Table A-1. Sediment COPC Screen for the Human Health Risk Assessment for Newark Bay Study Area

CAS Number	Detected Chemical	Minimum Concentration (Qualifier) (mg/kg) (a)	Maximum Concentration (Qualifier) (mg/kg) (a)	Location of Maximum Concentration	Number of Samples	Number of Detects	Detection Frequency	Range of Detection Limits (mg/kg)	Concentration Used for Screening (b)	Screening Level (N/C) (mg/kg) (c)	Known Human Carcinogen?	COPC Flag (Y/N)	Rationale for Selection or Deletion (d)
VOCs (no VOCs detected)													
SVOCs													
105-67-9	2,4-Dimethylphenol	0.023 U	0.13	NB03SED178	19	2	11%	0.023 0.043	0.13	130 N	N	N	Maximum Does Not Exceed SL
88-74-4	2-Nitroaniline	0.023 U	0.043 UJ	NB03SED177	19	1	5%	0.023 0.043	0.043	63 N	N	N	Maximum Does Not Exceed SL
106-44-5	4-Methylphenol	0.023 U	0.19 J	NB03SED143	20	11	55%	0.023 0.043	0.19	630 N	N	N	Maximum Does Not Exceed SL
98-86-2	Acetophenone	0.023 U	0.18 J	NB03SED168	24	12	50%	0.023 0.046	0.18	780 N	N	N	Maximum Does Not Exceed SL
92-52-4	Biphenyl	0.023 U	0.06 J	NB03SED178	19	2	11%	0.023 0.043	0.06	4.7 N	N	N	Maximum Does Not Exceed SL
117-81-7	bis(2-Ethylhexyl)phthalate	0.090 U	38 DJ	NB03SED172	23	19	83%	0.09 1.4	38	39 C	N	N	Maximum Does Not Exceed SL
86-74-8	Carbazole	0.023 U	0.48 J	NB03SED172	20	9	45%	0.023 0.043	0.48	240 N	N	N	Maximum Does Not Exceed SL
132-64-9	Dibenzofuran	0.023 U	0.24 J	NB03SED172	20	9	45%	0.023 0.043	0.24	7.3 N	N	N	Maximum Does Not Exceed SL
84-74-2	Di-n-Butylphthalate	0.090 U	0.17 J	NB03SED149, NB03SED166, NB03SED177	19	1	5%	0.09 0.17	0.17	630 N	N	N	Maximum Does Not Exceed SL
117-84-0	Di-n-Octylphthalate	0.090 U	0.25 J	NB03SED160	19	1	5%	0.09 0.17	0.25	63 N	N	N	Maximum Does Not Exceed SL
118-74-1	Hexachlorobenzene	0.00021 JB	0.0038 B	NB03SED176	24	24	100%	5.3E-06 5.3E-06	0.0038	0.21 C	N	N	Maximum Does Not Exceed SL
1002-53-5	Dibutyltin	0.0017 U	0.015 J	NB03SED176	24	4	17%	0.0017 0.0036	0.015	1.9 N	N	N	Maximum Does Not Exceed SL
688-73-3	Tributyltin	0.0020 U	0.016 PJ	NB03SED164	24	5	21%	0.002 0.0042	0.016	2.3 N	N	N	Maximum Does Not Exceed SL
108-95-2	Phenol	0.023 U	0.14	NB03SED164	19	3	16%	0.023 0.043	0.14	1900 N	N	N	Maximum Does Not Exceed SL
PAHs													
90-12-0	1-Methylnaphthalene	0.0010 U	0.046	NB03SED167	24	17	71%	0.0009 0.016	0.046	18 C	N	N	Maximum Does Not Exceed SL
91-57-6	2-Methylnaphthalene	0.0013 J	0.076	NB03SED167	24	23	96%	0.0009 0.016	0.076	24 N	N	N	Maximum Does Not Exceed SL
83-32-9	Acenaphthene	0.0010 U	0.053	NB03SED167	24	22	92%	0.0009 0.016	0.053	360 N	N	N	Maximum Does Not Exceed SL
208-96-8	Acenaphthylene	0.0017 U	0.081	NB03SED164	24	23	96%	0.0009 0.016	0.081	360 N	N	N	Maximum Does Not Exceed SL
120-12-7	Anthracene	0.0020 J	0.091	NB03SED164	24	24	100%	0.0009 0.016	0.091	1800 N	N	N	Maximum Does Not Exceed SL
56-55-3	Benzo(a)anthracene	0.0063	0.32 J-	NB03SED164	24	24	100%	0.0009 0.016	0.32	0.16 C	N	Y	Maximum Exceeds SL
50-32-8	Benzo(a)pyrene	0.0072	0.39 J-	NB03SED164, NB03SED149	24	24	100%	0.0009 0.016	0.39	0.016 C	N	Y	Maximum Exceeds SL
205-99-2	Benzo(b)fluoranthene	0.0067	0.31 J-	NB03SED149	24	24	100%	0.0009 0.016	0.31	0.16 C	N	Y	Maximum Exceeds SL
192-97-2	Benzo(e)pyrene	0.0056	0.27	NB03SED149	24	24	100%	0.0009 0.016	0.27	180 N	N	N	Maximum Does Not Exceed SL
191-24-2	Benzo(g,h,i)perylene	0.0051	0.24 J-	NB03SED149	24	24	100%	0.0009 0.016	0.24	180 N	N	N	Maximum Does Not Exceed SL
207-08-9-JK	Benzo(j,k)fluoranthene	0.0059	0.31 J-	NB03SED149	24	24	100%	0.0009 0.016	0.31	0.42 C	N	Y	Include as carcinogenic PAH
(e)	C1-Chrysenes	0.0059	0.29	NB03SED164	24	24	100%	0.0009 0.016	0.29	16 C	N	N	Maximum Does Not Exceed SL
(e)	C1-Fluoranthenes/Pyrenes	0.0092	0.44	NB03SED164, NB03SED149	24	24	100%	0.0009 0.016	0.44	180 N	N	N	Maximum Does Not Exceed SL
(e)	C1-Fluorenes	0.0013 J	0.042	NB03SED164	24	22	92%	0.0009 0.016	0.042	240 N	N	N	Maximum Does Not Exceed SL
(e)	C1-Naphthalenes	0.0016 J	0.083	NB03SED167	24	23	96%	0.0009 0.016	0.083	3.8 C	N	N	Maximum Does Not Exceed SL
(e)	C1-Phenanthrenes/Anthracenes	0.0038 J	0.19	NB03SED164,NB03SED170	24	24	100%	0.0009 0.016	0.19	1800 N	N	N	Maximum Does Not Exceed SL
(e)	C2-Chrysenes	0.0059	0.26	NB03SED149	24	24	100%	0.0009 0.016	0.26	16 C	N	N	Maximum Does Not Exceed SL
(e)	C2-Fluoranthenes/Pyrenes	0.0059	0.31	NB03SED149	24	24	100%	0.0009 0.016	0.31	180 N	N	N	Maximum Does Not Exceed SL
(e)	C2-Fluorenes	0.0010 U	0.044	NB03SED164	24	11	46%	0.0009 0.016	0.044	240 N	N	N	Maximum Does Not Exceed SL
(e)	C2-Naphthalenes	0.0017 U	0.064	NB03SED170	24	23	96%	0.0009 0.016	0.064	3.8 C	N	N	Maximum Does Not Exceed SL
(e)	C2-Phenanthrene/anthracenes	0.0067	0.24	NB03SED178	24	24	100%	0.0009 0.016	0.24	1800 N	N	N	Maximum Does Not Exceed SL
(e)	C3-Chrysenes	0.0029 J	0.17	NB03SED149	24	24	100%	0.0009 0.016	0.17	16 C	N	N	Maximum Does Not Exceed SL
(e)	C3-Fluoranthenes/Pyrenes	0.0043 J	0.25	NB03SED149	24	24	100%	0.0009 0.016	0.25	180 N	N	N	Maximum Does Not Exceed SL
(e)	C3-Fluorenes	0.0010 U	0.078	NB03SED178	24	4	17%	0.0009 0.016	0.078	240 N	N	N	Maximum Does Not Exceed SL
(e)	C3-Naphthalene	0.0027	0.090	NB03SED178	24	24	100%	0.0009 0.016	0.090	3.8 C	N	N	Maximum Does Not Exceed SL
(e)	C3-Phenanthrene/anthracenes	0.0066	0.22	NB03SED178	24	24	100%	0.0009 0.016	0.22	1800 N	N	N	Maximum Does Not Exceed SL
(e)	C4-Chrysenes	0.0010 U	0.13	NB03SED149	24	15	63%	0.0009 0.016	0.13	16 C	N	N	Maximum Does Not Exceed SL

Table A-1. Sediment COPC Screen for the Human Health Risk Assessment for Newark Bay Study Area

CAS Number	Detected Chemical	Minimum Concentration (Qualifier) (mg/kg) (a)		Maximum Concentration (Qualifier) (mg/kg) (a)		Location of Maximum Concentration	Number of Samples	Number of Detects	Detection Frequency	Range of Detection Limits (mg/kg)		Concentration Used for Screening (b)	Screening Level (N/C) (mg/kg) (c)		Known Human Carcinogen?	COPC Flag (Y/N)	Rationale for Selection or Deletion (d)
(e)	C4-Naphthalene	0.0030		0.13		NB03SED178	24	24	100%	0.0009	0.016	0.13	3.8	C	N	N	Maximum Does Not Exceed SL
(e)	C4-Phenanthrenes/anthracenes	0.00090	U	0.20		NB03SED173	24	4	17%	0.0009	0.016	0.20	1800	N	N	N	Maximum Does Not Exceed SL
218-01-9	Chrysene	0.0067		0.35	J-	NB03SED149	24	24	100%	0.0009	0.016	0.35	16	C	N	Y	Include as carcinogenic PAH
53-70-3	Dibenzo(a,h)anthracene	0.0017	U	0.068	J-	NB03SED149	24	23	96%	0.0009	0.016	0.068	0.016	C	N	Y	Maximum Exceeds SL
206-44-0	Fluoranthene	0.011		0.54	J-	NB03SED170	24	24	100%	0.0009	0.016	0.54	240	N	N	N	Maximum Does Not Exceed SL
86-73-7	Fluorene	0.0010	U	0.046		NB03SED167	24	21	88%	0.0009	0.016	0.046	240	N	N	N	Maximum Does Not Exceed SL
193-39-5	Indeno(1,2,3-cd)pyrene	0.0054		0.26	J-	NB03SED149	24	24	100%	0.0009	0.016	0.26	0.16	C	N	Y	Maximum Exceeds SL
91-20-3	Naphthalene	0.0018	J	0.14		NB03SED164	24	24	100%	0.0009	0.016	0.14	3.8	C	N	N	Maximum Does Not Exceed SL
198-55-0	Perylene	0.0028	J	0.096		NB03SED149	24	24	100%	0.0009	0.016	0.096	180	N	N	N	Maximum Does Not Exceed SL
85-01-8	Phenanthrene	0.0028	J	0.34		NB03SED170	24	24	100%	0.0009	0.016	0.34	1800	N	N	N	Maximum Does Not Exceed SL
129-00-0	Pyrene	0.010		0.55	J-	NB03SED170	24	24	100%	0.0009	0.016	0.55	180	N	N	N	Maximum Does Not Exceed SL
PCBs/Dioxins/Furans																	
WHOPCBTEQ(H)	PCB TEQ	1.1E-07	BT	2.1E-05	BT	NB03SED176	24	24	100%	NA	NA	2.1E-05	4.8E-06	C	N	Y	Maximum Exceeds SL
WHODIOXTEQ(H)	Dioxin/Furan TEQ	3.6E-06	BJ	0.00030	BJ	NB03SED173	24	24	100%	NA	NA	0.00030	4.8E-06	C	N	Y	Maximum Exceeds SL
TPCB Cong-209	Total PCBs	0.0025	BT	0.54	BT	NB03SED176	24	24	100%	NA	NA	0.54	0.23	C	N	Y	Maximum Exceeds SL
Pesticides/Herbicides																	
93-76-5	2,4,5-T	0.0011	UJ	0.0070	J	NB03SED174	24	6	25%	0.0011	0.0022	0.0070	63	N	N	N	Maximum Does Not Exceed SL
53-19-0	2,4'-DDD	0.00024		0.044	D	NB03SED173	24	24	100%	5.0E-06	5.0E-06	0.044	2.3	C	N	N	Maximum Does Not Exceed SL
3424-82-6	2,4'-DDE	0.00031		0.11	D	NB03SED173	24	24	100%	5.0E-06	5.0E-06	0.11	2	C	N	N	Maximum Does Not Exceed SL
789-02-6	2,4'-DDT	6.1E-06	UJ	0.0013		NB03SED177	24	20	83%	6.1E-06	6.1E-06	0.0013	1.9	C	N	N	Maximum Does Not Exceed SL
72-54-8	4,4'-DDD	0.00086	B	0.073	BD	NB03SED176	24	24	100%	5.2E-06	5.2E-06	0.073	2.3	C	N	N	Maximum Does Not Exceed SL
72-55-9	4,4'-DDE	0.0011	B	0.24	BD	NB03SED173	24	24	100%	8.1E-06	8.1E-06	0.24	2	C	N	N	Maximum Does Not Exceed SL
50-29-3	4,4'-DDT	0.00024	B	0.0099	JB	NB03SED164	24	24	100%	9.2E-06	9.2E-06	0.0099	1.9	C	N	N	Maximum Does Not Exceed SL
319-84-6	Alpha-BHC	8.1E-06	J	0.00036		NB03SED174	24	24	100%	7.9E-06	7.9E-06	0.00036	0.086	C	N	N	Maximum Does Not Exceed SL
5103-71-9	Alpha-Chlordane	9.6E-06	U	0.0075	J	NB03SED161	24	23	96%	9.6E-06	9.6E-06	0.0075	1.7	C	N	N	Maximum Does Not Exceed SL
319-85-7	Beta-BHC	6.6E-06	J	0.00016	J	NB03SED161	24	17	71%	1.3E-05	1.3E-05	0.00016	0.3	C	N	N	Maximum Does Not Exceed SL
5103-73-1	cis-Nonachlor	1.0E-05	UJ	0.0021	J	NB03SED136	24	22	92%	1.0E-05	1.0E-05	0.0021	1.7	C	N	N	Maximum Does Not Exceed SL
319-86-8	Delta-BHC	7.3E-06	UJ	2.2E-05	J	NB03SED161	24	2	8%	7.3E-06	7.3E-06	2.2E-05	0.086	C	N	N	Maximum Does Not Exceed SL
60-57-1	Dieldrin	1.1E-05	U	0.0035	B	NB03SED149	24	23	96%	1.1E-05	1.1E-05	0.0035	0.034	C	N	N	Maximum Does Not Exceed SL
959-98-8	Endosulfan I	2.1E-05	UJ	0.00022	UJ	NB03SED166	24	2	8%	2.1E-05	2.1E-05	0.00022	47	N	N	N	Maximum Does Not Exceed SL
58-89-9	Gamma-BHC (Lindane)	6.3E-06	J	0.00011		NB03SED174	24	6	25%	7.3E-06	0.0000073	0.00011	0.57	C	N	N	Maximum Does Not Exceed SL
76-44-8	Heptachlor	1.0E-05	UJ	0.00015		NB03SED174	24	4	17%	1.0E-05	1.0E-05	0.00015	0.13	C	N	N	Maximum Does Not Exceed SL
1024-57-3	Heptachlor Epoxide	9.4E-06	U	0.00055	J	NB03SED136	24	16	67%	9.4E-06	9.4E-06	0.00055	0.07	C	N	N	Maximum Does Not Exceed SL
72-43-5	Methoxychlor	1.2E-05	UJ	0.0014	J	NB03SED161	20	1	5%	1.2E-05	1.2E-05	0.0014	32	N	N	N	Maximum Does Not Exceed SL
2385-85-5	Mirex	4.9E-06	UJ	0.00021	J	NB03SED167	22	3	14%	4.9E-06	4.9E-06	0.00021	0.036	C	N	N	Maximum Does Not Exceed SL
39765-80-5	Nonachlor, trans-	7.6E-06	U	0.0040	J	NB03SED136	24	23	96%	7.6E-06	7.6E-06	0.0040	1.7	C	N	N	Maximum Does Not Exceed SL
27304-13-8	Oxychlordane	1.1E-05	UJ	4.2E-05		NB03SED142, NB03SED175	24	4	17%	1.1E-05	1.1E-05	4.2E-05	1.7	C	N	N	Maximum Does Not Exceed SL
TOT_AGChlor	Total Alpha + Gamma Chlordane	1.1E-05	U	0.014	J	NB03SED161	24	23	96%	1.1E-05	1.1E-05	0.014	1.7	C	N	N	Maximum Does Not Exceed SL
5103-74-2	trans-Chlordane	1.1E-05	U	0.0072	J	NB03SED170	24	23	96%	1.1E-05	1.1E-05	0.0072	1.7	C	N	N	Maximum Does Not Exceed SL
28044-83-9	trans-Heptachlor Epoxide	1.3E-05	UJ	0.00060		NB03SED176	24	14	58%	1.3E-05	1.3E-05	0.00060	0.07	C	N	N	Maximum Does Not Exceed SL
Inorganics																	
7429-90-5	Aluminum	4670		23300	J	NB03SED178	24	24	100%	7.44	14.8	23300	7700	N	N	Y	Maximum Exceeds SL
7440-36-0	Antimony	0.088	U	4.4	J	NB03SED161	24	23	96%	0.0877	0.175	4.4	3.1	N	N	Y	Maximum Exceeds SL
7440-38-2	Arsenic	2.4		56	J	NB03SED178	24	24	100%	0.199	0.397	56	0.68	C	Y	Y	Maximum Exceeds SL; a known human carcinogen
7440-39-3	Barium	32		374	J	NB03SED178	24	24	100%	0.244	0.487	374	1500	N	N	N	Maximum Does Not Exceed SL
7440-41-7	Beryllium	0.31		1.8	J	NB03SED176	24	24	100%	0.0189	0.0376	1.8	16	N	N	N	Maximum Does Not Exceed SL
7440-43-9	Cadmium	0.14		4.1	J	NB03SED176	24	24	100%	0.0611	0.122	4.1	7.1	N	N	N	Maximum Does Not Exceed SL

Table A-1. Sediment COPC Screen for the Human Health Risk Assessment for Newark Bay Study Area

CAS Number	Detected Chemical	Minimum Concentration (Qualifier) (mg/kg) (a)	Maximum Concentration (Qualifier) (mg/kg) (a)	Location of Maximum Concentration	Number of Samples	Number of Detects	Detection Frequency	Range of Detection Limits (mg/kg)		Concentration Used for Screening (b)	Screening Level (N/C) (mg/kg) (c)	Known Human Carcinogen?	COPC Flag (Y/N)	Rationale for Selection or Deletion (d)
7440-47-3	Chromium III	21	280 J	NB03SED173	24	24	100%	0.133	0.265	280	12000 N	N	N	Maximum Does Not Exceed SL
7440-48-4	Cobalt	4.3	19 J	NB03SED178	24	24	100%	0.0266	0.053	19	2.3 N	N	Y	Maximum Exceeds SL
7440-50-8	Copper	19	366 J	NB03SED176	24	24	100%	0.106	0.212	366	310 N	N	Y	Maximum Exceeds SL
18540-29-9	Hexavalent Chromium	0.68 U	2.0 B	NB03SED140	23	2	9%	0.68	1.4	2.0	0.3 C	N	Y	Maximum Exceeds SL
7439-89-6	Iron	9060	47600 J	NB03SED178	24	24	100%	6.14	12.2	47600	5500 N	N	Y	Maximum Exceeds SL
7439-92-1	Lead	39	441 J	NB03SED178	24	24	100%	0.0345	0.0689	441	400	N	Y	Maximum Exceeds SL
7439-96-5	Manganese	77	589 J	NB03SED178	24	24	100%	0.223	0.445	589	180 N	N	Y	Maximum Exceeds SL
7439-97-6	Mercury	0.17 J	4.5 J	NB03SED176	24	24	100%	0.00321	0.0116	4.5	2.3 N	N	Y	Maximum Exceeds SL
22967-92-6	Methyl Mercury	0.00033 J	0.0050 J	NB03SED149	24	24	100%	1.9E-05	4.2E-04	0.0050	0.78 N	N	N	Maximum Does Not Exceed SL
7440-02-0	Nickel	17	182 J	NB03SED172	24	24	100%	0.25	0.498	182	150 N	N	Y	Maximum Exceeds SL
7723-14-0	Phosphorus	158	1590	NB03SED161	24	24	100%	13.3	268	1590	0.16 N	N	Y	Maximum Exceeds SL
7782-49-2	Selenium	0.15 B	3.7 J	NB03SED178	24	24	100%	0.133	0.265	3.7	39 N	N	N	Maximum Does Not Exceed SL
7440-22-4	Silver	0.19	4.6 J	NB03SED176	24	24	100%	0.0266	0.053	4.6	39 N	N	N	Maximum Does Not Exceed SL
7440-28-0	Thallium	0.059 B	0.72 J	NB03SED161	24	24	100%	0.0398	0.0795	0.72	0.078 N	N	Y	Maximum Exceeds SL
7440-32-6	Titanium	200	675 J	NB03SED174	24	24	100%	0.226	0.45	675	NA	N	N	Maximum Does Not Exceed SL
7440-62-2	Vanadium	12	67 J	NB03SED178	24	24	100%	0.0398	0.0795	67	39 N	N	Y	Maximum Exceeds SL
7440-66-6	Zinc	80	752 J	NB03SED176	24	24	100%	0.983	1.96	752	2300 N	N	N	Maximum Does Not Exceed SL

(a) Data Qualifiers:
"J " estimated value
"J-" estimated value, but the result may be biased high
"U" analyzed for but not detected
"T" indicates a summed quantity
"B" the associated analyte was also detected in the method blank for organics; or for inorganics, reported value was obtained from an instrument reading that was less than the project quantitation limit (PQL)
"P" the percent difference between the primary and confirmation column for pesticide/Aroclor analyses is greater than 25%
"D" the organic analyte was quantitated from a diluted analysis
(b) Maximum detected concentration selected for the Concentration Used for Screening.
(c) USEPA Regional Screening Levels for Residential Soil. May 2016. Values based on noncarcinogenic effects are adjusted for a target hazard quotient of 0.1 to account for potential cumulative effects on the same target organ.
N - noncarcinogenic; C - carcinogenic.
(d) See the COPC Selection Process (Section 5.1 of the PAR) for details.
(e) Surrogate toxicity values for the methylated PAHs obtained from the Superfund Technical Support Center
CAS - Chemical Abstracts Service
COPC - Chemical of Potential Concern
FOD - Frequency of Detection
mg/kg - Milograms per kilogram
N - No
NA - Not Available
Y - Yes

Table A-2. Fish Tissue COPC Screen for the Human Health Risk Assessment for Newark Bay Study Area

CAS Number	Detected Chemical	Minimum Concentration (Qualifier) (mg/kg) (a)	Maximum Concentration (Qualifier) (mg/kg) (a)	Location of Maximum Concentration (b)	Number of Samples	Number of Detects	Detection Frequency	Range of Detection Limits (mg/kg)		Concentration Used for Screening (c)	Screening Level (N/C) (mg/kg)	Known Human Carcinogen?	COPC Flag (Y/N)	Rationale for Selection or Deletion (e)
VOCs (no VOCs detected)														
SVOCs														
65-85-0	Benzoic Acid	0.65 U	5.8 J	S	95	1	1%	0.65	3.3	5.8	593 N	N	N	Maximum Does Not Exceed SL
1002-53-5	Dibutyltin	0.0012 UJ	0.0030 J	S	92	1	1%	0.0012	0.0013	0.003	0.044 N	N	N	Maximum Does Not Exceed SL
108-95-2	Phenol	0.065 U	1.2 J	S	95	1	1%	0.065	0.33	1.2	44 N	N	N	Maximum Does Not Exceed SL
1461-25-2	Tetrabutyltin	0.0015 U	0.011 J	S	92	1	1%	0.0015	0.0017	0.011	0.044 N	N	N	Maximum Does Not Exceed SL
688-73-3	Tributyltin	0.0014 UJ	0.0064 J	S	92	8	9%	0.0014	0.0015	0.0064	0.044 N	N	N	Maximum Does Not Exceed SL
PAHs														
90-12-0	1-Methylnaphthalene	0.0027 U	0.029	N	95	11	12%	0.0027	0.013	0.029	0.14 C	N	N	Maximum Does Not Exceed SL
91-57-6	2-Methylnaphthalene	0.0027 U	0.054	N	95	10	11%	0.0027	0.013	0.054	0.59 N	N	N	Maximum Does Not Exceed SL
83-32-9	Acenaphthene	0.0042 J	0.028	N	95	18	19%	0.0027	0.013	0.028	8.9 N	N	N	Maximum Does Not Exceed SL
120-12-7	Anthracene	0.0027 U	0.013 UJ	C, N, S	95	2	2%	0.0027	0.013	0.013	44 N	N	N	Maximum Does Not Exceed SL
(f)	C1-Fluorenes	0.0027 U	0.013 UJ	C, N, S	95	1	1%	0.0027	0.013	0.013	5.9 N	N	N	Maximum Does Not Exceed SL
(f)	C1-Naphthalenes	0.0027 U	0.055	N	95	13	14%	0.0027	0.013	0.055	3.0 N	N	N	Maximum Does Not Exceed SL
(f)	C1-Phenanthrenes/anthracenes	0.0027 U	0.013 UJ	C, N, S	95	2	2%	0.0027	0.013	0.013	44 N	N	N	Maximum Does Not Exceed SL
(f)	C2-Naphthalenes	0.0027 U	0.077	N	95	10	11%	0.0027	0.013	0.077	3.0 N	N	N	Maximum Does Not Exceed SL
(f)	C2-Phenanthrene/anthracenes	0.0027 U	0.013 UJ	C, N, S	95	1	1%	0.0027	0.013	0.013	44 N	N	N	Maximum Does Not Exceed SL
(f)	C3-Naphthalene	0.0027 U	0.056	N	95	6	6%	0.0027	0.013	0.056	3.0 N	N	N	Maximum Does Not Exceed SL
(f)	C4-Naphthalene	0.0027 U	0.025	N	95	1	1%	0.0027	0.013	0.025	3.0 N	N	N	Maximum Does Not Exceed SL
206-44-0	Fluoranthene	0.0027 UJ	0.013 UJ	C, N, S	95	8	8%	0.0027	0.013	0.013	5.9 N	N	N	Maximum Does Not Exceed SL
86-73-7	Fluorene	0.0027 J	0.015	S	95	6	6%	0.0027	0.013	0.015	5.9 N	N	N	Maximum Does Not Exceed SL
91-20-3	Naphthalene	0.0027 U	0.18	C	95	17	18%	0.0027	0.013	0.18	3.0 N	N	N	Maximum Does Not Exceed SL
85-01-8	Phenanthrene	0.0027 U	0.032	S	95	7	7%	0.0027	0.013	0.032	44 N	N	N	Maximum Does Not Exceed SL
129-00-0	Pyrene	0.0027 UJ	0.017	C	95	4	4%	0.0027	0.013	0.017	4.4 N	N	N	Maximum Does Not Exceed SL
PCBs/Dioxins/Furans														
WHODIOXTEQ(H)	Dioxin/Furan TEQ	3.6E-07 BJ	3.4E-05 BJ	C	95	95	100%	NA	NA	3.4E-05	3.1E-08 C	N	Y	Maximum Exceeds SL
WHOPCBTEQ(H)	PCB TEQ	2.5E-07 BJ, BT	5.8E-05 BT	S	95	95	100%	NA	NA	5.8E-05	3.1E-08 C	N	Y	Maximum Exceeds SL
TPCB Cong-209	Total PCBs	0.024 BT	2.2 BT	S	95	95	100%	NA	NA	2.2	0.0020 C	N	Y	Maximum Exceeds SL
Pesticides/Herbicides														
53-19-0	2,4'-DDD	5.7E-05 J	0.103 DJ	S	95	95	100%	5.0E-06	5.0E-06	0.103	0.017 C	N	Y	Maximum Exceeds SL
3424-82-6	2,4'-DDE	0.00013 JB	0.040 DJ	S	95	95	100%	1.0E-05	1.0E-05	0.040	0.012 C	N	Y	Maximum Exceeds SL
789-02-6	2,4'-DDT	1.1E-05 UDJ	0.030 D	N	95	89	94%	1.1E-05	1.1E-05	0.030	0.012 C	N	Y	Maximum Exceeds SL
72-54-8	4,4'-DDD	0.00045 J	0.42 DJ	S	95	95	100%	7.4E-06	7.4E-06	0.42	0.017 C	N	Y	Maximum Exceeds SL
72-55-9	4,4'-DDE	0.0012 J	0.68 JBED	S	95	95	100%	7.6E-06	7.6E-06	0.68	0.012 C	N	Y	Maximum Exceeds SL
50-29-3	4,4'-DDT	9.4E-06 UJ	0.069 DJ	S	95	94	99%	9.4E-06	9.4E-06	0.069	0.012 C	N	Y	Maximum Exceeds SL
309-00-2	Aldrin	2.3E-06 J	0.00024 J	S	95	69	73%	9.2E-06	9.2E-06	0.00024	0.00024 C	N	N	Maximum Does Not Exceed SL
319-84-6	Alpha-BHC	5.5E-06 J	0.00027 J	C	94	88	94%	6.4E-06	6.4E-06	0.00027	0.00063 C	N	N	Maximum Does Not Exceed SL
5103-71-9	Alpha-Chlordane	0.00023 J	0.13 DJ	S	95	95	100%	8.8E-06	8.8E-06	0.13	0.011 C	N	Y	Maximum Exceeds SL
319-85-7	Beta-BHC	5.4E-06 J	0.00015 J	N	95	87	92%	1.1E-05	1.1E-05	0.00015	0.0022 C	N	N	Maximum Does Not Exceed SL
5103-73-1	cis-Nonachlor	9.2E-05 J	0.036 DJ	S	95	95	100%	1.3E-05	1.3E-05	0.036	0.011 C	N	Y	Maximum Exceeds SL
319-86-8	Delta-BHC	2.7E-06 J	9.1E-06 J	N	95	18	19%	5.1E-06	5.1E-06	9.1E-06	0.00063 C	N	N	Maximum Does Not Exceed SL
60-57-1	Dieldrin	0.00026 J	0.036 DJ	S	95	95	100%	1.5E-05	1.5E-05	0.036	0.00025 C	N	Y	Maximum Exceeds SL
1031-07-8	Endosulfan Sulfate	2.6E-05 J	8.4E-05 J	N	95	6	6%	6.3E-05	6.3E-05	8.4E-05	0.89 N	N	N	Maximum Does Not Exceed SL
72-20-8	Endrin	8.3E-06 J	7.5E-05	S	95	45	47%	1.4E-05	1.4E-05	7.5E-05	0.044 N	N	N	Maximum Does Not Exceed SL
53494-70-5	Endrin Ketone	3.6E-05 J	0.00010 J	S	85	5	6%	7.6E-05	7.6E-05	0.00010	0.044 N	N	N	Maximum Does Not Exceed SL
58-89-9	Gamma-BHC	3.3E-06 J	7.0E-05	S	95	76	80%	7.7E-06	7.7E-06	7.0E-05	0.0036 C	N	N	Maximum Does Not Exceed SL

Table A-2. Fish Tissue COPC Screen for the Human Health Risk Assessment for Newark Bay Study Area

CAS Number	Detected Chemical	Minimum Concentration (Qualifier) (mg/kg) (a)	Maximum Concentration (Qualifier) (mg/kg) (a)	Location of Maximum Concentration (b)	Number of Samples	Number of Detects	Detection Frequency	Range of Detection Limits (mg/kg)		Concentration Used for Screening (c)	Screening Level (N/C) (mg/kg)	Known Human Carcinogen?	COPC Flag (Y/N)	Rationale for Selection or Deletion (e)
76-44-8	Heptachlor	4.9E-06 J	4.3E-05 J	S	95	25	26%	3.3E-05	3.3E-05	4.3E-05	0.00089 C	N	N	Maximum Does Not Exceed SL
1024-57-3	Heptachlor Epoxide	5.9E-05 J	0.0063 J	N	95	95	100%	7.0E-06	7.0E-06	0.0063	0.00044 C	N	Y	Maximum Exceeds SL
118-74-1	Hexachlorobenzene	0.00010 BJ	0.0066 JB	S	95	95	100%	4.1E-06	4.1E-06	0.0066	0.0025 C	N	Y	Maximum Exceeds SL
78-59-1	Isophorone	0.066 U	0.33 UJ	C, N, S	95	3	3%	0.065	0.33	0.33	4.2 C	N	N	Maximum Does Not Exceed SL
72-43-5	Methoxychlor	3.0E-05 J	3.9E-05 UJ	C, N, S	87	1	1%	3.9E-05	3.9E-05	3.9E-05	0.74 N	N	N	Maximum Does Not Exceed SL
2385-85-5	Mirex	9.3E-06 UJ	0.00094	N	90	87	97%	9.3E-06	9.3E-06	0.00094	0.00022 C	N	Y	Maximum Exceeds SL
39765-80-5	Nonachlor, trans-	0.00020 J	0.087 DJ	S	95	95	100%	1.0E-05	1.0E-05	0.087	0.011 C	N	Y	Maximum Exceeds SL
27304-13-8	Oxychlordane	1.0E-05 U	0.029 DJ	N	95	94	99%	0.00001	1.0E-05	0.029	0.011 C	N	Y	Maximum Exceeds SL
5103-74-2	trans-Chlordane	0.00012 J	0.023 DJ	S	95	95	100%	1.4E-05	1.4E-05	0.023	0.011 C	N	Y	Maximum Exceeds SL
28044-83-9	trans-Heptachlor Epoxide	1.7E-05 UJ	0.0015 J	C	95	2	2%	1.7E-05	1.7E-05	0.0015	0.00044 C	N	N	Less than 5% FOD
TOT_AGChlor	Total Chlordane	0.00036 J	0.15 DJ	S	95	95	100%	NA	NA	0.15	0.011 C	N	Y	Maximum Exceeds SL
Inorganics														
7429-90-5	Aluminum	3.8 U	15 B	C	95	9	9%	3.7	5.6	15	148 N	N	N	Maximum Does Not Exceed SL
7440-36-0	Antimony	0.044 U	0.076 B	S	95	1	1%	0.044	0.066	0.076	0.059 N	N	N	Less than 5% FOD
7440-38-2	Arsenic	0.26 B	3.6	S	95	95	100%	0.10	0.15	3.6	0.0027 C	Y	Y	Maximum Exceeds SL; a known human carcinogen
7440-39-3	Barium	0.13 U	0.37	S	95	6	6%	0.12	0.18	0.37	30 N	N	N	Maximum Does Not Exceed SL
7440-47-3	Chromium (hexavalent)	0.067 U	2.4	N	95	26	27%	0.067	0.10	2.4	0.0080 C	N	Y	Maximum Exceeds SL
7440-48-4	Cobalt	0.014 B	2.2	N	95	6	6%	0.013	0.02	2.2	0.044 N	N	Y	Maximum Exceeds SL
7440-50-8	Copper	0.055 U	1.1	C	95	88	93%	0.053	0.08	1.1	5.9 N	N	N	Maximum Does Not Exceed SL
7439-89-6	Iron	3.2 U	21	N	95	59	62%	3.1	4.6	21	104 N	N	N	Maximum Does Not Exceed SL
7439-92-1	Lead	0.018 B	4.8	N	95	24	25%	0.017	0.026	4.8	0.1	N	Y	Maximum Exceeds SL
7439-96-5	Manganese	0.11 U	0.87	S	95	47	49%	0.11	0.17	0.87	21 N	N	N	Maximum Does Not Exceed SL
7439-97-6	Mercury	0.067	0.64	N	95	95	100%	0.00038	0.0028	0.64	0.044 N	N	Y	Maximum Exceeds SL
22967-92-6	Methyl Mercury	0.066	0.76	N	91	91	100%	0.0016	0.0096	0.76	0.015 N	N	Y	Maximum Exceeds SL
7440-02-0	Nickel	0.13 U	0.46	N	95	2	2%	0.13	0.19	0.46	3.0 N	N	N	Maximum Does Not Exceed SL
7782-49-2	Selenium	0.25 B	0.85	S	95	95	100%	0.0667	0.10	0.85	0.74 N	N	Y	Maximum Exceeds SL
7440-32-6	Titanium	0.16 U	0.37 U	N, S	95	2	2%	0.16	0.37	0.37	NA	N	Y	No Screening Value
7440-62-2	Vanadium	0.020 U	0.034 B	N	95	6	6%	0.020	0.030	0.034	0.75 N	N	N	Maximum Does Not Exceed SL
7440-66-6	Zinc	4.5	43	C	95	95	100%	0.37	0.74	43	44 N	N	N	Maximum Does Not Exceed SL

(a) Data Qualifiers:

"J " estimated value "B" the associated analyte was also detected in the method blank for organics; or for inorganics, reported value was obtained from an instrument reading that was less than the project quantitation limit (PQL)

"U" analyzed for but "D" the organic analyte was quantitated from a diluted analysis

"T" indicates a sum "E" the associated compound concentration exceeded the calibration range of the instrument for organics

(b) Location of Maximum Concentration: N- northern portion of Bay; C - central portion of Bay; S -southern portion of Bay.

(c) Maximum detected concentration selected for the Concentration Used for Screening.

(d) USEPA Regional Screening Levels Calculator; for Consumption of fish. May 2016. Values based on noncarcinogenic effects are adjusted for a target hazard quotient of 0.1 to account for potential cumulative effects on the same target organ.

N - noncarcinogenic; C - carcinogenic.

(e) See the COPC Selection Process (Section 5.1 of the PAR) for details.

(f) Surrogate toxicity values for the methylated PAHs obtained from the Superfund Technical Support Center

CAS - Chemical Abstracts Service

COPC - Chemical of Potential Concern

FOD - Frequency of Detection

mg/kg - Milograms per kilogram

N - No

NA - Not Available

Y - Yes

Table A-3. Crab Tissue COPC Screen for the Human Health Risk Assessment for Newark Bay Study Area

CAS Number	Detected Chemical	Minimum Concentration (Qualifier) (mg/kg) (a)		Maximum Concentration (Qualifier) (mg/kg) (a)		Location of Maximum Concentration (b)	Number of Samples	Number of Detects	Detection Frequency	Range of Detection Limits (mg/kg)		Concentration Used for Screening (c)	Screening Level (N/C) (mg/kg) (d)		Known Human Carcinogen?	COPC Flag (Y/N)	Rationale for Selection or Deletion (e)
VOCs (no VOCs detected)																	
SVOCs																	
122-66-7	1,2-Diphenylhydrazine	0.065	U	0.49	U	S	36	1	3%	0.066	0.65	0.49	0.0050	C	N	N	Less than 5% FOD
91-94-1	3,3'-Dichlorobenzidine	0.39	U	2.9	U	S	36	1	3%	0.39	3.9	2.9	0.0089	C	N	N	Less than 5% FOD
106-44-5	4-Methylphenol	0.065	U	0.49	U	S	36	1	3%	0.066	0.65	0.49	15	N	N	N	Maximum Does Not Exceed SL
98-86-2	Acetophenone	0.065	U	0.73		C	36	2	6%	0.066	0.65	0.73	15	N	N	N	Maximum Does Not Exceed SL
100-52-7	Benzaldehyde	0.28	J	3.2		S	36	25	69%	0.26	2.6	3.2	1.0	C	N	Y	Maximum Exceeds SL
65-85-0	Benzoic Acid	0.65	U	7.3		C	36	16	44%	0.66	6.5	7.3	593	N	N	N	Maximum Does Not Exceed SL
118-74-1	Hexachlorobenzene	0.00063	BD	0.0043	B	N	37	37	100%	4.1E-06	4.1E-06	0.0043	0.0025	C	N	Y	Maximum Exceeds SL
108-95-2	Phenol	0.065	U	0.50	J	S	36	7	19%	0.066	0.65	0.50	44	N	N	N	Maximum Does Not Exceed SL
110-86-1	Pyridine	0.0011	U	1.9	U	S	36	6	17%	0.26	2.6	1.9	0.15	N	N	Y	Maximum Exceeds SL
1002-53-5	Dibutyltin	0.0012	UJ	0.0015	UJ	N	37	4	11%	0.0012	0.0013	0.0015	0.044	N	N	N	Maximum Does Not Exceed SL
PAHs																	
90-12-0	1-Methylnaphthalene	0.0026	U	0.018	J+	N	37	9	24%	0.0026	0.013	0.018	0.14	C	N	N	Maximum Does Not Exceed SL
91-57-6	2-Methylnaphthalene	0.0026	U	0.026	J+	N	37	24	65%	0.0026	0.013	0.026	0.59	N	N	N	Maximum Does Not Exceed SL
83-32-9	Acenaphthene	0.0027	U	0.059	J+	N	37	33	89%	0.0026	0.013	0.059	8.9	N	N	N	Maximum Does Not Exceed SL
208-96-8	Acenaphthylene	0.0026	U	0.013	U	S	37	11	30%	0.0026	0.013	0.013	8.9	N	N	N	Maximum Does Not Exceed SL
120-12-7	Anthracene	0.0026	U	0.098	J	C	37	24	65%	0.0026	0.013	0.098	44	N	N	N	Maximum Does Not Exceed SL
56-55-3	Benzo(a)anthracene	0.0026	U	0.013	U	S	37	9	24%	0.0026	0.013	0.013	0.0055	C	N	Y	Maximum Exceeds SL
50-32-8	Benzo(a)pyrene	0.0026	U	0.013	U	S	37	2	5%	0.0026	0.013	0.013	0.00055	C	N	Y	Maximum Exceeds SL
205-99-2	Benzo(b)fluoranthene	0.0026	U	0.013	U	S	37	2	5%	0.0026	0.013	0.013	0.0055	C	N	Y	Maximum Exceeds SL
192-97-2	Benzo(e)pyrene	0.0026	U	0.013	U	S	37	3	8%	0.0026	0.013	0.013	4.4	N	N	N	Maximum Does Not Exceed SL
191-24-2	Benzo(g,h,i)perylene	0.0026	UJ	0.013	U	S	37	4	11%	0.0026	0.013	0.013	4.4	N	N	N	Maximum Does Not Exceed SL
207-08-9-JK	Benxo(j,k)fluoranthene	0.0026	U	0.013	U	S	37	1	3%	0.0026	0.013	0.013	0.0033	C	N	Y	Include as carcinogenic PAH
(f)	C1-Fluorenes	0.0026	U	0.013	U	S	37	2	5%	0.0026	0.013	0.013	5.9	N	N	N	Maximum Does Not Exceed SL
(f)	C1-Naphthalenes	0.0026	U	0.037		N	37	23	62%	0.0026	0.013	0.037	3.0	N	N	N	Maximum Does Not Exceed SL
(f)	C1-Phenanthrenes/anthracenes	0.0026	U	0.013	U	S	37	4	11%	0.0026	0.013	0.013	44	N	N	N	Maximum Does Not Exceed SL
(f)	C2-Chrysenes	0.0026	U	0.013	U	S	37	1	3%	0.0026	0.013	0.013	0.55	C	N	N	Maximum Does Not Exceed SL
(f)	C2-Fluorenes	0.0026	U	0.071		C	37	3	8%	0.0026	0.013	0.071	5.9	N	N	N	Maximum Does Not Exceed SL
(f)	C2-Naphthalenes	0.0026	U	0.029		N	37	13	35%	0.0026	0.013	0.029	3.0	N	N	N	Maximum Does Not Exceed SL
(f)	C2-Phenanthrene/anthracenes	0.0026	U	0.019		C	37	3	8%	0.0026	0.013	0.019	44	N	N	N	Maximum Does Not Exceed SL
(f)	C3-Fluorenes	0.0026	U	0.013	U	S	37	3	8%	0.0026	0.013	0.013	5.9	N	N	N	Maximum Does Not Exceed SL
(f)	C3-Naphthalene	0.0026	U	0.013	U	S	37	5	14%	0.0026	0.013	0.013	3.0	N	N	N	Maximum Does Not Exceed SL
(f)	C3-Phenanthrene/anthracenes	0.0026	U	0.013	U	S	37	1	3%	0.0026	0.013	0.013	44	N	N	N	Maximum Does Not Exceed SL
(f)	C4-Naphthalene	0.0026	U	0.013	U	S	37	2	5%	0.0026	0.013	0.013	3.0	N	N	N	Maximum Does Not Exceed SL
(f)	C4-Phenanthrenes/anthracenes	0.0026	U	0.013	U	S	37	1	3%	0.0026	0.013	0.013	44	N	N	N	Maximum Does Not Exceed SL
218-01-9	Chrysene	0.0026	U	0.013	U	S	37	14	38%	0.0026	0.013	0.013	0.55	C	N	Y	Include as carcinogenic PAH
53-70-3	Dibenzo(a,h)anthracene	0.0026	U	0.013	U	S	37	3	8%	0.0026	0.013	0.013	0.00055	C	N	Y	Maximum Exceeds SL
206-44-0	Fluoranthene	0.0026	U	0.024	J+	N	37	32	86%	0.0026	0.013	0.024	5.9	N	N	N	Maximum Does Not Exceed SL
86-73-7	Fluorene	0.0026	U	0.26		C	37	3	8%	0.0026	0.013	0.26	5.9	N	N	N	Maximum Does Not Exceed SL
193-39-5	Indeno(1,2,3-cd)pyrene	0.0026	UJ	0.26	J+	N	37	2	5%	0.0026	0.013	0.26	0.0055	C	N	Y	Maximum Exceeds SL
91-20-3	Naphthalene	0.0026	U	0.021	J+	N	37	14	38%	0.0026	0.013	0.021	3.0	N	N	N	Maximum Does Not Exceed SL
198-55-0	Perylene	0.0026	U	0.013	U	S	37	16	43%	0.0026	0.013	0.013	4.4	N	N	N	Maximum Does Not Exceed SL
85-01-8	Phenanthrene	0.0026	U	0.034		C	37	21	57%	0.0026	0.013	0.034	44	N	N	N	Maximum Does Not Exceed SL
129-00-0	Pyrene	0.0026	U	0.022	J+	N	37	33	89%	0.0026	0.013	0.022	4.4	N	N	N	Maximum Does Not Exceed SL
PCBs/Dioxins/Furans																	
TPCB Cong-209	Total PCB TEQ	0.33	BT	1.0	BT	N	37	37	100%	NA	NA	1.0	0.0020	C	N	Y	Maximum Exceeds SL
WHOPCBTEQ(H)	PCB TEQ	4.0E-06	BT	3.7E-05	BT	N	37	37	100%	NA	NA	3.7E-05	3.1E-08	C	N	Y	Maximum Exceeds SL
WHODIOXTEQ(H)	Dioxin/Furan TEQ	9.0E-06	BJ	8.7E-05	BJ	N	37	37	100%	NA	NA	8.7E-05	3.1E-08	C	N	Y	Maximum Exceeds SL

Table A-3. Crab Tissue COPC Screen for the Human Health Risk Assessment for Newark Bay Study Area

CAS Number	Detected Chemical	Minimum Concentration (Qualifier) (mg/kg) (a)	Maximum Concentration (Qualifier) (mg/kg) (a)	Location of Maximum Concentration (b)	Number of Samples	Number of Detects	Detection Frequency	Range of Detection Limits (mg/kg)		Concentration Used for Screening (c)	Screening Level (N/C) (mg/kg) (d)	Known Human Carcinogen?	COPC Flag (Y/N)	Rationale for Selection or Deletion (e)
							Pesticides/Herbicides							
53-19-0	2,4'-DDD	5.0E-06 U	0.0016	S	37	36	97%	5.0E-06	5.0E-06	0.0016	0.017 C	N	N	Maximum Does Not Exceed SL
3424-82-6	2,4'-DDE	1.0E-05 U	0.0022	S	36	35	97%	1.0E-05	1.0E-05	0.0022	0.012 C	N	N	Maximum Does Not Exceed SL
789-02-6	2,4'-DDT	1.1E-05 UD	0.0018	S	37	31	84%	1.1E-05	1.1E-05	0.0018	0.012 C	N	N	Maximum Does Not Exceed SL
72-54-8	4,4'-DDD	0.012 D	0.18 D	S	37	37	100%	7.4E-06	7.4E-06	0.18	0.017 C	N	Y	Maximum Exceeds SL
72-55-9	4,4'-DDE	0.058 BDJ	0.30 BD	S	37	37	100%	7.6E-06	7.6E-06	0.30	0.012 C	N	Y	Maximum Exceeds SL
50-29-3	4,4'-DDT	0.00012 B	0.0068 BJ	S	37	37	100%	9.4E-06	9.4E-06	0.0068	0.012 C	N	N	Maximum Does Not Exceed SL
309-00-2	Aldrin	7.7E-06 J	1.2E-05 J	N	37	5	14%	9.2E-06	9.2E-06	1.2E-05	0.00024 C	N	N	Maximum Does Not Exceed SL
319-84-6	Alpha-BHC	6.4E-06 U	6.9E-05	C	37	36	97%	6.4E-06	6.4E-06	6.9E-05	0.00063 C	N	N	Maximum Does Not Exceed SL
5103-71-9	Alpha-Chlordane	0.00028	0.0060	N	37	36	97%	8.8E-06	8.8E-06	0.0060	0.011 C	N	N	Maximum Does Not Exceed SL
319-85-7	Beta-BHC	0.00001028 JB	0.00027	N	37	37	100%	1.1E-05	1.1E-05	0.00027	0.0022 C	N	N	Maximum Does Not Exceed SL
5103-73-1	cis-Nonachlor	0.003109 D	0.020 DJ	N	37	37	100%	1.3E-05	1.3E-05	0.020	0.011 C	N	Y	Maximum Exceeds SL
319-86-8	Delta-BHC	5.08E-06 U	1.8E-05	S	37	3	8%	5.1E-06	5.1E-06	1.84E-05	0.00063 C	N	N	Maximum Does Not Exceed SL
60-57-1	Dieldrin	0.001495	0.017 D	C	37	36	97%	1.5E-05	1.5E-05	0.017	0.00025 C	N	Y	Maximum Exceeds SL
959-98-8	Endosulfan I	4.2E-05 J	5.7E-05 U	C, N, S	36	1	3%	5.7E-05	5.7E-05	5.74E-05	0.89 N	N	N	Maximum Does Not Exceed SL
1031-07-8	Endosulfan Sulfate	6.2E-05 J	6.3E-05 UJ	N	35	1	3%	6.3E-05	6.3E-05	6.33E-05	0.89 N	N	N	Maximum Does Not Exceed SL
7421-93-4	Endrin Aldehyde	0.00013 UD	0.00016 J	S	25	3	12%	0.00013	0.00013	0.00016	0.044 N	N	N	Maximum Does Not Exceed SL
58-89-9	Gamma-BHC	5.2E-06 J	3.1E-05	N	37	31	84%	7.7E-06	7.7E-06	3.1E-05	0.0036 C	N	N	Maximum Does Not Exceed SL
76-44-8	Heptachlor	1.9E-05 J	3.3E-05 UD	C, N, S	37	2	5%	3.3E-05	3.3E-05	3.25E-05	0.00089 C	N	N	Maximum Does Not Exceed SL
1024-57-3	Heptachlor Epoxide	0.0024	0.019 D	N	37	37	100%	7.0E-06	7.0E-06	0.019	0.00044 C	N	Y	Maximum Exceeds SL
72-43-5	Methoxychlor	2.4E-05 J	3.9E-05 UDJ	C, N, S	34	2	6%	3.9E-05	3.9E-05	3.89E-05	0.74 N	N	N	Maximum Does Not Exceed SL
2385-85-5	Mirex	0.00012 D	0.00056 J	N	37	37	100%	9.3E-06	9.3E-06	0.00056	0.00022 C	N	Y	Maximum Exceeds SL
39765-80-5	Nonachlor, trans-	0.0030 J	0.042 D	N	37	37	100%	1.0E-05	1.0E-05	0.042	0.011 C	N	Y	Maximum Exceeds SL
27304-13-8	Oxychlordane	0.0097 D	0.061 DJ	N	37	37	100%	1.0E-05	1.0E-05	0.061	0.011 C	N	Y	Maximum Exceeds SL
TOT_AGChlor	Total Chlordane	0.00030 J	0.0064	N	37	37	100%	1.4E-05	1.4E-05	0.0064	0.011 C	N	N	Maximum Does Not Exceed SL
5103-74-2	trans-Chlordane	1.4E-05 UD	0.00077	C	33	30	91%	1.4E-05	1.4E-05	0.00077	0.011 C	N	N	Maximum Does Not Exceed SL
28044-83-9	trans-Heptachlor Epoxide	0.00061	0.0044	N	37	37	100%	1.7E-05	1.7E-05	0.0044	0.00044 C	N	Y	Maximum Exceeds SL
							Inorganics							
7429-90-5	Aluminum	5.4 U	48	N	37	17	46%	5.3	5.6	48	147.7807692 N	N	N	Maximum Does Not Exceed SL
7440-38-2	Arsenic	1.6	4.8	S	37	37	100%	0.14	0.15	4.8	0.0027 C	Y	Y	Maximum Exceeds SL; a known human carcinogen
7440-39-3	Barium	0.18 U	3.1	C	37	36	97%	0.18	0.18	3.1	30 N	N	N	Maximum Does Not Exceed SL
7440-43-9	Cadmium	0.197	1.3	S	37	36	97%	0.044	0.046	1.3	0.15 N	N	Y	Maximum Exceeds SL
7440-47-3	Chromium (hexavalent)	0.097 U	0.43 B	S	37	26	70%	0.095	0.1	0.43	0.0080 C	N	Y	Maximum Exceeds SL
7440-48-4	Cobalt	0.067	0.21	N	37	37	100%	0.019	0.02	0.21	0.044 N	N	Y	Maximum Exceeds SL
7440-50-8	Copper	20	69	S	37	37	100%	0.076	0.08	69	5.9 N	N	Y	Maximum Exceeds SL
7439-89-6	Iron	13	155	N	37	37	100%	4.4	4.6	155	103.6384615 N	N	Y	Maximum Exceeds SL
7439-92-1	Lead	0.026 BU	1.4	N	37	36	97%	0.025	0.026	0.1	1.4	N	Y	Maximum Exceeds SL
7439-96-5	Manganese	1.2	25	N	37	36	97%	0.16	0.17	25	21 N	N	Y	Maximum Exceeds SL
7439-97-6	Mercury	0.047	0.19	N	37	37	100%	8.5E-05	0.0021	0.19	0.044 N	N	Y	Maximum Exceeds SL
22967-92-6	Methyl Mercury	0.017	0.22	C	37	37	100%	0.00050	0.002	0.22	0.015 N	N	Y	Maximum Exceeds SL
7440-02-0	Nickel	0.19 U	0.75	C	37	36	97%	0.18	0.19	0.75	3.0 N	N	N	Maximum Does Not Exceed SL
7782-49-2	Selenium	0.78	1.7	C	37	37	100%	0.095	0.1	1.7	0.74 N	N	Y	Maximum Exceeds SL
7440-22-4	Silver	0.34	2.0	C	37	37	100%	0.019	0.02	2.0	0.74 N	N	Y	Maximum Exceeds SL
7440-32-6	Titanium	0.16 U	1.1	N	37	27	73%	0.16	0.17	1.1	NA	N	Y	No Screening Value
7440-62-2	Vanadium	0.029 U	0.25	N	37	36	97%	0.029	0.03	0.25	0.75 N	N	N	Maximum Does Not Exceed SL
7440-66-6	Zinc	27	61	S	37	37	100%	0.71	0.74	61	44 N	N	Y	Maximum Exceeds SL

(a) Data Qualifiers:

"J " estimated value "B" the associated analyte was also detected in the method blank for organics; or for inorganics, reported value was obtained from an instrument reading that was less than the project quantitation limit (PQL)

Table A-3. Crab Tissue COPC Screen for the Human Health Risk Assessment for Newark Bay Study Area

CAS Number	Detected Chemical	Minimum Concentration (Qualifier) (mg/kg) (a)	Maximum Concentration (Qualifier) (mg/kg) (a)	Location of Maximum Concentration (b)	Number of Samples	Number of Detects	Detection Frequency	Range of Detection Limits (mg/kg)	Concentration Used for Screening (c)	Screening Level (N/C) (mg/kg) (d)	Known Human Carcinogen?	COPC Flag (Y/N)	Rationale for Selection or Deletion (e)

"J-" estimated value, b "J+" estimated value, but the result may be biased high
"U" analyzed for but n "P" the percent difference between the primary and confirmation column for pesticide/Aroclor analyses is greater than 25%
"T" indicates a summe "D" the organic analyte was quantitated from a diluted analysis
(b) Location of Maximum Concentration: N- northern portion of Bay; C - central portion of Bay; S -southern portion of Bay.
(c) Maximum detected concentration selected for the concentration used for screening.
(d) USEPA Regional Screening Levels Calculator; for Consumption of fish. May 2016. Values based on noncarcinogenic effects are adjusted for a target hazard quotient of 0.1 to account for potential cumulative effects on the same target organ.
N - noncarcinogenic; C - carcinogenic.
(e) See the COPC Selection Process (Section 5.1of the PAR) for details.
(f) Surrogate toxicity values for the methylated PAHs obtained from the Superfund Technical Support Center

CAS - Chemical Abstracts Service
COPC - Chemical of Potential Concern
FOD - Frequency of Detection
mg/kg - Milograms per kilogram

N - No
NA - Not Available
Y - Yes

Table A-4. Surface Water COPC Screen for the Human Health Risk Assessment for Newark Bay Study Area

CAS Number	Detected Chemical	Minimum Concentration (ug/L) (a)	Maximum Concentration (ug/L) (a)	Number of Samples	Number of Detects	Detection Frequency	Range of Detection Limits (ug/L)		Concentration Used for Screening (b)	Screening Level (N/C) (ug/L)		Known Human Carcinogen?	COPC Flag (Y/N)	Rationale for Selection or Deletion (d)
						VOCs								
71-55-6	1,1,1-Trichloroethane	0.075 U	0.50 U	81	4	5%	0.075	0.075	0.50	800	N	N	N	Maximum Does Not Exceed SL
67-66-3	Chloroform	0.072 U	0.16 J	81	29	36%	0.072	0.072	0.16	0.22	C	N	N	Maximum Does Not Exceed SL
74-87-3	Chloromethane	0.068 U	0.50 U	81	21	26%	0.068	0.068	0.50	19	N	N	N	Maximum Does Not Exceed SL
156-59-2	cis-1,2-Dichloroethylene	0.070 J	0.19 J	81	81	100%	0.067	0.067	0.19	3.6	N	N	N	Maximum Does Not Exceed SL
100-41-4	Ethylbenzene	0.050 J, U	0.50 U	80	2	3%	0.05	0.05	0.50	1.5	C	N	N	Maximum Does Not Exceed SL
179601-23-1	m,p-Xylenes	0.091 U	0.50 U	81	9	11%	0.091	0.11	0.50	19	N	N	N	Maximum Does Not Exceed SL
75-09-2	Methylene Chloride	0.100 U	2 U	81	2	2%	0.1	0.1	2.0	11	N	N	N	Maximum Does Not Exceed SL
127-18-4	Tetrachloroethylene	0.099 U	0.50 U	81	44	54%	0.099	0.099	0.50	4.1	N	N	N	Maximum Does Not Exceed SL
108-88-3	Toluene	0.052 U	0.23 J	80	4	5%	0.052	0.054	0.23	110	N	N	N	Maximum Does Not Exceed SL
79-01-6	Trichloroethene	0.10 J, U	0.50 U	81	46	57%	0.1	0.141	0.50	0.28	N	Y	Y	Maximum Exceeds SL
106-46-7	1,4-Dichlorobenzene	0.12 J, U	0.50 U	80	1	1%	0.12	0.12	0.50	0.48	C	N	N	Maximum Does Not Exceed SL
						SVOCs								
108-60-1	2,2'-oxybis(1-Chloropropane)	0.019 U, UJ	0.045 J	82	1	1%	0.019	0.021	0.045	71	N	N	N	Maximum Does Not Exceed SL
2245-38-7	2,3,5-Trimethylnaphthalene	0.0016 U, UJ	0.0070 J	79	48	61%	0.0016	0.0016	0.0070	0.17	C	N	N	Maximum Does Not Exceed SL
120-83-2	2,4-Dichlorophenol	0.032 U	0.038 J	82	1	1%	0.032	0.036	0.038	4.6	N	N	N	Maximum Does Not Exceed SL
121-14-2	2,4-Dinitrotoluene	0.051 U	0.21 J	82	1	1%	0.051	0.058	0.21	0.24	C	N	N	Maximum Does Not Exceed SL
581-42-0	2,6-Dimethylnaphthalene	0.0022 J, U	0.0206	79	58	73%	0.0022	0.0022	0.021	0.17	C	N	N	Maximum Does Not Exceed SL
91-58-7	2-Chloronaphthalene	0.014 U	0.043 J	82	1	1%	0.014	0.016	0.043	75	N	N	N	Maximum Does Not Exceed SL
106-44-5	4-Methylphenol	0.085 U	0.098 U	82	1	1%	0.085	0.098	0.098	190	N	N	N	Maximum Does Not Exceed SL
100-52-7	Benzaldehyde	0.14 U, UJ	0.87 J	82	6	7%	0.14	0.16	0.87	19	C	N	N	Maximum Does Not Exceed SL
117-81-7	bis-(2-Ethylhexyl)phthalate	1.2 U, UJ	2.7	82	3	4%	1.2	1.4	2.7	5.6	C	N	N	Maximum Does Not Exceed SL
74-83-9	Bromomethane	0.090 U, UJ	0.50 U, UJ	81	1	1%	0.09	0.10	0.50	0.75	N	N	N	Maximum Does Not Exceed SL
85-68-7	Butylbenzylphthalate	0.13 U	0.61 J	82	27	33%	0.13	0.15	0.61	16	C	N	N	Maximum Does Not Exceed SL
105-60-2	Caprolactam	1.1 U, UJ	2.2 J	82	4	5%	1.1	1.3	2.2	990	N	N	N	Maximum Does Not Exceed SL
86-74-8	Carbazole	0.015 U	0.047 J	82	1	1%	0.015	0.017	0.047	29	N	N	N	Maximum Does Not Exceed SL
132-65-0	Dibenzothiophene	0.00069 U	0.0058 J	79	57	72%	0.00069	0.00069	0.0058	6.5	N	N	N	Maximum Does Not Exceed SL
84-66-2	Diethylphthalate	0.14 J, U	0.32 J	82	14	17%	0.14	0.16	0.32	1500	N	N	N	Maximum Does Not Exceed SL
84-74-2	Di-n-butylphthalate	0.12 U	0.36 J	82	4	5%	0.12	0.14	0.36	90	N	N	N	Maximum Does Not Exceed SL
118-74-1	Hexachlorobenzene	4.0E-07 U	0.00019 J	80	5	6%	4.0E-07	0.0000126	0.00019	0.0098	C	N	N	Maximum Does Not Exceed SL
78-59-1	Isophorone	0.061 U	0.070 U	82	1	1%	0.061	0.07	0.07	78	C	N	N	Maximum Does Not Exceed SL
108-95-2	Phenol	0.055 U	0.063 U	82	1	1%	0.055	0.063	0.063	580	N	N	N	Maximum Does Not Exceed SL
14488-53-0	Dibutyltin	0.0073 U, UJ	0.11	81	1	1%	0.0073	0.014	0.11	0.60	N	N	N	Maximum Does Not Exceed SL
78763-54-9	Monobutyltin	0.029 U, UJ	0.18 J	81	2	2%	0.029	0.029	0.18	0.6	N	N	N	Maximum Does Not Exceed SL
36643-28-4	Tributyltin	0.012 U, UJ	0.050 U, UJ	81	1	1%	0.012	0.012	0.05	0.60	N	N	N	Maximum Does Not Exceed SL
						PAHs								
90-12-0	1-Methylnaphthalene	0.0041 U, UJ	0.035	79	36	46%	0.0041	0.0041	0.035	1.1	C	N	N	Maximum Does Not Exceed SL
832-69-9	1-Methylphenanthrene	0.0007 U	0.011	79	71	90%	0.0007	0.0007	0.011	180	N	N	N	Maximum Does Not Exceed SL
91-57-6	2-Methylnaphthalene	0.0083 U, UJ	0.043	161	32	20%	0.0083	0.013	0.043	3.6	N	N	N	Maximum Does Not Exceed SL
83-32-9	Acenaphthene	0.0039 J	0.046	161	80	50%	0.0024	0.016	0.046	53	N	N	N	Maximum Does Not Exceed SL
208-96-8	Acenaphthylene	0.0002 U	0.045 J	161	58	36%	0.00015	0.017	0.045	53	N	N	N	Maximum Does Not Exceed SL
120-12-7	Anthracene	0.0012 J	0.039 J	53	53	100%	0.00071	0.015	0.039	180	N	N	N	Maximum Does Not Exceed SL
56-55-3	Benzo(a)anthracene	0.0015 U, UJ	0.33	161	65	40%	0.0015	0.016	0.33	0.012	C	N	Y	Maximum Exceeds SL
50-32-8	Benzo(a)pyrene	0.0004 U, UJ	0.24	161	53	33%	0.0004	0.015	0.24	0.0034	C	N	Y	Maximum Exceeds SL
205-99-2	Benzo(b)fluoranthene	0.0015 U, UJ	0.64	161	57	35%	0.0015	0.017	0.64	0.034	C	N	Y	Maximum Exceeds SL
192-97-2	Benzo(E)pyrene	0.0014 U, UJ	0.040	79	59	75%	0.0014	0.0014	0.040	12	N	N	N	Maximum Does Not Exceed SL
191-24-2	Benzo(g,h,i)perylene	0.00051 U	0.19 J	161	55	34%	0.00051	0.016	0.19	12	N	N	N	Maximum Does Not Exceed SL

Table A-4. Surface Water COPC Screen for the Human Health Risk Assessment for Newark Bay Study Area

CAS Number	Detected Chemical	Minimum Concentration (ug/L) (a)	Maximum Concentration (ug/L) (a)	Number of Samples	Number of Detects	Detection Frequency	Range of Detection Limits (ug/L)		Concentration Used for Screening (b)	Screening Level (N/C) (ug/L)		Known Human Carcinogen?	COPC Flag (Y/N)	Rationale for Selection or Deletion (d)
207-08-9	Benzo(k)fluoranthene	0.001 U, UJ	0.18 J	161	59	37%	0.001	0.059	0.18	0.34	C	N	Y	Include as Carcinogenic PAH
(e)	C1-Benzanthracene/chrysenes	0.010 U, UJ	0.053	79	30	38%	0.01	0.01	0.053	3.4	C	N	N	Maximum Does Not Exceed SL
(e)	C1-Fluorenes	0.010 U, UJ	0.015	79	2	3%	0.01	0.01	0.015	29	N	N	N	Maximum Does Not Exceed SL
(e)	C1-Phenanthrene/anthracenes	0.010 U, UJ	0.033	79	36	46%	0.01	0.01	0.033	180	N	N	N	Maximum Does Not Exceed SL
(e)	C1-Pyrene/fluoranthenes	0.010 U	0.076	79	64	81%	0.01	0.01	0.076	12	N	N	N	Maximum Does Not Exceed SL
(e)	C2-Benzanthracene/chrysenes	0.010 U, UJ	0.024	79	5	6%	0.01	0.01	0.024	3.4	C	N	N	Maximum Does Not Exceed SL
(e)	C2-Dibenzothiophenes	0.010 U, UJ	0.014	79	2	3%	0.01	0.01	0.014	6.5	N	N	N	Maximum Does Not Exceed SL
(e)	C2-Fluorenes	0.010 U, UJ	0.020	79	8	10%	0.01	0.01	0.020	29	N	N	N	Maximum Does Not Exceed SL
(e)	C2-NAPHTHALENES	0.010 U, UJ	0.051	79	30	38%	0.01	0.01	0.051	0.17	C	N	N	Maximum Does Not Exceed SL
(e)	C2-Phenanthrene/anthracenes	0.010 U, UJ	0.039	79	44	56%	0.01	0.01	0.039	180	N	N	N	Maximum Does Not Exceed SL
(e)	C3-Benzanthracene/chrysenes	0.010 U, UJ	0.011	79	1	1%	0.01	0.01	0.011	3.4	C	N	N	Maximum Does Not Exceed SL
(e)	C3-Dibenzothiophenes	0.010 U, UJ	0.014	79	2	3%	0.01	0.01	0.014	6.5	N	N	N	Maximum Does Not Exceed SL
(e)	C3-Fluorenes	0.010 U, UJ	0.021	79	3	4%	0.01	0.01	0.021	29	N	N	N	Maximum Does Not Exceed SL
(e)	C3-NAPHTHALENE	0.010 U, UJ	0.023	79	27	34%	0.01	0.01	0.023	0.17	C	N	N	Maximum Does Not Exceed SL
(e)	C3-Phenanthrene/anthracenes	0.010 U, UJ	0.028	79	12	15%	0.01	0.01	0.028	180	N	N	N	Maximum Does Not Exceed SL
(e)	C4-Dibenzothiophenes	0.010 U, UJ	0.050	79	1	1%	0.01	0.01	0.050	6.5	N	N	N	Maximum Does Not Exceed SL
(e)	C4-NAPHTHALENE	0.010 U, UJ	0.024	79	32	41%	0.01	0.01	0.024	0.17	C	N	N	Maximum Does Not Exceed SL
(e)	C4-Phenanthrenes/anthracenes	0.010 U, UJ	0.016	79	2	3%	0.01	0.01	0.016	180	N	N	N	Maximum Does Not Exceed SL
218-01-9	Chrysene	0.00022 U	0.31	161	81	50%	0.00022	0.015	0.31	3.4	C	N	Y	Include as Carcinogenic PAH
53-70-3	Dibenzo(a,h)anthracene	0.00078 U	0.46	161	51	32%	0.00078	0.017	0.46	0.0034	C	N	Y	Maximum Exceeds SL
206-44-0	Fluoranthene	0.011	0.45	161	100	62%	0.0024	0.018	0.45	80	N	N	N	Maximum Does Not Exceed SL
86-73-7	Fluorene	0.0015 U	0.042 J	161	41	25%	0.0015	0.023	0.042	29	N	N	N	Maximum Does Not Exceed SL
193-39-5	Indeno(1,2,3-cd)pyrene	0.001 U	0.36	161	61	38%	0.001	0.022	0.36	0.034	C	N	Y	Maximum Exceeds SL
91-20-3	Naphthalene	0.013 U	0.095 J	161	48	30%	0.013	0.016	0.095	0.17	C	N	N	Maximum Does Not Exceed SL
198-55-0	Perylene	0.00081 U	0.022	79	55	70%	0.00081	0.00081	0.022	12	N	N	N	Maximum Does Not Exceed SL
85-01-8	Phenanthrene	0.011 U, UJ	0.097 J	161	52	32%	0.011	0.046	0.097	180	N	N	N	Maximum Does Not Exceed SL
129-00-0	Pyrene	0.015 U, UJ	0.32	161	95	59%	0.0017	0.017	0.32	12	N	N	N	Maximum Does Not Exceed SL
						PCBs/Dioxins/Furans								
	PCB TEQ	4.9E-08	1.5E-06	121	121	100%	NA	NA	1.5E-06	1.2E-07	C	N	Y	Maximum Exceeds SL
	Dioxin/Furan TEQ	1.5E-06	9.9E-06	122	119	98%	NA	NA	9.9E-06	1.2E-07		N	Y	Maximum Exceeds SL
	Total PCBs	0.0022	0.015	121	121	100%	NA	NA	0.015	0.044	C	N	N	Maximum Does Not Exceed SL
						Pesticides/Herbicides								
53-19-0	2,4'-DDD	1.9E-05 U	0.00033 J	79	63	80%	9.3E-06	0.000248	0.00033	0.032	C	N	N	Maximum Does Not Exceed SL
3424-82-6	2,4'-DDE	1.7E-05 U	0.00049 U	79	31	39%	1.1E-05	0.000491	0.00049	0.046	C	N	N	Maximum Does Not Exceed SL
789-02-6	2,4'-DDT	1.3E-05 U	0.00033 U	79	4	5%	1.3E-05	0.000333	0.00033	0.23	C	N	N	Maximum Does Not Exceed SL
72-54-8	4,4'-DDD	1.1E-05 U	0.0012	80	70	88%	0.00001	0.000262	0.0012	0.032	C	N	N	Maximum Does Not Exceed SL
72-55-9	4,4'-DDE	4.5E-05 U	0.0012	79	61	77%	1.3E-05	0.000686	0.0012	0.046	C	N	N	Maximum Does Not Exceed SL
50-29-3	4,4'-DDT	2.1E-05 U	0.00064	79	41	52%	1.3E-05	0.000361	0.00064	0.23	C	N	N	Maximum Does Not Exceed SL
309-00-2	Aldrin	3.3E-06 U	0.00016 J	79	9	11%	3.3E-06	0.000102	0.00016	0.00092	C	N	N	Maximum Does Not Exceed SL
319-84-6	alpha-BHC	3.9E-06 U	0.00097 J	80	69	86%	3.6E-06	0.000127	0.00097	0.0072	C	N	N	Maximum Does Not Exceed SL
319-85-7	beta-BHC	5.5E-06 U	0.00098 J	80	56	70%	5.5E-06	0.000164	0.00098	0.025	C	N	N	Maximum Does Not Exceed SL
5103-71-9	cis-Chlordane	5.8E-05 EMPC-J	0.00053	80	80	100%	6.1E-06	0.000176	0.00053	0.020	C	N	N	Maximum Does Not Exceed SL
5103-73-1	cis-Nonachlor	8.8E-06 U	0.00018 U	79	46	58%	8.1E-06	0.000182	0.00018	0.020	C	N	N	Maximum Does Not Exceed SL
319-86-8	delta-BHC	6.7E-06 U	0.0014 J	79	14	18%	6.3E-06	0.000202	0.0014	0.0072	C	N	N	Maximum Does Not Exceed SL
60-57-1	Dieldrin	9.6E-06 U	0.0016 J	80	77	96%	7.6E-06	0.000113	0.0016	0.0018	C	N	N	Maximum Does Not Exceed SL
959-98-8	Endosulfan I	1.8E-05 U	0.00054	79	6	8%	1.5E-05	0.000495	0.00054	10	N	N	N	Maximum Does Not Exceed SL
33213-65-9	Endosulfan II	2.7E-05 U	0.00079	79	5	6%	2.7E-05	0.000539	0.00079	10	N	N	N	Maximum Does Not Exceed SL

Table A-4. Surface Water COPC Screen for the Human Health Risk Assessment for Newark Bay Study Area

CAS Number	Detected Chemical	Minimum Concentration (ug/L) (a)	Maximum Concentration (ug/L) (a)	Number of Samples	Number of Detects	Detection Frequency	Range of Detection Limits (ug/L)		Concentration Used for Screening (b)	Screening Level (N/C) (ug/L)		Known Human Carcinogen?	COPC Flag (Y/N)	Rationale for Selection or Deletion (d)
1031-07-8	Endosulfan Sulfate	3.1E-06 U	0.00023 J	79	39	49%	2.9E-06	0.0000589	0.00023	10	N	N	N	Maximum Does Not Exceed SL
72-20-8	Endrin	8.4E-06 U	0.0018 J	79	13	16%	8.4E-06	0.000137	0.0018	0.23	N	N	N	Maximum Does Not Exceed SL
7421-93-4	Endrin aldehyde	1.2E-05 U	0.00036 J	79	6	8%	1.2E-05	0.000353	0.00036	0.23	N	N	N	Maximum Does Not Exceed SL
53494-70-5	Endrin ketone	9.3E-06 U	0.00048	79	25	32%	9.3E-06	0.000367	0.00048	0.23	N	N	N	Maximum Does Not Exceed SL
58-89-9	gamma-BHC	5.2E-06 U	0.00029 J	80	62	78%	5.2E-06	0.000172	0.00029	0.042	C	N	N	Maximum Does Not Exceed SL
76-44-8	Heptachlor	1.5E-06 U	0.00028 J	79	29	37%	1.4E-06	0.0000734	0.00028	0.0014	C	N	N	Maximum Does Not Exceed SL
1024-57-3	Heptachlor Epoxide	4.7E-06 U	0.00047	80	73	91%	3.1E-06	0.00019	0.00047	0.0014	C	N	N	Maximum Does Not Exceed SL
72-43-5	Methoxychlor	6.8E-06 U	0.00043 EMPC-J	79	20	25%	6.7E-06	0.00013	0.00043	3.7	N	N	N	Maximum Does Not Exceed SL
27304-13-8	Oxy-chlordane	4.2E-06 U	0.0002 U	79	8	10%	3.0E-06	0.0002	0.00020	0.020	C	N	N	Maximum Does Not Exceed SL
5103-74-2	trans-Chlordane	7.5E-06 U	0.00044	80	75	94%	5.4E-06	0.000175	0.00044	0.020	C	N	N	Maximum Does Not Exceed SL
39765-80-5	trans-Nonachlor	1.0E-05 U	0.00033 J	80	77	96%	6.5E-06	0.000212	0.00033	0.020	C	N	N	Maximum Does Not Exceed SL
						Inorganics								
7429-90-5	Aluminum	42 J	974	81	81	100%	0.5	2	974	2000	N	N	N	Maximum Does Not Exceed SL
7440-36-0	Antimony	0.10 U	2.4	82	16	20%	0.1	0.4	2.4	0.78	N	N	Y	Maximum Exceeds SL
7440-38-2	Arsenic	0.73	1.8	81	81	100%	0.03	0.04	1.8	0.052	C	Y	Y	Maximum Exceeds SL; a known human carcinogen
7440-39-3	Barium	17	38	81	81	100%	0.4	1	38	380	N	N	N	Maximum Does Not Exceed SL
7440-41-7	Beryllium	0.0003 U, UJ	0.124	81	23	28%	0.0003	0.001	0.12	2.5	N	N	N	Maximum Does Not Exceed SL
7440-43-9	Cadmium	0.027	0.233	142	142	100%	0.001	0.002	0.23	0.92	N	N	N	Maximum Does Not Exceed SL
7440-47-3	Chromium (assumed hexavalent)	0.43	5.61	81	81	100%	0.02	0.03	5.6	3.5E-02	C	N	Y	Maximum Exceeds SL
7440-48-4	Cobalt	0.098	0.473	81	81	100%	0.001	0.002	0.47	0.6	N	N	N	Maximum Does Not Exceed SL
7440-50-8	Copper	1.29	8.1	142	142	100%	0.003	0.004	8.1	80	N	N	N	Maximum Does Not Exceed SL
57-12-5	Cyanide	3.0 U	10 U	81	1	1%	3	3	10	0.15	N	N	N	Maximum Does Not Exceed SL
7439-89-6	Iron	130 J	2320	81	81	100%	3	5	2320	1400	N	N	Y	Maximum Exceeds SL
7439-92-1	Lead	0.53	8.5	142	142	100%	0.009	0.01	8.5	15	L	N	N	Maximum Does Not Exceed SL
7439-96-5	Manganese	29 J	117	81	81	100%	0.2	0.4	117	43	N	N	Y	Maximum Exceeds SL
7439-97-6	Mercury	0.0017 J	0.076	142	142	100%	0.00015	0.0049	0.076	0.063	N	N	Y	Maximum Exceeds SL
22967-92-6	Methyl Mercury	0.000020 U, UJ	0.00029	81	72	89%	1.9E-05	0.000021	0.00029	0.2	N	N	N	Maximum Does Not Exceed SL
7440-02-0	Nickel	0.89	2.4	81	81	100%	0.03	0.04	2.4	39	N	N	N	Maximum Does Not Exceed SL
7782-49-2	Selenium	0.20 J, U	1.0 U	81	13	16%	0.2	0.2	1.0	10	N	N	N	Maximum Does Not Exceed SL
7440-22-4	Silver	0.0040 J, U	0.84	81	70	86%	0.002	0.004	0.84	9.4	N	N	N	Maximum Does Not Exceed SL
7440-28-0	Thallium	0.0020 U, UJ	0.048	81	42	52%	0.002	0.004	0.048	0.020	N	N	Y	Maximum Exceeds SL
7440-32-6	Titanium	0.40 U, UJ	43 J	81	65	80%	0.4	0.7	43	0.021	N	N	Y	Maximum Exceeds SL
7440-62-2	Vanadium	1.7 J	7.1	81	70	86%	1	2	7.1	8.6	N	N	N	Maximum Does Not Exceed SL
7440-66-6	Zinc	4.1	21	81	81	100%	0.06	0.1	21	600	N	N	N	Maximum Does Not Exceed SL

(a) Data Qualifiers:
"EMPC" - Estimated Maximum Possible Concentration
"J " estimated value
"U" analyzed for but not detected
(b) Maximum detected concentration selected for the concentration used for screening.
(c) USEPA Regional Screening Levels for tap water. May 2016. Values based on noncarcinogenic effects are adjusted for a target hazard quotient of 0.1 to account for potential cumulative effects on the same target organ. N - noncarcinogenic; C - carcinogenic.
(d) See the COPC Selection Process (Section XX of the PAR) for details.
(e) Surrogate toxicity values for the methylated PAHs obtained from the Superfund Technical Support Center

EMPC Estimated Maximum Possible Concentration
CAS - Chemical Abstracts Service
COPC - Chemical of Potential Concern
FOD - Frequency of Detection

ug/L - micrograms per liter
N - No
SL - screening level
Y - Yes

TABLE A5.
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE/CENTRAL TENDENCY EXPOSURE
Newark Bay Study Area

Medium: Sediment, Surface Water
Exposure Medium: Fish/Crab, Sediment, Surface Water, Ambient Air
Receptor Population: Angler/Sportsman
Receptor Age: Adult

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Angler/Sportsman	Adult	Fish/Crab	Ct	Exposure Point Concentration - Tissue	mg/kg wet weight	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				IRF	Ingestion rate of fish	g/d	34.6	USEPA 2012a	3.9	USEPA 2012a	Intake (mg/kg-day) =
				IRC	Ingestion rate of crab	g/d	20.9	USEPA 2012a	3.0	USEPA 2012a	
				FI	Fraction from source	unitless	1	Assumed 100% of fish/crab consumed is from NBSA	1	Assumed 100% of fish/crab consumed is from NBSA	Ct x EF x ED x IR x (1-Loss) x FI x CF1 / AT x BW
				EF	Exposure frequency	d/yr	365	Fish ingestion rate already averaged over one year	365	Fish ingestion rate already averaged over one year	
				ED	Exposure duration	yr	20	USEPA 2014	9	USEPA 1989	
				Loss	Cooking loss for fish	g/g	0	Assumed 100% of chemical remains in fish	Chemical-specific	Refer to values listed in AECOM, 2015 in addition to more recent publications, if any	
				Loss	Cooking loss for crab	g/g	0	Assumed 100% of chemical remains in crab	Chemical-specific	Refer to values listed in AECOM, 2015 in addition to more recent publications, if any	
				CF1	Conversion factor	kg/g	1E-03	--	1E-03	--	
				BW	Body weight	kg	80	USEPA 2014; USEPA 2011, weighted mean values for adults 21–78 yrs	80	USEPA 2014; USEPA 2011, weighted mean values for adults 21–78 yrs	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
				ATnc	Averaging time (noncancer)	d	7,300	ED x 365 d/yr	3,285	ED x 365 d/yr	
Incidental Ingestion	Angler/Sportsman	Adult	Sediment	CS	Exposure Point Concentration - Sediment	mg/kg	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				EF	Exposure frequency fishing	d/yr	13	1 day/week, 3 months/year	7	Assumed to be one-half RME	Intake (mg/kg-day) =
				ED	Exposure duration	yr	20	USEPA 2014	9	USEPA 1989	CS x EF x ED x IRsed x FI x CF2 / AT x BW
				IRsed	Ingestion rate of sediment	mg/d	50	50% of the default residential adult soil IR (USEPA 2014)	25	Assumed to be one-half RME	
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	Arsenic intakes multiplied by a Relative Bioavailability (RBA) value of 0.6 (USEPA 2012b)
				CF2	Conversion factor	kg/mg	1E-06	--	1E-06	--	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
				ATnc	Averaging time (noncancer)	d	7,300	ED x 365 d/yr	3,285	ED x 365 d/yr	
				BW	Body weight	kg	80	USEPA 2014; USEPA 2011, weighted mean values for adults 21–78 yrs	80	USEPA 2014; USEPA 2011, weighted mean values for adults 21–78 yrs	

TABLE A5.
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE/CENTRAL TENDENCY EXPOSURE
Newark Bay Study Area

Medium: Sediment, Surface Water
Exposure Medium: Fish/Crab, Sediment, Surface Water, Ambient Air
Receptor Population: Angler/Sportsman
Receptor Age: Adult

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Dermal Contact	Angler/Sportsman	Adult	Sediment	CS	Exposure Point Concentration - Sediment	mg/kg	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				EFF	Exposure frequency fishing	d/yr	13	1 day/week, 3 months/year	7	Assumed to be one-half RME	Intake (mg/kg-day) =
				ED	Exposure duration	yr	20	USEPA 2014	9	USEPA 1989	
				SA	Skin surface area	cm^2/d	6,492	Mean value for adults: face, hands, forearms, lower legs, feet (USEPA 2011)	6,492	Mean value for adults: face, hands, forearms, lower legs, feet (USEPA 2011)	CS x EF x ED x SA x AF x ABS x FI x CF2 / AT x BW
				AF	Adherence factor	mg/cm^2	0.3	50% value for adult (reed gatherer): hands, lower legs, forearms, and feet (USEPA 2004)	0.3	50% value for adult (reed gatherer): hands, lower legs, forearms, and feet (USEPA 2004)	
				ABS	Dermal absorption factor	unitless	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
				CF2	Conversion factor	kg/mg	1E-06	--	1E-06	--	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
				ATnc	Averaging time (noncancer)	d	7,300	ED x 365 d/yr	3,285	ED x 365 d/yr	
				BW	Body weight	kg	80	USEPA 2014	80	USEPA 2014	
Inhalation	Angler/Sportsman	Adult	VOCs, SVOCs in Sediment	CS	Exposure Point Concentration - Sediment	mg/kg	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	Exposure Concentration (mg/m3 [noncancer]; µg/m3 [cancer]) =
				EFF	Exposure frequency fishing	d/yr	13	1 day/week, 3 months/year	7	Assumed to be one-half RME	
				ED	Exposure duration	yr	20	USEPA 2014	9	USEPA 1989	
				ET	Exposure time	hr/d	10	Professional judgment for length of typical fishing/crabbing trip	5	Assumed to be one-half RME	CS x EF x ED x ET x CF3 x (1/VF) x FI x CF4 / AT
				CF3	Conversion factor	d/hr	0.04	--	0.04	--	
				VF	Volatilization factor	m3/kg	Chemical-specific	Calculated, See Table X	Chemical-specific	Calculated, See Table X	*Note: CF4 applies to the cancer equation only
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
				CF4	Conversion factor	µg/mg	1E+03	--	1E+03	--	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
				ATnc	Averaging time (noncancer)	d	7,300	ED x 365 d/yr	3,285	ED x 365 d/yr	

TABLE A5.
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE/CENTRAL TENDENCY EXPOSURE
Newark Bay Study Area

Medium: Sediment, Surface Water
Exposure Medium: Fish/Crab, Sediment, Surface Water, Ambient Air
Receptor Population: Angler/Sportsman
Receptor Age: Adult

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Incidental Ingestion	Angler/Sportsman	Adult	Surface Water	Cwat	Exposure Point Concentration - Surface Water	ug/L	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				EFF	Exposure frequency fishing	d/yr	13	1 day/week, 3 months/year	7	Assumed to be one-half RME	Intake (mg/kg-day) =
				ED	Exposure duration	yr	20	USEPA 2014	9	USEPA 1989	
				IRwat	Ingestion rate of surface water	L/d	0.011	50% of the mean swimming rate for adults (USEPA 2011)	0.011	50% of the mean swimming rate for adults (USEPA 2011)	Cwat x EF x ED X IRwat x FI / AT x BW x CF4
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
				CF4	Conversion factor	µg/mg	1E+03	--	1E+03	--	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
				ATnc	Averaging time (noncancer)	d	7,300	ED x 365 d/yr	3,285	ED x 365 d/yr	
				BW	Body weight	kg	80	USEPA 2014	80	USEPA 2014	

TABLE A5.
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE/CENTRAL TENDENCY EXPOSURE
Newark Bay Study Area

Medium: Sediment, Surface Water
Exposure Medium: Fish/Crab, Sediment, Surface Water, Ambient Air
Receptor Population: Angler/Sportsman
Receptor Age: Adult

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Dermal Contact	Angler/Sportsman	Adult	Surface Water	Cwat	Exposure Point Concentration - Surface Water	ug/L	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	For Inorganics: Intake (mg/kg-day) =
				DA_{event}	Absorbed Dose per Event	mg/cm^2-event	Calculated value	--	Calculated value	--	Cwat x Kp x ET
				Kp	Dermal permeability constant	cm/hr	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	DAevent (int) x CF4
				ET	Exposure time	hr/d	1	Professional judgment for length of typical fishing/crabbing trip	1	Assumed to be one-half RME	
				CF4	Conversion Factor	µg/mg, cm3/L	1E+03	--	1E+03	--	For Organics:
				FA	Fraction absorbed water	unitless	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	If ET ≤ t*, Intake (mg/kg-day) =
				tevent	Event duration	hr/event	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	Cwat x 2 x FA x Kp x SQRT(6 x tevent x ET/¶)
				B	Ratio of permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis	unitless	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	DAevent (int) x CF4
				t*	Time to reach steady-state	hr	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	If ET > t*, Intake (mg/kg-day) =
				ATnc	Averaging time (noncancer)	d	7,300	ED x 365 d/yr	3,285	ED x 365 d/yr	Cwat x FA x Kp x (ET/1+B + 2 x tevent x [1+3B+3B^2/(1+B)^2])
				BW	Body weight	kg	80	USEPA 2014	80	USEPA 2014	DAevent (int) x CF4
				EV	Event frequency	event/d	1	Professional judgment	1	Professional judgment	Where:
				ED	Exposure duration	yr	20	USEPA 2014	9	USEPA 1989	DAevent (int) =
				EFF	Exposure frequency fishing	d/yr	13	1 day/week, 3 months/year	7	Assumed to be one-half RME	AT x BW x CF4
				SA	Skin surface area	cm^2	6,492	Mean value for adults: face, hands, forearms, lower legs, feet (USEPA 2011)	6,492	Mean value for adults: face, hands, forearms, lower legs, feet (USEPA 2011)	EV x ED x EF x SA x FI
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	

TABLE A5.
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE/CENTRAL TENDENCY EXPOSURE
Newark Bay Study Area

Medium: Sediment, Surface Water
Exposure Medium: Fish/Crab, Sediment, Surface Water, Ambient Air
Receptor Population: Angler/Sportsman
Receptor Age: Adult

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Angler/Sportsman	Adult	VOCs, SVOCs in Surface Water	Cwat	Exposure Point Concentration - Surface Water	ug/L	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	Exposure Concentration (mg/m3 [noncancer]; µg/m3 [cancer]) =
				EFF	Exposure frequency fishing	d/yr	13	1 day/week, 3 months/year	7	Assumed to be one-half RME	Cwat x EF x ED x ET x CF3 x FI x VF
				ED	Exposure duration	yr	20	USEPA 2014	9	USEPA 1989	AT x CF4
				ET	Exposure time	hr/d	10	Professional judgment for length of typical fishing/crabbing trip	5	Assumed to be one-half RME	*Note: CF4 applies to the noncancer equation only
				CF3	Conversion factor	d/hr	0.04	--	0.04	--	
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
				VF	Volatilization factor	L/m3	Chemical-specific	Calculated, See Table X	Chemical-specific	Calculated, See Table X	
				CF4	Conversion factor	µg/mg	1E+03	--	1E+03	--	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
				ATnc	Averaging time (noncancer)	d	7,300	ED x 365 d/yr	3,285	ED x 365 d/yr	

Definitions

cm2/d - square centimeter per day, cm/hr - centimeter per hour, cm3/L - cubic centimeter per liter, CTE - central tendency exposure, d - day, d/hr - day per hour, d/yr day per year, event/d - event per day, g/d - gram per day, g/g - gram per gram, hr - hour, hr/d - hour per day, hr/event - hour per event, kg - kilogram, kg/g - kilogram per gram, kg/mg - kilogram per milligram, L/d - liter per day, L/m3 - liter per cubic meter, mg/cm2 - milligram per square centimeter, mg/d - milligram per day, mg/kg - milligram per kilogram, RME - reasonable maximum exposure, µg/cm2 - event - microgram per square centimeter per event, µg/mg - microgram per milligram, ug/L - micrgram per liter, yr - year

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TABLE A6.
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE/CENTRAL TENDENCY EXPOSURE
Newark Bay Study Area

Scenario Timeframe: Current/Future
Medium: Sediment, Surface Water
Exposure Medium: Fish/Crab, Sediment, Surface Water, Ambient Air
Receptor Population: Angler/Sportsman - Adolescent
Receptor Age: 7 to <19 Years

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Angler/Sportsman	Adolescent	Fish/Crab	Ct	Exposure Point Concentration - Tissue	mg/kg wet weight	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				IRF	Ingestion rate of fish	g/d	23.1	Assumed to be 2/3 of adult ingestion (USEPA 2012a)	2.6	Assumed to be 2/3 of adult ingestion (USEPA 2012a)	Intake (mg/kg-day) =
				IRC	Ingestion rate of crab	g/d	13.9	Assumed to be 2/3 of adult ingestion (USEPA 2012a)	2.0	Assumed to be 2/3 of adult ingestion (USEPA 2012a)	
				FI	Fraction from source	unitless	1	Assumed 100% of fish/crab consumed is from NBSA	1	Assumed 100% of fish/crab consumed is from NBSA	Ct x EF x ED x IR x (1-Loss) x FI x CF1 / AT x BW
				EF	Exposure frequency	d/yr	365	Fish ingestion rate already averaged over one year	365	Fish ingestion rate already averaged over one year	
				ED	Exposure duration	yr	12	USEPA 2000	6	Assumed to be one-half RME	
				Loss	Cooking loss for fish	g/g	0	Assumed 100% of chemical remains in fish	Chemical-specific	Refer to values listed in AECOM, 2015 in addition to more recent publications, if any	
				Loss	Cooking loss for crab	g/g	0	Assumed 100% of chemical remains in crab	Chemical-specific	Refer to values listed in AECOM, 2015 in addition to more recent publications, if any	
				CF1	Conversion factor	kg/g	1E-03	--	1E-03	--	
				BW	Body weight	kg	52	USEPA 2011	52	USEPA 2011	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
				ATnc	Averaging time (noncancer)	d	4,380	ED x 365 d/yr	2,190	ED x 365 d/yr	
Incidental Ingestion	Angler/Sportsman	Adolescent	Sediment	CS	Exposure Point Concentration - Sediment	mg/kg	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				EFF	Exposure frequency fishing	d/yr	48	Assumed fishing 2x per week for ~5.5 months per year of fishing per Burger 2002	24	Assumed to be one-half RME	Intake (mg/kg-day) =
				EFC	Exposure frequency crabbing	d/yr	30	Assumed crabbing 2x per week for ~3.5 months per year of crabbing per Burger 2002	15	Assumed to be one-half RME	
				ED	Exposure duration	yr	12	USEPA 2000b	6	Assumed to be one-half RME	CS x EF x ED x IRsed x FI x CF2 / AT x BW
				IRsed	Ingestion rate of sediment	mg/d	50	50% of the default residential adult soil IR (USEPA 2014)	25	Assumed to be one-half RME	Arsenic intakes multiplied by a Relative Bioavailability (RBA) value of 0.6 (USEPA 2012b)
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
				CF2	Conversion factor	kg/mg	1E-06	--	1E-06	--	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
				ATnc	Averaging time (noncancer)	d	4,380	ED x 365 d/yr	2,190	ED x 365 d/yr	
				BW	Body weight	kg	52	USEPA 2011	52	USEPA 2011	

TABLE A6.
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE/CENTRAL TENDENCY EXPOSURE
Newark Bay Study Area

Scenario Timeframe: Current/Future
Medium: Sediment, Surface Water
Exposure Medium: Fish/Crab, Sediment, Surface Water, Ambient Air
Receptor Population: Angler/Sportsman - Adolescent
Receptor Age: 7 to <19 Years

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Dermal Contact	Angler/Sportsman	Adolescent	Sediment	CS	Exposure Point Concentration - Sediment	mg/kg	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				EFF	Exposure frequency fishing	d/yr	48	Assumed fishing 2x per week for ~5.5 months per year of fishing per Burger 2002	24	Assumed to be one-half RME	Intake (mg/kg-day) =
				EFC	Exposure frequency crabbing	d/yr	30	Assumed crabbing 2x per week for ~3.5 months per year of crabbing per Burger 2002	15	Assumed to be one-half RME	CS x EF x ED x SA x AF x ABS x FI x CF2 / AT x BW
				ED	Exposure duration	yr	12	USEPA 2000b	6	Assumed to be one-half RME	
				SA	Skin surface area	cm^2/d	4,436	Mean value for 7 to <19 years: face, hands, forearms, lower legs, feet (USEPA 2011)	4,436	Mean value for 7 to <19 years: face, hands, forearms, lower legs, feet (USEPA 2011)	
				AF	Adherence factor	mg/cm^2	0.2	50th percentile surface area weighted soil adherence data for children playing in wet soil (USEPA 2004)	0.2	50th percentile surface area weighted soil adherence data for children playing in wet soil (USEPA 2004)	
				ABS	Dermal Absorption Factor	unitless	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
				CF2	Conversion factor	kg/mg	1E-06	--	1E-06	--	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
				ATnc	Averaging time (noncancer)	d	4,380	ED x 365 d/yr	2,190	ED x 365 d/yr	
				BW	Body weight	kg	52	USEPA 2011	52	USEPA 2011	
Inhalation	Angler/Sportsman	Adolescent	VOCs, SVOCs in Sediment	CS	Exposure Point Concentration - Sediment	mg/kg	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	Exposure Concentration (mg/m3 [noncancer]; µg/m3 [cancer]) =
				EFF	Exposure frequency fishing	d/yr	48	Assumed fishing 2x per week for ~5.5 months per year of fishing per Burger 2002	24	Assumed to be one-half RME	CS x EF x ED x ET x CF3 x (1/VF) x FI x CF4 / AT
				EFC	Exposure frequency crabbing	d/yr	30	Assumed crabbing 2x per week for ~3.5 months per year of crabbing per Burger 2002	15	Assumed to be one-half RME	
				ED	Exposure duration	yr	12	USEPA 2000b	6	Assumed to be one-half RME	*Note: CF4 applies to the cancer equation only
				ET	Exposure time	hr/d	10	Professional judgment for length of typical fishing/crabbing trip	1	Assumed to be one-half RME	
				CF3	Conversion factor	d/hr	0.04	USEPA 2014	0.04	USEPA 2014	
				VF	Volatilization factor	m3/kg	Chemical-specific	Calculated, See Table X	Chemical-specific	Calculated, See Table X	
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
				CF4	Conversion factor	µg/mg	1E+03	--	1E+03	--	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
				ATnc	Averaging time (noncancer)	d	4,380	ED x 365 d/yr	2,190	ED x 365 d/yr	

TABLE A6.
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE/CENTRAL TENDENCY EXPOSURE
Newark Bay Study Area

Scenario Timeframe: Current/Future
Medium: Sediment, Surface Water
Exposure Medium: Fish/Crab, Sediment, Surface Water, Ambient Air
Receptor Population: Angler/Sportsman - Adolescent
Receptor Age: 7 to <19 Years

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Incidental Ingestion	Angler/Sportsman	Adolescent	Surface Water	Cwat	Exposure Point Concentration - Surface Water	ug/L	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				EFF	Exposure frequency fishing	d/yr	48	Assumed fishing 2x per week for ~5.5 months per year of fishing per Burger 2002	24	Assumed to be one-half RME	Intake (mg/kg-day) =
				EFC	Exposure frequency crabbing	d/yr	30	Assumed crabbing 2x per week for ~3.5 months per year of crabbing per Burger 2002	15	Assumed to be one-half RME	Cwat x EF x ED X IRwat x EV x FI
				ED	Exposure duration	yr	12	USEPA 2000b	6	Assumed to be one-half RME	AT x BW x CF4
				IRwat	Ingestion rate of surface water	L/d	0.025	50% of the mean swimming rate for children age 6-15 (USEPA 2011)	0.025	50% of the mean swimming rate for children age 6-15 (USEPA 2011)	
				EV	Event frequency	event/d	1	Professional judgment	1	Professional judgment	
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
				CF4	Conversion factor	µg/mg	1E+03	--	1E+03	--	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
				ATnc	Averaging time (noncancer)	d	4,380	ED x 365 d/yr	2,190	ED x 365 d/yr	
				BW	Body weight	kg	52	USEPA 2011	52	USEPA 2011	
Dermal Contact	Angler/Sportsman	Adolescent	Surface Water	Cwat	Exposure Point Concentration - Surface Water	ug/L	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	For Inorganics: Intake (mg/kg-day) =
				DA_{event}	Absorbed Dose per Event	mg/cm^2-event	Calculated value	--	Calculated value	--	Cwat x Kp x ET
				Kp	Dermal permeability constant	cm/hr	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	DAevent (int) x CF4
				ET	Exposure time	hr/d	1	Professional judgment for length of typical fishing/crabbing trip	1	Assumed to be one-half RME	
				CF4	Conversion Factor	µg/mg, cm3/L	1E+03	--	1E+03	--	For Organics:
				FA	Fraction absorbed water	unitless	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	If ET ≤ t*, Intake (mg/kg-day) =
				tevent	Event duration	hr/evnt	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	Cwat x 2 x FA x Kp x SQRT(6 x tevent x ET/¶)
				B	Ratio of permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis	unitless	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	DAevent (int) x CF4
				t*	Time to reach steady-state	hr	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	If ET > t*, Intake (mg/kg-day) =
				ATnc	Averaging time (noncancer)	d	4,380	ED x 365 d/yr	2,190	ED x 365 d/yr	Cwat x FA x Kp x (ET/1+B + 2 x tevent x [1+3B+3B²/(1+B)²])
				BW	Body weight	kg	52	USEPA 2011	52	USEPA 2011	DAevent (int) x CF4
				EV	Event frequency	event/d	1	Assumes receptor goes fishing once per day	1	Assumes receptor goes fishing once per day	Where:
				ED	Exposure duration	yr	12	USEPA 2000b	6	Assumed to be one-half RME	DAevent (int) =
				EFF	Exposure frequency fishing	d/yr	48	Assumed fishing 2x per week for ~5.5 months per year of fishing per Burger 2002	24	Assumed to be one-half RME	AT x BW x CF4
				EFC	Exposure frequency crabbing	d/yr	30	Assumed crabbing 2x per week for ~3.5 months per year of crabbing per Burger 2002	15	Assumed to be one-half RME	EV x ED x EF x SA x FI
				SA	Skin surface area	cm^2	4,436	Mean value for 7 to <19 years: face, hands, forearms, lower legs, feet (USEPA 2011)	4,436	Mean value for 7 to <19 years: face, hands, forearms, lower legs, feet (USEPA 2011)	
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	

TABLE A6.
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE/CENTRAL TENDENCY EXPOSURE
Newark Bay Study Area

Scenario Timeframe: Current/Future
Medium: Sediment, Surface Water
Exposure Medium: Fish/Crab, Sediment, Surface Water, Ambient Air
Receptor Population: Angler/Sportsman - Adolescent
Receptor Age: 7 to <19 Years

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Inhalation	Angler/Sportsman	Adolescent	VOCs, SVOCs in Surface Water	Cwat	Exposure Point Concentration - Surface Water	ug/L	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	Exposure Concentration (mg/m3 [noncancer]; µg/m3 [cancer]) =
				EFF	Exposure frequency fishing	d/yr	48	Assumed fishing 2x per week for ~5.5 months per year of fishing per Burger 2002	24	Assumed to be one-half RME	Cwat x EF x ED x ET x CF3 x FI x VF / AT x CF4
				EFC	Exposure frequency crabbing	d/yr	30	Assumed crabbing 2x per week for ~3.5 months per year of crabbing per Burger 2002	15	Assumed to be one-half RME	
				ED	Exposure duration	yr	12	USEPA 2000b	6	Assumed to be one-half RME	*Note: CF4 applies to the noncancer equation only
				ET	Exposure time	hr/d	10	Professional judgment for length of typical fishing/crabbing trip	1	Assumed to be one-half RME	
				CF3	Conversion factor	d/hr	0.04	USEPA 2014	0.04	USEPA 2014	
				FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
				VF	Volatilization factor	L/m3	Chemical-specific	Calculated, See Table X	Chemical-specific	Calculated, See Table X	
				CF4	Conversion factor	µg/mg	1E+03	--	1E+03	--	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
				ATnc	Averaging time (noncancer)	d	4,380	ED x 365 d/yr	2,190	ED x 365 d/yr	

Definitions

cm2/d - square centimeter per day, cm/hr - centimeter per hour, cm3/L - cubic centimeter per liter, CTE - central tendency exposure, d - day, d/hr - day per hour, d/yr day per year, event/d - event per day, g/d - gram per day, g/g - gram per gram, hr - hour, hr/d - hour per day, hr/event - hour per event, kg - kilogram, kg/g - kilogram per gram, kg/mg - kilogram per milligram, L/d - liter per day, L/m3 - liter per cubic meter, mg/cm2 - milligram per square centimeter, mg/d - milligram per day, mg/kg - milligram per kilogram, RME - reasonable maximum exposure, µg/cm2 - event - microgram per square centimeter per event, µg/mg - microgram per milligram, ug/L - micrgram per liter, yr - year

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TABLE A7.
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE/CENTRAL TENDENCY EXPOSURE
Newark Bay Study Area

Scenario Timeframe: Current/Future
Medium: Sediment, Surface Water
Exposure Medium: Fish/Crab, Sediment, Surface Water, Ambient Air
Receptor Population: Angler/Sportsman - Child
Receptor Age: 1 to <7 Years

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CTE Value	CTE Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Angler/Sportsman	Child	Fish/Crab	Ct	Exposure Point Concentration - Tissue	mg/kg wet weight	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
				IRF	Ingestion rate of fish	g/d	11.5	Assumed to be 1/3 of adult ingestion (USEPA 2012)	1.3	Assumed to be 1/3 of adult ingestion (USEPA 2012)	Intake (mg/kg-day) =
				IRC	Ingestion rate of crab	g/d	7.0	Assumed to be 1/3 of adult ingestion (USEPA 2012)	1.0	Assumed to be 1/3 of adult ingestion (USEPA 2012)	
				FI	Fraction from source	unitless	1	Assumed 100% of fish/crab consumed is from NBSA	1	Assumed 100% of fish/crab consumed is from NBSA	Ct x EF x ED x IR x (1-Loss) x FI x CF1 / AT x BW
				EF	Exposure frequency	d/yr	365	Fish ingestion rate already averaged over one year	365	Fish ingestion rate already averaged over one year	
				ED	Exposure duration	yr	6	USEPA 2014	3	Assumed to be one-half RME	
				Loss	Cooking loss for fish	g/g	0	Assumed 100% of chemical remains in fish	Chemical-specific	Refer to values listed in AECOM, 2015 in addition to more recent publications, if any	
				Loss	Cooking loss for crab	g/g	0	Assumed 100% of chemical remains in crab	Chemical-specific	Refer to values listed in AECOM, 2015 in addition to more recent publications, if any	
				CF1	Conversion factor	kg/g	1E-03	--	1E-03	--	
				BW	Body weight	kg	17	USEPA 2011 (mean, ages 1 to <7)	17	USEPA 2011 (mean, ages 1 to <7)	
				ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
				ATnc	Averaging time (noncancer)	d	2,190	ED x 365 d/yr	1,095	ED x 365 d/yr	

Definitions

cm2/d - square centimeter per day, cm/hr - centimeter per hour, cm3/L - cubic centimeter per liter, CTE - central tendency exposure, d - day, d/hr - day per hour, d/yr day per year, event/d - event per day, g/d - gram per day, g/g - gram per gram, hr - hour, hr/d - hour per day, hr/event - hour per event, kg - kilogram, kg/g - kilogram per gram, kg/mg - kilogram per milligram, L/d - liter per day, L/m3 - liter per cubic meter, mg/cm2 - milligram per square centimeter, mg/d - milligram per day, mg/kg - milligram per kilogram, RME - reasonable maximum exposure, µg/cm2 - event - microgram per square centimeter per event, µg/mg - microgram per milligram, ug/L - micrgram per liter, yr - year

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TABLE A8.
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE/CENTRAL TENDENCY EXPOSURE
Newark Bay Study Area

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Route	Receptor Population	Receptor Age	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Worker	Adult	CS	Chemical Concentration in Sediment	mg/kg	chemical-specific	--	chemical-specific	--	Intake (mg/kg/day)
			IR_s	Ingestion Rate of Sediment	mg/day	50	USEPA 1991	25	50% of RME	$Intake = \frac{CS \times IR_s \times FI \times EF \times ED \times CF}{BW \times AT}$
			FI	Fraction Ingested	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
			EF	Exposure Frequency	days/year	50	1 day/week, 50 weeks/year	25	50% of RME	Arsenic intakes are also multiplied by a relative bioavailability (RBA) of 0.6 (USEPA, 2012).
			ED	Exposure Duration	years	25	USEPA 2014	7	USEPA 2011	
			CF	Conversion Factor	kg/mg	1.00E-06	--	1.00E-06	--	
			BW	Body Weight	kg	80	USEPA 2014	80	USEPA 2014	
			AT-C	Averaging Time (Cancer)	days	25,550	70-year lifetime exposure x 365 days/year (USEPA, 1989)	25,550	70-year lifetime exposure x 365 days/year (USEPA, 1989)	
			AT-NC	Averaging Time (Noncancer)	days	9,125	ED (years) x 365 days/year	2,555	ED (years) x 365 days/year	
Dermal	Worker	Adult	CS	Chemical Concentration in Sediment	mg/kg	chemical-specific	--	chemical-specific	--	
			ABS	Dermal Absorption Factor	unitless	chemical-specific	USEPA 2004	chemical-specific	USEPA 2004	Intake Dermal Absorbed Dose (DAD) (mg/kg/day)
			AF	Adherence Factor	mg/cm^2	0.3	50% value for adult (reed gatherer): hands, lower legs, forearms, and feet (U.S. 2004)	0.3	50% value for adult (reed gatherer): hands, lower legs, forearms, and feet (USEPA 2004)	$Intake = \frac{CS \times SA \times AF \times EF \times ED \times ABS \times CF}{BW \times AT}$
			SA	Surface Area	cm^2/event	3,527	Mean default value for workers: head, hands, forearms (USEPA 2014)	3,527	Mean default value for workers: head, hands, forearms (USEPA 2014)	Assume 1 dermal event per exposure day
			EF	Exposure Frequency	days/year	50	1 day/week, 50 weeks/year	25	50% of RME	
			ED	Exposure Duration	years	25	USEPA 2014	7	USEPA 2011	
			CF	Conversion Factor	kg/mg	1.00E-06	--	1.00E-06	--	
			BW	Body Weight	kg	80	USEPA 2014	80	USEPA 2014	
			AT-C	Averaging Time (Cancer)	days	25,550	70-year lifetime exposure x 365 days/year (USEPA, 1989)	25,550	70-year lifetime exposure x 365 days/year (USEPA, 1989)	
			AT-NC	Averaging Time (Noncancer)	days	9,125	ED (years) x 365 days/year	2,555	ED (years) x 365 days/year	
Inhalation	Worker	Adult	CS	Exposure Point Concentration - Sediment	mg/kg	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	Exposure Concentration (mg/m3 [noncancer]; µg/m3 [cancer]) =
			EF	Exposure Frequency	days/year	50	1 day/week, 50 weeks/year	25	50% of RME	CS x EF x ED x ET x CF x (1/VF) x FI x CF4
			ED	Exposure Duration	years	25	USEPA 2014	7	USEPA 2011	*Note: CF applies to the cancer equation only
			ET	Exposure time	hr/d	8	Professional judgment for a normal work day	4	Assumed to be one-half RME	
			CF	Conversion factor	d/hr	0.04	--	0.04	--	
			VF	Volatilization factor	m3/kg	Chemical-specific	Calculated, See Table X	Chemical-specific	Calculated, See Table X	
			FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
			CF4	Conversion factor	µg/mg	1E+03	--	1E+03	--	
			ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
			ATnc	Averaging time (noncancer)	d	9,125	ED x 365 d/yr	2,555	ED x 365 d/yr	

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

References

USEPA 1989: Risk Assessment Guidance for Superfund. Vol. 1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.
USEPA 1991: Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors", OSWER Directive 9285.6-03.
USEPA 2004: Risk Assessment Guidance for Superfund. Vol. 1: Human Health Evaluation Manual, Part E, Supplemental Guidance for Dermal Risk Assessment Final. USEPA/540/R/99/005
USEPA 2011: Exposure Factors Handbook: 2011 Edition. USEPA/600/R-09/052F. September 2011.
USEPA 2012: OSWER Directive 9200.1-113. Recommendations for Default Value for Relative Bioavailability (RBA) of Arsenic in Soil. USEPA, December 2012. Consistent with the approach used by the Regional Screening Level (RSL) table (USEPA, 2016).
USEPA 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER Directive 9200.1-120. February 2014 with April 2015 corrections.

TABLE A9.
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE/CENTRAL TENDENCY EXPOSURE
Newark Bay Study Area

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Route	Receptor Population	Receptor Age	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Wader	Adult	CS	Chemical Concentration in Sediment	mg/kg	chemical-specific	chemical-specific	chemical-specific	chemical-specific	Intake (mg/kg/day) = $Intake = \frac{CS \times IR \times FI \times EF \times ED \times CF}{BW \times AT}$
			IR	Ingestion Rate of Sediment	mg/day	50	50% of the default residential adult soil IR (U.S. EPA 1991)	25	50% of RME	
			FI	Fraction Ingested	unitless	1	Assumes 100% sediment exposure is from Newark Bay Study Area	1	Assumes 100% sediment exposure is from Newark Bay Study Area	
			EF	Exposure Frequency	days/year	13	1 day/week, 3 months year	7	Approximately 50% of RME	
			ED	Exposure Duration	years	20	USEPA 2014	9	U.S. EPA 1989	Arsenic intakes are also multiplied by a relative bioavailability (RBA) of 0.6
			CF	Conversion Factor	kg/mg	1.00E-06	--	1.00E-06	--	(U.S. EPA, 2012).
			BW	Body Weight	kg	80	USEPA 2014	80	USEPA 2014	
			AT-C	Averaging Time (Cancer)	days	25,550	70-year lifetime exposure x 365 days/year (U.S. EPA, 1989)	25,550	70-year lifetime exposure x 365 days/year (U.S. EPA, 1989)	
			AT-NC	Averaging Time (Noncancer)	days	7,300	ED (years) x 365 days/year	3,285	ED (years) x 365 days/year	
	Swimmer	Adult	CS	Chemical Concentration in Sediment	mg/kg	chemical-specific	chemical-specific	chemical-specific	chemical-specific	
			IR	Ingestion Rate of Sediment	mg/day	50	50% of the default residential child soil IR (U.S. EPA, 1991)	25	50% of RME	
			FI	Fraction Ingested	unitless	1	Assumes 100% sediment exposure is from Newark Bay Study Area	1	Assumes 100% sediment exposure is from Newark Bay Study Area	
			EF	Exposure Frequency	days/year	13	1 day/week, 3 months year	7	Approximately 50% of RME	
			ED	Exposure Duration	years	20	USEPA 2014	9	U.S. EPA 1989	
			CF	Conversion Factor	kg/mg	1.00E-06	--	1.00E-06	--	
			BW	Body Weight	kg	80	USEPA 2014	80	USEPA 2014	
			AT-C	Averaging Time (Cancer)	days	25,550	70-year lifetime exposure x 365 days/year (U.S. EPA, 1989)	25,550	70-year lifetime exposure x 365 days/year (U.S. EPA, 1989)	
			AT-NC	Averaging Time (Noncancer)	days	7,300	ED (years) x 365 days/year	3,285	ED (years) x 365 days/year	
	Boater	Adult	CS	Chemical Concentration in Sediment	mg/kg	chemical-specific	chemical-specific	chemical-specific	chemical-specific	
			IR	Ingestion Rate of Sediment	mg/day	50	50% of the default residential adult soil IR (U.S. EPA 1991)	25	50% of RME	
			FI	Fraction Ingested	unitless	1	Assumes 100% sediment exposure is from Newark Bay Study Area	1	Assumes 100% sediment exposure is from Newark Bay Study Area	
			EF	Exposure Frequency	days/year	9	1 day/month, 8.5 months/year	4	Approximately 50% of RME	
			ED	Exposure Duration	years	20	USEPA 2014	9	U.S. EPA 1989	
			CF	Conversion Factor	kg/mg	1.00E-06	--	1.00E-06	--	
			BW	Body Weight	kg	80	USEPA 2014	80	USEPA 2014	
			AT-C	Averaging Time (Cancer)	days	25,550	70-year lifetime exposure x 365 days/year (U.S. EPA, 1989)	25,550	70-year lifetime exposure x 365 days/year (U.S. EPA, 1989)	
			AT-NC	Averaging Time (Noncancer)	days	7,300	ED (years) x 365 days/year	3,285	ED (years) x 365 days/year	

TABLE A9.
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE/CENTRAL TENDENCY EXPOSURE
Newark Bay Study Area

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Route	Receptor Population	Receptor Age	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Dermal	Wader	Adult	CS	Chemical Concentration in Sediment	mg/kg	chemical-specific	chemical-specific	chemical-specific	chemical-specific	Dermal Absorbed Dose (mg/kg/day) = $Intake = \frac{CS \times SA \times AF \times EF \times ED \times ABS \times CF}{BW \times AT}$
			ABS	Dermal Absorption Factor	unitless	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
			AF	Adherence Factor	mg/cm^2	0.3	50% value for adult (reed gatherer): hands, lower legs, forearms, and feet (U.S. EPA 2004)	0.3	50% value for adult (reed gatherer): hands, lower legs, forearms, and feet (U.S. EPA 2004)	
			SA	Skin Surface Area Available for Contact	cm^2/event	6,492	Mean value for adults: face, hands, forearms, lower legs, feet (USEPA 2011)	6,492	Mean value for adults: face, hands, forearms, lower legs, feet (USEPA 2011)	1 event per dermal exposure day
			EF	Exposure Frequency	days/year	13	1 day/week, 3 months/year	7	Approximately 50% of RME	
			ED	Exposure Duration	years	20	USEPA 2014	9	U.S. EPA 1989	
			CF	Conversion Factor	kg/mg	1.00E-06	--	1.00E-06	--	
			BW	Body Weight	kg	80	USEPA 2014	80	USEPA 2014	
			AT-C	Averaging Time (Cancer)	days	25,550	70-year lifetime exposure x 365 days/year (U.S. EPA, 1989)	25,550	70-year lifetime exposure x 365 days/year (U.S. EPA, 1989)	
			AT-NC	Averaging Time (Noncancer)	days	7,300	ED (years) x 365 days/year	3,285	ED (years) x 365 days/year	
	Swimmer	Adult	CS	Chemical Concentration in Sediment	mg/kg	chemical-specific	chemical-specific	chemical-specific	chemical-specific	
			ABS	Dermal Absorption Factor	unitless	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
			AF	Adherence Factor	mg/cm^2	0.3	50% value for adult (reed gatherer): hands, lower legs, forearms, and feet (U.S. EPA 2004)	0.3	50% value for adult (reed gatherer): hands, lower legs, forearms, and feet (U.S. EPA 2004)	
			SA	Skin Surface Area Available for Contact	cm^2/event	6,492	Mean value for adults: face, hands, forearms, lower legs, feet (USEPA 2011)	6,492	Mean value for adults: face, hands, forearms, lower legs, feet (USEPA 2011)	
			EF	Exposure Frequency	days/year	13	1 day/week, 3 months/year	7	Approximately 50% of RME	
			ED	Exposure Duration	years	20	USEPA 2014	9	U.S. EPA 1989	
			CF	Conversion Factor	kg/mg	1.00E-06	--	1.00E-06	--	
			BW	Body Weight	kg	80	USEPA 2014	80	USEPA 2014	
			AT-C	Averaging Time (Cancer)	days	25,550	70-year lifetime exposure x 365 days/year (U.S. EPA, 1989)	25,550	70-year lifetime exposure x 365 days/year (U.S. EPA, 1989)	
			AT-NC	Averaging Time (Noncancer)	days	7,300	ED (years) x 365 days/year	3,285	ED (years) x 365 days/year	
	Boater	Adult	CS	Chemical Concentration in Sediment	mg/kg	chemical-specific	chemical-specific	chemical-specific	chemical-specific	
			ABS	Dermal Absorption Factor	unitless	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
			AF	Adherence Factor	mg/cm^2	0.3	50% value for adult (reed gatherer): hands, lower legs, forearms, and feet (U.S. EPA 2004)	0.3	50% value for adult (reed gatherer): hands, lower legs, forearms, and feet (U.S. EPA 2004)	
			SA	Skin Surface Area Available for Contact	cm^2/event	2,692	Mean value for adults: face, hands, forearms (USEPA 2011)	2,692	Mean value for adults: face, hands, forearms (USEPA 2011)	
			EF	Exposure Frequency	days/year	9	1 day/month, 8.5 months/year	4	Approximately 50% of RME	
			ED	Exposure Duration	years	20	USEPA 2014	9	U.S. EPA 1989	
			CF	Conversion Factor	kg/mg	1.00E-06	--	1.00E-06	--	
			BW	Body Weight	kg	80	USEPA 2014	80	USEPA 2014	
			AT-C	Averaging Time (Cancer)	days	25,550	70-year lifetime exposure x 365 days/year (U.S. EPA, 1989)	25,550	70-year lifetime exposure x 365 days/year (U.S. EPA, 1989)	
			AT-NC	Averaging Time (Noncancer)	days	7,300	ED (years) x 365 days/year	3,285	ED (years) x 365 days/year	

TABLE A9.
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE/CENTRAL TENDENCY EXPOSURE
Newark Bay Study Area

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Route	Receptor Population	Receptor Age	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Inhalation of VOCs, SVOCs in Sediment	Wader	Adult	CS	Exposure Point Concentration	mg/kg	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	Exposure Concentration (mg/m3 [noncancer]; µg/m3 [cancer]) =
			EF	Exposure frequency	d/yr	13	1 day/week, 3 months year	7	Approximately 50% of RME	CS x EF x ED x ET x CF3 x (1/VF) x FI x CF4
			ED	Exposure duration	yr	20	USEPA 2014	9	U.S. EPA 1989	AT
			ET	Exposure time	hr/d	1	Professional judgment	0.5	Assumed to be one-half RME	*Note: CF4 applies to the cancer equation only
			CF3	Conversion factor	d/hr	0.04	--	0.04	--	
			VF	Volatilization factor	m3/kg	Chemical-specific	Calculated, See Table X	Chemical-specific	Calculated, See Table X	
			FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1.0	Assumed to be one-half RME	
			CF4	Conversion factor	µg/mg	1E+03	--	1E+03	--	
			ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
			ATnc	Averaging time (noncancer)	d	7,300	ED x 365 d/yr	3,285	ED x 365 d/yr	
	Swimmer	Adult	CS	Exposure Point Concentration	mg/kg	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
			EF	Exposure frequency	d/yr	13	1 day/week, 3 months year	7	Approximately 50% of RME	
			ED	Exposure duration	yr	20	USEPA 2014	9	U.S. EPA 1989	
			ET	Exposure time	hr/d	2.6	National average for swimming (U.S. EPA 1989)	2.6	National average for swimming (U.S. EPA 1989)	
			CF3	Conversion factor	d/hr	0.04	--	0.04	--	
			VF	Volatilization factor	m3/kg	Chemical-specific	Calculated, See Table X	Chemical-specific	Calculated, See Table X	
			FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1.0	Assumed to be one-half RME	
			CF4	Conversion factor	µg/mg	1E+03	--	1E+03	--	
			ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
			ATnc	Averaging time (noncancer)	d	7,300	ED x 365 d/yr	3,285	ED x 365 d/yr	

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

References:

U.S. EPA 1989: Risk Assessment Guidance for Superfund. Vol. 1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

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USEPA 2004. Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005, OSWER 9285.7-02EP, PB99-963312. Office of Superfund

USEPA 2011: Exposure Factors Handbook: 2011 Edition. USEPA/600/R-09/052F. September 2011.

USEPA 2012: OSWER Directive 9200.1-113. Recommendations for Default Value for Relative Bioavailability (RBA) of Arsenic in Soil. USEPA, December 2012. Consistent with the approach used by the Regional Screening Level (RSL) table (USEPA, 2016).

USEPA 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER Directive 9200.1-120. February 2014 with April 2015 corrections.

TABLE A10.
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE/CENTRAL TENDENCY EXPOSURE
Newark Bay Study Area

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Route	Receptor Population	Receptor Age	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Wader	Adult	CW	Chemical Concentration in Water	mg/l	chemical-specific	chemical-specific	chemical-specific	chemical-specific	Intake (mg/kg/day)
			IR	Ingestion Rate of Surface Water	l/hr	0.011	50% of the mean swimming rate for adults (USEPA 2011)	0.011	50% of the mean swimming rate for adults (USEPA 2011)	$Intake = \frac{CW \times IR \times ET \times EF \times ED}{BW \times AT}$
			ET	Exposure Time	hours/day	1.0	Best professional judgment	0.5	50% of the RME	
			EF	Exposure Frequency	days/year	13	1 day/week, 3 months/year	7	Approximately 50% of RME	
			ED	Exposure Duration	years	20	USEPA 2014	9	U.S. EPA 1989	
			BW	Body Weight	kg	80	USEPA 2014	80	USEPA 2014	
			AT-C	Averaging Time (Cancer)	days	25,550	70-year lifetime exposure x 365 days/year (U.S. EPA, 1989)	25,550	70-year lifetime exposure x 365 days/year (U.S. EPA, 1989)	
			AT-NC	Averaging Time (Noncancer)	days	7,300	ED (years) x 365 days/year	3,285	ED (years) x 365 days/year	
	Swimmer	Adult	CW	Chemical Concentration in Water	mg/l	chemical-specific	chemical-specific	chemical-specific	chemical-specific	
			IR_w	Ingestion Rate of Surface Water	l/hr	0.021	mean swimming rate for adults (USEPA 2011)	0.021	mean swimming rate for adults (USEPA 2011)	
			ET	Exposure Time	hours/day	2.6	National average for swimming (U.S. EPA 1989)	2.6	National average for swimming (U.S. EPA 1989)	
			EF	Exposure Frequency	days/year	13	1 day/week, 3 months/year	7	Approximately 50% of RME	
			ED	Exposure Duration	years	20	USEPA 2014	9	U.S. EPA 1989	
			BW	Body Weight	kg	80	USEPA 2014	80	USEPA 2014	
			AT-C	Averaging Time (Cancer)	days	25,550	70-year lifetime exposure x 365 days/year (U.S. EPA, 1989)	25,550	70-year lifetime exposure x 365 days/year (U.S. EPA, 1989)	
			AT-NC	Averaging Time (Noncancer)	days	7,300	ED (years) x 365 days/year	3,285	ED (years) x 365 days/year	
	Boater	Adult	CW	Chemical Concentration in Water	mg/l	chemical-specific	chemical-specific	chemical-specific	chemical-specific	
			IR	Ingestion Rate of Surface Water	l/hr	0.011	50% of the mean swimming rate for adults (USEPA 2011)	0.011	50% of the mean swimming rate for adults (USEPA 2011)	
			ET	Exposure Time	hours/day	2.0	Based on assumption in Lower Passaic River Baseline Human Health Risk Assessment	1.5	Based on assumption in Lower Passaic River Baseline Human Health Risk Assessment	
			EF	Exposure Frequency	days/year	259	7 days/week for 37 weeks; Refer to AECOM 2015 for details	111	3 days/week for 37 weeks	
			ED	Exposure Duration	years	20	USEPA 2014	9	U.S. EPA 1989	
			BW	Body Weight	kg	80	USEPA 2014	80	USEPA 2014	
			AT-C	Averaging Time (Cancer)	days	25,550	70-year lifetime exposure x 365 days/year (U.S. EPA, 1989)	25,550	70-year lifetime exposure x 365 days/year (U.S. EPA, 1989)	
			AT-NC	Averaging Time (Noncancer)	days	7,300	ED (years) x 365 days/year	3,285	ED (years) x 365 days/year	

TABLE A10.
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE/CENTRAL TENDENCY EXPOSURE
Newark Bay Study Area

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Route	Receptor Population	Receptor Age	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Dermal	Wader	Adult	CW	Chemical Concentration in Water	mg/l	chemical-specific	chemical-specific	chemical-specific	chemical-specific	DAD = dermally absorbed dose (mg/kg-day)
			DA_{event}	Absorbed Dose per Event	mg/cm^2-event	Calculated value	--	Calculated value	--	
			SA	Skin Surface Area Available for Contact	cm^2/event	6,492	Mean value for adults: face, hands, forearms, lower legs, feet (USEPA 2011)	6,492	Mean value for adults: face, hands, forearms, lower legs, feet (USEPA 2011)	1 event per dermal exposure day
			Kp	Permeability Coefficient	cm/hr	chemical-specific	U.S. EPA 2004	chemical-specific	U.S. EPA 2004	$Intake = \frac{DA_{event} \times EF \times EV \times ED \times SA}{BW \times AT}$
			FA	Fraction Absorbed Water	--	chemical-specific	U.S. EPA, 2004	chemical-specific	U.S. EPA, 2004	
			tau-event	Lag Time per Event	hours/event	chemical-specific	U.S. EPA, 2004	chemical-specific	U.S. EPA, 2004	
			t-event	Event Duration	hours/event	1.0	Best professional judgment	0.5	50% of RME	
			t*	time to reach steady state	hour	chemical-specific [2.4 x tau-event].	U.S. EPA, 2004	chemical-specific [2.4 x tau-event].	U.S. EPA, 2004	
			B	Ratio of Permeability Coefficient of a Compound through the Stratum Corneum Relative to its Permeability Coefficient Across the Viable Epidermis	--	chemical-specific	U.S. EPA, 2004	chemical-specific	U.S. EPA, 2004	
			CF	Conversion Factor	l/cm^3	0.001	--	0.001	---	DA_{event} for inorganics or highly ionized organics:
			EV	Event Frequency	event/day	1	U.S. EPA, 2004	1	U.S. EPA, 2004	DAevent = CW × Kp × ET × CF
			ET	Exposure Time	hours/day	1.0	Best professional judgment	0.5	Best professional judgment	
			EF	Exposure Frequency	days/year	13	1 day per week, 3 months/year	7	Approximately 50% of RME	DA_{event} for organics:
			ED	Exposure Duration	years	20	USEPA 2014	9	U.S. EPA 1989	If ET < t*, then
			BW	Body Weight	kg	80	USEPA 2014	80	USEPA 2014	
			AT-C	Averaging Time (Cancer)	days	25,550	70-year lifetime exposure x 365 days/year (U.S. EPA, 1989)	25,550	70-year lifetime exposure x 365 days/year (U.S. EPA, 1989)	$DA_{event} = 2\,FA \times Kp \times CW \times CF \sqrt{\frac{6T \times ET}{\Pi}}$
			AT-NC	Averaging Time (Noncancer)	days	7,300	ED (years) x 365 days/year	3,285	ED (years) x 365 days/year	
	Swimmer	Adult	CW	Chemical Concentration in Water	mg/l	chemical-specific	chemical-specific	chemical-specific	chemical-specific	If ET > t*, then
			DA_{event}	Absorbed Dose per Event	mg/cm^2-event	Calculated value	--	Calculated value	--	
			SA	Skin Surface Area Available for Contact	cm^2/event	20,900	Resident default whole body (USEPA 2014)	20,900	Resident default whole body (USEPA 2014)	$DA_{event} = FA \times Kp \times CW \times CF \times \left[\frac{ET}{1+B} + 2T\left(\frac{1+3B+3B^2}{(1+B)^2}\right)\right]$
			Kp	Permeability Coefficient	cm/hr	chemical-specific	U.S. EPA 2004	Chemical-specific	U.S. EPA 2004	
			FA	Fraction Absorbed Water	--	chemical-specific	U.S. EPA, 2004	chemical-specific	U.S. EPA, 2004	
			tau-event	Lag Time per Event	hours/event	chemical-specific	U.S. EPA, 2004	chemical-specific	U.S. EPA, 2004	
			t-event	Event Duration	hours/event	2.6	National average for swimming (U.S. EPA 1989)	2.6	National average for swimming (U.S. EPA 1989)	
			t*	time to reach steady state	hour	chemical-specific [2.4 x tau-event]	U.S. EPA, 2004	chemical-specific [2.4 x tau-event]	U.S. EPA, 2004	
			B	Ratio of Permeability Coefficient of a Compound through the Stratum Corneum Relative to its Permeability Coefficient Across the Viable Epidermis	--	chemical-specific	U.S. EPA, 2004	chemical-specific	U.S. EPA, 2004	
			CF	Conversion Factor	l/cm^3	0.001	--	0.001	---	
			EV	Event Frequency	event/day	1	U.S. EPA, 2004	1	U.S. EPA, 2004	
			ET	Exposure Time	hours/day	2.6	National average for swimming (U.S. EPA 1989)	2.6	National average for swimming (U.S. EPA 1989)	
			EF	Exposure Frequency	days/year	13	1 day per week, 3 months/year	7	Approximately 50% of RME	
			ED	Exposure Duration	years	20	USEPA 2014	9	U.S. EPA 1989	
			BW	Body Weight	kg	80	USEPA 2014	80	USEPA 2014	
			AT-C	Averaging Time (Cancer)	days	25,550	70-year lifetime exposure x 365 days/year (U.S. EPA, 1989)	25,550	70-year lifetime exposure x 365 days/year (U.S. EPA, 1989)	
			AT-NC	Averaging Time (Noncancer)	days	7,300	ED (years) x 365 days/year	3,285	ED (years) x 365 days/year	

TABLE A10.
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE/CENTRAL TENDENCY EXPOSURE
Newark Bay Study Area

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Route	Receptor Population	Receptor Age	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
	Boater	Adult	CW	Chemical Concentration in Water	mg/l	chemical-specific	chemical-specific	chemical-specific	chemical-specific	
			DA_{event}	Absorbed Dose per Event	mg/cm^2-event	Calculated value	--	Calculated value	--	
			SA	Skin Surface Area Available for Contact	cm^2/event	2,692	Mean value for adults: face, hands, forearms (USEPA 2011)	2,692	Mean value for adults: face, hands, forearms (USEPA 2011)	
			Kp	Permeability Coefficient	cm/hr	chemical-specific	U.S. EPA 2004	chemical-specific	U.S. EPA 2004	
			CF	Conversion Factor	l/cm^3	0.001	--	0.001	---	
			FA	Fraction Absorbed Water	--	chemical-specific	U.S. EPA, 2004	chemical-specific	U.S. EPA, 2004	
			tau-event	Lag Time per Event	hours/event	chemical-specific	U.S. EPA, 2004	chemical-specific	U.S. EPA, 2004	
			t-event	Event Duration	hours/event	2	Professional judgment	1.5	Best professional judgment	
			t*	time to reach steady state	hour	chemical-specific [2.4 x tau-event]	U.S. EPA, 2004	chemical-specific [2.4 x tau-event]	U.S. EPA, 2004	
			B	Ratio of Permeability Coefficient of a Compound through the Stratum Corneum Relative to its Permeability Coefficient Across the Viable Epidermis	--	chemical-specific	U.S. EPA, 2004	chemical-specific	U.S. EPA, 2004	
			EV	Event Frequency	event/day	1	U.S. EPA, 2004	1	U.S. EPA, 2004	
			ET	Exposure Time	hours/day	2.0	Best professional judgment	1.5	Best professional judgment	
			EF	Exposure Frequency	days/year	259	7 days/week for 37 weeks; Refer to AECOM 2015 for details	111	3 days/wk for 37 weeks	
			ED	Exposure Duration	years	20	USEPA 2014	9	U.S. EPA 1989	
			BW	Body Weight	kg	80	USEPA 2014	80	USEPA 2014	
			AT-C	Averaging Time (Cancer)	days	25,550	70-year lifetime exposure x 365 days/year (U.S. EPA, 1989)	25,550	70-year lifetime exposure x 365 days/year (U.S. EPA, 1989)	
			AT-NC	Averaging Time (Noncancer)	days	7,300	ED (years) x 365 days/year	3,285	ED (years) x 365 days/year	
Inhalation of VOCs, SVOCs in Surface Water	Wader	Adult	CS	Exposure Point Concentration - Sedime	mg/kg	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	Exposure Concentration (mg/m3 [noncancer]; µg/m3 [cancer]) =
			EF	Exposure frequency	d/yr	13	1 day per week, 3 months/year	7	Approximately 50% of RME	CS x EF x ED x ET x CF3 x (1/VF) x FI x CF4
			ED	Exposure duration	yr	20	USEPA 2014	9	U.S. EPA 1989	AT
			ET	Exposure time	hr/d	1	Professional judgment	0.5	Assumed to be one-half RME	*Note: CF4 applies to the cancer equation only
			CF3	Conversion factor	d/hr	0.04	--	0.04	--	
			VF	Volatilization factor	m3/kg	Chemical-specific	Calculated, See Table X	Chemical-specific	Calculated, See Table X	
			FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
			CF4	Conversion factor	µg/mg	1E+03	--	1E+03	--	
			ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
			ATnc	Averaging time (noncancer)	d	7,300	ED x 365 d/yr	3,285	ED x 365 d/yr	

TABLE A10.
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE/CENTRAL TENDENCY EXPOSURE
Newark Bay Study Area

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Route	Receptor Population	Receptor Age	Parameter Code	Parameter Definition	Units	RME RME Value	RME Rationale/ Reference	CT CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
	Swimmer	Adult	CS	Exposure Point Concentration - Sedime	mg/kg	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	Exposure Concentration (mg/m3 [noncancer]; µg/m3 [cancer]) =
			EF	Exposure frequency	d/yr	13	1 day/week, 3 months/year	7	Approximately 50% of RME	CS x EF x ED x ET x CF3 x (1/VF) x FI x CF4
			ED	Exposure duration	yr	20	USEPA 2014	9	U.S. EPA 1989	AT
			ET	Exposure time	hr/d	2.6	National average for swimming (U.S. EPA 1989)	2.6	National average for swimming (U.S. EPA 1989)	*Note: CF4 applies to the cancer equation only
			CF3	Conversion factor	d/hr	0.04	--	0.04	--	
			VF	Volatilization factor	m3/kg	Chemical-specific	Calculated, See Table X	Chemical-specific	Calculated, See Table X	
			FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
			CF4	Conversion factor	µg/mg	1E+03	--	1E+03	--	
			ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
			ATnc	Averaging time (noncancer)	d	7,300	ED x 365 d/yr	3,285	ED x 365 d/yr	

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

References:

AECOM. 2015. Baseline Human Health Risk Assessment for the Lower Passaic River Study Area. Revised Draft. Prepared for the Cooperating Parties Group. December. Report No. 60145884.J908.
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USEPA 2011. Exposure Factors Handbook: 2011 Edition. EPA/600/R-090/052F. Office of Research and Development, Washington, DC, National Center for Environmental Assessment. September.
USEPA 2014: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER Directive 9200.1-120. February 2014 with April 2015 corrections.

TABLE A11.
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE/CENTRAL TENDENCY EXPOSURE
Newark Bay Study Area

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Route	Receptor Population	Receptor Age	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Wader	Adolescent (7 to <19 years)	CS	Chemical Concentration in Sediment	mg/kg	chemical-specific	chemical-specific	chemical-specific	chemical-specific	Intake (mg/kg/day) = $Intake = \frac{CS \times IR \times FI \times EF \times ED \times CF}{BW \times AT}$ Arsenic intakes also may be multiplied by a relative bioavailability (RBA) of 0.6 (USEPA, 2012)
			IR	Ingestion Rate of Sediment	mg/day	50	50% of the default residential adult soil IR (USEPA 1991)	25	50% of RME	
			FI	Fraction Ingested	unitless	1	Assumes 100% sediment exposure is from Newark Bay Study Area	1	Assumes 100% sediment exposure is from Newark Bay Study Area	
			EF	Exposure Frequency	days/year	39	3 days/week, 3 months year	20	Approximately 50% of RME	
			ED	Exposure Duration	years	12	Based on age of receptor	6	EPA default (USEPA 1991)	
			CF	Conversion Factor	kg/mg	1.00E-06	--	1.00E-06	--	
			BW	Body Weight	kg	52	USEPA 2011	52	USEPA 2011	
			AT-C	Averaging Time (Cancer)	days	25,550	70-year lifetime exposure x 365 days/year (USEPA, 1989)	25,550	70-year lifetime exposure x 365 days/year (USEPA, 1989)	
			AT-NC	Averaging Time (Noncancer)	days	4,380	ED (years) x 365 days/year	2,190	ED (years) x 365 days/year	
	Swimmer	Adolescent (7 to <19 years)	CS	Chemical Concentration in Sediment	mg/kg	chemical-specific	chemical-specific	chemical-specific	chemical-specific	
			IR	Ingestion Rate of Sediment	mg/day	50	50% of the default residential child soil IR (USEPA, 1991)	25	50% of RME	
			FI	Fraction Ingested	unitless	1	Best professional judgment	1	Best professional judgment	
			EF	Exposure Frequency	days/year	39	3 days/week, 3 months year	20	Approximately 50% of RME	
			ED	Exposure Duration	years	12	Based on age of receptor	6	EPA default (USEPA 1991)	
			CF	Conversion Factor	kg/mg	1.00E-06	--	1.00E-06	--	
			BW	Body Weight	kg	52	USEPA 2011	52	USEPA 2011	
			AT-C	Averaging Time (Cancer)	days	25,550	70-year lifetime exposure x 365 days/year (USEPA, 1989)	25,550	70-year lifetime exposure x 365 days/year (USEPA, 1989)	
			AT-NC	Averaging Time (Noncancer)	days	4,380	ED (years) x 365 days/year	2,190	ED (years) x 365 days/year	
	Boater	Adolescent (7 to <19 years)	CS	Chemical Concentration in Sediment	mg/kg	chemical-specific	chemical-specific	chemical-specific	chemical-specific	
			IR	Ingestion Rate of Sediment	mg/day	50	50% of the default residential child soil IR (USEPA, 1991)	25	50% of RME	
			FI	Fraction Ingested	unitless	1	Best professional judgment	1	Best professional judgment	
			EF	Exposure Frequency	days/year	4	1 day per month for 14 weeks	2	Approximately 50% of RME	
			ED	Exposure Duration	years	12	Based on age of receptor	6	EPA default (USEPA 1991)	
			CF	Conversion Factor	kg/mg	1.00E-06	--	1.00E-06	--	
			BW	Body Weight	kg	52	USEPA 2011	52	USEPA 2011	
			AT-C	Averaging Time (Cancer)	days	25,550	70-year lifetime exposure x 365 days/year (USEPA, 1989)	25,550	70-year lifetime exposure x 365 days/year (USEPA, 1989)	
			AT-NC	Averaging Time (Noncancer)	days	4,380	ED (years) x 365 days/year	2,190	ED (years) x 365 days/year	

TABLE A11.
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE/CENTRAL TENDENCY EXPOSURE
Newark Bay Study Area

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Route	Receptor Population	Receptor Age	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Dermal	Wader	Adolescent (7 to <19 years)	CS	Chemical Concentration in Sediment	mg/kg	chemical-specific	chemical-specific	chemical-specific	chemical-specific	Dermal Absorbed Dose (mg/kg/day) = $Intake = \frac{CS \times SA \times AF \times EF \times ED \times ABS \times CF}{BW \times AT}$
			ABS	Dermal Absorption Factor	unitless	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
			AF	Adherence Factor	mg/cm^2	0.2	50th percentile surface area weighted soil adherence data for children playing in wet soil (USEPA 2004)	0.2	50th percentile surface area weighted soil adherence data for children playing in wet soil (USEPA 2004)	
			SA	Skin Surface Area Available for Contact	cm^2/event	4,436	Mean value for 7 to <19 years: face, hands, forearms, lower legs, feet (USEPA 2011)	4,436	Mean value for 7 to <19 years: face, hands, forearms, lower legs, feet (USEPA 2011)	1 event per dermal exposure day
			EF	Exposure Frequency	days/year	39	3 days/week, 3 months/year	20	Approximately 50% of RME	
			ED	Exposure Duration	years	12	Based on age of receptor	6	EPA default (USEPA 1991)	
			CF	Conversion Factor	kg/mg	1.00E-06	--	1.00E-06	--	
			BW	Body Weight	kg	52	USEPA 2011	52	USEPA 2011	
			AT-C	Averaging Time (Cancer)	days	25,550	70-year lifetime exposure x 365 days/year (USEPA, 1989)	25,550	70-year lifetime exposure x 365 days/year (USEPA, 1989)	
			AT-NC	Averaging Time (Noncancer)	days	4,380	ED (years) x 365 days/year	2,190	ED (years) x 365 days/year	
	Swimmer	Adolescent (7 to <19 years)	CS	Chemical Concentration in Sediment	mg/kg	chemical-specific	chemical-specific	chemical-specific	chemical-specific	
			ABS	Dermal Absorption Factor	unitless	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
			AF	Adherence Factor	mg/cm^2	0.2	50th percentile surface area weighted soil adherence data for children playing in wet soil (USEPA 2004)	0.2	50th percentile surface area weighted soil adherence data for children playing in wet soil (USEPA 2004)	
			SA	Skin Surface Area Available for Contact	cm^2/event	4,436	Mean value for 7 to <19 years: face, hands, forearms, lower legs, feet (USEPA 2011)	4,436	Mean value for 7 to <19 years: face, hands, forearms, lower legs, feet (USEPA 2011)	
			EF	Exposure Frequency	days/year	39	3 days/week, 3 months/year	20	Approximately 50% of RME	
			ED	Exposure Duration	years	12	Based on age of receptor	6	EPA default (USEPA 1991)	
			CF	Conversion Factor	kg/mg	1.00E-06	--	1.00E-06	--	
			BW	Body Weight	kg	52	USEPA 2011	52	USEPA 2011	
			AT-C	Averaging Time (Cancer)	days	25,550	70-year lifetime exposure x 365 days/year (USEPA, 1989)	25,550	70-year lifetime exposure x 365 days/year (USEPA, 1989)	
			AT-NC	Averaging Time (Noncancer)	days	4,380	ED (years) x 365 days/year	2,190	ED (years) x 365 days/year	
	Boater	Adolescent (7 to <19 years)	CS	Chemical Concentration in Sediment	mg/kg	chemical-specific	chemical-specific	chemical-specific	chemical-specific	
			ABS	Dermal Absorption Factor	unitless	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
			AF	Adherence Factor	mg/cm^2	0.2	50th percentile surface area weighted soil adherence data for children playing in wet soil (USEPA 2004)	0.2	50th percentile surface area weighted soil adherence data for children playing in wet soil (USEPA 2004)	
			SA	Skin Surface Area Available for Contact	cm^2/event	4,436	Mean value for 7 to <19 years: face, hands, forearms, lower legs, feet (USEPA 2011)	4,436	Mean value for 7 to <19 years: face, hands, forearms, lower legs, feet (USEPA 2011)	
			EF	Exposure Frequency	days/year	4	1 day per month for 14 weeks	2	Approximately 50% of RME	
			ED	Exposure Duration	years	12	Based on age of receptor	6	EPA default (USEPA 1991)	
			CF	Conversion Factor	kg/mg	1.00E-06	--	1.00E-06	--	
			BW	Body Weight	kg	52	USEPA 2011	52	USEPA 2011	
			AT-C	Averaging Time (Cancer)	days	25,550	70-year lifetime exposure x 365 days/year (USEPA, 1989)	25,550	70-year lifetime exposure x 365 days/year (USEPA, 1989)	
			AT-NC	Averaging Time (Noncancer)	days	4,380	ED (years) x 365 days/year	2,190	ED (years) x 365 days/year	

TABLE A11.
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE/CENTRAL TENDENCY EXPOSURE
Newark Bay Study Area

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Route	Receptor Population	Receptor Age	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
VOCs, SVOCs in Sediment	Wader	Adolescent	CS	Exposure Point Concentration - Sediment	mg/kg	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
		(7 to <19 years)	EF	Exposure Frequency	days/year	39	3 days/week, 3 months year	20	Approximately 50% of RME	
			ED	Exposure Duration	years	12	Based on age of receptor	6	EPA default (USEPA 1991)	
			ET	Exposure time	hr/d	1	Best professional judgment	0.5	Best professional judgment	
			CF3	Conversion factor	d/hr	0.04	--	0.04	--	
			VF	Volatilization factor	m3/kg	Chemical-specific	Calculated, See Table X	Chemical-specific	Calculated, See Table X	
			FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	Exposure Concentration (mg/m3 [noncancer]; µg/m3 [cancer]) =
			CF4	Conversion factor	µg/mg	1E+03	--	1E+03	--	
			ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	CS x EF x ED x ET x CF3 x (1/VF) x FI x CF4
			ATnc	Averaging time (noncancer)	d	4,380	ED x 365 d/yr	2,190	ED x 365 d/yr	AT
	Swimmer	Adolescent	CS	Exposure Point Concentration - Sediment	mg/kg	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	*Note: CF4 applies to the cancer equation only
		(7 to <19 years)	EF	Exposure Frequency	days/year	39	3 days/week, 3 months year	20	Approximately 50% of RME	
			ED	Exposure Duration	years	12	Based on age of receptor	6	EPA default (USEPA 1991)	
			ET	Exposure time	hr/d	2.6	National average for swimming (USEPA 1989)	2.6	National average for swimming (USEPA 1989)	
			CF3	Conversion factor	d/hr	0.04	--	0.04	--	
			VF	Volatilization factor	m3/kg	Chemical-specific	Calculated, See Table X	Chemical-specific	Calculated, See Table X	
			FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
			CF4	Conversion factor	µg/mg	1E+03	--	1E+03	--	
			ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
			ATnc	Averaging time (noncancer)	d	4,380	ED x 365 d/yr	2,190	ED x 365 d/yr	

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

References:

USEPA 1989: Risk Assessment Guidance for Superfund. Vol. 1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.
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TABLE A12.
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE/CENTRAL TENDENCY EXPOSURE
Newark Bay Study Area

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Route	Receptor Population	Receptor Age	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Wader	Adolescent (7 to < 19 years)	C_w	Chemical Concentration in Water	mg/l	chemical-specific	chemical-specific	chemical-specific	chemical-specific	Intake (mg/kg/day) $Intake = \frac{C_w \times IR \times ET \times EF \times ED}{BW \times AT}$
			IR	Ingestion Rate of Surface Water	l/hr	0.025	USEPA 2011	0.025	USEPA 2011	
			ET	Exposure Time	hours/day	1	Best professional judgment	0.5	Best professional judgment	
			EF	Exposure Frequency	days/year	39	3 days/week, 3 months/year	20	Approximately 50% of RME	
			ED	Exposure Duration	years	12	Based on age of receptor	6	50% of RME	
			BW	Body Weight	kg	52	USEPA 2011	52	USEPA 2011	
			AT-C	Averaging Time (Cancer)	days	25,550	70-year lifetime exposure x 365 days/year (USEPA, 1989)	25,550	70-year lifetime exposure x 365 days/year (USEPA, 1989)	
			AT-NC	Averaging Time (Noncancer)	days	4,380	ED (years) x 365 days/year	2,190	ED (years) x 365 days/year	
	Swimmer	Adolescent (7 to < 19 years)	C_w	Chemical Concentration in Water	mg/l	chemical-specific	chemical-specific	chemical-specific	chemical-specific	
			IR_w	Ingestion Rate of Surface Water	l/hr	0.05	USEPA 2011	0.05	USEPA 2011	
			ET	Exposure Time	hours/day	2.6	National average for swimming (USEPA 1989)	2.6	National average for swimming (USEPA 1989)	
			EF	Exposure Frequency	days/year	39	3 days/week, 3 months/year	20	Approximately 50% of RME	
			ED	Exposure Duration	years	12	Based on age of receptor	6	USEPA default (USEPA 1991)	
			BW	Body Weight	kg	52	USEPA 2011	52	USEPA 2011	
			AT-C	Averaging Time (Cancer)	days	25,550	70-year lifetime exposure x 365 days/year (USEPA, 1989)	25,550	70-year lifetime exposure x 365 days/year (USEPA, 1989)	
			AT-NC	Averaging Time (Noncancer)	days	4,380	ED (years) x 365 days/year	2,190	ED (years) x 365 days/year	
	Boater	Adolescent (7 to < 19 years)	C_w	Chemical Concentration in Water	mg/l	chemical-specific	chemical-specific	chemical-specific	chemical-specific	
			IR_w	Ingestion Rate of Surface Water	l/hr	0.025	USEPA 2011	0.025	USEPA 2011	
			ET	Exposure Time	hours/day	2.0	Best professional judgment	1.5	Best professional judgment	
			EF	Exposure Frequency	days/year	98	7 days/week for 37 weeks; Refer to AECOM 2015 for details	70	5 days/wk for 14 weeks	
			ED	Exposure Duration	years	12	Based on age of receptor	6	USEPA default (USEPA 1991)	
			BW	Body Weight	kg	52	USEPA 2011	52	USEPA 2011	
			AT-C	Averaging Time (Cancer)	days	25,550	70-year lifetime exposure x 365 days/year (USEPA, 1989)	25,550	70-year lifetime exposure x 365 days/year (USEPA, 1989)	
			AT-NC	Averaging Time (Noncancer)	days	4,380	ED (years) x 365 days/year	2,190	ED (years) x 365 days/year	
Dermal	Wader	Adolescent (7 to < 19 years)	C_w	Chemical Concentration in Water	mg/l	chemical-specific	chemical-specific	chemical-specific	Chemical-specific	Intake is dermally absorbed dose (DAD) (mg/kg-day) $Intake = \frac{DA_{event} \times EF \times EV \times ED \times SA}{BW \times AT}$
			DA_{event}	Absorbed Dose per Event	mg/cm^2-event	Calculated value	--	Calculated value	--	
			SA	Skin Surface Area Available for Contact	cm^2/event	4,436	Mean value for 7 to <19 years: face, hands, forearms, lower legs, feet (USEPA 2011)	4,436	Mean value for 7 to <19 years: face, hands, forearms, lower legs, feet (USEPA 2011)	
			Kp	Permeability Coefficient	cm/hr	chemical-specific	USEPA 2004	chemical-specific	USEPA 2004	
			CF	Conversion Factor	l/cm^3	0.001	--	0.001	---	
			EV	Event Frequency	event/day	1.0	Best professional judgment	1.0	Best professional judgment	
			ET	Exposure Time	hours/day	1.0	Best professional judgment	0.5	Best professional judgment	
			EF	Exposure Frequency	days/year	39	3 days/week, 3 months/year	20	Approximately 50% of RME	
			ED	Exposure Duration	years	12	Based on age of receptor	6	USEPA default (USEPA 2011)	
			BW	Body Weight	kg	52	USEPA 2011	52	USEPA 2011	
			AT-C	Averaging Time (Cancer)	days	25,550	70-year lifetime exposure x 365 days/year (USEPA, 1989)	25,550	70-year lifetime exposure x 365 days/year (USEPA, 1989)	
			AT-NC	Averaging Time (Noncancer)	days	4,380	ED (years) x 365 days/year	2,190	ED (years) x 365 days/year	

TABLE A12.
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE/CENTRAL TENDENCY EXPOSURE
Newark Bay Study Area

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Route	Receptor Population	Receptor Age	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
	Swimmer	Adolescent (7 to < 19 years)	C_w	Chemical Concentration in Water	mg/l	chemical-specific	chemical-specific	chemical-specific	chemical-specific	
			DA_{event}	Absorbed Dose per Event	mg/cm^2-event	Calculated value	--	Calculated value	--	DA_{event} for inorganics or highly ionized organics:
			SA	Skin Surface Area Available for Contact	cm^2/event	14,825	Mean value for 7 to <19 years: whole body (USEPA 2011)	14,825	Mean value for 7 to <19 years: whole body (USEPA 2011)	DAevent = CW × Kp × ET × CF
			Kp	Permeability Coefficient	cm/hr	chemical-specific	USEPA 2004	chemical-specific	USEPA 2004	
			CF	Conversion Factor	l/cm^3	0.001	--	0.001	---	
			EV	Event Frequency	event/day	1.0	Best professional judgment	1.0	Best professional judgment	DA_{event} for organics:
			ET	Exposure Time	hours/day	2.6	National average for swimming (USEPA 1989)	2.6	National average for swimming (USEPA 1989)	If ET < t*, then
			EF	Exposure Frequency	days/year	39	3 days/week, 3 months/year	20	Approximately 50% of RME	$DA_{event} = 2\,FA \times Kp \times CW \times CF \sqrt{\frac{6T \times ET}{\Pi}}$
			ED	Exposure Duration	years	12	Based on age group of receptor	6	USEPA default (USEPA 2011)	
			BW	Body Weight	kg	52	USEPA 2011	52	USEPA 2011	If ET > t*, then
			AT-C	Averaging Time (Cancer)	days	25,550	70-year lifetime exposure x 365 days/year (USEPA, 1989)	25,550	70-year lifetime exposure x 365 days/year (USEPA, 1989)	
			AT-NC	Averaging Time (Noncancer)	days	4,380	ED (years) x 365 days/year	2,190	ED (years) x 365 days/year	
	Boater	Adolescent (7 to < 19 years)	C_w	Chemical Concentration in Water	mg/l	chemical-specific	chemical-specific	chemical-specific	Chemical-specific	$DA_{event} = FA \times Kp \times CW \times CF \times \left[\frac{ET}{1+B} + 2T\left(\frac{1+3B+3B^2}{(1+B)^2}\right)\right]$
			DA_{event}	Absorbed Dose per Event	mg/cm^2-event	Calculated value	--	Calculated value	--	
			SA	Skin Surface Area Available for Contact	cm^2/event	5,100	Mean value for male/female 7 - 18 years: hands, lower legs, forearms, feet, and face (USEPA 2011)	5,100	Mean value for male/female 7 - 18 years: hands, lower legs, forearms, feet, and face (USEPA 2011)	
			Kp	Permeability Coefficient	cm/hr	chemical-specific	USEPA 2004	chemical-specific	USEPA 2004	
			CF	Conversion Factor	l/cm^3	0.001	--	0.001	---	
			EV	Event Frequency	event/day	1.0	Best professional judgment	1.0	Best professional judgment	
			ET	Exposure Time	hours/day	2.0	Best professional judgment	1.5	Best professional judgment	
			EF	Exposure Frequency	days/year	98	7 days/week for 37 weeks; Refer to AECOM 2015 for details	70	5 days/wk for 14 weeks	
			ED	Exposure Duration	years	12	Based on age of receptor	6	USEPA default (USEPA 2011)	
			BW	Body Weight	kg	52	USEPA 2011	52	USEPA 2011	
			AT-C	Averaging Time (Cancer)	days	25,550	70-year lifetime exposure x 365 days/year (USEPA, 1989)	25,550	70-year lifetime exposure x 365 days/year (USEPA, 1989)	
			AT-NC	Averaging Time (Noncancer)	days	4,380	ED (years) x 365 days/year	2,190	ED (years) x 365 days/year	

TABLE A12.
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE/CENTRAL TENDENCY EXPOSURE
Newark Bay Study Area

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Route	Receptor Population	Receptor Age	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
VOCs, SVOCs in Surface Water	Wader	Adolescent (7 to < 19 years)	Cwat	Exposure Point Concentration - Surface Water	ug/L	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	Exposure Concentration (mg/m3 [noncancer]; µg/m3 [cancer]) =
			EF	Exposure frequency	d/yr	39	3 days/week, 3 months/year	20	Approximately 50% of RME	Cwat x EF x ED x ET x CF3 x FI x VF
			ED	Exposure duration	yr	12	USEPA 2000b	6	Assumed to be one-half RME	
			ET	Exposure time	hr/d	1	Best professional judgment	0.5	Best professional judgment	*Note: CF4 applies to the noncancer equation only
			CF3	Conversion factor	d/hr	0.04	--	0.04	--	
			FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
			VF	Volatilization factor	L/m3	Chemical-specific	Calculated, See Table X	Chemical-specific	Calculated, See Table X	
			CF4	Conversion factor	µg/mg	1E+03	--	1E+03	--	
			ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
			ATnc	Averaging time (noncancer)	d	4,380	ED x 365 d/yr	2,190	ED x 365 d/yr	
	Swimmer	Adolescent (7 to < 19 years)	Cwat	Exposure Point Concentration - Surface Water	ug/L	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
			EF	Exposure frequency	d/yr	39	3 days/week, 3 months/year	20	Approximately 50% of RME	
			ED	Exposure duration	yr	12	Based on age of receptor	6	USEPA default (USEPA 1991)	
			ET	Exposure time	hr/d	2.6	National average for swimming (USEPA 1989)	2.6	National average for swimming (USEPA 1989)	
			CF3	Conversion factor	d/hr	0.04	--	0.04	--	
			FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
			VF	Volatilization factor	L/m3	Chemical-specific	Calculated, See Table X	Chemical-specific	Calculated, See Table X	
			CF4	Conversion factor	µg/mg	1E+03	--	1E+03	--	
			ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
			ATnc	Averaging time (noncancer)	d	4,380	ED x 365 d/yr	2,190	ED x 365 d/yr	

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

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TABLE A13.
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE/CENTRAL TENDENCY EXPOSURE
Newark Bay Study Area

Scenario
Timeframe:
Current/Future

Medium: Sediment

Exposure Medium: Sediment

Exposure Route	Receptor Population	Receptor Age	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Swimmer	Child (1 to <7 years)	CS	Chemical Concentration in Sediment	mg/kg	chemical-specific	--	chemical-specific	--	Intake (mg/kg/day) =
			IR	Ingestion Rate of Sediment	mg/day	100	50% of the default residential child soil IR (U.S. EPA, 1991)	50	50% of RME	$Intake = \frac{CS \times IR \times FI \times EF \times ED \times CF}{BW \times AT}$
			FI	Fraction Ingested	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
			EF	Exposure Frequency	days/year	13	1 day/week, 3 months/year	7	Approximately 50% of RME	
			ED	Exposure Duration	years	6	U.S. EPA, 1991	3	50% of RME	Arsenic intakes multiplied by a Relative Bioavailability (RBA) value of 0.6 (USEPA 2012)
			CF	Conversion Factor	kg/mg	1.00E-06	--	1.00E-06	--	
			BW	Body Weight	kg	17	USEPA 2011 (mean, ages 1 to <7)	17	USEPA 2011 (mean, ages 1 to <7)	
			AT-C	Averaging Time (Cancer)	days	25,550	70-year lifetime exposure x 365 days/year (U.S. EPA, 1989)	25,550	70-year lifetime exposure x 365 days/year (U.S. EPA, 1989)	
			AT-NC	Averaging Time (Noncancer)	days	2,190	ED (years) x 365 days/year	1,095	ED (years) x 365 days/year	
	Wader	Child (1 to <7 years)	CS	Chemical Concentration in Sediment	mg/kg	chemical-specific	--	chemical-specific	--	
			IR	Ingestion Rate of Sediment	mg/day	100	50% of the default residential child soil IR (U.S. EPA, 1991)	50	50% of RME	
			FI	Fraction Ingested	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
			EF	Exposure Frequency	days/year	13	1 day/week, 3 months/year	7	Approximately 50% of RME	
			ED	Exposure Duration	years	6	U.S. EPA 1991, Based on age of receptor	3	Assumed	
			CF	Conversion Factor	kg/mg	1.00E-06	--	1.00E-06	--	
			BW	Body Weight	kg	17	USEPA 2011 (mean, ages 1 to <7)	17	USEPA 2011 (mean, ages 1 to <7)	
			AT-C	Averaging Time (Cancer)	days	25,550	70-year lifetime exposure x 365 days/year (U.S. EPA, 1989)	25,550	70-year lifetime exposure x 365 days/year (U.S. EPA, 1989)	
			AT-NC	Averaging Time (Noncancer)	days	2,190	ED (years) x 365 days/year	1,095	ED (years) x 365 days/year	

TABLE A13.
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE/CENTRAL TENDENCY EXPOSURE
Newark Bay Study Area

Scenario
Timeframe:
Current/Future

Medium: Sediment

Exposure Medium: Sediment

Exposure Route	Receptor Population	Receptor Age	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Dermal	Swimmer	Child (1 to <7 years)	CS	Chemical Concentration in Sediment	mg/kg	chemical-specific	--	chemical-specific	--	Dermal Absorbed Dose (DAD) Intake (mg/kg/day) = $Intake = \frac{CS \times SA \times AF \times EF \times ED \times ABS \times CF}{BW \times AT}$
			ABS	Dermal Absorption Factor	unitless	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
			AF	Adherence Factor	mg/cm^2	0.2	50th percentile surface area weighted soil adherence data for children playing in wet soil (U.S. EPA 2004)	0.2	50th percentile surface area weighted soil adherence data for children playing in wet soil (U.S. EPA 2004)	
			SA	Surface Area	cm^2/event	2,272	Mean value for 1 to <7 years: face, hands, forearms, lower legs, feet (USEPA 2011)	2,272	Mean value for 1 to <7 years: face, hands, forearms, lower legs, feet (USEPA 2011)	
			EF	Exposure Frequency	days/year	13	1 day/week, 3 months/year	7	Assumed to be one-half RME	
			ED	Exposure Duration	years	6	U.S. EPA 1991 and the age of receptor	3	50% of RME	
			CF	Conversion Factor	kg/mg	1.00E-06	--	1.00E-06	--	
			BW	Body Weight	kg	17	USEPA 2011 (mean, ages 1 to <7)	17	USEPA 2011 (mean, ages 1 to <7)	
			AT-C	Averaging Time (Cancer)	days	25,550	70-year lifetime exposure x 365 days/year (U.S. EPA, 1989)	25,550	70-year lifetime exposure x 365 days/year (U.S. EPA, 1989)	
			AT-NC	Averaging Time (Noncancer)	days	2,190	ED (years) x 365 days/year	1,095	ED (years) x 365 days/year	
	Wader	Child (1 to <7 years)	CS	Chemical Concentration in Sediment	mg/kg	chemical-specific	--	chemical-specific	--	
			ABS	Dermal Absorption Factor	unitless	Chemical-specific	USEPA 2004	Chemical-specific	USEPA 2004	
			AF	Adherence Factor	mg/cm^2	0.2	50th percentile surface area weighted soil adherence data for children playing in wet soil (U.S. EPA 2004)	0.2	50th percentile surface area weighted soil adherence data for children playing in wet soil (U.S. EPA 2004)	
			SA	Surface Area	cm^2/event	2,272	Mean value for 1 to <7 years: face, hands, forearms, lower legs, feet (USEPA 2011)	2,272	Mean value for 1 to <7 years: face, hands, forearms, lower legs, feet (USEPA 2011)	
			EF	Exposure Frequency	days/year	13	1 day/week, 3 months/year	7	Approximately 50% of RME	
			ED	Exposure Duration	years	6	U.S. EPA 1991 and the age of receptor	3	50% of RME	
			CF	Conversion Factor	kg/mg	1.00E-06	--	1.00E-06	--	
			BW	Body Weight	kg	17	USEPA 2011 (mean, ages 1 to <7)	17	USEPA 2011 (mean, ages 1 to <7)	
			AT-C	Averaging Time (Cancer)	days	25,550	70-year lifetime exposure x 365 days/year (U.S. EPA, 1989)	25,550	70-year lifetime exposure x 365 days/year (U.S. EPA, 1989)	
			AT-NC	Averaging Time (Noncancer)	days	2,190	ED (years) x 365 days/year	1,095	ED (years) x 365 days/year	

TABLE A13.
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE/CENTRAL TENDENCY EXPOSURE
Newark Bay Study Area

Scenario Timeframe: Current/Future

Medium: Sediment

Exposure Medium: Sediment

Exposure Route	Receptor Population	Receptor Age	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Inhalation VOCs, SVOCs in Sediment	Swimmer	Child (1 to <7 years)	Cwat	Exposure Point Concentration - S	ug/L	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	Exposure Concentration (mg/m3 [noncancer]; µg/m3 [cancer]) =
			EF	Exposure frequency	d/yr	13	1 day/week, 3 months/year	7	Assumed to be one-half RME	Cwat x EF x ED x ET x CF3 x FI x VF / AT x CF4
			ED	Exposure duration	yr	6	U.S. EPA 1991 and the age of receptor	3	Assumed to be one-half RME	
			ET	Exposure time	hr/d	2.6	National average for swimming (USEPA 1989)	2.6	National average for swimming (USEPA 1989)	*Note: CF4 applies to the noncancer equation only
			CF3	Conversion factor	d/hr	0.04	--	0.04	--	
			FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
			VF	Volatilization factor	L/m3	Chemical-specific	Calculated, See Table X	Chemical-specific	Calculated, See Table X	
			CF4	Conversion factor	µg/mg	1E+03	--	1E+03	--	
			ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
			ATnc	Averaging time (noncancer)	d	2,190	ED x 365 d/yr	1,095	ED x 365 d/yr	
	Wader	Child (1 to <7 years)	Cwat	Exposure Point Concentration - S	ug/L	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
			EF	Exposure frequency	d/yr	13	1 day/week, 3 months/year	7	Approximately 50% of RME	
			ED	Exposure duration	yr	6	U.S. EPA 1991 and the age of receptor	3	50% of RME	
			ET	Exposure time	hr/d	1	Professional judgment	0.5	50% of RME	
			CF3	Conversion factor	d/hr	0.04	--	0.04	--	
			FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
			VF	Volatilization factor	L/m3	Chemical-specific	Calculated, See Table X	Chemical-specific	Calculated, See Table X	
			CF4	Conversion factor	µg/mg	1E+03	--	1E+03	--	
			ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
			ATnc	Averaging time (noncancer)	d	2,190	ED x 365 d/yr	1,095	ED x 365 d/yr	

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

References:

U.S. EPA 1989: Risk Assessment Guidance for Superfund. Vol. 1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.
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TABLE A14.
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE/CENTRAL TENDENCY EXPOSURE
Newark Bay Study Area

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Route	Receptor Population	Receptor Age	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	Wader	Child (1 to <7 years)	C_w	Chemical Concentration in Water	mg/l	chemical-specific	chemical-specific	chemical-specific	chemical-specific	Intake (mg/kg/day)
			IR	Ingestion Rate of Surface Water	l/hr	0.025	50% of the mean swimming rate for children age 6-15 (USEPA 2011)	0.025	50% of the mean swimming rate for children age 6-15 (USEPA 2011)	$Intake = \frac{C_w \times IR \times ET \times EF \times ED}{BW \times AT}$
			ET	Exposure Time	hours/day	1	Professional judgment	0.5	50% of RME	
			EF	Exposure Frequency	days/year	13	1 day/week, 3 months/year	7	Approximately 50% of RME	
			ED	Exposure Duration	years	6	U.S. EPA 1991, Based on age of receptor	3	50% of RME	
			BW	Body Weight	kg	17	USEPA 2011 (mean, ages 1 to <7)	17	USEPA 2011 (mean, ages 1 to <7)	
			AT-C	Averaging Time (Cancer)	days	25,550	70-year lifetime exposure x 365 days/year (U.S. EPA, 1989)	25,550	70-year lifetime exposure x 365 days/year (U.S. EPA, 1989)	
			AT-NC	Averaging Time (Noncancer)	days	2,190	ED (years) x 365 days/year	1,095	ED (years) x 365 days/year	
	Swimmer	Child (1 to <7 years)	C_w	Chemical Concentration in Water	mg/l	chemical-specific	chemical-specific	chemical-specific	chemical-specific	
			IR_w	Ingestion Rate of Surface Water	l/hr	0.05	mean swimming rate for children 6-15 yrs (USEPA 2011)	0.05	mean swimming rate for children 6-15 yrs (USEPA 2011)	
			ET	Exposure Time	hours/day	2.6	National average for swimming (USEPA 1989)	2.6	National average for swimming (USEPA 1989)	
			EF	Exposure Frequency	days/year	13	1 day/week, 3 months/year	7	Approximately 50% of RME	
			ED	Exposure Duration	years	6	U.S. EPA 1991, Based on age of receptor	3	50% of RME	
			BW	Body Weight	kg	17	USEPA 2011 (mean, ages 1 to <7)	17	USEPA 2011 (mean, ages 1 to <7)	
			AT-C	Averaging Time (Cancer)	days	25,550	70-year lifetime exposure x 365 days/year (U.S. EPA, 1989)	25,550	70-year lifetime exposure x 365 days/year (U.S. EPA, 1989)	
			AT-NC	Averaging Time (Noncancer)	days	2,190	ED (years) x 365 days/year	1,095	ED (years) x 365 days/year	
Dermal	Wader	Child (1 to <7 years)	C_w	Chemical Concentration in Water	mg/l	chemical-specific	chemical-specific	chemical-specific	chemical-specific	Intake DAD = dermally absorbed dose (mg/kg-day)
			DA_{event}	Absorbed Dose per Event	mg/cm^2-event	Calculated value	--	Calculated value	--	
			SA	Skin Surface Area Available for Contact	cm^2/event	2,272	Mean value for 1 to <7 years: face, hands, forearms, lower legs, feet (USEPA 2011)	2,272	Mean value for 1 to <7 years: face, hands, forearms, lower legs, feet (USEPA 2011)	$Intake = \frac{DA_{event} \times EF \times ET \times EV \times ED \times SA}{BW \times AT}$
			Kp	Permeability Coefficient	cm/hr	chemical-specific	U.S. EPA 2004	chemical-specific	U.S. EPA 2004	
			FA	Fraction Absorbed Water	--	chemical-specific	U.S. EPA 2004	Chemical-specific	U.S. EPA 2004	
			tau-event	Lag Time per Event	hours/event	chemical-specific	U.S. EPA 2004	Chemical-specific	U.S. EPA 2004	
			t-event	Event Duration	hours/event	1	Best professional judgment	0.5	Best professional judgment	
			t*	time to reach steady state	hour	chemical-specific [2.4 x tau-event].	U.S. EPA 2004	chemical-specific [2.4 x tau-event].	U.S. EPA 2004	
			B	Ratio of Permeability Coefficient of a Compound through the Stratum Corneum Relative to its Permeability Coefficient Across the Viable Epidermis	--	chemical-specific	U.S. EPA 2004	chemical-specific	U.S. EPA 2004	
			EV	Event Frequency	event/day	1.0	U.S. EPA 2004	1.0	U.S. EPA 2004	
			ET	Exposure Time	hours/day	1.0	Best professional judgment	0.5	Best professional judgment	
			EF	Exposure Frequency	days/year	13	1 day per week, 3 months/year	7	Approximately 50% of RME	
			ED	Exposure Duration	years	6	U.S. EPA 1991, Based on age of receptor	3	50% of RME	
			BW	Body Weight	kg	17	USEPA 2011 (mean, ages 1 to <7)	17	USEPA 2011 (mean, ages 1 to <7)	DA_{event} for inorganics or highly ionized organics:
			AT-C	Averaging Time (Cancer)	days	25,550	70-year lifetime exposure x 365 days/year (U.S. EPA, 1989)	25,550	70-year lifetime exposure x 365 days/year (U.S. EPA, 1989)	DAevent = CW × Kp × ET × CF
			AT-NC	Averaging Time (Noncancer)	days	2,190	ED (years) x 365 days/year	1,095	ED (years) x 365 days/year	

TABLE A14.
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE/CENTRAL TENDENCY EXPOSURE
Newark Bay Study Area

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Route	Receptor Population	Receptor Age	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
	Swimmer	Child (1 to <7 years)	C_w	Chemical Concentration in Water	mg/l	chemical-specific	chemical-specific	chemical-specific	chemical-specific	DA_{event} for organics:
			DA_{event}	Absorbed Dose per Event	mg/cm^2-event	Calculated value	--	Calculated value	--	If ET < t*, then
			SA	Skin Surface Area Available for Contact	cm^2/event	7,500	Mean value for 1 to <7 years: whole body (USEPA 2011)	7,500	Mean value for 1 to <7 years: whole body (USEPA 2011)	$DA_{event} = 2\,FA \times Kp \times CW \times CF \sqrt{\frac{6T \times ET}{\Pi}}$
			Kp	Permeability Coefficient	cm/hr	chemical-specific	U.S. EPA 2004	chemical-specific	U.S. EPA 2004	
			FA	Fraction Absorbed Water	--	chemical-specific	U.S. EPA 2004	Chemical-specific	U.S. EPA 2004	
			tau-event	Lag Time per Event	hours/event	chemical-specific	U.S. EPA 2004	Chemical-specific	U.S. EPA 2004	
			t-event	Event Duration	hours/event	2.6	National average for swimming (U.S. EPA 1989)	2.6	National average for swimming (U.S. EPA 1989)	
			t*	time to reach steady state	hour	chemical-specific [2.4 x tau-event].	U.S. EPA 2004	chemical-specific [2.4 x tau-event]	U.S. EPA 2004	
			B	Ratio of Permeability Coefficient of a Compound through the Stratum Corneum Relative to its Permeability Coefficient Across the Viable Epidermis	--	chemical-specific	U.S. EPA 2004	chemical-specific	U.S. EPA 2004	
			CF2	Conversion Factor 2	l/cm^3	0.001	--	0.001	---	
			EV	Event Frequency	event/day	1.0	U.S. EPA 2004	1.0	U.S. EPA 2004	If ET > t*, then
			ET	Exposure Time	hours/day	2.6	National average for swimming (U.S. EPA 1989)	2.6	National average for swimming (U.S. EPA 1989)	$DA_{event} = FA \times Kp \times CW \times CF \times \left[\frac{ET}{1+B} + 2T\left(\frac{1+3B+3B^2}{(1+B)^2}\right)\right]$
			EF	Exposure Frequency	days/year	13	1 day per week, 3 months/year	7	Approximately 50% of RME	
			ED	Exposure Duration	years	6	U.S. EPA 1991, Based on age of receptor	3	50% of RME	
			BW	Body Weight	kg	17	USEPA 2011 (mean, ages 1 to <7)	17	USEPA 2011 (mean, ages 1 to <7)	
			AT-C	Averaging Time (Cancer)	days	25,550	70-year lifetime exposure x 365 days/year (U.S. EPA, 1989)	25,550	70-year lifetime exposure x 365 days/year (U.S. EPA, 1989)	
			AT-NC	Averaging Time (Noncancer)	days	2,190	ED (years) x 365 days/year	1,095	ED (years) x 365 days/year	
Inhalation VOCs, SVOCs in Surface Water	Wader	Child (1 to <7 years)	Cwat	Exposure Point Concentration - Surface Water	ug/L	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	Exposure Concentration (mg/m3 [noncancer]; µg/m3 [cancer]) =
			EF	Exposure frequency	d/yr	13	1 day per week, 3 months/year	7	Assumed to be one-half RME	Cwat x EF x ED x ET x CF3 x FI x VF / AT x CF4
			ED	Exposure duration	yr	6	U.S. EPA 1991, Based on age of receptor	3	50% of RME	
			ET	Exposure time	hr/d	1	Professional judgment	0.5	50% of RME	*Note: CF4 applies to the noncancer equation only
			CF3	Conversion factor	d/hr	0.04	--	0.04	--	
			FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
			VF	Volatilization factor	L/m3	Chemical-specific	Calculated, See Table X	Chemical-specific	Calculated, See Table X	
			CF4	Conversion factor	µg/mg	1E+03	--	1E+03	--	
			ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
			ATnc	Averaging time (noncancer)	d	2,190	ED x 365 d/yr	1,095	ED x 365 d/yr	

TABLE A14.
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE/CENTRAL TENDENCY EXPOSURE
Newark Bay Study Area

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water

Exposure Route	Receptor Population	Receptor Age	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
	Swimmer	Child (1 to <7 years)	Cwat	Exposure Point Concentration - Surface Water	ug/L	Site-specific	See Table 3 Series	Site-specific	See Table 3 Series	
			EF	Exposure frequency	d/yr	13	1 day per week, 3 months/year	7	Approximately 50% of RME	
			ED	Exposure duration	yr	6	U.S. EPA 1991, Based on age of receptor	3	50% of RME	
			ET	Exposure time	hr/d	2.6	National average for swimming (USEPA 1989)	2.6	National average for swimming (USEPA 1989)	
			CF3	Conversion factor	d/hr	0.04	--	0.04	--	
			FI	Fraction from source	unitless	1	Assumed 100% exposure is from NBSA	1	Assumed 100% exposure is from NBSA	
			VF	Volatilization factor	L/m3	Chemical-specific	Calculated, See Table X	Chemical-specific	Calculated, See Table X	
			CF4	Conversion factor	µg/mg	1E+03	--	1E+03	--	
			ATc	Averaging time (cancer)	d	25,550	70-yr lifetime x 365 d/yr	25,550	70-yr lifetime x 365 d/yr	
			ATnc	Averaging time (noncancer)	d	2,190	ED x 365 d/yr	1,095	ED x 365 d/yr	

RME - Reasonable Maximum Exposure
CTE - Central Tendency Exposure

References:

U.S. EPA 1989: Risk Assessment Guidance for Superfund. Vol. 1: Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.
U.S. EPA 1991: Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors", OSWER Directive 9285.6-03.
U.S. EPA 2004: Risk Assessment Guidance for Superfund. Vol. 1: Human Health Evaluation Manual, Part E. Supplemental Guidance for Dermal Risk Assessment Final. EPA 540/R/99/005.
USEPA 2011: Exposure Factors Handbook: 2011 Edition. USEPA/600/R-09/052F. September 2011.

Table A-15. Summary of Carcinogenic Toxicity Values for the COPCs Selected in the Preliminary Screening

Chemical of Potential Concern	CAS Number	Chronic Oral Reference Dose (mg/kg-day)	Gastrointestinal Absorption Efficiency for Dermal (a)	Absorbed Chronic RfD for Dermal (b) (mg/kg-day)	Primary Target Organ/ System	Critical Endpoint	Combined Uncertainty/ Modifying Factors	Confidence Level	Source	Date	RfD Tier (r)
PCDDs/PCDFs											
TCDD-TEQ	TCDD-TEQ	7.00E-10	--	7.00E-10	Reproductive, Developmental	Decreased sperm count and motility in men / Increased TSH in neonates	30	High	IRIS	11/2015	Tier 1
PCBs											
PCBs, total PCBs (non-DLC)	1336-36-3	7.00E-05 (c)	--	7.00E-05	Developmental	Reduced birth weights	100	Medium	IRIS	11/2015	Tier 1
		2.00E-05 (c)	--	2.00E-05	Eye, Nails, Immune	Ocular exudate, inflamed and prominent Meibomian glands, distorted growth of finger and toe nails; decreased antibody response to sheep erythrocytes	300	Medium	IRIS	11/2015	Tier 1
PCB-TEQ	PCB-TEQ	7.00E-10 (i)	--	7.00E-10	Reproductive, Developmental	Decreased sperm count and motility in men / Increased TSH in neonates	30	High	IRIS	11/2015	Tier 1
Inorganics											
Aluminum	7429-90-5	1.00E+00	--	1.00E+00	Neurological	Neurological Toxicity	100	Low	PPRTV	10/2006	Tier 2
Antimony	7440-36-0	4.00E-04	0.15	6.00E-05	Mortality, Blood	Longevity, blood glucose, and cholesterol	1,000	Low	IRIS	11/2015	Tier 1
Arsenic, inorganic	7440-38-2	3.00E-04	--	3.00E-04	Skin, Vascular	Hyperpigmentation, keratosis and possible vascular complications	3	Medium	IRIS	11/2015	Tier 1
Cadmium, diet	7440-43-9	1.00E-03 (o)	0.025	2.50E-05	Kidney	Significant proteinuria	10	High	IRIS	11/2015	Tier 1
Cadmium, water	7440-43-9	5.00E-04 (o)	0.05	2.50E-05	Kidney	Significant proteinuria	10	High	IRIS	11/2015	Tier 1
Chromium, total	7440-47-3	1.50E+00	0.013	1.95E-02	No effects observed	No effects observed	100	Low	IRIS	11/2015	Tier 1
Chromium, hexavalent	18540-29-9	3.00E-03	0.025	7.50E-05	None reported	None reported	900	Low	IRIS	11/2015	Tier 1
Cobalt	7440-48-4	3.00E-04	--	3.00E-04	Thyroid	Decreased iodine uptake	3,000	Low/Medium	PPRTV	8/2008	Tier 2
Copper	7440-50-8	4.00E-02	--	4.00E-02	Gastrointestinal	GI Irritation	NA	NA	HEAST	1997	Tier 3
Lead	7439-92-1	NA (j)	--	NA	NA	NA	NA	NA	NA	NA	NA
Manganese, diet	7439-96-5	1.40E-01 (p)	NA	NA	Neurological	CNS effects (other effect: Impairment of neurobehavioral function)	1	High	IRIS	11/2015	Tier 1
Manganese, nondiet	7439-96-5	2.40E-02 (n)	0.04	9.60E-04	Neurological	CNS effects (other effect: Impairment of neurobehavioral function)	3	High	IRIS	11/2015	Tier 1
Mercury, inorganic	7487-94-7	3.00E-4 (q)	0.07	2.10E-05	Immune	Autoimmune	1,000	High	IRIS	11/2015	Tier 1
Methyl Mercury	22967-92-6	1.00E-04	--	1.00E-04	Neurological	Developmental neuropsychological impairment	10	High	IRIS	11/2015	Tier 1
Selenium	7782-49-2	5.00E-03	--	5.00E-03	Skin, Nails, Hair, Behavioral	Clinical selenosis	3	High	IRIS	11/2015	Tier 1
Silver	7440-22-4	5.00E-03	0.04	2.00E-04	Skin	Argyria	3	Low	IRIS	11/2015	Tier 1
Thallium	7440-28-0	1.00E-05 (k)	--	1.00E-05	Hair	Hair follicle atrophy	3,000	--	PPRTV screening value (k)	10/2012	Tier 3
Vanadium	7440-62-2	5.04E-03 (l)	0.026	1.31E-04	Hair	Decreased hair cystine	100	Low	IRIS	11/2015	Tier 1
Zinc	7440-66-6	3.00E-01	--	3.00E-01	Blood	Decreases in erythrocyte Cu, Zn-superoxide dismutase (ESOD) activity in healthy adult male and female volunteers	3	Medium/High	IRIS	11/2015	Tier 1

Table A-15. Summary of Carcinogenic Toxicity Values for the COPCs Selected in the Preliminary Screening

Chemical of Potential Concern	CAS Number	Chronic Oral Reference Dose (mg/kg-day)	Gastrointestinal Absorption Efficiency for Dermal (a)	Absorbed Chronic RfD for Dermal (b) (mg/kg-day)	Primary Target Organ/ System	Critical Endpoint	Combined Uncertainty/ Modifying Factors	Confidence Level	Source	Date	RfD Tier (r)
Pesticides											
4,4'-DDD	72-54-8	5.00E-04 (f)	--	5.00E-04	Liver	Liver lesions	100	Medium	IRIS	11/2015	Surrogate
4,4'-DDE	72-55-9	5.00E-04(f)	--	5.00E-04	Liver	Liver lesions	100	Medium	IRIS	11/2015	Surrogate
4,4'-DDT	50-29-3	5.00E-04	--	5.00E-04	Liver	Liver lesions	100	Medium	IRIS	11/2015	Tier 1
cis-Nonachlor	5103-73-1	1.72E-04 (g,s)	--	1.72E-04	Liver	Liver necrosis	300	Medium	IRIS	11/2015	Surrogate
Dieldrin	60-57-1	5.00E-05	--	5.00E-05	Liver	Liver lesions	100	Medium	IRIS	11/2015	Tier 1
Gamma-Chlordane	5566-34-7	5.00E-4 (g)	--	5.00E-04	Liver	Liver necrosis	300	Medium	IRIS	11/2015	Surrogate
Heptachlor Epoxide	1024-57-3	1.30E-05	--	1.30E-05	Liver	Increased liver-to-body weight ratio in both males and females	1,000	Low	IRIS	11/2015	Tier 1
Hexachlorobenzene	118-74-1	8.00E-04	--	8.00E-04	Liver	Liver effects	100	Medium	IRIS	11/2015	Tier 1
Oxychlordane	27304-13-8	8.93E-05 (g,s)	--	8.93E-05	Liver	Liver necrosis	300	Medium	IRIS	11/2015	Surrogate
trans-Nonachlor	39765-80-5	2.51E-05 (g,s)	--	2.51E-05	Liver	Liver necrosis	300	Medium	IRIS	11/2015	Surrogate
PAHs											
Benzo(a)anthracene	56-55-3	NA	--	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	50-32-8	3.00E-04	--	3.00E-04	Developmental	Neurobehavioral changes	300	Medium	IRIS	Jan-17	Tier 1
Benzo(b)fluoranthene	205-99-2	NA	--	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	207-08-9	NA	--	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(j,k)fluoranthene											
Chrysene	218-01-9	NA	--	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	53-70-3	NA	--	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	193-39-5	NA	--	NA	NA	NA	NA	NA	NA	NA	NA
VOCs											
Trichloroethene	79-01-6	5.00E-04	--	5.00E-04	Thyroid	Decreased thymus weight	100	High	IRIS	11/2015	Tier 1
					Developmental	Immunotoxicity	1,000				
					Vascular	Increased fetal heart malformations	10				

Notes:
"--" - No adjustment necessary.
ABS(GI) - Fraction of contaminant absorbed in gastrointestinal tract (dimensionless).
ATSDR - Agency for Toxic Substances Disease Registry.
CAS - Chemical Abstracts Service.
CNS - Central Nervous System.
DLC - Dioxin-like congener.
GI - Gastrointestinal.
HEAST - Health Effects Assessment Summary Tables (USEPA 1997).
mg/kg-day - milligrams per kilogram per day.
NA - Not available.
PAH - Polycyclic Aromatic Hydrocarbons.
PCB - Polychlorinated Biphenyls.
(a) USEPA 2004. Risk Assessment Guidance for Superfund. Volume 1, Part E, Supplemental Guidance for Dermal Risk Assessment. Exhibit 4-1. Where USEPA 2004 does not recommend adjustments, no value is listed.
(b) Oral RfD multiplied by ABSGI. Where no adjustment is recommended, Dermal RfD = Oral RfD.
(f) The value for 4,4'-DDT is used as a surrogate based on structural similarity.
(g) Value for chlordane is used as a surrogate based on structural similarity. Relative potency factors have been applied based on a letter from Superfund Technical Support Center to Marian Olsen dated August 5, 2015. The relative potency factors applied are: 2.9 (cis-nonachlor), 19.9 (trans-nonachlor, and 5.6 (oxychlordane).
(h) Value for fluoranthene is used as a surrogate based on structural similarity.
(i) Per USEPA Region 2 direction, the reference dose for 2,3,7,8-TCDD is used to evaluate the noncarcinogenic effects of potentially dioxin-like PCBs (PCB-TEQ).
(j) Lead is evaluated using available lead modeling tools.

(k) No PPRTVs were developed for thallium in the PPRTV document (USEPA 2012) due to database deficiencies. According to USEPA (2012) an RfD for thallium was not derived because the available toxicity database contains studies that are generally of poor quality. Appendix A of the PPRTV document indicates that it is inappropriate to derive provisional chronic or subchronic RfDs for thallium, but that information is available which, although insufficient to support derivation of a provisional toxicity value, under current guidelines, may be of limited use to risk assessors as a screening value. The use of this screening provisional value is highly uncertain but is the value used in the USEPA Regional Screening Tables (USEPA 2015b).

(l) The oral RfD for vanadium is derived from the IRIS oral RfD for Vanadium Pentoxide by factoring out the molecular weight (MW) of the oxide ion. Vanadium Pentoxide (V205) has a molecular weight of 181.88. The two atoms of Vanadium contribute 56% of the MW. Vanadium Pentoxide's oral RfD of 9E-03 mg/kg-day multiplied by 56% gives a Vanadium oral RfD of 5.04E-03 mg/kg-day.

Table A-15. Summary of Carcinogenic Toxicity Values for the COPCs Selected in the Preliminary Screening

Chemical of Potential Concern	CAS Number	Chronic Oral Reference Dose (mg/kg-day)	Gastrointestinal Absorption Efficiency for Dermal (a)	Absorbed Chronic RfD for Dermal (b) (mg/kg-day)	Primary Target Organ/ System	Critical Endpoint	Combined Uncertainty/ Modifying Factors	Confidence Level	Source	Date	RfD Tier (r)

(n) When assessing exposure to manganese for non-dietary pathways, IRIS recommends applying a modifying factor of 3 to the oral RfD of 0.14 mg/kg-day. The USEPA Regional Screening Level User's Guide also indicates that the average dietary manganese content of the US diet (5 mg/day) be subtracted from the critical dose of 10 mg/day when assessing exposure to non-dietary manganese. Therefore, the RfD is (10 mg/day - 5 mg/day)/Modifying Factor (3) = 1.67 mg/day / 70 kg = 0.024 mg/kg-day. The unadjusted value of 0.14 mg/kg-day is used to assess dietary exposure to fish and crab tissue.

(o) The RfD for cadmium in food is used to evaluate dietary cadmium as well as oral and dermal contact with cadmium in sediment. The RfD for cadmium in water is used to evaluate oral and dermal contact with cadmium in surface water.

(p) The value for Manganese, nondiet is used to assess dermal exposures.

(q) The value for Mercury, inorganic is used to assess dermal exposures.

(r) USEPA 2003. Human Health Toxicity Values in Superfund Risk Assessments. OSWER Directive 9285.7-53. December 5, 2003. IRIS values are considered Tier 1, PPRTVs are considered Tier 2, and other values, including ATSDR, CalEPA, HEAST, and other non-EPA values are considered Tier 3 values.

(s) Letter from Superfund Technical Support Center to Marian Olsen dated April 9, 2015. Approval of Surrogates for Multiple Chemicals. Cis- and trans-nonachlor and oxychlordane.

(t) Letter from Superfund Technical Support Center to Marian Olsen dated April 9, 2015. Approval of Surrogates for Multiple Chemicals. C2-, C3-, and C4-naphthalenes, C2-benzanthracene/chrysene.

Table A-16. Summary of Carcinogenic Toxicity Values for the COPCs Selected in the Preliminary Screening

Chemical of Potential Concern	CAS No.	Oral Cancer Slope Factor (mg/kg-day)-1	Gastrointestinal Absorption Efficiency for Dermal (a)	Absorbed Dermal Cancer Slope Factor (b) (mg/kg-day)-1	Weight of Evidence/ Cancer Guideline Description (c)	Classification System	Oral CSF/WOE		CSF Tier (n)
							Source(s)	Date	
PCDDs/PCDFs									
TCDD-TEQ	TCDD-TEQ	1.50E+05 (d)	--	1.50E+05 (d)	(o)	(o)	HEAST	1997	Tier 3
PCBs									
PCBs, total PCBs (non-DLC)	1336-36-3								
high risk & persistence/upper bound		2.00E+00 (e)	--	2.00E+00	B2	1986	IRIS	11/2015	Tier 1
high risk & persistence/central estimate		1.00E+00 (e)	--	1.00E+00					
low risk & persistence/upper bound		4.00E-01 (e)	--	4.00E-01					
low risk & persistence/central estimate		3.00E-01 (e)	--	3.00E-01					
lowest risk & persistence/upper bound		7.00E-02 (e)	--	7.00E-02					
lowest risk & persistence/central estimate		4.00E-02 (e)	--	4.00E-02					
PCB-TEQ	PCB-TEQ	1.50E+05 (d)	--	1.50E+05 (d)	(o)	(o)	HEAST	1997	Tier 3
Inorganics									
Aluminum	7429-90-5	NA	--	NA	Inadequate Information	2005	PPRTV	2/2007	NA
Antimony	7440-36-0	NA	0.15	NA	NA	NA	NA	NA	NA
Arsenic, inorganic	7440-38-2	1.50E+00	--	1.50E+00	A	1986	IRIS	11/2015	Tier 1
Cadmium, diet	7440-43-9	NA	0.025	NA	B1	1986	IRIS	11/2015	NA
Cadmium, water	7440-43-9	NA	0.05	NA	B1	1986	IRIS	11/2015	NA
Chromium, total	7440-47-3	NA	0.013	NA	D	1986	IRIS	11/2015	NA
Chromium, hexavalent	18540-29-9	5.00E-01 (m,j)	0.025	2.00E+01 (m,j)	D [oral (p)]; A [inhalation]	1986	NJDEP	4/2009	Tier 3
Cobalt	7440-48-4	NA	--	NA	Likely Carcinogenic (inhalation)	2005	PPRTV	8/2008	NA
Copper	7440-50-8	NA	--	NA	NA	NA	NA	NA	NA
Lead	7439-92-1	NA	--	NA	B2	1986	IRIS	11/2015	NA
Manganese, diet	7439-96-5	NA	1	NA	D	1986	IRIS	11/2015	NA
Manganese, nondiet	7439-96-5	NA	0.04	NA	D	1986	IRIS	11/2015	NA
Mercury, inorganic	7487-94-7	NA	0.07	NA	C	1986	IRIS	11/2015	NA
Methyl Mercury	22967-92-6	NA	NA	NA	C	1986	IRIS	11/2015	NA
Selenium	7782-49-2	NA	--	NA	D	1986	IRIS	11/2015	NA
Silver	7440-22-4	NA	0.04	NA	D	1986	IRIS	11/2015	NA
Thallium	7440-28-0	NA	--	NA	Inadequate Information	2005	PPRTV	10/2012	NA
Vanadium	7440-62-2	NA	0.026	NA	NA	NA	NA	NA	NA
Zinc	7440-66-6	NA	--	NA	Inadequate Information	2005	IRIS	11/2015	NA
Pesticides									
4,4'-DDD	72-54-8	2.40E-01	--	2.40E-01	B2	1986	IRIS	11/2015	Tier 1
4,4'-DDE	72-55-9	3.40E-01	--	3.40E-01	B2	1986	IRIS	11/2015	Tier 1
4,4'-DDT	50-29-3	3.40E-01	--	3.40E-01	B2	1986	IRIS	11/2015	Tier 1
cis-Nonachlor	5103-73-1	1.02E+00 (f,g)	--	1.02E+00 (f,g)	B2	1986	IRIS	11/2015	Surrogate
Dieldrin	60-57-1	1.60E+01	--	1.60E+01	B2	1986	IRIS	11/2015	Tier 1
Heptachlor Epoxide	1024-57-3	9.10E+00	--	9.10E+00	Likely Carcinogenic	2005	IRIS	11/2015	Tier 1
Hexachlorobenzene	118-74-1	1.60E+00	--	1.60E+00	B2	1986	IRIS	11/2015	Tier 1
Oxychlordane	27304-13-8	1.96E+00 (f,g)	--	1.96E+00 (f,g)	B2	1986	IRIS	11/2015	Surrogate
trans-Nonachlor	39765-80-5	6.97E+00 (f,g)	--	6.97E+00 (f,g)	B2	1986	IRIS	11/2015	Surrogate
PAHs									
Benzo(a)anthracene	56-55-3	1.00E-01 (i,j)	--	1.00E+00 (j)	Carcinogenic to humans	2005	IRIS	01/2017	Tier 1
Benzo(a)pyrene	50-32-8	1.00E+00 (j)	--	1.00E+00 (j)	Carcinogenic to humans	2005	IRIS	01/2017	Tier 1

Table A-16. Summary of Carcinogenic Toxicity Values for the COPCs Selected in the Preliminary Screening

Chemical of Potential Concern	CAS No.	Oral Cancer Slope Factor (mg/kg-day)-1	Gastrointestinal Absorption Efficiency for Dermal (a)	Absorbed Dermal Cancer Slope Factor (b) (mg/kg-day)-1	Weight of Evidence/ Cancer Guideline Description (c)	Classification System	Oral CSF/WOE		CSF Tier (n)
							Source(s)	Date	
Benzo(b)fluoranthene	205-99-2	1.00E-01 (i,j)	--	1.00E-01 (i,j)	Carcinogenic to humans	2005	IRIS	01/2017	Tier 1
Benzo(j,k)fluoranthene	207-08-9-JK								
Benzo(k)fluoranthene	207-08-9	1.00E-02 (i,j)	--	1.00E-02 (i,j)	Carcinogenic to humans	2005	IRIS	01/2017	Tier 1
Chrysene	218-01-9	1.00E-03 (i,j)	--	1.00E-03 (i,j)	Carcinogenic to humans	2005	IRIS	01/2017	Tier 1
Dibenz(a,h)anthracene	53-70-3	1.00E+00 (i,j)	--	1.00E+00 (i,j)	Carcinogenic to humans	2005	IRIS	01/2017	Tier 1
Indeno(1,2,3-cd)pyrene	193-39-5	1.00E-01 (i,j)	--	1.00E-01 (i,j)	Carcinogenic to humans	2005	IRIS	01/2017	Tier 1
VOCs									
Trichloroethene	79-01-6	4.60E-02 (j)	--	4.60E-02 (j)	Carcinogenic	2005	IRIS	11/2015	Tier 1

Notes:
"--" - No adjustment necessary.
ABS(GI) - Fraction of contaminant absorbed in gastrointestinal tract (dimensionless).
CalEPA - California Environmental Protection Agency. Toxicity Criteria Database. http://www.oehha.ca.gov/risk/ChemicalDB/index.asp.
COPC - Constituent of Potential Concern.
DLC - Dioxin-like congener.
CSF - Cancer Slope Factor.
HEAST - Health Effects Assessment Summary Tables (USEPA 1997).
IRIS - Integrated Risk Information System, an online computer database of toxicological information (USEPA 2015a).
mg/kg-day - milligrams per kilogram per day.
NA - Not available.
NJDEP - New Jersey Department of Environmental Protection.
NTP - National Toxicology Program.
PAH - Polycyclic Aromatic Hydrocarbons. PCB - Polychlorinated Biphenyls.
(a) USEPA 2004. Risk Assessment Guidance for Superfund. Volume 1, Part E, Supplemental Guidance for Dermal Risk Assessment. Exhibit 4-1. Where USEPA 2004 does not recommend adjustments, no value is listed.
(b) Oral CSF divided by ABSGI. Where no adjustment is recommended, Dermal CSF = Oral CSF.
(c) Some chemicals are classified under the 1986 system, while others have been classified under the 2005 system:

1986 Classifications	2005 Classifications
Group A Carcinogenic to Humans.	Carcinogenic Carcinogenic to Humans
Group B Probably Carcinogenic to Humans:	Likely Carcinogenic Likely to be Carcinogenic to Humans
B1 Based on limited human evidence.	Suggestive Evidence Suggestive Evidence of Carcinogenic Potential
B2 Based on animal evidence.	Inadequate Information Inadequate Information to Assess Carcinogenic Potential Group C Possibly Carcinogenic to Humans
Group D Not Classifiable as to Human Carcinogenicity.	Not Likely Carcinogenic Not Likely to be Carcinogenic to Humans
Group E Evidence of Non-carcinogenicity for Humans	

(d) Per USEPA Region 2 direction, the HEAST (USEPA 1997) cancer slope factor for 2,3,7,8-TCDD is used to evaluate carcinogenic effects of TCDD-TEQ and the potentially dioxin-like PCBs (PCB-TEQ).
(e) For the LPRSA BHHRA, the range of PCB CSFs is used to evaluate carcinogenic effects of total PCBs and non-dioxin-like PCBs (PCBs (non-DLC)).
(f) Letter from Superfund Technical Support Center to Marian Olsen dated April 9, 2015. Approval of Surrogates for Multiple Chemicals. Cis- and trans-nonachlor and oxychlordane.
(g) Value for chlordane is used as a surrogate based on structural similarity. Relative potency factors have been applied based on a letter from Superfund Technical Support Center to Marian Olsen dated August 5, 2015. The relative potency factors applied are: 2.9 (cis-nonachlor), 19.9 (trans-nonachlor), and 5.6 (oxychlordane).
(h) Letter from Superfund Technical Support Center to Marian Olsen dated April 9, 2015. Approval of Surrogates for Multiple Chemicals. C2-, C3-, and C4-naphthalenes, C2-benzanthracene/chrysene.
(i) Calculated using RPFs as per USEPA Guidance for Quantitative Risk Assessment of PAHs (USEPA 1993).
(j) Assumed to act via a mutagenic mode of carcinogenic action; therefore, age-dependent adjustment factors are applied to the risk estimates.
(k) IRIS provides a range of CSF for benzene of 1.5E-02 to 5.5E-02 mg/kg-day IRIS states that each value within this range has equal scientific plausibility. The high end of the range is used to be conservative.
(l) The oral reference dose is considered protective of potential carcinogenic effects (USEPA 2015a).
(m) IRIS indicates that there is no evidence that hexavalent chromium is carcinogenic via the oral route and does not provide a CSF. However, because USEPA has used the NJDEP CSF in its RSL tables, the NJDEP value is used here (Derivation of Ingestion-Based Soil Remediation Criterion for Cr+6 Based on the NTP Chronic Bioassay Data for Chromium (NJDEP 2009)).
(n) USEPA 2003. Human Health Toxicity Values in Superfund Risk Assessments. OSWER Directive 9285.7-53. December 5, 2003. IRIS values are considered Tier 1, PPRTVs are considered Tier 2, and other values, including ATSDR, CalEPA, PPRTV Appendix Screening Toxicity Values, HEAST and other non-EPA values are considered Tier 3 values.
(o) The cancer assessment for 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) is currently underway (USEPA 2015a).
(p) The cancer assessment for oral exposure to hexavalent chromium is currently underway (USEPA 2015a).