8+/-4.09% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.47+/-0.306		Pastorok & Becker 1990
0.553	+/-0.379	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.167+/-0.198 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.59+/-1.09	4.67+/-6.99	Bricker et al. 1993
0.558	+/-0.22	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (6.67+/-8.07% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.51+/-0.330		Pastorok & Becker 1990
0.563	+/-0.36	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (16.5+/-9.19% mortality)	Streblospio benedicti (polychaete worm)		0.783+/-0.845	4.83+/-2.23	Hall et al. 1992
0.567	+/-0.549	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (4.8+/-2.28% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1983a
0.567	+/-0.549	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (15.8+/-4.21% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1983a
0.567	+/-0.549	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (1.2+/-.447% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1983a
0.6	+/-0.8	*	San Francisco Bay, CA	COA	10-d	Highly toxic (67+/-11.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
0.6	+/-0.324	NE	Puget Sound, WA	COA	20-d	Not significantly toxic (5+/-3.86% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.46+/-0.26		Pastorok & Becker 1990
0.61	+/-0.375	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (1.8+/-1.79% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1983b
0.617	+/-0.375	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (6+/-2.35% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1983b
0.617	+/-0.375	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (2.6+/-2.97% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1983b
0.633	+/-0.262	NE	Puget Sound, WA	COA	15-min	Not significantly toxic (EC50; 0.283+/-0.168% extract)	Microtox (Photobacterium phosphoreum)		1.39+/-0.37		Pastorok & Becker 1990
0.654	+/-0.387	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (4.43+/-2.1% mortality)	Panope generosa (geoduck)	JUV	1.51+/-0.261		Pastorok & Becker 1990
0.7		*	Northern California	AETA	10-d	Northern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
0.7		*	California	AETA	10-d	California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
0.771	+/-0.555	SG	Puget Sound, WA	COA	15-min	Significantly toxic (EC50; 0.065+/-0.043% extract)	Microtox (Photobacterium phosphoreum)		1.58+/-0.255		Pastorok & Becker 1990
0.808	+/-0.555	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (2.09+/-1.73% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.56+/-0.329		Pastorok & Becker 1990
0.817		*	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.003 mg/day growth)	Lepidactylus dytiscus (amphipod)		1.38	3.25	Hall et al. 1992
0.817		NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1% mortality)	Streblospio benedicti (polychaete worm)		1.38	3.25	Hall et al. 1992
0.867	+/-0.618	SG	Puget Sound, WA	COA	2-d	Significantly toxic (60.4+/-46.5% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.57+/-0.287		Pastorok & Becker 1990
0.99			***PEL***								
1		NC	Tampa Bay, FL	COA	1-h	Moderately toxic (15.3+/-10.6% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.94+/-0.908		Long 1993
1		NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (18% mortality)	Ampelisca abdita (amphipod)		0.028	9 ug/g	Windom In Prep
1		NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (0% mortality)	Arbacia punctulata (sea urchin)		0.03	19 ug/g	Windom In Prep
1.08	+/-0.665	*	Puget Sound, WA	COA	10-d	Significantly toxic (80.8+/-30.6% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.266		Pastorok & Becker 1990
1.16	+/-0.072	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (28.3+/-6.11% mortality)	Mysidopsis bahia (mysid)		0.246+/-0.051	127+/-24 ug/g	Windom In Prep
1.16	+/-0.048	NE	Brunswick Harbor Entrance, GA	COA	48-h	Not significantly toxic (86.6+/-4.25% normal development)	Arbacia punctulata (sea urchin)		0.181+/-0.162	182+/-208 ug/g	Windom In Prep
1.2	+/-0.193	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (9.78+/-5.33% mortality)	Mysidopsis bahia (mysid)		0.24+/-0.247	91.9+/-73.4 ug/g	Windom In Prep
1.2	+/-0.206	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (4+/-2.83% mortality)	Menidia beryllina (silverside)		0.243+/-0.264	90.5+/-78.4 ug/g	Windom In Prep
1.2	+/-0.191	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (91.3+/-2.91% normal development)	Arbacia punctulata (sea urchin)		0.299+/-0.251	114+/-68.4 ug/g	Windom In Prep
1.23	+/-0.19	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (11.6+/-4.33% mortality)	Ampelisca abdita (amphipod)		0.267+/-0.25	102+/-71.1 ug/g	Windom In Prep
1.23	+/-0.236	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (27.5+/-10.6% mortality)	Mysidopsis bahia (mysid)		0.237+/-0.311	74.6+/-85.5 ug/g	Windom In Prep
1.24	+/-0.184	SG	Savannah River Entrance Channel, GA	COA	48-h	Significantly toxic (25.4+/-7.66% mortality)	Arbacia punctulata (sea urchin)		0.344+/-0.242	129.5+/-59.3 ug/g	Windom In Prep
1.3		*	California	AETA	48-h	California AET Values	Mytilus edulis (bivalve)	LAR			Becker et al. 1990
1.3		*	California	AETA		California AET Values	Benthic species				Becker et al. 1990
>1.3		-	Northern California	AETA		Northern California AET Values	Benthic species				Becker et al. 1990
1.32	+/-0.791	*	Puget Sound, WA	COA	20-d	Significantly toxic (37.3+/-22% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.87+/-0.208		Pastorok & Becker 1990

Table 40. A summary of the available data on the biological effects associated with sediment-sorbed LINDANE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Lindane Std Dev		Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
1.55	+/-0.415	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (10.6+/-3.17% mortality)	Ampelisca abdita (amphipod)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
1.55	+/-0.415	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (8.00+/-2.92% mortality)	Mysidopsis bahia (mysid)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
1.59	+/-0.444	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (5.43+/-3.21% mortality)	Mysidopsis bahia (mysid)		1.21+/-1.13	9096+/-13378 ug/g	Windom In Prep
1.59	+/-0.444	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (9.61+/-2.7% mortality)	Menidia beryllina (silverside)		1.22+/-1.13	9172+/-13363 ug/g	Windom In Prep
1.7		SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (16% mortality)	Mysidopsis bahia (mysid)		1.8	7095 ug/g	Windom In Prep
1.7		SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (22.3% mortality)	Menidia beryllina (silverside)		1.71	6562 ug/g	Windom In Prep
1.7	+/-1.09	NE	Tampa Bay, FL	COA		Not significantly toxic (EC50; 0.066+/-0.033 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.89+/-0.902		Long 1993
1.79	+/-1.13	NE	Tampa Bay, FL	COA	10-d	Not significantly toxic (14.6+/-7.67% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.63+/-0.596		Long 1993
1.86	+/-0.268	SG	Brunswick Harbor Entrance, GA	COA	48-h	Significantly toxic (14.6+/-18.9% normal development)	Arbacia punctulata (sea urchin)		1.99+/-0.562	14009+/-13434 ug/g	Windom In Prep
2		*	Puget Sound, WA	COA	10-d	Significantly toxic (56% mortality)	Panope generosa (geoduck)	JUV	2.1		Pastorok & Becker 1990
2.5		NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (9+/-1.73% mortality)	Nereis virens (polychaetes)	ADT			EG&G Bionomics 1980
2.5		NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (13+/- 3.61% mortality)	Penaeus duorarum (pink shrimp)	ADT			EG&G Bionomics 1980
2.5		NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (11.3+/-3.21% mortality)	Crassostrea virginica (oyster)	ADT			EG&G Bionomics 1980
2.85	+/-1.91	NE	Tampa Bay, FL	COA	1-h	Least toxic (79.4+/-9.9% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.45+/-0.587		Long 1993
3		*	United States	EqPA		Chronic Marine EqP Threshold	Aquatic biota		1		Bolton et al. 1985
3.1		*	United States	EqPA		Chronic Marine Sediment Safe Level Criteria					Pavlou 1987
5		NE	Puget Sound, WA	AETA		PSDDA Screening level concentration	Aquatic biota				USACOE 1988
20.1	+/-47.6	*	Tampa Bay, FL	COA	1-h	Most toxic (0.091+/-0.187% fertilization)	Arbacia punctulata (sea urchin)	GAM	2.96+/-1.49		Long 1993
26.9	+/-55.1	*	Tampa Bay, FL	COA	10-d	Significantly toxic (35.2+/-17.5% mortality)	Ampelisca abdita (amphipod)	SUB ADT	3.53+/-1.35		Long 1993
30.6	+/-58.5	*	Tampa Bay, FL	COA		Significantly toxic (EC50; 0.017+/-0.012 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.47+/-1.49		Long 1993
<50		NE	Georgetown Harbor, SC	COA		Not toxic (species richness or abundance)	Benthic species		0.12		Van Dolah et al. 1984
900	+/-86	NE	Galveston Harbor, TX	COA	10-d	Not toxic (2.4+/-1.52% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Grieco 1984
900	+/-86	NE	Galveston Harbor, TX	COA	10-d	Not toxic (0% mortality)	Mercenaria mercenaria (hard clams)	ADT			Grieco 1984
900	+/-86	NE	Galveston Harbor, TX	COA	10-d	Not toxic (2.8+/-2.17% mortality)	Nereis virens (sandworm)	ADT			Grieco 1984

Table 41. A summary of the available data on the biological effects associated with sediment-sorbed MIREX (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Mirex Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.005	NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (9+/-1.73% mortality)	Nereis virens (polychaetes)	ADT			EG&G Bionomics 1980
0.005	NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (13+/- 3.61% mortality)	Penaeus duorarum (pink shrimp)	ADT			EG&G Bionomics 1980
0.005	NE	Pensacola Harbor & Bay, FL	COA	10-d	Not significantly toxic (11.3+/-3.21% mortality)	Crassostrea virginica (oyster)	ADT			EG&G Bionomics 1980
0.085	NE	Apalachee Bay, FL	COA		Not significantly toxic (0.75+/-1.5% mortality)	Mysidopsis bahia (mysid shrimp)		0.540+/-0.385	0.405+/-0.417	EMAP Louisiana Province 1991
0.085	NG	Apalachee Bay, FL	COA	10-d	Significantly toxic (15.6% mortality)	Ampelisca abdita (amphipod)		0.438+/-0.442	0.421+/-0.593	EMAP Louisiana Province 1991
0.085	NE	Apalachee Bay, FL	COA	10-d	Not significantly toxic (3.3+/-3.25% mortality)	Ampelisca abdita (amphipod)		0.643+/-0.455	0.390+/-0.410	EMAP Louisiana Province 1991
0.085	NE	Chandeleur Sound, LA	COA		Not significantly toxic (1.03+/-2.05% mortality)	Mysidopsis bahia (mysid shrimp)		0.824+/-0.915	1.69+/-0.920	EMAP Louisiana Province 1991
0.085	NG	Chandeleur Sound, LA	COA		Significantly toxic (7.6+/-1.32% mortality)	Mysidopsis bahia (mysid shrimp)		0.624+/-0.197	2.07+/-1.19	EMAP Louisiana Province 1991
0.085	NE	Chandeleur Sound, LA	COA	10-d	Not significantly toxic (2.87+/-4.05% mortality)	Ampelisca abdita (amphipod)		0.517+/-0.166	2.02+/-1.38	EMAP Louisiana Province 1991
0.085	NG	Chandeleur Sound, LA	COA	10-d	Significantly toxic (11.5+/-4.86% mortality)	Ampelisca abdita (amphipod)		0.811+/-0.711	1.87+/-0.973	EMAP Louisiana Province 1991
0.085	NE	Galveston Bay, TX	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		0.934+/-0.657	0.457+/-0.530	EMAP Louisiana Province 1991
0.085	NG	Galveston Bay, TX	COA		Significantly toxic (13.4+/-9.11% mortality)	Mysidopsis bahia (mysid shrimp)		0.778+/-0.482	1.21+/-0.778	EMAP Louisiana Province 1991
0.085	NE	Galveston Bay, TX	COA	10-d	Not significantly toxic (1.35+/-1.45% mortality)	Ampelisca abdita (amphipod)		0.961+/-0.537	1.17+/-0.640	EMAP Louisiana Province 1991
0.085	NG	Galveston Bay, TX	COA	10-d	Significantly toxic (15.8+/-3.89% mortality)	Ampelisca abdita (amphipod)		0.647+/-0.606	0.160+/-0.184	EMAP Louisiana Province 1991
0.085	NE	Matagorda Bay, TX	COA		Not significantly toxic (1.58+/-1.82% mortality)	Mysidopsis bahia (mysid shrimp)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
0.085	NE	Matagorda Bay, TX	COA	10-d	Not significantly toxic (2.33+/-4.65% mortality)	Ampelisca abdita (amphipod)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
0.085	NE	Mississippi River, MS, LA	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		1.3+/-0.83	1.14+/-1	EMAP Louisiana Province 1991
0.085	NG	Mississippi River, MS, LA	COA		Significantly toxic (32.9+/-36.4% mortality)	Mysidopsis bahia (mysid shrimp)		1.07+/-0.924	1.41+/-1.93	EMAP Louisiana Province 1991
0.085	NE	Mississippi River, MS, LA	COA	10-d	Not significantly toxic (7.8+/-1.63% mortality)	Ampelisca abdita (amphipod)		1.15+/-1.04	2.31+/-0.651	EMAP Louisiana Province 1991
0.085	NG	Mississippi River, MS, LA	COA	10-d	Significantly toxic (15.9+/-6.65% mortality)	Ampelisca abdita (amphipod)		1.22+/-0.717	0.235+/-0.276	EMAP Louisiana Province 1991
0.085	NE	Mississippi Sound, MS	COA		Not significantly toxic (0.789+/-1.59% mortality)	Mysidopsis bahia (mysid shrimp)		0.827+/-0.757	1.46+/-1.58	EMAP Louisiana Province 1991
0.085	NG	Mississippi Sound, MS	COA		Significantly toxic (12.2+/-4.42% mortality)	Mysidopsis bahia (mysid shrimp)		0.939+/-0.335	2.63+/-2.3	EMAP Louisiana Province 1991
0.085	NE	Mississippi Sound, MS	COA	10-d	Not significantly toxic (1.4+/-1.73% mortality)	Ampelisca abdita (amphipod)		0.998+/-0.602	2.01+/-1.82	EMAP Louisiana Province 1991
0.085	NG	Mississippi Sound, MS	COA	10-d	Significantly toxic (11.6+/-3.39% mortality)	Ampelisca abdita (amphipod)		0.111+/-0.045	0.03	EMAP Louisiana Province 1991
0.085	NE	Mobile Bay, AL	COA		Not significantly toxic (1.07+/-1.85% mortality)	Mysidopsis bahia (mysid shrimp)		0.968+/-0.815	8.23+/-3.4	EMAP Louisiana Province 1991
0.085	NG	Mobile Bay, AL	COA		Significantly toxic (10% mortality)	Mysidopsis bahia (mysid shrimp)		0.009	0.004	EMAP Louisiana Province 1991
0.085	NE	Mobile Bay, AL	COA	10-d	Not significantly toxic (0.5+/-0.778% mortality)	Ampelisca abdita (amphipod)		1.24+/-0.948	8.51+/-4.76	EMAP Louisiana Province 1991
0.085	NG	Mobile Bay, AL	COA	10-d	Significantly toxic (46+/-49.3% mortality)	Ampelisca abdita (amphipod)		0.22+/-0.298	3.84+/-5.43	EMAP Louisiana Province 1991
0.245	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-6.07% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.71+/-0.9	15.3+/-23.2	Bricker et al. 1993
0.245	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (91.5+/-7.28% normal development)	Mulinia lateralis (bivalve)	LAR	2.6+/-0.899	36.8+/-34.9	Bricker et al. 1993
0.245	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (21.5+/-6.36% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.35+/-1.05	10.5+/-13.4	Bricker et al. 1993
0.245	NG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (25.9+/-5.01% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.21+/-0.444	2.41+/-2.32	Bricker et al. 1993
0.245	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (6.48+/-10.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
0.245	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99+/-0.862% normal development)	Mulinia lateralis (bivalve)	LAR	1.46+/-0.733	4.2+/-6.27	Bricker et al. 1993
0.245	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (17.2+/-7.99% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.14+/-0.352	6.09+/-5.38	Bricker et al. 1993

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Mirex Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.245	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (12.3+/-14.5% mortality)	Mulinia lateralis (bivalve)	LAR	1.53+/-0.743	15.7+/-23.2	Bricker et al. 1993
0.245	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (88.5+/-8.39% normal development)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.05	38.1+/-38.9	Bricker et al. 1993
0.245	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (19.3+/-5.86% mortality)	Ampelisca abidta (amphipod)	SUB ADT	1.82+/-0.225	6.3+/-6.2	Bricker et al. 1993
0.245	NG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (39.5+/-18.2% mortality)	Ampelisca abidta (amphipod)	SUB ADT	2.06+/-0.523	20.1+/-13.9	Bricker et al. 1993
0.245	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (15.2+/-9.21% mortality)	Mulinia lateralis (bivalve)	LAR	2.17+/-0.663	18.4+/-19.9	Bricker et al. 1993
0.245	NG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.5+/-11.4% mortality)	Mulinia lateralis (bivalve)	LAR	2.33+/-0.364	26.8+/-9.42	Bricker et al. 1993
0.245	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.3+/-2.22% normal development)	Mulinia lateralis (bivalve)	LAR	2.18+/-0.531	19.1+/-12.5	Bricker et al. 1993
0.245	NG	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (96+/-1.66% normal development)	Mulinia lateralis (bivalve)	LAR	2.52+/-0.997	35+/-42.9	Bricker et al. 1993
0.245	NE	Long Island Sound, NY, CT	COA	10-d	Not significantly toxic (23+/-4.24% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.46+/-1.22	40+/-55.1	Bricker et al. 1993
0.245	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (75.1+/-10.6% mortality)	Mulinia lateralis (bivalve)	LAR	3.32+/-0.317	42.3+/-19.2	Bricker et al. 1993
0.245	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.061+/-0.038 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.8+/-0.477	8.52+/-10.7	Bricker et al. 1993
0.245	NG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.014+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.51+/-0.45	29.6+/-15.7	Bricker et al. 1993
0.245	NC	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.016+/-0.007 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.26+/-0.936	43.4+/-35.6	Bricker et al. 1993
0.245	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.125+/-0.084 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.25+/-0.468	1.98+/-2.25	Bricker et al. 1993
0.245	NG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.008+/-0.001 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.19+/-1.27	12+/-11.3	Bricker et al. 1993
0.364 +/-0.581	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (99.3+/-0.827% normal development)	Mulinia lateralis (bivalve)	LAR	1.43+/-0.738	14.7+/-24	Bricker et al. 1993
0.39 +/-0.83	SG	San Francisco Bay, CA	COA	10-d	Significantly toxic (42.9+/-19.2% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
0.395 +/-0.653	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.074+/-0.043 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.27+/-0.626	6.21+/-5.41	Bricker et al. 1993
0.4 +/-0.8	SG	San Francisco Bay, CA	COA	48-h	Significantly toxic (55.7+/-22.7% abnormal)	Bivalve	LAR			Long & Morgan 1990
0.403 +/-0.671	SG	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (30.5+/-16.4% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.62+/-0.777	17.7+/-26.3	Bricker et al. 1993
0.435 +/-0.735	NC	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (68.1+/-13.3% mortality)	Mulinia lateralis (bivalve)	LAR	2.68+/-0.955	31.8+/-24.4	Bricker et al. 1993
0.5 +/-0.9	SG	San Francisco Bay, CA	COA	48-h	Moderately toxic (59.4+/-11.3% abnormal)	Bivalve	LAR			Long & Morgan 1990
0.5	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (0.33+/-0.516% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
0.5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (2.33+/-1.03% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
0.5	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (55.0+/-22.6% mortality)	Hyalella azteca (amphipod)	JUV	0.338+/-0.133	2.9+/-3.11	Hall et al. 1992
0.5	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (15.3+/-11.0% mortality)	Hyalella azteca (amphipod)	JUV	0.648+/-0.641	1.74+/-1.39	Hall et al. 1992
0.5	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29.8+/-11.1% mortality)	Streblospio benedicti (polychaete worm)		0.316+/-0.12	2.13+/-2.46	Hall et al. 1992
0.5	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1% mortality)	Streblospio benedicti (polychaete worm)		1.38	3.25	Hall et al. 1992
0.5	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (55.0+/-19.5% mortality)	Streblospio benedicti (polychaete worm)		0.349+/-0.11	1.07+/-0.66	Hall et al. 1992
0.5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (16.5+/-9.19% mortality)	Streblospio benedicti (polychaete worm)		0.783+/-0.845	4.83+/-2.23	Hall et al. 1992
0.5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.367+/-0.085 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
0.5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.0005 mg/day growth)	Streblospio benedicti (polychaete worm)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
0.5	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.003 mg/day growth)	Lepidactylus dytiscus (amphipod)		1.38	3.25	Hall et al. 1992
0.5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.003+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.316+/-0.120	2.13+/-2.46	Hall et al. 1992
0.5	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29% mortality)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992

Table 41. A summary of the available data on the biological effects associated with sediment-sorbed MIREX (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Mirex Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.5	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (7.2+/-1.92% mortality)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
0.5	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (89.7% reburial)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
0.5	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.6+/-0.55% reburial)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
0.5	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
0.5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
0.5	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	6.41	Hall et al. 1992
0.5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
0.5	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
0.5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.001+/-0.001 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.555+/-0.471	2.68+/-2.3	Hall et al. 1992
0.5	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1.83+/-1.6% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
0.5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (3.5+/-1.87% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
0.5	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (45.5+/-12% mortality)	Lepidactylus dytiscus (amphipod)		0.383+/-0.279	3.61+/-2.79	Hall et al. 1992
0.5	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (9.25+/-5.32% mortality)	Lepidactylus dytiscus (amphipod)		0.638+/-0.768	1.65+/-1.62	Hall et al. 1992
0.5	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (63.0+/-24.3% mortality)	Hyalella azteca (amphipod)	JUV	0.317+/-0.228	2.57+/-2.67	Hall et al. 1992
0.5	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (22.3+/-7.37% mortality)	Hyalella azteca (amphipod)	JUV	0.788+/-0.866	2.04+/-1.75	Hall et al. 1992
0.5	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (22% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
0.5	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (8.8+/-7.12% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
0.5	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (28% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
0.5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (14+/-9.22% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
0.5	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (82.9% reburial)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
0.5	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.1+/-0.865% reburial)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
0.5	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>20% emergence)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
0.5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<20% emergence)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
0.5	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	5.58	Hall et al. 1992
0.5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
0.5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (-0.057+/-0.04 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
0.5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.001mg/day growth)	Streblospio benedicti (polychaete worm)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
0.5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.016 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
0.5	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.008+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.4	Hall et al. 1992
0.5	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.003 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
0.5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.005+/-0.0004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
0.5	NG	Tampa Bay, FL	COA	10-d	Significantly toxic (35.2+/-17.5% mortality)	Ampelisca abdita (amphipod)	SUB ADT	3.53+/-1.35		Long 1993
0.5	NE	Tampa Bay, FL	COA	10-d	Not significantly toxic (14.6+/-7.67% mortality)	Ampelisca abdita (amphipod)	SUB ADT	1.63+/-0.596		Long 1993
0.5	NG	Tampa Bay, FL	COA	1-h	Most toxic (0.091+/-0.187% fertilization)	Arbacia punctulata (sea urchin)	GAM	2.96+/-1.49		Long 1993
0.5	NG	Tampa Bay, FL	COA	1-h	Moderately toxic (15.3+/-10.6% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.94+/-0.908		Long 1993

Table 41. A summary of the available data on the biological effects associated with sediment-sorbed MIREX (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Mirex Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.5	NE	Tampa Bay, FL	COA	1-h	Least toxic (79.4+/-9.9% fertilization)	Arbacia punctulata (sea urchin)	GAM	1.45+/-0.587		Long 1993
0.5	NG	Tampa Bay, FL	COA		Significantly toxic (EC50; 0.017+/-0.012 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.47+/-1.49		Long 1993
0.5	NE	Tampa Bay, FL	COA		Not significantly toxic (EC50; 0.066+/-0.033 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.89+/-0.902		Long 1993
0.506 +/-0.801	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.096+/-0.101 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.37+/-0.759	6.93+/-6.83	Bricker et al. 1993
0.7 +/-1.1	SG	San Francisco Bay, CA	COA	10-d	Highly toxic (67+/-11.8% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
0.832 +/-3.54	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (98.1+/-2.78% normal development)	Mulinia lateralis (bivalve)	LAR	2.12+/-1.04	22.9+/-23.7	Bricker et al. 1993
0.895 +/-3.87	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (17+/-16.1% mortality)	Mulinia lateralis (bivalve)	LAR	1.99+/-1	21.6+/-24.5	Bricker et al. 1993
0.969 +/-3.93	*	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (34.9+/-15.7% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.23+/-1.04	25.4+/-25.5	Bricker et al. 1993
1.01 +/-4.52	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.013+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		2.79+/-0.744	37.6+/-25.3	Bricker et al. 1993
1.14 +/-1.34	NE	Long Island Sound, NY, CT	COA		Not significantly toxic (EC50; 0.167+/-0.198 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		1.59+/-1.09	4.67+/-6.99	Bricker et al. 1993
1.19 +/-1.64	*	Long Island Sound, NY, CT	COA	48-h	Significantly toxic (51.3+/-6.95% mortality)	Mulinia lateralis (bivalve)	LAR	1.8+/-1.71	29.6+/-46.3	Bricker et al. 1993
1.73 +/-5.83	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (96.6+/-3.79% normal development)	Mulinia lateralis (bivalve)	LAR	2.87+/-0.94	35.1+/-25.9	Bricker et al. 1993
1.89 +/-6.12	*	Long Island Sound, NY, CT	COA	10-d	Significantly toxic (38+/-13% mortality)	Ampelisca abdita (amphipod)	SUB ADT	2.92+/-0.937	34.6+/-23.9	Bricker et al. 1993
1.92 +/-6.68	SG	Long Island Sound, NY, CT	COA		Significantly toxic (EC50; 0.011+/-0.006 mg dry wt/ml)	Microtox (Photobacterium phosphoreum)		3.28+/-0.363	45.3+/-21.4	Bricker et al. 1993
2.47 +/-7.11	NE	Long Island Sound, NY, CT	COA	48-h	Not significantly toxic (29.8+/-13.9% mortality)	Mulinia lateralis (bivalve)	LAR	2.65+/-1.07	32.1+/-28.4	Bricker et al. 1993

Table 42. A summary of the available data on the biological effects associated with sediment-sorbed TOXAPHENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Toxaphene Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.001	*	United States	EqPA		99% Chronic Marine Criteria	Aquatic organisms		1		Pavlou et al. 1987
0.002	*	United States	EqPA		95% Chronic Marine Criteria	Aquatic organisms		1		Pavlou et al. 1987
0.051 +/-0.264	NE	Narragansett Bay, RI	COA	10-d	Not significantly toxic (5.28+/-3.04% mortality))	Ampelisca abdita (amphipod)	ADT			Munns et al. 1991
0.1	NE	San Francisco Bay, CA	COA	10-d	Moderately toxic (33.8+/-4.7% mortality)	Rhepoxynius abronius (amphipod)	ADT			Long & Morgan 1990
0.1	NE	Matagorda Ship Channel, TX	COA	10-d	Not toxic (7.2+/-2.77% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1985a
0.1	NE	Matagorda Ship Channel, TX	COA	10-d	Not toxic (10.6+/-5.18% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1985a
0.1	NE	Matagorda Ship Channel, TX	COA	10-d	Not toxic (0.2+/-0.447% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1985a
0.1	*	New York State	EqPA		New York State Sediment Criteria Value			1		Newell 1989
5	NE	Freeport Harbor, TX	COA	10-d	Not toxic (2+/-1% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1985b
5	NE	Freeport Harbor, TX	COA	10-d	Not toxic (9.6+/-4.22% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1985b
5	NE	Freeport Harbor, TX	COA	10-d	Not toxic (0% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1985b
5	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (4.8+/-2.28% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1983a
5	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (15.8+/-4.21% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1983a
5	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (1.2+/-.447% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1983a
5	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (6+/-2.35% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Espey, Huston & Associates 1983b
5	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (2.6+/-2.97% mortality)	Nereis virens (sandworm)	ADT			Espey, Huston & Associates 1983b
5	NE	Sabine-Neches Waterway, TX	COA	10-d	Not toxic (1.8+/-1.79% mortality)	Mercenaria mercenaria (hard clams)	ADT			Espey, Huston & Associates 1983b
5	*	United States	EqPA		Chronic Marine EqP Threshold	Aquatic biota		1		Bolton et al. 1985
5	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (0.33+/-0.516% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (2.33+/-1.03% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
5	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (55.0+/-22.6% mortality)	Hyalella azteca (amphipod)	JUV	0.338+/-0.133	2.9+/-3.11	Hall et al. 1992
5	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (15.3+/-11.0% mortality)	Hyalella azteca (amphipod)	JUV	0.648+/-0.641	1.74+/-1.39	Hall et al. 1992
5	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29.8+/-11.1% mortality)	Streblospio benedicti (polychaete worm)		0.316+/-0.12	2.13+/-2.46	Hall et al. 1992
5	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1% mortality)	Streblospio benedicti (polychaete worm)		1.38	3.25	Hall et al. 1992
5	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (55.0+/-19.5% mortality)	Streblospio benedicti (polychaete worm)		0.349+/-0.11	1.07+/-0.66	Hall et al. 1992
5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (16.5+/-9.19% mortality)	Streblospio benedicti (polychaete worm)		0.783+/-0.845	4.83+/-2.23	Hall et al. 1992
5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.367+/-0.085 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.0005 mg/day growth)	Streblospio benedicti (polychaete worm)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
5	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.003 mg/day growth)	Lepidactylus dytiscus (amphipod)		1.38	3.25	Hall et al. 1992
5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.003+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.316+/-0.120	2.13+/-2.46	Hall et al. 1992
5	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29% mortality)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
5	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (7.2+/-1.92% mortality)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
5	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (89.7% reburial)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
5	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.6+/-0.55% reburial)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
5	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
5	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	6.41	Hall et al. 1992
5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
5	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992

Table 42. A summary of the available data on the biological effects associated with sediment-sorbed TOXAPHENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Toxaphene Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.001+/-0.001 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.555+/-0.471	2.68+/-2.3	Hall et al. 1992
5	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1.83+/-1.6% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (3.5+/-1.87% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
5	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (45.5+/-12% mortality)	Lepidactylus dytiscus (amphipod)		0.383+/-0.279	3.61+/-2.79	Hall et al. 1992
5	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (9.25+/-5.32% mortality)	Lepidactylus dytiscus (amphipod)		0.638+/-0.768	1.65+/-1.62	Hall et al. 1992
5	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (63.0+/-24.3% mortality)	Hyalella azteca (amphipod)	JUV	0.317+/-0.228	2.57+/-2.67	Hall et al. 1992
5	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (22.3+/-7.37% mortality)	Hyalella azteca (amphipod)	JUV	0.788+/-0.866	2.04+/-1.75	Hall et al. 1992
5	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (22% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
5	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (8.8+/-7.12% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
5	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (28% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (14+/-9.22% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
5	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (82.9% reburial)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
5	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.1+/-0.865% reburial)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
5	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>20% emergence)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<20% emergence)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
5	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	5.58	Hall et al. 1992
5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (-0.057+/-0.04 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.001mg/day growth)	Streblospio benedicti (polychaete worm)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.016 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
5	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.008+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.4	Hall et al. 1992
5	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.003 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
5	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.005+/-0.0004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
5	NG	Galveston Bay, TX	COA	1-h	Toxic (20.4+/-18.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	1.26+/-0.47	14.6+/-10.1	Carr 1992
5	NE	Galveston Bay, TX	COA	1-h	Not toxic (92.5+/-6.9% fertilization)	Arbacia punctulata (sea urchin)	EMB	0.77+/-0.448	6.37+/-6.58	Carr 1992
5	NG	Galveston Bay, TX	COA	48-h	Toxic (4.65+/-16.1% normal development)	Arbacia punctulata (sea urchin)	EMB	1.06+/-0.449	14.5+/-9.2	Carr 1992
5	NE	Galveston Bay, TX	COA	48-h	Not toxic (98.1+/-1.79% normal development)	Arbacia punctulata (sea urchin)	EMB	.748+/-0.476	4.16+/-3.45	Carr 1992
5	NG	Galveston Bay, TX	COA		Low species richness (10+/-3.73 S/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
5	NE	Galveston Bay, TX	COA		High species richness (24.5+/-3.7 S/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
5	NG	Galveston Bay, TX	COA		Low abundance (89+/-60.7 N/0.00203 sq.m.)	Benthic species		0.795+/-0.425	8.56+/-8.14	Carr 1992
5	NE	Galveston Bay, TX	COA		High abundance (359+/-92.8 N/0.00203 sq.m.)	Benthic species		1.36+/-0.66	1.2+/-0.39	Carr 1992
5	NG	Galveston Bay, TX	COA		Low abundance (41.7+/-21.8 N/0.00203 sq.m.)	Polychaeta		0.848+/-0.427	9.21+/-8.61	Carr 1992
5	NE	Galveston Bay, TX	COA		High abundance (156+/-22.9 N/0.00203 sq.m.)	Polychaeta		0.916+/-0.661	2.94+/-2.3	Carr 1992
5	NG	Galveston Bay, TX	COA		Low abundance (4.21+/-5.66 N/0.00203 sq.m.)	Oligochaeta		0.895+/-0.453	7.85+/-8.8	Carr 1992
5	NG	Galveston Bay, TX	COA		Moderate abundance (58.3+/-16.2 N/0.00203 sq.m.)	Oligochaeta		0.632+/-0.274	7.93+/-5.6	Carr 1992
5	NE	Galveston Bay, TX	COA		High abundance (155+/-49.5 N/0.00203 sq.m.)	Oligochaeta		1.2+/-1.27	4.27+/-3.85	Carr 1992
5	NG	Galveston Bay, TX	COA		Low abundance (1.86+/-2.59 N/0.00203 sq.m.)	Mollusca		0.784+/-0.421	8.29+/-8.13	Carr 1992
5	NE	Galveston Bay, TX	COA		High abundance (27.3+/-10 N/0.00203 sq.m.)	Mollusca		1.64+/-0.4	1.39+/-0.17	Carr 1992
5	NG	Galveston Bay, TX	COA		Low abundance (0.3+/-0.651 N/0.00203 sq.m.)	Amphipoda		0.859+/-0.487	7.67+/-8.12	Carr 1992

Table 42. A summary of the available data on the biological effects associated with sediment-sorbed TOXAPHENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Toxaphene Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
5	NE	Galveston Bay, TX	COA		High Abundance (6+/-1.41 N/0.00203 sq.m.)	Amphipoda		0.955+/-0.629	7.21+/-8.2	Carr 1992
5	NG	Galveston Bay, TX	COA		Low abundance (2.05+/-1.58 N/0.00203 sq.m.)	Copepoda		0.879+/-0.47	9.63+/-9.65	Carr 1992
5	NE	Galveston Bay, TX	COA		High abundance (16.2+/-6.19 N/0.00203 sq.m.)	Copepoda		0.844+/-0.524	4.73+/-3.1	Carr 1992
5	NE	Apalachee Bay, FL	COA		Not significantly toxic (0.75+/-1.5% mortality)	Mysidopsis bahia (mysid shrimp)		0.540+/-0.385	0.405+/-0.417	EMAP Louisiana Province 1991
5	NG	Apalachee Bay, FL	COA	10-d	Significantly toxic (15.6% mortality)	Ampelisca abdita (amphipod)		0.438+/-0.442	0.421+/-0.593	EMAP Louisiana Province 1991
5	NE	Apalachee Bay, FL	COA	10-d	Not significantly toxic (3.3+/-3.25% mortality)	Ampelisca abdita (amphipod)		0.643+/-0.455	0.390+/-0.410	EMAP Louisiana Province 1991
5	NE	Chandeleur Sound, LA	COA		Not significantly toxic (1.03+/-2.05% mortality)	Mysidopsis bahia (mysid shrimp)		0.824+/-0.915	1.69+/-0.920	EMAP Louisiana Province 1991
5	NG	Chandeleur Sound, LA	COA		Significantly toxic (7.6+/-1.32% mortality)	Mysidopsis bahia (mysid shrimp)		0.624+/-0.197	2.07+/-1.19	EMAP Louisiana Province 1991
5	NE	Chandeleur Sound, LA	COA	10-d	Not significantly toxic (2.87+/-4.05% mortality)	Ampelisca abdita (amphipod)		0.517+/-0.166	2.02+/-1.38	EMAP Louisiana Province 1991
5	NG	Chandeleur Sound, LA	COA	10-d	Significantly toxic (11.5+/-4.86% mortality)	Ampelisca abdita (amphipod)		0.811+/-0.711	1.87+/-0.973	EMAP Louisiana Province 1991
5	NE	Galveston Bay, TX	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		0.934+/-0.657	0.457+/-0.530	EMAP Louisiana Province 1991
5	NG	Galveston Bay, TX	COA		Significantly toxic (13.4+/-9.11% mortality)	Mysidopsis bahia (mysid shrimp)		0.778+/-0.482	1.21+/-0.778	EMAP Louisiana Province 1991
5	NE	Galveston Bay, TX	COA	10-d	Not significantly toxic (1.35+/-1.45% mortality)	Ampelisca abdita (amphipod)		0.961+/-0.537	1.17+/-0.640	EMAP Louisiana Province 1991
5	NG	Galveston Bay, TX	COA	10-d	Significantly toxic (15.8+/-3.89% mortality)	Ampelisca abdita (amphipod)		0.647+/-0.606	0.160+/-0.184	EMAP Louisiana Province 1991
5	NE	Matagorda Bay, TX	COA		Not significantly toxic (1.58+/-1.82% mortality)	Mysidopsis bahia (mysid shrimp)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
5	NE	Matagorda Bay, TX	COA	10-d	Not significantly toxic (2.33+/-4.65% mortality)	Ampelisca abdita (amphipod)		0.944+/-0.540	1.93+/-1.58	EMAP Louisiana Province 1991
5	NE	Mississippi River, MS, LA	COA		Not significantly toxic (0% mortality)	Mysidopsis bahia (mysid shrimp)		1.3+/-0.83	1.14+/-1	EMAP Louisiana Province 1991
5	NG	Mississippi River, MS, LA	COA		Significantly toxic (32.9+/-36.4% mortality)	Mysidopsis bahia (mysid shrimp)		1.07+/-0.924	1.41+/-1.93	EMAP Louisiana Province 1991
5	NE	Mississippi River, MS, LA	COA	10-d	Not significantly toxic (7.8+/-1.63% mortality)	Ampelisca abdita (amphipod)		1.15+/-1.04	2.31+/-0.651	EMAP Louisiana Province 1991
5	NG	Mississippi River, MS, LA	COA	10-d	Significantly toxic (15.9+/-6.65% mortality)	Ampelisca abdita (amphipod)		1.22+/-0.717	0.235+/-0.276	EMAP Louisiana Province 1991
5	NE	Mississippi Sound, MS	COA		Not significantly toxic (0.789+/-1.59% mortality)	Mysidopsis bahia (mysid shrimp)		0.827+/-0.757	1.46+/-1.58	EMAP Louisiana Province 1991
5	NG	Mississippi Sound, MS	COA		Significantly toxic (12.2+/-4.42% mortality)	Mysidopsis bahia (mysid shrimp)		0.939+/-0.335	2.63+/-2.3	EMAP Louisiana Province 1991
5	NE	Mississippi Sound, MS	COA	10-d	Not significantly toxic (1.4+/-1.73% mortality)	Ampelisca abdita (amphipod)		0.998+/-0.602	2.01+/-1.82	EMAP Louisiana Province 1991
5	NG	Mississippi Sound, MS	COA	10-d	Significantly toxic (11.6+/-3.39% mortality)	Ampelisca abdita (amphipod)		0.111+/-0.045	0.03	EMAP Louisiana Province 1991
5	NE	Mobile Bay, AL	COA		Not significantly toxic (1.07+/-1.85% mortality)	Mysidopsis bahia (mysid shrimp)		0.968+/-0.815	8.23+/-3.4	EMAP Louisiana Province 1991
5	NG	Mobile Bay, AL	COA		Significantly toxic (10% mortality)	Mysidopsis bahia (mysid shrimp)		0.009	0.004	EMAP Louisiana Province 1991
5	NE	Mobile Bay, AL	COA	10-d	Not significantly toxic (0.5+/-0.778% mortality)	Ampelisca abdita (amphipod)		1.24+/-0.948	8.51+/-4.76	EMAP Louisiana Province 1991
5	NG	Mobile Bay, AL	COA	10-d	Significantly toxic (46+/-49.3% mortality)	Ampelisca abdita (amphipod)		0.22+/-0.298	3.84+/-5.43	EMAP Louisiana Province 1991
5	NE	Galveston Bay, TX	COA		Low species (11.2+/-1.94 S/0.00203 sq.m.)	Benthic species		0.642+/-0.356	13.4+/-8.65	Carr 1992
5	NG	Galveston Bay, TX	COA		Low abundance (53+/-33.9 N/0.00203 sq.m.)	Benthic invertebrates		0.985+/-0.247	22+/-11.2	Carr 1992
5	NE	Galveston Bay, TX	COA		High abundance (154+/-30.2 N/0.00203 sq.m.)	Benthic invertebrates		0.47+/-0.27	9.07+/-2.94	Carr 1992
25	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (18% mortality)	Ampelisca abdita (amphipod)		0.028	9 ug/g	Windom In Prep
25.5	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (0% mortality)	Arbacia punctulata (sea urchin)		0.03	19 ug/g	Windom In Prep
28.8 +/-1.61	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (28.3+/-6.11% mortality)	Mysidopsis bahia (mysid)		0.246+/-0.051	127+/-24 ug/g	Windom In Prep
30 +/-4.78	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (91.3+/-2.91% normal development)	Arbacia punctulata (sea urchin)		0.299+/-0.251	114+/-68.4 ug/g	Windom In Prep
30.1 +/-4.9	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (9.78+/-5.33% mortality)	Mysidopsis bahia (mysid)		0.24+/-0.247	91.9+/-73.4 ug/g	Windom In Prep
30.2 +/-5.24	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (4+/-2.83% mortality)	Menidia beryllina (silverside)		0.243+/-0.264	90.5+/-78.4 ug/g	Windom In Prep
30.7 +/-4.83	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (11.6+/-4.33% mortality)	Ampelisca abdita (amphipod)		0.267+/-0.25	102+/-71.1 ug/g	Windom In Prep
30.7 +/-6	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (27.5+/-10.6% mortality)	Mysidopsis bahia (mysid)		0.237+/-0.311	74.6+/-85.5 ug/g	Windom In Prep

Table 42. A summary of the available data on the biological effects associated with sediment-sorbed TOXAPHENE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Toxaphene Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
30.8 +/-4.76	SG	Savannah River Entrance Channel, GA	COA	48-h	Significantly toxic (25.4+/-7.66% mortality)	Arbacia punctulata (sea urchin)		0.344+/-0.242	129.5+/-59.3 ug/g	Windom In Prep
31.6 +/-11.3	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (5.8+/-3.7% mortality)	Rhepoxynius abronius (amphipod)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
31.6 +/-11.3	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (3.4+/-1.82% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
31.6 +/-11.3	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (11.2+/-3.7% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
31.6 +/-11.3	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (3.52+/-1.66% mortality)	Macoma nasuta (clam)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
68.8 +/-2.5	NE	Brunswick Harbor Entrance, GA	COA	48-h	Not significantly toxic (86.6+/-4.25% normal development)	Arbacia punctulata (sea urchin)		0.181+/-0.162	182+/-208 ug/g	Windom In Prep
91.1 +/-23.7	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (10.6+/-3.17% mortality)	Ampelisca abdita (amphipod)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
91.1 +/-23.7	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (8.00+/-2.92% mortality)	Mysidopsis bahia (mysid)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
92.9 +/-25.6	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (5.43+/-3.21% mortality)	Mysidopsis bahia (mysid)		1.21+/-1.13	9096+/-13378 ug/g	Windom In Prep
92.9 +/-25.6	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (9.61+/-2.7% mortality)	Menidia beryllina (silverside)		1.22+/-1.13	9172+/-13363 ug/g	Windom In Prep
100	SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (16% mortality)	Mysidopsis bahia (mysid)		1.8	7095 ug/g	Windom In Prep
100	SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (22.3% mortality)	Menidia beryllina (silverside)		1.71	6562 ug/g	Windom In Prep
109 +/-14.7	SG	Brunswick Harbor Entrance, GA	COA	48-h	Significantly toxic (14.6+/-18.9% normal development)	Arbacia punctulata (sea urchin)		1.99+/-0.562	14009+/-13434 ug/g	Windom In Prep
<11683 +/-8787	NE	Galveston Harbor, TX	COA	10-d	Not toxic (2.4+/-1.52% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Grieco 1984
<11683 +/-8787	NE	Galveston Harbor, TX	COA	10-d	Not toxic (0% mortality)	Mercenaria mercenaria (hard clams)	ADT			Grieco 1984
<11683 +/-8787	NE	Galveston Harbor, TX	COA	10-d	Not toxic (2.8+/-2.17% mortality)	Nereis virens (sandworm)	ADT			Grieco 1984

Table 43. A summary of the available data on the biological effects associated with sediment-sorbed PENTACHLOROPHENOL (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Pentachlorophenol Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.233 +/-0.085	NE	Puget Sound, WA	COA	15-min	Not significantly toxic (EC50; 0.283+/-0.168% extract)	Microtox (Photobacterium phosphoreum)		1.39+/-0.37		Pastorok & Becker 1990
0.25	NC	Puget Sound, WA	COA	10-d	Significantly toxic (56% mortality)	Panope generosa (geoduck)	JUV	2.1		Pastorok & Becker 1990
0.25	NC	Puget Sound, WA	COA	2-d	Significantly toxic (3.8% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.5		Pastorok & Becker 1990
0.375 +/-0.314	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (6.67+/-8.07% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.51+/-0.330		Pastorok & Becker 1990
1.74 +/-2.99	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (13.8+/-4.09% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.47+/-0.306		Pastorok & Becker 1990
>9.3	-	Puget Sound, WA	AETA	15-min	1986 Puget Sound AET	Microtox (Photobacterium phosphoreum)		1		Bellar et al. 1986
>9.3	-	Puget Sound, WA	AETA	48-h	1986 Puget Sound AET	Crassostrea gigas (oyster)	LAR	1		Bellar et al. 1986
>9.3	-	Puget Sound, WA	AETA	10-d	1986 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT	1		Bellar et al. 1986
>9.3	-	Puget Sound, WA	AETA		1986 Puget Sound AET	Benthic species		1		Bellar et al. 1986
10	NE	Burrard Inlet, BC	SQO		Sediment Quality Objectives	Aquatic biota				Swain & Nijman 1991
32.1 +/-106	NE	Puget Sound, WA	COA	20-d	Not significantly toxic (5+/-3.86% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.46+/-0.26		Pastorok & Becker 1990
68	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (0.33+/-0.516% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
68	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (2.33+/-1.03% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
68	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (55.0+/-22.6% mortality)	Hyalella azteca (amphipod)	JUV	0.338+/-0.133	2.9+/-3.11	Hall et al. 1992
68	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (15.3+/-11.0% mortality)	Hyalella azteca (amphipod)	JUV	0.648+/-0.641	1.74+/-1.39	Hall et al. 1992
68	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29.8+/-11.1% mortality)	Streblospio benedicti (polychaete worm)		0.316+/-0.12	2.13+/-2.46	Hall et al. 1992
68	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1% mortality)	Streblospio benedicti (polychaete worm)		1.38	3.25	Hall et al. 1992
68	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (55.0+/-19.5% mortality)	Streblospio benedicti (polychaete worm)		0.349+/-0.11	1.07+/-0.66	Hall et al. 1992
68	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (16.5+/-9.19% mortality)	Streblospio benedicti (polychaete worm)		0.783+/-0.845	4.83+/-2.23	Hall et al. 1992
68	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.367+/-0.085 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
68	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.0005 mg/day growth)	Streblospio benedicti (polychaete worm)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
68	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.003 mg/day growth)	Lepidactylus dytiscus (amphipod)		1.38	3.25	Hall et al. 1992
68	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.003+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.316+/-0.120	2.13+/-2.46	Hall et al. 1992
68	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29% mortality)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
68	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (7.2+/-1.92% mortality)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
68	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (89.7% reburial)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
68	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.6+/-0.55% reburial)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
68	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
68	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
68	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	6.41	Hall et al. 1992
68	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
68	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
68	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.001+/-0.001 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.555+/-0.471	2.68+/-2.3	Hall et al. 1992
68	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1.83+/-1.6% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
68	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (3.5+/-1.87% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
68	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (45.5+/-12% mortality)	Lepidactylus dytiscus (amphipod)		0.383+/-0.279	3.61+/-2.79	Hall et al. 1992
68	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (9.25+/-5.32% mortality)	Lepidactylus dytiscus (amphipod)		0.638+/-0.768	1.65+/-1.62	Hall et al. 1992
68	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (63.0+/-24.3% mortality)	Hyalella azteca (amphipod)	JUV	0.317+/-0.228	2.57+/-2.67	Hall et al. 1992
68	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (22.3+/-7.37% mortality)	Hyalella azteca (amphipod)	JUV	0.788+/-0.866	2.04+/-1.75	Hall et al. 1992

Table 43. A summary of the available data on the biological effects associated with sediment-sorbed PENTACHLOROPHENOL (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Pentachlorophenol Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
68	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (22% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
68	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (8.8+/-7.12% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
68	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (28% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
68	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (14+/-9.22% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
68	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (82.9% reburial)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
68	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.1+/-0.865% reburial)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
68	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>20% emergence)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
68	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<20% emergence)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
68	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	5.58	Hall et al. 1992
68	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
68	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (-0.057+/-0.04 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
68	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.001mg/day growth)	Streblospio benedicti (polychaete worm)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
68	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.016 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
68	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.008+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.4	Hall et al. 1992
68	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.003 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
68	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.005+/-0.0004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
91.2 +/-250	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (4.43+/-2.1% mortality)	Panope generosa (geoduck)	JUV	1.51+/-0.261		Pastorok & Becker 1990
106 +/-269	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (2.09+/-1.73% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.56+/-0.329		Pastorok & Becker 1990
106 +/-269	*	Puget Sound, WA	COA	15-min	Significantly toxic (EC50; 0.065+/-0.043% extract)	Microtox (Photobacterium phosphoreum)		1.58+/-0.255		Pastorok & Becker 1990
140	NE	Puget Sound, WA	AETA		PSDDA Screening level concentration	Aquatic biota				USACOE 1988
>140	-	Puget Sound, WA	AETA	48-h	1988 Puget Sound AET	Crassostrea gigas (oyster)	LAR			PTI 1988
142 +/-306	*	Puget Sound, WA	COA	2-d	Significantly toxic (60.4+/-46.5% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.57+/-0.287		Pastorok & Becker 1990
210 +/-364	*	Puget Sound, WA	COA	10-d	Significantly toxic (80.8+/-30.6% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.266		Pastorok & Becker 1990
297 +/-513	*	Puget Sound, WA	COA	20-d	Significantly toxic (37.3+/-22% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.87+/-0.208		Pastorok & Becker 1990
305	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (18% mortality)	Ampelisca abdita (amphipod)		0.028	9 ug/g	Windom In Prep
305	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (0% mortality)	Arbacia punctulata (sea urchin)		0.03	19 ug/g	Windom In Prep
>340	-	California	AETA	10-d	California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
>340	-	Southern California	AETA	10-d	Southern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
345 +/-14.1	NE	Brunswick Harbor Entrance, GA	COA	48-h	Not significantly toxic (86.6+/-4.25% normal development)	Arbacia punctulata (sea urchin)		0.181+/-0.162	182+/-208 ug/g	Windom In Prep
350 +/-13.2	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (28.3+/-6.11% mortality)	Mysidopsis bahia (mysid)		0.246+/-0.051	127+/-24 ug/g	Windom In Prep
360	*	Puget Sound, WA	AETA	10-d	1988 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT			PTI 1988
360	*	Puget Sound, WA	SQG		Chemical Criteria	Benthic community		1		WDE 1989
360 +/-52	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (91.3+/-2.91% normal development)	Arbacia punctulata (sea urchin)		0.299+/-0.251	114+/-68.4 ug/g	Windom In Prep
361 +/-54.1	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (9.78+/-5.33% mortality)	Mysidopsis bahia (mysid)		0.24+/-0.247	91.9+/-73.4 ug/g	Windom In Prep
362 +/-57.8	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (4+/-2.83% mortality)	Menidia beryllina (silverside)		0.243+/-0.264	90.5+/-78.4 ug/g	Windom In Prep
367 +/-67.1	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (27.5+/-10.6% mortality)	Mysidopsis bahia (mysid)		0.237+/-0.311	74.6+/-85.5 ug/g	Windom In Prep
368 +/-53.3	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (11.6+/-4.33% mortality)	Ampelisca abdita (amphipod)		0.267+/-0.25	102+/-71.1 ug/g	Windom In Prep
369 +/-50.3	SG	Savannah River Entrance Channel, GA	COA	48-h	Significantly toxic (25.4+/-7.66% mortality)	Arbacia punctulata (sea urchin)		0.344+/-0.242	129.5+/-59.3 ug/g	Windom In Prep
462 +/-127	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (10.6+/-3.17% mortality)	Ampelisca abdita (amphipod)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep

Table 43. A summary of the available data on the biological effects associated with sediment-sorbed PENTACHLOROPHENOL (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Pentachlorophenol Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
462 +/-127	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (8.00+/-2.92% mortality)	Mysidopsis bahia (mysid)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
474 +/-137	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (5.43+/-3.21% mortality)	Mysidopsis bahia (mysid)		1.21+/-1.13	9096+/-13378 ug/g	Windom In Prep
474 +/-137	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (9.61+/-2.7% mortality)	Menidia beryllina (silverside)		1.22+/-1.13	9172+/-13363 ug/g	Windom In Prep
500	SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (16% mortality)	Mysidopsis bahia (mysid)		1.8	7095 ug/g	Windom In Prep
500	SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (22.3% mortality)	Menidia beryllina (silverside)		1.71	6562 ug/g	Windom In Prep
556 +/-86.2	SG	Brunswick Harbor Entrance, GA	COA	48-h	Significantly toxic (14.6+/-18.9% normal development)	Arbacia punctulata (sea urchin)		1.99+/-0.562	14009+/-13434 ug/g	Windom In Prep
690	*	Puget Sound, WA	AETA		1988 Puget Sound AET	Benthic community				PTI 1988
178032 +/-161240	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (5.8+/-3.7% mortality)	Rhepoxynius abronius (amphipod)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
178032 +/-161240	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (3.4+/-1.82% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
178032 +/-161240	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (11.2+/-3.7% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
178032 +/-161240	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (3.52+/-1.66% mortality)	Macoma nasuta (clam)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992

Table 44. A summary of the available data on the biological effects associated with sediment-sorbed TOTAL 2,3,7,8-T4CDD (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

2,3,7,8-T4CDD	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.00017	+/-0.00002	NE	Brunswick Harbor Entrance, GA	COA	48-h	Not significantly toxic (88.2+/-4.24% normal development)	Arbacia punctulata (sea urchin)		0.127+/-0.127	223+/-292 ug/g	Windom In Prep
0.00039	+/-0.00022	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not significantly toxic (10+/-2.77% mortality)	Menidia berllina (silverside)		1.42+/-1.11	10655+/-13994 ug/g	Windom In Prep
0.000404	+/-0.00023	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not significantly toxic (6.33+/-2.34% mortality)	Mysidopsis bahia (mysid)		1.4+/-1.1	10566+/-14023 ug/g	Windom In Prep
0.000411	+/-0.00021	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (10.1+/-3.53% mortality)	Ampelisca abdita (amphipod)		1.46+/-1.02	10070+/-12868 ug/g	Windom In Prep
0.000411	+/-0.00021	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (8.29+/-3.25% mortality)	Mysidopsis bahia (mysid)		1.46+/-1.02	10070+/-12868 ug/g	Windom In Prep
0.00046		SG	Brunswick Harbor Entrance, GA	COA	96-h	Significantly toxic (16% mortality)	Mysidopsis bahia (mysid)		1.8	7095 ug/g	Windom In Prep
0.00051	+/-0.00016	*	Brunswick Harbor Entrance, GA	COA	48-h	Significantly toxic (14.6+/-18.9% normal development)	Arbacia punctulata (sea urchin)		1.99+/-0.562	14009+/-13434 ug/g	Windom In Prep
0.00055		SG	Brunswick Harbor Entrance, GA	COA	96-h	Significantly toxic (22.3% mortality)	Menidia berllina (silverside)		1.71	6562 ug/g	Windom In Prep
0.00067		NC	Grays Harbor/Chehalis River, WA	COA	96-h	Significantly toxic (53% normal development)	Crassostrea gigas (oyster)	LAR	1.3		Word et al. 1990
0.00175	+/-0.00097	NE	Grays Harbor/Chehalis River, WA	COA	30-d	Not significantly toxic (12.3+/-4.92% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.45+/-0.63		Word et al. 1990
0.00175	+/-0.00097	NE	Grays Harbor/Chehalis River, WA	COA	30-d	Not significantly toxic (4.35+/-3.94% mortality)	Macoma nasuta (clam)	ADT	1.45+/-0.63		Word et al. 1990
0.00175	+/-0.00097	NE	Grays Harbor/Chehalis River, WA	COA	60-d	Not significantly toxic (14.2+/-8.12% mortality)	Macoma nasuta (clam)	ADT	1.45+/-0.63		Word et al. 1990
0.00182	+/-0.00096	NE	Grays Harbor/Chehalis River, WA	COA	96-h	Not significantly toxic (83.6+/-9.96% normal development)	Crassostrea gigas (oyster)	LAR	1.46+/-0.65		Word et al. 1990
0.2	+/-0.035	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (5.8+/-3.7% mortality)	Rhepoxynius abronius (amphipod)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
0.2	+/-0.035	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (3.4+/-1.82% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
0.2	+/-0.035	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (11.2+/-3.7% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
0.2	+/-0.035	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (3.52+/-1.66% mortality)	Macoma nasuta (clam)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
<100		*	New York State	EqPA		New York State Sediment Criteria Value			1		Newell 1989

Table 45. A summary of the available data on the biological effects associated with sediment-sorbed TOTAL 2,3,7,8-T4CDF (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

2,3,78,-T4CDF Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.00019 +/-000006	NE	Brunswick Harbor Entrance, GA	COA	48-h	Not significantly toxic (88.2+/-4.24% normal development)	Arbacia punctulata (sea urchin)		0.127+/-0.127	223+/-292 ug/g	Windom In Prep
0.0012 +/-000087	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not significantly toxic (10+/-2.77% mortality)	Menidia berllina (silverside)		1.42+/-1.11	10655+/-13994 ug/g	Windom In Prep
0.00121 +/-000088	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not significantly toxic (6.33+/-2.34% mortality)	Mysidopsis bahia (mysid)		1.4+/-1.1	10566+/-14023 ug/g	Windom In Prep
0.00124 +/-00008	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (10.1+/-3.53% mortality)	Ampelisca abdita (amphipod)		1.46+/-1.02	10070+/-12868 ug/g	Windom In Prep
0.00124 +/-00008	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (8.29+/-3.25% mortality)	Mysidopsis bahia (mysid)		1.46+/-1.02	10070+/-12868 ug/g	Windom In Prep
0.0014	SG	Brunswick Harbor Entrance, GA	COA	96-h	Significantly toxic (16% mortality)	Mysidopsis bahia (mysid)		1.8	7095 ug/g	Windom In Prep
0.0015	SG	Brunswick Harbor Entrance, GA	COA	96-h	Significantly toxic (22.3% mortality)	Menidia berllina (silverside)		1.71	6562 ug/g	Windom In Prep
0.00166 +/-000044	*	Brunswick Harbor Entrance, GA	COA	48-h	Significantly toxic (14.6+/-18.9% normal development)	Arbacia punctulata (sea urchin)		1.99+/-0.562	14009+/-13434 ug/g	Windom In Prep
0.00213 +/-000167	NE	Grays Harbor/Chehalis River, WA	COA	96-h	Not significantly toxic (83.6+/-9.96% normal development)	Crassostrea gigas (oyster)	LAR	1.46+/-0.65		Word et al. 1990
0.00222 +/-000166	NE	Grays Harbor/Chehalis River, WA	COA	30-d	Not significantly toxic (12.3+/-4.92% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.45+/-0.63		Word et al. 1990
0.00222 +/-000166	NE	Grays Harbor/Chehalis River, WA	COA	30-d	Not significantly toxic (4.35+/-3.94% mortality)	Macoma nasuta (clam)	ADT	1.45+/-0.63		Word et al. 1990
0.00222 +/-000166	NE	Grays Harbor/Chehalis River, WA	COA	60-d	Not significantly toxic (14.2+/-8.12% mortality)	Macoma nasuta (clam)	ADT	1.45+/-0.63		Word et al. 1990
0.0037	SG	Grays Harbor/Chehalis River, WA	COA	96-h	Significantly toxic (53% normal development)	Crassostrea gigas (oyster)	LAR	1.3		Word et al. 1990
0.297 +/-0.125	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (5.8+/-3.7% mortality)	Rhepoxynius abronius (amphipod)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
0.297 +/-0.125	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (3.4+/-1.82% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
0.297 +/-0.125	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (11.2+/-3.7% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
0.297 +/-0.125	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (3.52+/-1.66% mortality)	Macoma nasuta (clam)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992

Table 46. A summary of the available data on the biological effects associated with sediment-sorbed BIS(2-ethylexyl)PHTHALATE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Bis(2-ethylexyl) Phthalate Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
6.25	NC	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (55.0+/-22.6% mortality)	Hyalella azteca (amphipod)	JUV	0.338+/-0.133	2.9+/-3.11	Hall et al. 1992
6.25	NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.003 mg/day growth)	Lepidactylus dytiscus (amphipod)		1.38	3.25	Hall et al. 1992
6.25	NC	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29% mortality)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
6.25	NC	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (89.7% reburial)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
6.25	NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
6.25	NC	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	6.41	Hall et al. 1992
6.25	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1% mortality)	Streblospio benedicti (polychaete worm)		1.38	3.25	Hall et al. 1992
6.25	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (16.5+/-9.19% mortality)	Streblospio benedicti (polychaete worm)		0.783+/-0.845	4.83+/-2.23	Hall et al. 1992
6.25	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.001+/-0.001 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.555+/-0.471	2.68+/-2.3	Hall et al. 1992
6.25	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1.83+/-1.6% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
6.25	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (3.5+/-1.87% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
6.25	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (9.25+/-5.32% mortality)	Lepidactylus dytiscus (amphipod)		0.638+/-0.768	1.65+/-1.62	Hall et al. 1992
6.25	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (22.3+/-7.37% mortality)	Hyalella azteca (amphipod)	JUV	0.788+/-0.866	2.04+/-1.75	Hall et al. 1992
6.25	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (8.8+/-7.12% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
6.25	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (14+/-9.22% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
6.25	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.1+/-0.865% reburial)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
6.25	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<20% emergence)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
6.25	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
6.25	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (-0.057+/-0.04 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
6.25	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.001mg/day growth)	Streblospio benedicti (polychaete worm)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
6.25	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.016 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
6.25	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.005+/-0.0004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
6.25	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (45.5+/-12% mortality)	Lepidactylus dytiscus (amphipod)		0.383+/-0.279	3.61+/-2.79	Hall et al. 1992
6.25	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (63.0+/-24.3% mortality)	Hyalella azteca (amphipod)	JUV	0.317+/-0.228	2.57+/-2.67	Hall et al. 1992
6.25	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (22% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
6.25	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (28% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
6.25	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (82.9% reburial)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
6.25	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>20% emergence)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
6.25	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	5.58	Hall et al. 1992
6.25	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.008+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.4	Hall et al. 1992
6.25	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.003 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
15.9	+/-23.5 NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (0.33+/-0.516% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
15.9	+/-23.5 NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (2.33+/-1.03% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
15.9	+/-23.5 NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.367+/-0.085 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
15.9	+/-23.5 NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.0005 mg/day growth)	Streblospio benedicti (polychaete worm)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
17.8	+/-25.8 *	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29.8+/-11.1% mortality)	Streblospio benedicti (polychaete worm)		0.316+/-0.12	2.13+/-2.46	Hall et al. 1992
17.8	+/-25.8 NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.003+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.316+/-0.120	2.13+/-2.46	Hall et al. 1992
17.8	+/-25.8 NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (7.2+/-1.92% mortality)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992

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Bis(2-ethylexyl) Phthalate Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
17.8 +/-25.8	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.6+/-0.55% reburial)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
17.8 +/-25.8	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
17.8 +/-25.8	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
20.7 +/-28.8	*	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (55.0+/-19.5% mortality)	Streblospio benedicti (polychaete worm)		0.349+/-0.11	1.07+/-0.66	Hall et al. 1992
25.5 +/-33.3	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (15.3+/-11.0% mortality)	Hyalella azteca (amphipod)	JUV	0.648+/-0.641	1.74+/-1.39	Hall et al. 1992
60	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (18% mortality)	Ampelisca abdita (amphipod)		0.028	9 ug/g	Windom In Prep
60	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (0% mortality)	Arbacia punctulata (sea urchin)		0.03	19 ug/g	Windom In Prep
63.9	*	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
67.5 +/-2.89	NE	Brunswick Harbor Entrance, GA	COA	48-h	Not significantly toxic (86.6+/-4.25% normal development)	Arbacia punctulata (sea urchin)		0.181+/-0.162	182+/-208 ug/g	Windom In Prep
68.3 +/-2.89	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (28.3+/-6.11% mortality)	Mysidopsis bahia (mysid)		0.246+/-0.051	127+/-24 ug/g	Windom In Prep
70 +/-9.57	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (91.3+/-2.91% normal development)	Arbacia punctulata (sea urchin)		0.299+/-0.251	114+/-68.4 ug/g	Windom In Prep
70.6 +/-10.4	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (9.78+/-5.33% mortality)	Mysidopsis bahia (mysid)		0.24+/-0.247	91.9+/-73.4 ug/g	Windom In Prep
70.6 +/-11.2	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (4+/-2.83% mortality)	Menidia beryllina (silverside)		0.243+/-0.264	90.5+/-78.4 ug/g	Windom In Prep
71.7 +/-12.9	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (27.5+/-10.6% mortality)	Mysidopsis bahia (mysid)		0.237+/-0.311	74.6+/-85.5 ug/g	Windom In Prep
71.7 +/-9.31	SG	Savannah River Entrance Channel, GA	COA	48-h	Significantly toxic (25.4+/-7.66% mortality)	Arbacia punctulata (sea urchin)		0.344+/-0.242	129.5+/-59.3 ug/g	Windom In Prep
71.9 +/-10.3	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (11.6+/-4.33% mortality)	Ampelisca abdita (amphipod)		0.267+/-0.25	102+/-71.1 ug/g	Windom In Prep
90.6 +/-24.3	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (10.6+/-3.17% mortality)	Ampelisca abdita (amphipod)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
90.6 +/-24.3	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (8.00+/-2.92% mortality)	Mysidopsis bahia (mysid)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
92.9 +/-25.6	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (5.43+/-3.21% mortality)	Mysidopsis bahia (mysid)		1.21+/-1.13	9096+/-13378 ug/g	Windom In Prep
92.9 +/-25.6	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (9.61+/-2.7% mortality)	Menidia beryllina (silverside)		1.22+/-1.13	9172+/-13363 ug/g	Windom In Prep
100	SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (16% mortality)	Mysidopsis bahia (mysid)		1.8	7095 ug/g	Windom In Prep
100	SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (22.3% mortality)	Menidia beryllina (silverside)		1.71	6562 ug/g	Windom In Prep
109 +/-14.7	SG	Brunswick Harbor Entrance, GA	COA	48-h	Significantly toxic (14.6+/-18.9% normal development)	Arbacia punctulata (sea urchin)		1.99+/-0.562	14009+/-13434 ug/g	Windom In Prep
127	*	Puget Sound, WA	AETA	15-min	1986 Puget Sound AET	Microtox (Photobacterium phosphoreum)		1		Bellar et al. 1986
127	*	Puget Sound, WA	AETA	48-h	1986 Puget Sound AET	Crassostrea gigas (oyster)	LAR	1		Bellar et al. 1986
127	*	Puget Sound, WA	AETA		1986 Puget Sound AET	Benthic species		1		Bellar et al. 1986
138	NE	Palos Verdes, CA	COA		High density (4.4 N/0.1 sq.m.)	Echinoderm		0.9		Swartz et al. 1985a
138	NE	Palos Verdes, CA	COA		High density (88 N/0.1 sq.m.)	Foraminifera (sponge)		0.9		Swartz et al. 1985a
138	NE	Palos Verdes, CA	COA		High density (132 N/0.1 sq.m.)	Ophiuroidea (brittle star)		0.9		Swartz et al. 1985a
184		***TEL***								
>207	-	Puget Sound, WA	AETA	10-d	1986 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT	1		Bellar et al. 1986
220 +/-110	NE	Puget Sound, WA	COA	15-min	Not significantly toxic (EC50; 0.283+/-0.168% extract)	Microtox (Photobacterium phosphoreum)		1.39+/-0.37		Pastorok & Becker 1990
277 +/-482	NE	Jetty Island Pier, Everett Marina, WA	COA	10-d	Not toxic (12.3+/-2.87% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.08+/-0.66		Hart Crowser & Associates Inc. 1986
345 +/-49.5	SG	Jetty Island Pier, Everett Marina, WA	COA	10-d	Toxic (19.5+/-0.707% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.15+/-0.071		Hart Crowser & Associates Inc. 1986
399 +/-338	NE	Puget Sound, WA	COA	20-d	Not significantly toxic (5+/-3.86% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.46+/-0.26		Pastorok & Becker 1990
430	NC	Puget Sound, WA	COA	10-d	Significantly toxic (56% mortality)	Panope generosa (geoduck)	JUV	2.1		Pastorok & Becker 1990
440	NE	Palos Verdes, CA	COA		High density (93.4 N/0.1 sq.m.)	Echinoderm		1.3+/-0.77		Swartz et al. 1986
450	NC	Puget Sound, WA	COA	2-d	Significantly toxic (3.8% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.5		Pastorok & Becker 1990

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470	*	Puget Sound, WA	SQG		Chemical Criteria	Benthic community		1		WDE 1989
531	+/-588 NE	Puget Sound, WA	COA	10-d	Not significantly toxic (13.8+/-4.09% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.47+/-0.306		Pastorok & Becker 1990
595	+/-703 NE	Puget Sound, WA	COA	2-d	Not significantly toxic (6.67+/-8.07% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.51+/-0.330		Pastorok & Becker 1990
613	+/-303 NC	Oakland Harbor, CA	COA	10-d	Significantly toxic (35.3+/-2.5% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.56+/-0.07		Word et al. 1988
635	+/-676 NE	Puget Sound, WA	COA	10-d	Not significantly toxic (4.43+/-2.1% mortality)	Panope generosa (geoduck)	JUV	1.51+/-0.261		Pastorok & Becker 1990
639	+/-661 SG	Puget Sound, WA	COA	2-d	Significantly toxic (60.4+/-46.5% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.57+/-0.287		Pastorok & Becker 1990
640	NE	Palos Verdes, CA	COA		High abundance (208 N/0.1 sq.m.)	Echinoderms	VAR			Ferraro et al. 1991
703	+/-709 NE	Puget Sound, WA	COA	2-d	Not significantly toxic (2.09+/-1.73% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.56+/-0.329		Pastorok & Becker 1990
722	+/-696 *	Puget Sound, WA	COA	15-min	Significantly toxic (EC50; 0.065+/-0.043% extract)	Microtox (Photobacterium phosphoreum)		1.58+/-0.255		Pastorok & Becker 1990
738	+/-816 NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (10.4+/-6.3% mortality)	Nephtys caecoides (polychaete)		1.63+/-0.657		Word et al. 1988
738	+/-816 NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (0.2+/-0.6% mortality)	Macoma nasuta (clam)		1.63+/-0.657		Word et al. 1988
757	+/-778 SG	Puget Sound, WA	COA	10-d	Significantly toxic (80.8+/-30.6% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.266		Pastorok & Becker 1990
772	+/-912 NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (23.3+/-6.14% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.738		Word et al. 1988
903	+/-794 NE	Palos Verdes, CA	COA		High density (20.9+/-0.23 N/0.1 sq.m.)	Amphipod		1.7+/-0.61		Swartz et al. 1986
903	+/-794 NE	Palos Verdes, CA	COA		High density (11.2+/-1.64 N/0.1 sq.m.)	Phoxocephalid		1.7+/-0.61		Swartz et al. 1986
1030	+/-552 NE	Palos Verdes, CA	COA		High abundance (54.6+/-5.09 N/0.1 sq.m.)	Amphipods	VAR			Ferraro et al. 1991
1030	+/-552 NE	Palos Verdes, CA	COA		High abundance (30.7+/-0.99 N/0.1 sq.m.)	Phoxocephalids	VAR			Ferraro et al. 1991
1040	+/-846 *	Palos Verdes, CA	COA		Low density (0.03+/-0.08 N/0.1 sq.m.)	Echinoderm		3.53+/-0.742		Swartz et al. 1985a
1300	*	Puget Sound, WA	AETA		1988 Puget Sound AET	Benthic community				PTI 1988
1510	+/-937 *	Puget Sound, WA	COA	20-d	Significantly toxic (37.3+/-22% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.87+/-0.208		Pastorok & Becker 1990
1900	*	Puget Sound, WA	AETA	15-min	1988 Puget Sound AET	Microtox (Photobacterium phosphoreum)				PTI 1988
1900	*	Puget Sound, WA	AETA	48-h	1988 Puget Sound AET	Crassostrea gigas (oyster)	LAR			PTI 1988
2090	+/-266 NE	Palos Verdes, CA	COA		High species richness (80.8+/-13.7 S/0.1 sq.m.)	Macro benthos		2.10+/-1.15		Swartz et al. 1985a
2090	+/-266 NE	Palos Verdes, CA	COA		High density (54.5+/-9.91 N/0.1 sq.m.)	Amphipod		2.1+/-1.15		Swartz et al. 1985a
2090	+/-266 NE	Palos Verdes, CA	COA		High density (34.3+/-5.67 N/0.1 sq.m.)	Phoxocephalid		2.1+/-1.15		Swartz et al. 1985a
2090	+/-266 NE	Palos Verdes, CA	COA		High density (111+/-32 N/0.1 sq.m.)	Crustacea		2.1+/-1.15		Swartz et al. 1985a
>3100	-	Puget Sound, WA	AETA	10-d	1988 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT			PTI 1988
3100	NE	Puget Sound, WA	AETA		PSDDA Screening level concentration	Aquatic biota				USACOE 1988
3367	+/-335 NE	Palos Verdes, CA	COA		High density (594+/-688 N/0.1 sq.m.)	Mollusca		2.53+/-1.27		Swartz et al. 1985a
3367	+/-335 NE	Palos Verdes, CA	COA	10-d	Not significantly toxic (8+/-5.7% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.53+/-1.27		Swartz et al. 1985a
4591		***PEL***								
5060	+/-807 NE	Palos Verdes, CA	COA		High abundance (944+/-101 N/0.1 sq.m.)	Benthic species	VAR			Ferraro et al. 1991
5100	*	California	AETA		California AET Values	Benthic species				Becker et al. 1990
5100	*	Southern California	AETA		Southern California AET Values	Benthic species				Becker et al. 1990
5121	NE	Palos Verdes, CA	COA		High density (2177 N/0.1 sq.m.)	Polychaeta		3.2		Swartz et al. 1985a
5323	+/-389 NE	Palos Verdes, CA	COA		High species richness (70.9+/-16.9 S/0.1 sq.m.)	Benthic species	VAR			Ferraro et al. 1991
5740	+/-564 NE	Palos Verdes, CA	COA	10-d	Not significantly toxic (9.5+/-5.45% mortality)	Rhepoxynius abronius (amphipod)	ADT	2.42+/-0.88		Swartz et al. 1986
6800	+/-560 *	Palos Verdes, CA	COA		Low density (0.2+/-0.14 N/0.1 sq.m.)	Echinoderm		2.64+/-0.77		Swartz et al. 1986

Table 46. A summary of the available data on the biological effects associated with sediment-sorbed BIS(2-ethylexyl)PHTHALATE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Bis(2-ethylexyl) Phthalate	Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
8136	+/-244	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (5.8+/-3.7% mortality)	Rhepoxynius abronius (amphipod)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
8136	+/-244	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (3.4+/-1.82% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
8136	+/-244	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (11.2+/-3.7% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
8136	+/-244	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (3.52+/-1.66% mortality)	Macoma nasuta (clam)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
9210	+/-924	SG	Palos Verdes, CA	COA		Low density (365+/-178 N/0.1 sq.m.)	Polychaeta		3.15+/-1.32		Swartz et al. 1985a
10040	+/-846	*	Palos Verdes, CA	COA		Low density (0.233+/-0.367 N/0.1 sq.m.)	Foraminifera (sponge)		3.53+/-0.742		Swartz et al. 1985a
10040	+/-846	*	Palos Verdes, CA	COA		Low density (0.3+/-0.8 N/0.1 sq.m.)	Ophiuroidea (brittle star)		3.53+/-0.742		Swartz et al. 1985a
10577	+/-296	*	Palos Verdes, CA	COA		Low density (5.3+/-3.7 N/0.1 sq.m.)	Amphipod		3.13+/-0.15		Swartz et al. 1986
10577	+/-296	*	Palos Verdes, CA	COA		Low density (0.13+/-0.23 N/0.1 sq.m.)	Phoxocephalid		3.13+/-0.15		Swartz et al. 1986
10985	+/-164	NE	Palos Verdes, CA	COA	10-d	Not significantly toxic (11.9+/-5.36% mortality)	Rhepoxynius abronius (amphipod)	VAR			Ferraro et al. 1991
12463	+/-171	*	Palos Verdes, CA	COA		Low abundance (2.4+/-5.65 N/0.1 sq.m.)	Echinoderms	VAR			Ferraro et al. 1991
13528	+/-823	*	Palos Verdes, CA	COA		Low species richness (26.0+/-11.5 S/0.1 sq.m.)	Macro benthos		3.95+/-0.238		Swartz et al. 1985a
13528	+/-832	*	Palos Verdes, CA	COA		Low density (1.0+/-1.2 N/0.1 sq.m.)	Amphipod		3.95+/-0.238		Swartz et al. 1985a
13528	+/-823	*	Palos Verdes, CA	COA		Low density (0 N/0.1 sq.m.)	Phoxocephalid		3.95+/-0.238		Swartz et al. 1985a
13528	+/-823	*	Palos Verdes, CA	COA		Low density (8.7+/-6.01 N/0.1 sq.m.)	Crustacea		3.95+/-0.238		Swartz et al. 1985a
14303	+/-180	*	Palos Verdes, CA	COA		Low abundance (13.8+/-11.4 N/0.1 sq.m.)	Amphipods	VAR			Ferraro et al. 1991
14303	+/-180	*	Palos Verdes, CA	COA		Low abundance (5.87+/-7.06 N/0.1 sq.m.)	Phoxocephalids	VAR			Ferraro et al. 1991
14540	+/-207	*	Palos Verdes, CA	COA		Low abundance (415+/-94.4 N/0.1 sq.m.)	Benthic species	VAR			Ferraro et al. 1991
15637	+/-866	*	Palos Verdes, CA	COA		Low density (21.5+/-11.6 N/0.1 sq.m.)	Mollusca		4+/-0.265		Swartz et al. 1985a
15637	+/-866	*	Palos Verdes, CA	COA	10-d	Significantly toxic (21+/-6.3% mortality)	Rhepoxynius abronius (amphipod)	ADT	4+/-0.265		Swartz et al. 1985a
>25000		-	California	AETA	10-d	California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
>25000		-	Southern California	AETA	10-d	Southern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
50620		*	Palos Verdes, CA	COA		Low species richness (19.2 S/0.1 sq.m.)	Benthic species	VAR			Ferraro et al. 1991

Table 47. A summary of the available data on the biological effects associated with sediment-sorbed DIMETHYL PHTHALATE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Dimethyl phthalate Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
0.5	NE	Puget Sound, WA	COA	15-min	Not significantly toxic (EC50; 0.283+/-0.168% extract)	Microtox (Photobacterium phosphoreum)		1.39+/-0.37		Pastorok & Becker 1990
2.5	NC	Puget Sound, WA	COA	10-d	Significantly toxic (56% mortality)	Panope generosa (geoduck)	JUV	2.1		Pastorok & Becker 1990
4.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (0.33+/-0.516% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (2.33+/-1.03% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (55.0+/-22.6% mortality)	Hyalella azteca (amphipod)	JUV	0.338+/-0.133	2.9+/-3.11	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (15.3+/-11.0% mortality)	Hyalella azteca (amphipod)	JUV	0.648+/-0.641	1.74+/-1.39	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29.8+/-11.1% mortality)	Streblospio benedicti (polychaete worm)		0.316+/-0.12	2.13+/-2.46	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1% mortality)	Streblospio benedicti (polychaete worm)		1.38	3.25	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (55.0+/-19.5% mortality)	Streblospio benedicti (polychaete worm)		0.349+/-0.11	1.07+/-0.66	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (16.5+/-9.19% mortality)	Streblospio benedicti (polychaete worm)		0.783+/-0.845	4.83+/-2.23	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.367+/-0.085 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.0005 mg/day growth)	Streblospio benedicti (polychaete worm)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.003 mg/day growth)	Lepidactylus dytiscus (amphipod)		1.38	3.25	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.003+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.316+/-0.120	2.13+/-2.46	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29% mortality)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (7.2+/-1.92% mortality)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (89.7% reburial)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.6+/-0.55% reburial)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	6.41	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.001+/-0.001 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.555+/-0.471	2.68+/-2.3	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1.83+/-1.6% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (3.5+/-1.87% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (45.5+/-12% mortality)	Lepidactylus dytiscus (amphipod)		0.383+/-0.279	3.61+/-2.79	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (9.25+/-5.32% mortality)	Lepidactylus dytiscus (amphipod)		0.638+/-0.768	1.65+/-1.62	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (63.0+/-24.3% mortality)	Hyalella azteca (amphipod)	JUV	0.317+/-0.228	2.57+/-2.67	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (22.3+/-7.37% mortality)	Hyalella azteca (amphipod)	JUV	0.788+/-0.866	2.04+/-1.75	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (22% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (8.8+/-7.12% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (28% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (14+/-9.22% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (82.9% reburial)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.1+/-0.865% reburial)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>20% emergence)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<20% emergence)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	5.58	Hall et al. 1992

Table 47. A summary of the available data on the biological effects associated with sediment-sorbed DIMETHYL PHTHALATE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Dimethyl phthalate Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (-0.057+/-0.04 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.001mg/day growth)	Streblospio benedicti (polychaete worm)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.016 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.008+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.4	Hall et al. 1992
4.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.003 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
4.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.005+/-0.0004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
5	*	Puget Sound, WA	AETA	15-min	1986 Puget Sound AET	Microtox (Photobacterium phosphoreum)		1		Bellar et al. 1986
6.29 +/-10.1	NE	Puget Sound, WA	COA	20-d	Not significantly toxic (5+/-3.86% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.46+/-0.26		Pastorok & Becker 1990
7 +/-12	NC	Puget Sound, WA	COA	10-d	Significantly toxic (80.8+/-30.6% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.266		Pastorok & Becker 1990
8.94 +/-13.6	NC	Puget Sound, WA	COA	2-d	Significantly toxic (60.4+/-46.5% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.57+/-0.287		Pastorok & Becker 1990
11	*	Puget Sound, WA	AETA	48-h	1986 Puget Sound AET	Crassostrea gigas (oyster)	LAR	1		Bellar et al. 1986
11	*	Puget Sound, WA	AETA	10-d	1986 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT	1		Bellar et al. 1986
11	*	Puget Sound, WA	AETA		1986 Puget Sound AET	Benthic species		1		Bellar et al. 1986
14	NC	Puget Sound, WA	COA	2-d	Significantly toxic (3.8% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.5		Pastorok & Becker 1990
15.5 +/-29.5	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (4.43+/-2.1% mortality)	Panope generosa (geoduck)	JUV	1.51+/-0.261		Pastorok & Becker 1990
17 +/-31.6	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (2.09+/-1.73% abnormal chromosome)	Dendraster excentricus (echinoderm)	EMB	1.56+/-0.329		Pastorok & Becker 1990
18.1 +/-31.2	*	Puget Sound, WA	COA	15-min	Significantly toxic (EC50; 0.065+/-0.043% extract)	Microtox (Photobacterium phosphoreum)		1.58+/-0.255		Pastorok & Becker 1990
19.7 +/-35.6	NE	Puget Sound, WA	COA	10-d	Not significantly toxic (13.8+/-4.09% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.47+/-0.306		Pastorok & Becker 1990
23.1 +/-43.1	NE	Puget Sound, WA	COA	2-d	Not significantly toxic (6.67+/-8.07% abnormal development)	Dendraster excentricus (echinoderm)	EMB	1.51+/-0.330		Pastorok & Becker 1990
47.8 +/-55.7	*	Puget Sound, WA	COA	20-d	Significantly toxic (37.3+/-22% mortality)	Neanthes arenaceodentata (polychaete)	EMB	1.87+/-0.208		Pastorok & Becker 1990
60	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (18% mortality)	Ampelisca abdita (amphipod)		0.028	9 ug/g	Windom In Prep
60	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (0% mortality)	Arbacia punctulata (sea urchin)		0.03	19 ug/g	Windom In Prep
67.5 +/-2.89	NE	Brunswick Harbor Entrance, GA	COA	48-h	Not significantly toxic (86.6+/-4.25% normal development)	Arbacia punctulata (sea urchin)		0.181+/-0.162	182+/-208 ug/g	Windom In Prep
68.3 +/-2.89	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (28.3+/-6.11% mortality)	Mysidopsis bahia (mysid)		0.246+/-0.051	127+/-24 ug/g	Windom In Prep
70 +/-9.57	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (91.3+/-2.91% normal development)	Arbacia punctulata (sea urchin)		0.299+/-0.251	114+/-68.4 ug/g	Windom In Prep
70.6 +/-10.4	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (9.78+/-5.33% mortality)	Mysidopsis bahia (mysid)		0.24+/-0.247	91.9+/-73.4 ug/g	Windom In Prep
70.6 +/-11.2	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (4+/-2.83% mortality)	Menidia beryllina (silverside)		0.243+/-0.264	90.5+/-78.4 ug/g	Windom In Prep
71	*	Puget Sound, WA	AETA	15-min	1988 Puget Sound AET	Microtox (Photobacterium phosphoreum)				PTI 1988
71.7 +/-12.9	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (27.5+/-10.6% mortality)	Mysidopsis bahia (mysid)		0.237+/-0.311	74.6+/-85.5 ug/g	Windom In Prep
71.7 +/-9.31	SG	Savannah River Entrance Channel, GA	COA	48-h	Significantly toxic (25.4+/-7.66% mortality)	Arbacia punctulata (sea urchin)		0.344+/-0.242	129.5+/-59.3 ug/g	Windom In Prep
71.9 +/-10.3	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (11.6+/-4.33% mortality)	Ampelisca abdita (amphipod)		0.267+/-0.25	102+/-71.1 ug/g	Windom In Prep
90.6 +/-24.3	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (10.6+/-3.17% mortality)	Ampelisca abdita (amphipod)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
90.6 +/-24.3	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (8.00+/-2.92% mortality)	Mysidopsis bahia (mysid)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
92.9 +/-25.6	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (5.43+/-3.21% mortality)	Mysidopsis bahia (mysid)		1.21+/-1.13	9096+/-13378 ug/g	Windom In Prep
92.9 +/-25.6	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (9.61+/-2.7% mortality)	Menidia beryllina (silverside)		1.22+/-1.13	9172+/-13363 ug/g	Windom In Prep
100	SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (16% mortality)	Mysidopsis bahia (mysid)		1.8	7095 ug/g	Windom In Prep
100	SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (22.3% mortality)	Menidia beryllina (silverside)		1.71	6562 ug/g	Windom In Prep
109 +/-14.7	SG	Brunswick Harbor Entrance, GA	COA	48-h	Significantly toxic (14.6+/-18.9% normal development)	Arbacia punctulata (sea urchin)		1.99+/-0.562	14009+/-13434 ug/g	Windom In Prep

Table 47. A summary of the available data on the biological effects associated with sediment-sorbed DIMETHYL PHTHALATE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Dimethyl phthalate Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
160	*	Puget Sound, WA	AETA	48-h	1988 Puget Sound AET	Crassostrea gigas (oyster)	LAR			PTI 1988
160	NE	Puget Sound, WA	AETA		PSDDA Screening level concentration	Aquatic biota				USACOE 1988
490	*	United States	EqPA		Chronic Marine EqP Threshold	Aquatic biota		1		Bolton et al. 1985
530	*	Puget Sound, WA	SQG		Chemical Criteria	Benthic community		1		WDE 1989
>1400	-	Puget Sound, WA	AETA		1988 Puget Sound AET	Benthic community				PTI 1988
>1400	-	Puget Sound, WA	AETA	10-d	1988 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT			PTI 1988
128165 +/-178741	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (5.8+/-3.7% mortality)	Rhepoxynius abronius (amphipod)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
128165 +/-178741	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (3.4+/-1.82% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
128165 +/-178741	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (11.2+/-3.7% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
128165 +/-178741	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (3.52+/-1.66% mortality)	Macoma nasuta (clam)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992

Table 48. A summary of the available data on the biological effects associated with sediment-sorbed DI-N-BUTYL PHTHALATE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Di-n-butyl Phthalate Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
2.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (0.33+/-0.516% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
2.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (2.33+/-1.03% mortality)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
2.95	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (55.0+/-22.6% mortality)	Hyalella azteca (amphipod)	JUV	0.338+/-0.133	2.9+/-3.11	Hall et al. 1992
2.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (15.3+/-11.0% mortality)	Hyalella azteca (amphipod)	JUV	0.648+/-0.641	1.74+/-1.39	Hall et al. 1992
2.95	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29.8+/-11.1% mortality)	Streblospio benedicti (polychaete worm)		0.316+/-0.12	2.13+/-2.46	Hall et al. 1992
2.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1% mortality)	Streblospio benedicti (polychaete worm)		1.38	3.25	Hall et al. 1992
2.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (55.0+/-19.5% mortality)	Streblospio benedicti (polychaete worm)		0.349+/-0.11	1.07+/-0.66	Hall et al. 1992
2.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (16.5+/-9.19% mortality)	Streblospio benedicti (polychaete worm)		0.783+/-0.845	4.83+/-2.23	Hall et al. 1992
2.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.367+/-0.085 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
2.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.0005 mg/day growth)	Streblospio benedicti (polychaete worm)		0.493+/-0.448	2.32+/-2.25	Hall et al. 1992
2.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.003 mg/day growth)	Lepidactylus dytiscus (amphipod)		1.38	3.25	Hall et al. 1992
2.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.003+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.316+/-0.120	2.13+/-2.46	Hall et al. 1992
2.95	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (29% mortality)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
2.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (7.2+/-1.92% mortality)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
2.95	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (89.7% reburial)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
2.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.6+/-0.55% reburial)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
2.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Lepidactylus dytiscus (amphipod)		0.185	6.41	Hall et al. 1992
2.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Lepidactylus dytiscus (amphipod)		0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
2.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	6.41	Hall et al. 1992
2.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.56+/-0.47	1.5+/-1.13	Hall et al. 1992
2.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (-0.004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
2.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.001+/-0.001 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.555+/-0.471	2.68+/-2.3	Hall et al. 1992
2.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (1.83+/-1.6% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
2.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (3.5+/-1.87% mortality)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
2.95	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (45.5+/-12% mortality)	Lepidactylus dytiscus (amphipod)		0.383+/-0.279	3.61+/-2.79	Hall et al. 1992
2.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (9.25+/-5.32% mortality)	Lepidactylus dytiscus (amphipod)		0.638+/-0.768	1.65+/-1.62	Hall et al. 1992
2.95	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (63.0+/-24.3% mortality)	Hyalella azteca (amphipod)	JUV	0.317+/-0.228	2.57+/-2.67	Hall et al. 1992
2.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (22.3+/-7.37% mortality)	Hyalella azteca (amphipod)	JUV	0.788+/-0.866	2.04+/-1.75	Hall et al. 1992
2.95	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (22% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
2.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (8.8+/-7.12% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
2.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (28% mortality)	Streblospio benedicti (polychaete worm)		0.185	0.5	Hall et al. 1992
2.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (14+/-9.22% mortality)	Streblospio benedicti (polychaete worm)		0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
2.95	NG	Chesapeake Bay, VA, MD	COA	10-d	Significantly toxic (82.9% reburial)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
2.95	NE	Chesapeake Bay, VA, MD	COA	10-d	Not significantly toxic (99.1+/-0.865% reburial)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
2.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>20% emergence)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
2.95	NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<20% emergence)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
2.95	NG	Chesapeake Bay, VA, MD	COA	20-d	Toxic (>10% emergence)	Hyalella azteca (amphipod)	JUV	0.185	5.58	Hall et al. 1992

Table 48. A summary of the available data on the biological effects associated with sediment-sorbed DI-N-BUTYL PHTHALATE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Di-n-butyl Phthalate				Analysis	Test			Life			
Std Dev		Hit	Area	Type	Type	End-Point Measured	Species	Stage	TOC (%)	AVS (umol/g)	Reference
2.95		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (<10% emergence)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	1.65+/-1.40	Hall et al. 1992
2.95		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (-0.057+/-0.04 mg/day growth)	Palaemonetes pugio (grass shrimp)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
2.95		NE	Chesapeake Bay, VA, MD	COA	20-d	Not toxic (0.002+/-0.001mg/day growth)	Streblospio benedicti (polychaete worm)		0.553+/-0.622	2.31+/-2.04	Hall et al. 1992
2.95		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.016 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.185	5.58	Hall et al. 1992
2.95		NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.008+/-0.002 mg/day growth)	Lepidactylus dytiscus (amphipod)		0.626+/-0.666	1.65+/-1.4	Hall et al. 1992
2.95		NG	Chesapeake Bay, VA, MD	COA	20-d	Significantly toxic (0.003 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.185	0.5	Hall et al. 1992
2.95		NE	Chesapeake Bay, VA, MD	COA	20-d	Not significantly toxic (0.005+/-0.0004 mg/day growth)	Hyalella azteca (amphipod)	JUV	0.626+/-0.666	2.67+/-2.05	Hall et al. 1992
47.5	+/-21.7	NC	Oakland Harbor, CA	COA	10-d	Significantly toxic (35.3+/-2.5% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.56+/-0.07		Word et al. 1988
51.4	+/-26	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (10.4+/-6.3% mortality)	Nephtys caecoides (polychaete)		1.63+/-0.657		Word et al. 1988
51.4	+/-26	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (0.2+/-0.6% mortality)	Macoma nasuta (clam)		1.63+/-0.657		Word et al. 1988
52.5	+/-27.8	NE	Oakland Harbor, CA	COA	10-d	Not significantly toxic (23.3+/-6.14% mortality)	Rhepoxynius abronius (amphipod)	ADT	1.65+/-0.738		Word et al. 1988
60		NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (18% mortality)	Ampelisca abdita (amphipod)		0.028	9 ug/g	Windom In Prep
60		NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (0% mortality)	Arbacia punctulata (sea urchin)		0.03	19 ug/g	Windom In Prep
67.5	+/-2.89	NE	Brunswick Harbor Entrance, GA	COA	48-h	Not significantly toxic (86.6+/-4.25% normal development)	Arbacia punctulata (sea urchin)		0.181+/-0.162	182+/-208 ug/g	Windom In Prep
68.3	+/-2.89	NC	Savannah River Entrance Channel, GA	COA	10-d	Significantly toxic (28.3+/-6.11% mortality)	Mysidopsis bahia (mysid)		0.246+/-0.051	127+/-24 ug/g	Windom In Prep
70	+/-9.57	NE	Savannah River Entrance Channel, GA	COA	48-h	Not significantly toxic (91.3+/-2.91% normal development)	Arbacia punctulata (sea urchin)		0.299+/-0.251	114+/-68.4 ug/g	Windom In Prep
71.7	+/-9.31	SG	Savannah River Entrance Channel, GA	COA	48-h	Significantly toxic (25.4+/-7.66% mortality)	Arbacia punctulata (sea urchin)		0.344+/-0.242	129.5+/-59.3 ug/g	Windom In Prep
90.6	+/-24.3	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (10.6+/-3.17% mortality)	Ampelisca abdita (amphipod)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
90.6	+/-24.3	NE	Brunswick Harbor Entrance, GA	COA	10-d	Not significantly toxic (8.00+/-2.92% mortality)	Mysidopsis bahia (mysid)		1.19+/-1.04	7864+/-11973 ug/g	Windom In Prep
92.9	+/-25.6	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (5.43+/-3.21% mortality)	Mysidopsis bahia (mysid)		1.21+/-1.13	9096+/-13378 ug/g	Windom In Prep
92.9	+/-25.6	NE	Brunswick Harbor Entrance, GA	COA	96-h	Not toxic (9.61+/-2.7% mortality)	Menidia beryllina (silverside)		1.22+/-1.13	9172+/-13363 ug/g	Windom In Prep
93		*	Puget Sound, WA	AETA	15-min	1986 Puget Sound AET	Microtox (Photobacterium phosphoreum)		1		Bellar et al. 1986
93		*	Puget Sound, WA	AETA	48-h	1986 Puget Sound AET	Crassostrea gigas (oyster)	LAR	1		Bellar et al. 1986
94.4	+/-77.6	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (9.78+/-5.33% mortality)	Mysidopsis bahia (mysid)		0.24+/-0.247	91.9+/-73.4 ug/g	Windom In Prep
97.5	+/-82.4	NE	Savannah River Entrance Channel, GA	COA	96-h	Not significantly toxic (4+/-2.83% mortality)	Menidia beryllina (silverside)		0.243+/-0.264	90.5+/-78.4 ug/g	Windom In Prep
98.8	+/-81.8	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (11.6+/-4.33% mortality)	Ampelisca abdita (amphipod)		0.267+/-0.25	102+/-71.1 ug/g	Windom In Prep
100		SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (16% mortality)	Mysidopsis bahia (mysid)		1.8	7095 ug/g	Windom In Prep
100		SG	Brunswick Harbor Entrance, GA	COA	96-h	Toxic (22.3% mortality)	Menidia beryllina (silverside)		1.71	6562 ug/g	Windom In Prep
108	+/-95	NE	Savannah River Entrance Channel, GA	COA	10-d	Not significantly toxic (27.5+/-10.6% mortality)	Mysidopsis bahia (mysid)		0.237+/-0.311	74.6+/-85.5 ug/g	Windom In Prep
109	+/-14.7	SG	Brunswick Harbor Entrance, GA	COA	48-h	Significantly toxic (14.6+/-18.9% normal development)	Arbacia punctulata (sea urchin)		1.99+/-0.562	14009+/-13434 ug/g	Windom In Prep
>340		-	Puget Sound, WA	AETA	10-d	1986 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT	1		Bellar et al. 1986
>340		-	Puget Sound, WA	AETA		1986 Puget Sound AET	Benthic species		1		Bellar et al. 1986
>360		-	California	AETA	10-d	California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
>360		-	Southern California	AETA	10-d	Southern California AET Values	Rhepoxynius abronius (amphipod)	ADT			Becker et al. 1990
>360		-	California	AETA		California AET Values	Benthic species				Becker et al. 1990
>360		-	Southern California	AETA		Southern California AET Values	Benthic species				Becker et al. 1990
1400		*	Puget Sound, WA	AETA	15-min	1988 Puget Sound AET	Microtox (Photobacterium phosphoreum)				PTI 1988

Table 48. A summary of the available data on the biological effects associated with sediment-sorbed DI-N-BUTYL PHTHALATE (ppb) used to support the derivation of sediment quality guidelines for marine and estuarine ecosystems.

Di-n-butyl Phthalate Std Dev	Hit	Area	Analysis Type	Test Type	End-Point Measured	Species	Life Stage	TOC (%)	AVS (umol/g)	Reference
1400	*	Puget Sound, WA	AETA	48-h	1988 Puget Sound AET	Crassostrea gigas (oyster)	LAR			PTI 1988
1400	*	Puget Sound, WA	AETA	10-d	1988 Puget Sound AET	Rhepoxynius abronius (amphipod)	ADT			PTI 1988
1400	NE	Puget Sound, WA	AETA		PSDDA Screening level concentration	Aquatic biota				USACOE 1988
2200	*	Puget Sound, WA	SQG		Chemical Criteria	Benthic community		1		WDE 1989
>5100	-	Puget Sound, WA	AETA		1988 Puget Sound AET	Benthic community				PTI 1988
10000	NE	Laboratory	SSBA	96-h ST	Not toxic (0% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Clark et al. 1987
10000	NE	Laboratory	SSBA	10-d ST	Not toxic (0% mortality)	Palaemonetes pugio (grass shrimp)	ADT			Clark et al. 1987
71760 +/-150707	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (5.8+/-3.7% mortality)	Rhepoxynius abronius (amphipod)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
71760 +/-150707	NE	Wilmington Harbor, NC	COA	10-d	Not significantly toxic (3.4+/-1.82% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
71760 +/-150707	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (11.2+/-3.7% mortality)	Nereis virens (polychaete)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
71760 +/-150707	NE	Wilmington Harbor, NC	COA	28-d	Not significantly toxic (3.52+/-1.66% mortality)	Macoma nasuta (clam)		2.83+/-0.459	16.3+/-9.58	Ward et al. 1992
500000	*	United States	EqPA		Chronic Marine EqP Threshold	Aquatic biota		1		Bolton et al. 1985

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