Table 2-1. Methods for Laboratory Measurements

Parameter	Units	Matrix	Method Reference	Lab Performing Analysis
Grain Size	%	Sediment	ASTM D422	MERI
Total Organic Matter	%	Sediment	ASTM D2974	MERI
Moisture	%	Sediment	ASTM D2974	MERI
PAHs	mg/Kg-wet	Sediment	EPA SW 846 Method 8270C-SIM	Accutest
Pesticides				
Hexachlorobenzene	mg/Kg-wet	Sediment	EPA SW 846 Method 8270C-SIM	Accutest
Mirex	mg/Kg-wet	Sediment	EPA SW 846 Method 8270C-SIM	Accutest
Other Pesticides (Aldrin, Alpha BHC, Beta BHC, Chlordane, Delta BHC, Dieldrin, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin aldehyde, Gamma BHC (Lindane), Heptachlor, Heptachlor epoxide, Toxaphene)	mg/Kg-wet	Sediment	EPA SW 846 Method 8081A	Accutest
PCBs (Aroclor 1016, Aroclor 1221, Aroclor 1232, Aroclor 1242, Aroclor 1248, Aroclor 1254, Aroclor 1260)	mg/Kg-wet	Sediment	EPA SW 846 Method 8082	Accutest
Metals				
Arsenic	mg/Kg-wet	Sediment	EPA SW 846 Method 6010	Accutest
Cadmium	mg/Kg-wet	Sediment	EPA SW 846 Method 7000A	MERI
Chromium	mg/Kg-wet	Sediment	EPA SW 846 Method 7000A	MERI
Copper	mg/Kg-wet	Sediment	EPA SW 846 Method 7000A	MERI
Iron	mg/Kg-wet	Sediment	EPA SW 846 Method 7000A	MERI
Lead	mg/Kg-wet	Sediment	EPA SW 846 Method 7000A	MERI
Nickel	mg/Kg-wet	Sediment	EPA SW 846 Method 7000A	MERI
Zinc	mg/Kg-wet	Sediment	EPA SW 846 Method 7000A	MERI
Hg	mg/Kg-wet	Sediment	EPA SW 846 Method 7000A	MERI

Notes and References:
ASTM International (Copyright 2003)
U.S. EPA (2002) SW-846. Test Methods for Evaluating Solid Waste, Physical/Chemical Methods. Revision 6.

Table 3-1. Field Measurements of Water Quality at the time of Sediment Sampling September 15 - 17, 2003

Project Number 08508-321-005B
September 15-17, 2003

Station	Date	Time	Water Depth[a]	Temp	Salinity	SpCon	DO	DO	pH	Orp	TDS
	m/dd/yy	*hh:mm*	*ft*	*C°*	*ppt*	*mS/cm*	*%*	*mg/l*		*mV*	*g/l*
RM-SD-01	9/15/2003	11:35	3.5	24.5	11.9	20.0	63.3	3.8	7.2	321	12.8
RM-SD-02	9/15/2003	12:53	3.1	24.7	14.7	24.3	54.0	3.4	7.2	335	15.6
SHSM-SD-01	9/15/2003	15:34	3.1	23.6	6.5	11.4	89.5	5.9	7.4	326	7.3
SHSM-SD-02	9/15/2003	15:01	3.5	23.2	5.6	9.9	44.5	3.1	7.2	320	6.3
SHSM-SD-03	9/16/2003	13:40	3.4	23.6	6.4	11.2	91.6	5.8	7.4	333	7.1
SAW-SD-01	9/16/2003	11:25	1.7	25.3	12.5	20.9	58.0	3.6	7.2	360	13.4
SAW-SD-02	9/16/2003	12:25	4.3	25.1	11.4	19.3	61.1	3.8	7.3	358	12.4
OM-SD-01	9/17/2003	10:20	2.0	19.7	7.3	12.7	31.5	2.2	7.0	311	8.1
OM-SD-02	9/17/2003	11:36	1.0	25.3	8.4	14.5	156.1	10.1	8.3	319	9.3
KM-SD-01	9/17/2003	14:10	2.0	25.0	0.9	1.7	147.0	10.4	8.1	286	1.1
KM-SD-02	9/17/2003	15:41	2.5	24.4	1.3	2.5	144.5	9.7	8.6	310	1.6
KM-SD-03	9/17/2003	17:15	4.0	24.0	1.3	2.5	132.1	9.0	8.7	299	1.6

** Water Quality measured at surface with a HydroLab Mini Sonde Water Quality Multi-probe Sensorflex Parameter Expansion System: Serial # 36121*
a - water depth at time of sampling, not corrected for tidal cycle

Table 3-2. Invertebrate taxa found in sediment samples collected from Kearny Marsh and Riverbend Marsh in September 2003.

	Number of Individuals					
Station	**KM-01**	**KM-02**	**Total Kearny**	**RB-01**	**RB-02**	**Total Riverbend**
Taxa						
Ampelisca abdita			0	1	12	13
Apocorophium lacustre			0	1	4	5
Boccardiella ligerica			0		2	2
Chironomidae pupae/larvae	17	6	23	256	2	258
Culicoides sp.	3	4	7	42	4	46
Cyathura polita			0		37	37
Edotia triloba			0		16	16
Edwardsia elegans			0	5	39	44
Gammarus palustris		3	3	7		7
Heteromastus filiformis			0	1		1
Hobsonia florida			0	189	438	627
Laeonereis culveri	1		1	495	369	864
Macoma balthica			0		1	1
Manayunkia aestuarina			0	1	71	72
Melita nitida			0		1	1
Oligochaeta	210	150	360	707	503	1210
Polydora cornuta			0		2	2
Spurwinkia salsa			0	1201	35	1236
Streblospio benedicti			0		2	2
Total no. ind.	231	163	394	2906	1538	4444
	Other Parameters					
Density (No. ind./m^2)	3315	2339		41699	22069	
Diversity (H') (Log base2)	0.52	0.52		2.16	2.36	
Evenness (J')	0.26	0.26		0.6	0.58	
No. of species	4	4		12	17	

The three replicate samples collected at each of the stations are summed.
Results for individual replicates provided in Appendix D.

Table 3-3. Community parameters for recent Kearny and Riverbend Marsh samples and for historical samples collected at Secaucus High School, Oritani, and Mill Creek marshes.

Marsh	Data Source	Station	Year sampled	Area sampled (m2) (3 reps)	Total no. ind. (3 reps)	Density (No. ind./m2)	No. of species	Diversity (H') (log base 2)	Evenness (J')
Kearny Marsh	Current Study	KM-01	2003	0.06969	231	3315	4	0.52	0.26
Kearny Marsh	Current Study	KM-02	2003	0.06969	163	2339	4	0.52	0.26
Riverbend	Current Study	RB-01	2003	0.06969	2906	41699	12	2.16	0.60
Riverbend	Current Study	RB-02	2003	0.06969	1538	22069	17	2.36	0.58
Secaucus H.S.	(a)	B-1	2000	0.06969	185	2655	3	0.17	0.11
Secaucus H.S.	(a)	B-2	2000	0.06969	16	230	5	1.67	0.72
Secaucus H.S.	(a)	B-3	2000	0.06969	347	4980	4	0.37	0.19
Secaucus H.S.	(a)	B-4	2000	0.06969	0	0	0	N.A.	N.A.
Secaucus H.S.	(a)	B-5	2000	0.06969	0	0	0	N.A.	N.A.
Secaucus H.S.	(a)	B-6	2000	0.06969	335	4808	4	0.21	0.11
Oritani Marsh	(b)	Station 01	2000	0.06969	271	3889	8	1.20	0.40
Oritani Marsh	(b)	Station 02	2000	0.06969	111	1593	3	1.25	0.79
Oritani Marsh	(b)	Station 03	2000	0.06969	5	91	1	0.00	N.A.
Oritani Marsh	(b)	Station 05	2000	0.06969	123	1765	7	1.34	0.48
Oritani Marsh	(b)	Station 07	2000	0.06969	1	11	1	0.00	N.A.
Oritani Marsh	(b)	Station 10	2000	0.06969	86	1234	3	0.60	0.38
Oritani Marsh	(b)	Station 11	2000	0.06969	60	861	6	1.61	0.62
Oritani Marsh	(b)	Station 12	2000	0.06969	10	183	3	1.37	0.86
Oritani Marsh	(b)	Station 13	2000	0.06969	50	718	9	2.01	0.63
Oritani Marsh	(b)	Station 16	2000	0.06969	1	11	1	0.00	N.A.
Oritani Marsh	(b)	Station 18	2000	0.06969	196	2813	7	1.25	0.45
Mill Creek	(c)	Depression	1997	0.06969	13	188	3	1.14	0.72
Mill Creek	(c)	Sed A	1997	0.06969	78	1130	8	2.07	0.69
Mill Creek	(c)	SED-001	1997	0.06969	168	2435	9	1.60	0.50
Mill Creek	(c)	SED-002	1997	0.06969	168	2435	5	1.25	0.54
Mill Creek	(c)	SED-003	1997	0.06969	126	1826	7	1.75	0.62
Mill Creek	(c)	SED-006	1997	0.06969	131	1899	5	0.61	0.26
Mill Creek	(c)	SED-007	1997	0.06969	42	609	8	1.61	0.54
Mill Creek	(c)	SED-008	1997	0.06969	64	928	7	1.12	0.40
Mill Creek	(c)	SED-009	1997	0.06969	321	4652	12	2.62	0.73
Mill Creek	(c)	SED-010	1997	0.06969	100	1449	13	3.07	0.83
Mill Creek	(c)	SED-011	1997	0.06969	70	1014	4	0.32	0.16
Mill Creek	(c)	SED-012	1997	0.06969	142	2058	9	1.72	0.54
Mill Creek	(c)	Soil-006	1997	0.06969	137	1986	9	1.60	0.50
Mill Creek	(c)	Soil-007	1997	0.06969	15	217	6	2.39	0.92
Mill Creek	(c)	Soil-009	1997	0.06969	68	986	3	0.63	0.40
Mill Creek	(c)	Soil-011	1997	0.06969	38	551	6	2.05	0.79
Mill Creek	(c)	Station 1	1997	0.06969	131	1899	8	2.31	0.77
Mill Creek	(c)	Station 2	1997	0.06969	89	1290	5	1.65	0.71
Mill Creek	(c)	Station 3	1997	0.06969	66	957	5	1.54	0.66
Mill Creek	(c)	Station 4	1997	0.06969	266	3855	4	0.64	0.32

Counts at the three replicate samples for each station are summed prior to calculations.
N.A. = Not applicable; too few individuals or taxa to calculate index

(a) TAMS. 2001a. Secaucus High School Wetlands Mitigation Site Baseline Studies: Sampling Analyses of Surface water and Sediment. Prepared by TAMS Consultants, Inc, March 2001

(b) Louis Berger. 2001. Oritani Marsh Mitigation Site - Baseline Studies. Prepared by The Louis Berger Group, Inc., February 2001.

(c) HMDC. 1997. Mill Creek Wetlands Mitigation Site Baseline Monitoring Program, Soil and Sediment Analysis. Prepared by Hackensack Meadowlands Development Commission, June 1997.

Table 3-4. Dominance tables for Kearny and Riverbend Marshes.

Kearny Marsh – 2 stations, 3 reps at each, all combined			
Rank	**Species**	**Percent of Total Fauna**	**Density (Ind./m^2)**
1	Oligochaeta (oligochaete)	91.37	2583
2	Chironomidae pupae/larvae (insect)	5.84	165
3	Culicoides sp. (insect)	1.78	50
4	Gammarus palustris (amphipod)	0.76	22
5	Laeonereis culveri (polychaete)	0.25	7
Total – 5 taxa		100	2827
Remaining fauna – 0 taxa		0	0
Total fauna – 5 taxa		100	2827

Riverbend Marsh – 2 stations, 3 reps at each, all combined

Rank	**Species**	**Percent of Total Fauna**	**Density (Ind./m^2)**
1	Spurwinkia salsa (gastropod)	27.81	8868
2	Oligochaeta (oligochaete)	27.23	8681
3	Laeonereis culveri (polychaete)	19.44	6199
4	Hobsonia florida (polychaete)	14.11	4498
5	Chironomidae pupae/larvae (insect)	5.81	1851
6	Manayunkia aestuarina (polychaete)	1.62	517
7	Culicoides sp. (insect)	1.04	330
8	Edwardsia elegans (anemone)	0.99	316
9	Cyathura polita (isopod)	0.83	265
10	Edotia triloba (isopod)	0.36	115
Total – 10 taxa		99.24	31640
Remaining fauna – 9 taxa		0.76	244
Total fauna – 19 taxa		100	31,884

Table 3-5. Summary of species and total counts found at five marshes, Kearny, Mill Creek, Oritani, Riverbend, and Secaucus High School Marshes.

	Kearny Marsh 2003	Mill Creek 1997	Oritani Marsh 2000	Riverbend Marsh 2003	Secaucus H. S. (2000)	All Marshes
Taxa						
Ampelisca abdita				13		13
Anisolabis maritime		16				16
Annura maritime		95				95
Apocorophium lacustre				5		5
Aranae		1				1
Balanus improvisus			1			1
Bivalvia			1			1
Boccardiella ligerica				2		2
Ceratopogonidae					7	7
Chironomidae		150			837	987
Chironomidae (larvae)			2			2
Chironomidae pupae/larvae	23			258		281
Coleoptera		10				10
Congeria leucopheata		1				1
Copepoda			32			32
Corophium sp.		55			11	66
Culicoides sp.	7			46		53
Cyathura		1				1
Cyathura polita		5	3	37		45
Dulichopidae		1				1
Edotia triloba				16		16
Edwardsia elegans				44		44
Empididae					2	2
Gammarus palustris	3			7		10
Gammarus sp.		154	9			163
Glycera sp.					7	7
Harpacticoid copepod		41				41
Heteromastus filiformis				1		1
Hobsonia florida		222	23	627		872
Hydrobia minuta		21				21
Laeonereis culveri	1			864		865
Littorina sp.			1			1
Macoma balthica			2	1		3
Manayunkia aestuarina				72		72
Marenzellaria viridis			101			101
Melampus bidentatus		5	1			6
Melita nitida				1		1
Nematoda		98	2		2	102
Nemertea			5			5
Nereis succinea			71			71
Oligochaeta	360	1252	624	1210	16	3462
Orchestia sp.		4				4
Ostracoda		3				3
Palmacorixa sp.			20			20
Philoscia sp.		1				1
Philoscia vittata		3				3
Polydora cornuta		80		2		82
Rhithropanopeus harrisii		1	1			2
Sipuncula			1			1
Spionidae		12				12
Spurwinkia salsa				1236		1236
Streblospio benedicti			12	2		14
Tabanidae		1				1
Tipulidae					1	1
Uca minax			2			2
Total # Individuals (all stations)	394	2233	914	4444	883	8868
Number of stations	2	20	11	2	4	39
Average # Ind./station	197	112	83	2222	221	227
Min # Ind./station	163	13	1	1538	0	0
Max # Ind./station	231	321	271	2906	347	2906
Number of taxa	5	25	20	19	8	55
Average # of taxa per station	3	1	2	10	2	1
Min # of taxa per station	4	3	1	12	0	0
Max # of taxa per station	4	13	9	17	5	17

(a) TAMS. 2001a. Secaucus High School Wetlands Mitigation Site Baseline Studies: Sampling Analyses of Surface water and Sediment. Prepared by TAMS Consultants, Inc, March 2001

(b) Louis Berger. 2001. Oritani Marsh Mitigation Site - Baseline Studies. Prepared by The Louis Berger Group, Inc., February 2001.

(c) HMDC. 1997. Mill Creek Wetlands Mitigation Site Baseline Monitoring Program, Soil and Sediment Analysis. Prepared by Hackensack Meadowlands Development Commission, June 1997.

Table 3-6. General Sediment Chemistry For Five NJ Meadowlands Marshes

		Grain Size Analysis						
Sample Location	**Solids, Percent (%)**	**% Gravel**	**% Coarse Sand**	**% Medium Sand**	**% Fine Sand**	**% Silt**	**Organic Material (%)**	**Moisture (%)**
KM-SP-01	9.9	0.39%	7.00%	27.5%	45.7%	17.2%	47.9	91.1
KM-SP-02	11.0	0.39%	7.00%	27.5%	45.7%	17.2%	47.9	91.1
KM-SP-03 DUP AVG	7.2	0.23%	11.57%	45.35%	29.12%	9.58%	20.0	79.4
OM-SP-01	39.0	0.33%	8.70%	26.3%	39.0%	20.1%	21.6	66.6
OM-SP-02	11.0	0.31%	5.20%	26.1%	46.0%	19.9%	22.0	88.5
RM-SD-01	27.0	0.26%	1.87%	11.7%	56.2%	29.0%	20.9	71.8
RM-SD-02	22.0	0.30%	4.07%	11.5%	47.2%	36.2%	17.2	78.0
SAW-SD-01	28.3	0.04%	0.80%	9.02%	63.6%	25.7%	24.7	70.5
SAW-SD-02	42.1	0.18%	1.75%	5.53%	64.2%	27.8%	10.1	62.0
SHSM-SD-01	26.2	0.24%	1.93%	6.61%	64.8%	25.7%	24.9	70.0
SHSM-SD-02	26.6	0.20%	1.35%	8.28%	60.0%	28.5%	15.6	79.3
SHSM-SD-03	22.1	2.03%	7.60%	17.0%	53.1%	18.7%	20.5	79.5

Gravel includes particles greater than 4.75 mm in size; Course sand includes particles 2.0 - 4.75 mm in size; Medium sand includes particles 0.425 - 2.0 mm in size; Fine sand includes particles 0.075 - 0.425 mm in size; Silt includes particles less than 0.075 mm in size

Table 4-1. Assessment and Measurement Endpoints

Assessment Endpoint	Measurement Endpoint
Protection and maintenance of a wetland vegetative community in the study area comparable to communities elsewhere in the Hackensack Meadowland.	Comparison of bulk sediment/hydric soil analytical chemistry results to soil quality benchmarks. Concentrations in excess of benchmarks will be considered indicative of a potential for ecological risks.
Protection and maintenance of a benthic macroinvertebrate community in the study area comparable to communities elsewhere in the Hackensack Meadowland.	Comparison of bulk sediment analytical chemistry results to sediment quality benchmarks. Concentrations in excess of sediment quality benchmarks will be considered indicative of a potential for ecological risks.
Protection and maintenance of a resident warmwater and anadromous fish community in the study area comparable to communities elsewhere in the Hackensack Meadowland.	Comparison of surface water analytical chemistry results to surface water quality benchmarks. Concentrations in excess of surface water quality benchmarks will be considered indicative of a potential for ecological risks.
	Comparison of bulk sediment analytical chemistry results to sediment quality benchmarks. Concentrations in excess of sediment quality benchmarks will be considered indicative of a potential for ecological risks.
Protection and maintenance of a vertebrate wildlife community in the study area comparable to communities elsewhere in the Hackensack Meadowland.	Evaluation of potential risks to representative avian and mammalian receptors from exposure to surface water and sediments and ingestion of Persistent, Bioaccumulative, Toxic (PBT)-containing prey items.
	Evaluation of potential risks to crustacean community and viability as a food source by comparing modeled invertebrate tissue concentrations to Critical Body Residues (CBRs).

Table 4-2. Sediment Summary Statistics Across All Wetlands for Selected COPCs

COPCs	Minimum Detected Concentration	Average Concentration	Maximum Detected Concentration
Organics (ppb)			
4,4'-DDE	5.4	27.9	183
Chlordane (alpha(cis)-)	399	76.4	399
TOTAL PAHS	1276.5	4236.9	8161.8
TOTAL PCBs	45	418.7	1845
Metals (ppm)			
Arsenic	9.8	19.3	33.2
Cadmium	1.9	3.7	7.8
Chromium	19.1	191.6	509.5
Copper	60.6	133.2	184.7
Lead	71.6	225.2	557.4
Mercury	0.32	2.3	6.2
Zinc	187.0	358.9	686.8

Table 4-3. Sediment and Soil Benchmark Screening Values

Detected Analytes	Selected Sediment Aquatic Life Criteria	Source	Selected Phytotoxicity Value	Source
Organics (ppb)				
4,4'-DDD	8	[2]	NV	
4,4'-DDE	5	[2]	NV	
4,4'-DDT	8	[2]	NV	
Chlordane (alpha(cis)-)	7	[2]	NV	
Methoxychlor	13.6	[3]	NV	
Total PAHs	4022	[1]	20000	[4]
Total PCBs	22.7	[1]	40000	[4]
Metals (ppm)				
Arsenic	8.2	[1]	10	[4]
Cadmium	1.2	[1]	4	[4]
Chromium	81.0	[1]	1	[4]
Copper	34.0	[1]	100	[4]
Iron	20.0	[2]		
Lead	46.7	[1]	50	[4]
Mercury	0.2	[1]	0.3	[4]
Nickel	20.9	[1]	30	[4]
Zinc	150.0	[1]	50	[4]

Sources
[1] ER-L = Effects Range - Low (Long et al., 1995)
[2] LEL = Lowest Effects Level (Long et al., 1995)
[3] ESL = Ecological Screening Levels (U.S. EPA, 2003; Available at: http://www.epa.gov/reg5rcra/ca/edql.htm)
[4] Phytotoxicity value based on experimental studies of terrestrial plants in soil and include chronic endpoints (e.g., growth)(Efroymson, et al., 1997).

NV - No Value identified.

Table 4-4a. Phytotoxicity Screening - All 2003 Study Wetlands

Detected Analytes	Selected Phytotoxicity Criteria	Source	Kearny Average Concentration	Kearny Maximum Detected Concentration	Oritani Average Concentration	Oritani Maximum Detected Concentration	Riverbend Average Concentration	Riverbend Maximum Detected Concentration	Sawmill Average Concentration	Sawmill Maximum Detected Concentration	Secaucus Average Concentration	Secaucus Maximum Detected Concentration
Organics (ppb)												
Total PAHs	20,000	[1]	5093.4	8161.8	3850.4	4166.8	5596.3	7654.6	3819.8	6363.0	3010.1	3302.2
4,4'-DDD	NV		349.8	864.5	NA	NA	2.5	3.4	6.0	8.7	4.1	9.4
4,4'-DDE	NV		85.7	183.0	13.4	15.2	4.1	6.7	11.3	14.2	6.5	12.9
4,4'-DDT	NV		15.2	39.4	NA	NA	2.7	4.2	NA	NA	NA	NA
Methoxychlor	NV	[1]	17.2	32.4	NA	NA	NA	NA	NA	NA	NA	NA
Total PCBs	40,000	[1]	365.8	982.0	1115.5	1845.0	218.3	280.0	321.4	477.7	205.6	219.5
Metals (ppm)												
Arsenic	10	[1]	***22.4***	***26.5***	***29.4***	***33.2***	***15.8***	***16.1***	***14.6***	***19.3***	***14.9***	***16.5***
Cadmium	4	[1]	2.7	3.4	***7.3***	***7.8***	3.2	3.5	2.4	2.9	3.4	***4.2***
Chromium	1	[1]	***36.4***	***49.0***	***373.7***	***509.5***	***220.1***	***237.9***	***137.9***	***156.1***	***242.3***	***280.0***
Copper	100	[1]	***110.1***	***148.9***	***170.2***	***184.7***	***147.0***	***150.5***	96.1	***120.5***	***147.0***	***179.0***
Iron	NV		13.4	17.2	31.9	46.0	42.8	52.0	36.8	40.6	38.7	44.8
Lead	50	[1]	***345.0***	***557.4***	***281.5***	***356.0***	***182.5***	***189.6***	***110.5***	***149.4***	***173.0***	***183.0***
Nickel	30	[1]	***43.8***	***57.0***	***88.1***	***92.4***	***52.2***	***53.2***	***41.6***	***45.8***	***57.5***	***66.8***
Zinc	50	[1]	***257.8***	***354.2***	***680.6***	***686.8***	***341.4***	***362.2***	***229.5***	***269.2***	***343.3***	***396.0***
Mercury	0.30	[1]	***0.4***	***0.5***	***4.3***	***6.2***	***4.1***	***4.4***	***1.1***	***1.1***	***2.5***	***3.6***

Sources
[1] Efroymson, et al. (1997)
NV - No phytotoxicity value identified.
Bold-italic text indicates concentration above screening value.
NA - Not applicable; analyte not detected in any samples; therefore summary statistics not calculated.
See Appendix E for all data.

Table 5-2. Modeled Tissue Concentrations For Wetland Receptors - Wildlife Risk Curves

COPC	log Kow	Water-to-Fish BCFs (mg COPC/kg ww tissue)/(mg dissolved COPC/L water)		Food Chain Multipliers TL2	Food Chain Multipliers TL3	Sediment-to-Sediment Invertebrate BSAFs (mg COPC/kg wet tissue) / (mg COPC/ kg dw sed)		Plant Uptake Factor (UF) (mg ANALYTEplant/kgdw)/ (mg ANALYTEsoil/kgdw)		Exposure Point Concentrations: Estuarine Surface Water (1) (mg/L)	Exposure Point Concentrations: Fish (2) (mg/kg_{ww})	Exposure Point Concentrations: Sediment (3) (mg/kg_{dw})	Exposure Point Concentrations: Wetland Invertebrate (4) (mg/kg_{ww})	Exposure Point Concentrations: Wetland Plant (5) (mg/kg_{ww})
METALS														
ARSENIC	**NA**	**114**	**[a]**	**1**	**1**	**0.9**	**[a]**	**0.036**	**[a]**					
ARSENIC_25										0.007	0.767	8.920	8.028	0.048
ARSENIC_50										0.007	0.821	17.300	15.570	0.093
ARSENIC_75										0.016	1.855	34.550	31.095	0.187
ARSENIC_100										0.068	7.741	185.500	166.950	1.002
CADMIUM	**NA**	**907**	**[a]**	**1**	**1**	**3.4**	**[a]**	**0.364**	**[a]**					
CADMIUM_25										4.00E-04	0.363	0.500	1.700	0.027
CADMIUM_50										0.003	2.540	1.350	4.590	0.074
CADMIUM_75										0.010	8.889	6.595	22.424	0.360
CADMIUM_100										0.057	51.790	946.000	3216.400	51.652
CHROMIUM	**NA**	**19**	**[a]**	**1**	**1**	**0.39**	**[a]**	**0.0075**	**[a]**					
CHROMIUM_25										0.002	0.042	35.275	13.757	0.040
CHROMIUM_50										0.014	0.272	159.900	62.361	0.180
CHROMIUM_75										0.063	1.197	340.000	132.600	0.383
CHROMIUM_100										0.700	13.300	5950.000	2320.500	6.694
COPPER	**NA**	**710**	**[a]**	**1**	**1**	**0.3**	**[a]**	**0.4**	**[a]**					
COPPER_25										0.013	9.177	34.600	10.380	2.076
COPPER_50										0.039	27.939	110.000	33.000	6.600
COPPER_75										0.173	122.635	186.415	55.924	11.185
COPPER_100										0.770	546.700	860.000	258.000	51.600
LEAD	**NA**	**0.09**	**[a]**	**1**	**1**	**0.63**	**[a]**	**0.045**	**[a]**					
LEAD_25										0.008	0.001	87.975	55.424	0.594
LEAD_50										0.011	0.001	174.680	110.048	1.179
LEAD_75										0.018	0.002	295.000	185.850	1.991
LEAD_100										0.510	0.046	2030.000	1278.900	13.703
MERCURY	**NA**	**3912**	**[a,f]**	**1**	**1**	**0.089**	**[a,f]**	**0.042**	**[a,f]**					
MERCURY_25										2.20E-04	0.861	0.500	0.044	0.003
MERCURY_50										2.20E-04	0.861	2.900	0.257	0.018
MERCURY_75										4.50E-04	1.760	10.400	0.921	0.066
MERCURY_100										0.012	46.943	152.000	13.467	0.968
ZINC	**NA**	**2059**	**[a]**	**1**	**1**	**0.57**	**[a]**	**1.2E-12**	**[a]**					
ZINC_25										0.030	61.770	91.500	52.155	1.65E-11
ZINC_50										0.041	84.625	244.000	139.080	4.39E-11
ZINC_75										0.070	144.233	466.000	265.620	8.39E-11
ZINC_100										1.200	2470.800	6429.000	3664.530	1.16E-09

Table 5-2. Modeled Tissue Concentrations For Wetland Receptors - Wildlife Risk Curves

COPC	log Kow	Water-to-Fish BCFs (mg COPC/kg ww tissue)/(mg dissolved COPC/L water)		Food Chain Multipliers TL2	Food Chain Multipliers TL3	Sediment-to-Sediment Invertebrate BSAFs (mg COPC/kg wet tissue) / (mg COPC/ kg dw sed)		Plant Uptake Factor (UF) (mg ANALYTEplant/kgdw)/ (mg ANALYTEsoil/kgdw)		Exposure Point Concentrations: Estuarine Surface Water (1) (mg/L)	Exposure Point Concentrations: Fish (2) (mg/kg_{ww})	Exposure Point Concentrations: Sediment (3) (mg/kg_{dw})	Exposure Point Concentrations: Wetland Invertebrate (4) (mg/kg_{ww})	Exposure Point Concentrations: Wetland Plant (5) (mg/kg_{ww})
ORGANICS														
ALPHA CHLORDANE	**1.8**	**7**	**[b]**	**1**	**10**	**3.5**	**[d]**	**3.53**	**[e]**					
ALPHA CHLORDANE_25										0.006	0.440	0.019	0.065	0.010
ALPHA CHLORDANE_50										0.011	0.761	0.032	0.113	0.017
ALPHA CHLORDANE_75										0.016	1.087	0.046	0.161	0.024
ALPHA CHLORDANE_100										0.136	9.494	0.399	1.407	0.211
4, 4-DDE	**7.3**	**3625**	**[b]**	**1**	**10**	**22.7**	**[d]**	**0.0023**	**[a]**					
4, 4-DDE_25										3.17E-10	1.15E-05	0.000	0.005	8.32E-08
4, 4-DDE_50										2.64E-09	9.57E-05	0.002	0.045	6.94E-07
4, 4-DDE_75										1.23E-08	0.000	0.009	0.209	3.22E-06
4, 4-DDE_100										2.44E-07	0.009	0.183	4.152	6.41E-05
TOTAL PAH	**6.11**	**500**	**[c]**	**1**	**11**	**0.1**	**[d]**	**0.011**	**[e]**					
TOTAL PAH_25										5.77E-05	0.318	2.930	0.349	0.005
TOTAL PAH_50										6.97E-05	0.383	3.536	0.421	0.006
TOTAL PAH_75										1.15E-04	0.631	5.823	0.693	0.010
TOTAL PAH_100										1.61E-04	0.885	8.162	0.971	0.014
TOTAL PCB	**6.02**	**17022**	**[b]**	**1**	**11**	**4.2**	**[d]**	**0.013**	**[e]**					
TOTAL PCB_25										1.24E-06	0.233	0.051	0.218	9.90E-05
TOTAL PCB_50										3.30E-06	0.617	0.136	0.578	2.63E-04
TOTAL PCB_75										7.41E-06	1.387	0.307	1.297	0.001
TOTAL PCB_100										5.33E-05	9.989	2.208	9.345	0.004

NA - Not applicable
-- = Not calculated. Either no uptake factor was available, or constituent not further considered in that medium.
Tissue concentration calculated by: ANALYTEprey (mg/kgww) = ANALYTEss/sed (mg/kgdw) x BCF ((mg ANALYTE prey/kgww)/(mgANALYTE ss/sed/kgdw))
BCF = (mg ANALYTEtissue)/ (mg ANALYTEsurface water - dissolved)
BSAF = (mg ANALYTEtissue)/ (mg ANALYTEsediment)
UF = (mg ANALYTEplant/kgdw)/ (mg ANALYTEsoil/kgdw)
Plants assumed to be 85% water (USEPA, 1993).

(1) Maximum surface water concentration from historic studies (see Table 4-14; (Langan EES, 1999; Louis Berger, 2001; TAMS, 2001a; HMDC, 1997)
(2) Fish concentration calculated by:
$COPC_{fish} = COPC_{surface\ water} \times BCF \times FCM_{TL2} \times FCM_{TL3}$
(3) Maximum sediment concentration from current and historic studies (See Appendix F; Langan EES, 1999; Louis Berger, 2001; TAMS, 2001a; TAMS, 2001b; ECI, 1997a; ECI, 1997b; HMDC, 1997; Weis, J. and P. Weis, undated)
(4) Wetland invertebrate and amphibian concentrations calculated by:
$COPC_{invert} = COPC_{sediment} \times BSAF \times (\%\ lipid/\%\ organic\ carbon)$
(5) Plant concentration calculated by:
COPCplant = COPCsoil x UF x % solid

Notes for BCFs, BSAFs and UFs
[a] Recommended value from USEPA, 1999, Appendix C.
[b] BCF calculated using the algorithm of Bintein et al (1993) where:
log BCF = 0.91 x log Kow - 1.975 x log(6.8E-7 x Kow + 1.0) - 0.786
[c] The measured BCF for benzo(a)pyrene used as a surrogate BCF for PAHs.
[d] US Army Corps of Engineers Waterways Experiment Station BSAF Database (http://www.wes.army.mil/el/bsaf/bsaf.html). Mean value for 4,4-DDE,Total PAHs and Total PCBs. Chlordane value is individual value for white sucker - only data containing mean, error, and number of measurements. Assuming 7% lipids in invertebrates and 5% organic carbon in the sediment.
[e] Calculated using the algorithm from Travis and Arms (1983) where:
log(BCF) = 1.588 - (0.578 x log(Kow))
[f] Mercury BCF is a weighted averaged of mercuric chloride and methylmercury, assuming 95% mercury in media is inorganic and 5% is methylated.

Table 5-3. Summary Of Potential Risks To Wildlife At Multiple Concentrations

COPC	Surface Water Concentration (mg/L)	Sediment Concentration (mg/kg)	Hazard Quotients			
			Mink	Heron	Mallard	Muskrat
METALS						
ARSENIC_25	0.007	8.9	***7.80***	0.04	<0.01	0.68
ARSENIC_50	0.007	17.3	***12.96***	0.06	<0.01	***1.33***
ARSENIC_75	0.016	34.6	***26.58***	0.13	0.01	***2.65***
ARSENIC_100	0.068	185.5	***135.49***	0.61	0.05	***14.24***
CADMIUM_25	0.000	0.5	0.16	0.05	<0.01	0.01
CADMIUM_50	0.003	1.4	0.78	0.31	<0.01	0.04
CADMIUM_75	0.010	6.6	***3.01***	***1.14***	0.02	0.17
CADMIUM_100	0.057	946.0	***152.79***	***27.13***	***3.01***	***24.62***
CHROMIUM_25	0.002	35.3	<0.01	0.21	0.04	<0.01
CHROMIUM_50	0.014	159.9	<0.01	0.94	0.19	<0.01
CHROMIUM_75	0.063	340.0	<0.01	***2.11***	0.40	<0.01
CHROMIUM_100	0.700	5950.0	0.04	***35.62***	***7.06***	0.01
COPPER_25	0.013	34.6	0.17	0.04	<0.01	0.06
COPPER_50	0.039	110.0	0.52	0.11	0.01	0.20
COPPER_75	0.173	186.4	***1.96***	0.44	0.02	0.33
COPPER_100	0.770	860.0	***8.79***	***1.97***	0.09	***1.54***
LEAD_25	0.008	88.0	0.32	0.61	0.12	0.06
LEAD_50	0.011	174.7	0.64	***1.20***	0.24	0.12
LEAD_75	0.018	295.0	***1.07***	***2.03***	0.40	0.21
LEAD_100	0.510	2030.0	***7.40***	***13.99***	***2.78***	***1.45***
MERCURY_25	2.20E-04	0.5	***8.24***	***22.01***	0.12	0.12
MERCURY_50	2.20E-04	2.9	***8.94***	***23.10***	0.69	0.69
MERCURY_75	4.50E-04	10.4	***19.58***	***49.29***	***2.48***	***2.48***
MERCURY_100	0.012	152.0	***485.63***	***1257.41***	***36.18***	***36.29***
ZINC_25	0.030	91.5	0.10	0.36	<0.01	<0.01
ZINC_50	0.041	244.0	0.16	0.52	0.01	<0.01
ZINC_75	0.070	466.0	0.28	0.91	0.02	0.01
ZINC_100	1.200	6429.0	***4.47***	***15.15***	0.24	0.12
ORGANICS						
ALPHA CHLORDANE_25	0.006	0.02	0.04	0.03	<0.01	<0.01
ALPHA CHLORDANE_50	0.011	0.03	0.07	0.06	<0.01	<0.01
ALPHA CHLORDANE_75	0.016	0.05	0.10	0.08	<0.01	<0.01
ALPHA CHLORDANE_100	0.136	0.40	0.87	0.73	0.01	0.03
4, 4-DDE_25	3.17E-10	2.38E-04	<0.01	0.00	<0.01	<0.01
4, 4-DDE_50	2.64E-09	0.00	<0.01	0.03	<0.01	<0.01
4, 4-DDE_75	1.23E-08	0.01	0.01	0.14	<0.01	<0.01
4, 4-DDE_100	2.44E-07	0.18	0.22	***2.80***	0.01	<0.01
TOTAL PAH_25	5.77E-05	2.93	0.17	<0.01	<0.01	0.02
TOTAL PAH_50	6.97E-05	3.54	0.21	<0.01	<0.01	0.02
TOTAL PAH_75	1.15E-04	5.82	0.35	<0.01	<0.01	0.04
TOTAL PAH_100	1.61E-04	8.16	0.48	<0.01	<0.01	0.06
TOTAL PCB_25	1.24E-06	0.05	0.34	0.10	<0.01	<0.01
TOTAL PCB_50	3.30E-06	0.14	0.90	0.26	<0.01	<0.01
TOTAL PCB_75	7.41E-06	0.31	***2.02***	0.58	<0.01	0.01
TOTAL PCB_100	5.33E-05	2.21	***14.54***	***4.16***	0.01	0.05

Hazard quotients (HQs) = estimated Total Daily Dose (TDD) / Toxicity Reference Value (TRV); See Table 4-12 for TRVs
TDD - estimate from food web modeling using maximum sediment and surface water concentrations
See Appendix E for details of individual food web calculations.
COPC - Chemical of Potential Concern
DDE - Dichloro-diphenyl-dichloroethylene
PAH - Polycyclic aromatic hydrocarbon
PCB - Polychlorinated biphenyls
Hazard quotients (HQs) greater than 1 are shaded.
Parameter_## - Parameter name and percentile (e.g., Arsenic_25 = 25th percentile concentration for arsenic)

Maximum sediment concentration from current and historic studies (See Appendix F; Langan EES, 1999; Louis Berger, 2001; TAMS, 2001a; TAMS, 2001b; ECI, 1997a; ECI, 1997b; HMDC, 1997; Weis, J. and P. Weis, undated)
Surface water data for metals obtained from historic studies (Langan EES, 1999; Louis Berger, 2001; TAMS, 2001a; HMDC, 1997)
Surface water data for organics predicted from 2003 sediment data using equilibrium partitioning.

Table 5-4. Summary Of Potential Risks To Wildlife At Multiple Concentrations - No Surface Water Contribution

			Hazard Quotients			
COPC	**Surface Water Concentration (mg/L)**	**Sediment Concentration (mg/kg)**	**Mink**	**Heron**	**Mallard**	**Muskrat**
METALS						
ARSENIC_25	0.000	15.2	***5.31***	***7.80***	0.02	0.04
ARSENIC_50	0.000	17.4	***10.29***	***12.96***	0.03	0.06
ARSENIC_75	0.000	23.3	***20.55***	***26.58***	0.07	0.13
ARSENIC_100	0.000	33.2	***110.35***	***135.49***	0.37	0.61
CADMIUM_25	0.000	2.4	0.07	0.16	0.01	0.05
CADMIUM_50	0.000	3.1	0.20	0.78	0.03	0.31
CADMIUM_75	0.000	3.8	0.98	***3.01***	0.15	***1.14***
CADMIUM_100	0.000	7.8	***140.95***	***152.79***	***21.34***	***27.13***
CHROMIUM_25	0.000	102.0	<0.01	<0.01	0.20	0.21
CHROMIUM_50	0.000	211.6	<0.01	<0.01	0.90	0.94
CHROMIUM_75	0.000	237.8	<0.01	<0.01	***1.91***	***2.11***
CHROMIUM_100	0.000	509.5	0.04	0.04	***33.47***	***35.62***
COPPER_25	0.000	120.8	0.04	0.17	<0.01	0.04
COPPER_50	0.000	141.7	0.11	0.52	0.01	0.11
COPPER_75	0.000	151.8	0.19	***1.96***	0.02	0.44
COPPER_100	0.000	184.7	0.88	***8.79***	0.09	***1.97***
LEAD_25	0.000	163.3	0.32	0.32	0.61	0.61
LEAD_50	0.000	179.2	0.64	0.64	***1.20***	***1.20***
LEAD_75	0.000	237.9	***1.07***	***1.07***	***2.03***	***2.03***
LEAD_100	0.000	557.4	***7.40***	***7.40***	***13.99***	***13.99***
MERCURY_25	0.000	0.7	0.15	***8.24***	0.23	***22.01***
MERCURY_50	0.000	1.7	0.84	***8.94***	***1.32***	***23.10***
MERCURY_75	0.000	3.7	***3.03***	***19.58***	***4.73***	***49.29***
MERCURY_100	0.000	6.2	***44.28***	***485.63***	***69.17***	***1,257.41***
ZINC_25	0.000	246.3	0.02	0.10	0.02	0.36
ZINC_50	0.000	337.4	0.04	0.16	0.06	0.52
ZINC_75	0.000	386.3	0.08	0.28	0.11	0.91
ZINC_100	0.000	686.8	***1.07***	***4.47***	***1.58***	***15.15***
ORGANICS						
ALPHA CHLORDANE_25	0.000	0.030	<0.01	0.04	<0.01	0.03
ALPHA CHLORDANE_50	0.000	0.038	<0.01	0.07	<0.01	0.06
ALPHA CHLORDANE_75	0.000	0.075	<0.01	0.10	<0.01	0.08
ALPHA CHLORDANE_100	0.000	0.399	0.02	0.87	0.01	0.73
4, 4-DDE_25	0.000	0.005	<0.01	<0.01	<0.01	<0.01
4, 4-DDE_50	0.000	0.010	<0.01	<0.01	0.03	0.03
4, 4-DDE_75	0.000	0.014	0.01	0.01	0.14	0.14
4, 4-DDE_100	0.000	0.183	0.21	0.22	***2.70***	***2.80***
TOTAL PAH_25	0.000	2.930	0.04	0.17	<0.01	<0.01
TOTAL PAH_50	0.000	3.538	0.05	0.21	<0.01	<0.01
TOTAL PAH_75	0.000	5.823	0.09	0.35	<0.01	<0.01
TOTAL PAH_100	0.000	8.162	0.12	0.48	<0.01	<0.01
TOTAL PCB_25	0.000	0.163	0.05	0.34	0.01	0.10
TOTAL PCB_50	0.000	0.218	0.14	0.90	0.01	0.26
TOTAL PCB_75	0.000	0.409	0.31	***2.02***	0.03	0.58
TOTAL PCB_100	0.000	1.845	***2.20***	***14.54***	0.22	***4.16***

Hazard quotients (HQs) = estimated Total Daily Dose (TDD) / Toxicity Reference Value (TRV); See Table 4-12 for TRVs
TDD - estimate from food web modeling using maximum sediment and surface water concentrations
See Appendix E for details of individual food web calculations.
COPC - Chemical of Potential Concern
DDE - Dichloro-diphenyl-dichloroethylene
Hazard quotients (HQs) greater than 1 are shaded with bold-italic text.
PAH - Polycyclic aromatic hydrocarbon
PCB - Polychlorinated biphenyls
Parameter_## - Parameter name and percentile (e.g., Arsenic_25 = 25th percentile concentration for arsenic)

Maximum sediment concentration from current and historic studies (See Appendix F; Langan EES, 1999; Louis Berger, 2001; TAMS, 2001a; TAMS, 2001b; ECI, 1997a; ECI, 1997b; HMDC, 1997; Weis, J. and P. Weis, undated)
Surface water data for metals obtained from historic studies (Langan EES, 1999; Louis Berger, 2001; TAMS, 2001a; HMDC, 1997)
Surface water data for organics predicted from 2003 sediment data using equilibrium partitioning.

Table 5-5. Evaluation of the Impact of Surface Water on Modeled Risk to Mink and Heron

COPC	Sediment Concentration (mg/kg)	Hazard Quotients			
		Mink - no water	Mink - with water	Heron - no water	Heron - with water
METALS					
ARSENIC_25	15.2	***9.01***	***7.80***	0.03	0.04
ARSENIC_50	17.4	***10.35***	***12.96***	0.03	0.06
ARSENIC_75	23.3	***13.85***	***26.58***	0.05	0.13
ARSENIC_100	33.2	***19.75***	***135.49***	0.07	0.61
CADMIUM_25	2.4	0.36	0.16	0.05	0.05
CADMIUM_50	3.1	0.47	0.78	0.07	0.31
CADMIUM_75	3.8	0.57	***3.01***	0.09	***1.14***
CADMIUM_100	7.8	***1.16***	***152.79***	0.18	***27.13***
CHROMIUM_25	102.0	<0.01	<0.01	0.57	0.21
CHROMIUM_50	211.6	<0.01	<0.01	***1.19***	0.94
CHROMIUM_75	237.8	<0.01	<0.01	***1.34***	***2.11***
CHROMIUM_100	509.5	<0.01	0.04	***2.87***	***35.62***
COPPER_25	120.8	0.12	0.17	0.01	0.04
COPPER_50	141.7	0.14	0.52	0.01	0.11
COPPER_75	151.8	0.16	***1.96***	0.02	0.44
COPPER_100	184.7	0.19	***8.79***	0.02	***1.97***
LEAD_25	163.3	0.60	0.32	***1.13***	0.61
LEAD_50	179.2	0.65	0.64	***1.23***	***1.20***
LEAD_75	237.9	0.87	***1.07***	***1.64***	***2.03***
LEAD_100	557.4	***2.03***	***7.40***	***3.84***	***13.99***
MERCURY_25	0.7	0.20	***8.24***	0.31	***22.01***
MERCURY_50	1.7	0.51	***8.94***	0.79	***23.10***
MERCURY_75	3.7	***1.07***	***19.58***	***1.67***	***49.29***
MERCURY_100	6.2	***1.79***	***485.63***	***2.80***	***1257.41***
ZINC_25	246.3	0.04	0.10	0.06	0.36
ZINC_50	337.4	0.06	0.16	0.08	0.52
ZINC_75	386.3	0.06	0.28	0.09	0.91
ZINC_100	686.8	0.11	***4.47***	0.17	***15.15***
ORGANICS					
ALPHA CHLORDANE_25	0.030	<0.01	0.04	<0.01	0.03
ALPHA CHLORDANE_50	0.038	<0.01	0.07	<0.01	0.06
ALPHA CHLORDANE_75	0.075	<0.01	0.10	<0.01	0.08
ALPHA CHLORDANE_100	0.399	0.02	0.87	0.01	0.73
4, 4-DDE_25	0.005	0.01	<0.01	0.07	0.00
4, 4-DDE_50	0.010	0.01	<0.01	0.15	0.03
4, 4-DDE_75	0.014	0.02	0.01	0.21	0.14
4, 4-DDE_100	0.183	0.21	0.22	***2.70***	***2.80***
TOTAL PAH_25	2.930	0.04	0.17	<0.01	<0.01
TOTAL PAH_50	3.538	0.05	0.21	<0.01	<0.01
TOTAL PAH_75	5.823	0.09	0.35	<0.01	<0.01
TOTAL PAH_100	8.162	0.12	0.48	<0.01	<0.01
TOTAL PCB_25	0.163	0.16	0.34	0.02	0.10
TOTAL PCB_50	0.218	0.22	0.90	0.02	0.26
TOTAL PCB_75	0.409	0.41	***2.02***	0.04	0.58
TOTAL PCB_100	1.845	***1.84***	***14.54***	0.18	***4.16***

Hazard quotients (HQs) = estimated Total Daily Dose (TDD) / Toxicity Reference Value (TRV); See Table 4-12 for TRVs
TDD - estimate from food web modeling using maximum sediment and surface water concentrations
See Appendix E for details of individual food web calculations.
COPC - Chemical of Potential Concern
DDE - Dichloro-diphenyl-dichloroethylene
PAH - Polycyclic aromatic hydrocarbon
PCB - Polychlorinated biphenyls
Hazard quotients (HQs) greater than 1 are shaded with bold-italic text.
Parameter_## - Parameter name and percentile (e.g., Arsenic_25 = 25th percentile concentration for arsenic)

Maximum sediment concentration from current and historic studies (See Appendix F; Langan EES, 1999; Louis Berger, 2001; TAMS, 2001a; TAMS, 2001b; ECI, 1997a; ECI, 1997b; HMDC, 1997; Weis, J. and P. Weis, undated)
Surface water data for metals obtained from historic studies (Langan EES, 1999; Louis Berger, 2001; TAMS, 2001a; HMDC, 1997)
Surface water data for organics predicted from 2003 sediment data using equilibrium partitioning.

Table 6-1. Screening Risk Quotients for Five Marshes

				Maximum Detected Concentration					LEL Ecological Effect Quotient					SEL Screening Risk Quotient				
	LEL	SEL	Crit. Source	Riverbend	Secaucus	Sawmill	Kearny	Oritani	Riverbend	Secaucus	Sawmill	Kearny	Oritani	Riverbend	Secaucus	Sawmill	Kearny	Oritani
PAHs (ppb)																		
Acenaphthene	16	500	1	59.8	166.0	35.5	80.3	30.6	3.7	10.4	2.2	5.0	1.9	0.1	0.3	0.1	0.2	0.1
Acenaphthylene	44	640	1	220.0	68.0	171.0	73.1	107.0	5.0	1.5	3.9	1.7	2.4	0.3	0.1	0.3	0.1	0.2
Anthracene	85.3	1100	1	228.0	74.1	242.0	148.0	113.0	2.7	0.9	2.8	1.7	1.3	0.2	0.1	0.2	0.1	0.1
Benzo(a)anthracene	261	1600	1	612.0	225.0	614.0	539.0	301.0	2.3	0.9	2.4	2.1	1.2	0.4	0.1	0.4	0.3	0.2
Benzo(a)pyrene	430	1600	1	971.0	326.0	795.0	762.0	430.0	2.3	0.8	1.8	1.8	1.0	0.6	0.2	0.5	0.5	0.3
Benzo(b)fluoranthene	10400	10400	4	804.0	349.0	746.0	976.0	460.0	0.1	0.0	0.1	0.1	0.0	0.1	0.0	0.1	0.1	0.0
Benzo(g,h,i)perylene	170	16000	2	597.0	236.0	354.0	580.0	225.0	3.5	1.4	2.1	3.4	1.3	1.9	0.7	1.1	1.8	0.7
Benzo(k)fluoranthene	240	67000	2	502.0	246.0	470.0	501.0	294.0	2.1	1.0	2.0	2.1	1.2	0.4	0.2	0.4	0.4	0.2
Chrysene	384	2800	1	631.0	273.0	610.0	717.0	343.0	1.6	0.7	1.6	1.9	0.9	0.2	0.1	0.2	0.3	0.1
Dibenzo(a,h)anthracene	63.4	260	1	179.0	74.5	104.0	132.0	66.3	2.8	1.2	1.6	2.1	1.0	0.7	0.3	0.4	0.5	0.3
Fluoranthene	600	5100	1	948.0	452.0	850.0	1300.0	658.0	1.6	0.8	1.4	2.2	1.1	0.2	0.1	0.2	0.3	0.1
Fluorene	19	540	1	41.0	51.1	30.7	110.0	29.4	2.2	2.7	1.6	5.8	1.5	0.1	0.1	0.1	0.2	0.1
Hexachlorobenzene	20	1200	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	200	16000	2	525.0	207.0	356.0	533.0	238.0	2.6	1.0	1.8	2.7	1.2	1.6	0.6	1.1	1.7	0.7
2-Methylnaphthalene	70	670	1	24.2	NA	NA	NA	40.3	0.3	NA	NA	NA	0.6	0.0	NA	NA	NA	0.1
Mirex	7	6500	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	160	2100	1	55.6	46.5	43.8	NA	68.2	0.3	0.3	0.3	NA	0.4	0.0	0.0	0.0	NA	0.0
Phenanthrene	240	1500	1	310.0	171.0	180.0	520.0	286.0	1.3	0.7	0.8	2.2	1.2	0.2	0.1	0.1	0.3	0.2
Pyrene	665	2600	1	947.0	371.0	761.0	1230.0	637.0	1.4	0.6	1.1	1.8	1.0	0.4	0.1	0.3	0.5	0.2
Total PAHs	4022	44792	1	7654.6	3302.2	6363.0	8161.8	4166.8	1.9	0.8	1.6	2.0	1.0	0.2	0.1	0.1	0.2	0.1
Pesticides (ppb)																		
Aldrin	2	400	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
alpha-BHC	6	500	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
beta-BHC	5	1050	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
delta-BHC	71500	71500	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
gamma-BHC (Lindane)*	3	50	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlordane (alpha(cis)-)	7	300	2	NA	NA	NA	399.0	NA	NA	NA	NA	57.0	NA	NA	NA	NA	1.3	NA
Dieldrin	2	4550	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDD	8	6000	2	3.4	9.4	8.7	864.5	NA	0.4	1.2	1.1	108.1	NA	0.0	0.0	0.0	0.1	NA
4,4'-DDE	5	950	2	6.7	12.9	14.2	183.0	15.2	1.3	2.6	2.8	36.6	3.0	0.0	0.0	0.0	0.0	0.0
4,4'-DDT	8	3550	2	4.2	NA	NA	39.4	NA	0.5	NA	NA	4.9	NA	0.0	NA	NA	0.0	NA
Endrin	3	6500	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan sulfate	34.6	34.6	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endrin aldehyde	480	480	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan-I	3.26	3.26	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan-II	1.94	1.94	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor	0.6	0.6	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	5	250	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methoxychlor	13.6	13.6	3	NA	NA	NA	32.4	NA	NA	NA	NA	2.4	NA	NA	NA	NA	2.4	NA
Toxaphene	0.077	0.077	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PCBs (ppb)																		
Aroclor 1016	7	2650	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor 1221	NV	NV		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor 1232	NV	NV		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor 1242	NV	NV		125.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor 1248	30	7500	2	73.4	160.0	400.0	376.0	1110.0	2.4	5.3	13.3	12.5	37.0	0.0	0.0	0.0	0.0	0.0
Aroclor 1254	60	1700	2	149.0	101.0	NA	342.0	735.0	2.5	1.7	NA	5.7	12.3	0.0	0.0	NA	0.0	0.0
Aroclor 1260	5	1200	2	NA	48.3	77.7	264.0	NA	NA	9.7	15.5	52.8	NA	NA	0.0	0.0	0.0	NA
Total PCBs	23	180	1	280.0	219.5	477.7	982.0	1845.0	12.2	9.5	20.8	42.7	80.2	1.6	1.2	2.7	5.5	10.3
Metals (ppm)																		

Table 6-1. Screening Risk Quotients for Five Marshes

				Maximum Detected Concentration					LEL Ecological Effect Quotient					SEL Screening Risk Quotient				
	LEL	SEL	Crit. Source	Riverbend	Secaucus	Sawmill	Kearny	Oritani	Riverbend	Secaucus	Sawmill	Kearny	Oritani	Riverbend	Secaucus	Sawmill	Kearny	Oritani
Arsenic	8.2	70	1	16.1	16.5	19.3	26.5	33.2	2.0	2.0	2.4	3.2	4.0	0.2	0.2	0.3	0.4	0.5
Cadmium	1.2	9.6	1	3.5	4.2	2.9	3.4	7.8	2.9	3.5	2.4	2.8	6.5	0.4	0.4	0.3	0.4	0.8
Chromium	81	370	1	237.9	280.0	156.1	49.0	509.5	2.9	3.5	1.9	0.6	6.3	0.6	0.8	0.4	0.1	1.4
Copper	34	270	1	150.5	179.0	120.5	148.9	184.7	4.4	5.3	3.5	4.4	5.4	0.6	0.7	0.4	0.6	0.7
Iron	20	40	2	52.0	44.8	40.6	17.2	46.0	2.6	2.2	2.0	0.9	2.3	1.3	1.1	1.0	0.4	1.2
Lead	46.7	218	1	189.6	183.0	149.4	557.4	356.0	4.1	3.9	3.2	11.9	7.6	0.9	0.8	0.7	2.6	1.6
Nickel	20.9	51.6	1	53.2	66.8	45.8	57.0	92.4	2.5	3.2	2.2	2.7	4.4	1.0	1.3	0.9	1.1	1.8
Zinc	150	410	1	362.2	396.0	269.2	354.2	686.8	2.4	2.6	1.8	2.4	4.6	0.9	1.0	0.7	0.9	1.7
Mercury	0.15	2	1	4.4	3.6	1.1	0.5	6.2	29.6	24.1	7.6	3.5	41.0	2.2	1.8	0.6	0.3	3.1
Cumulative Screening Risk Quotient									108.1	103.7	107.6	392.7	232.8	16.0	11.6	12.4	22.9	25.5