ATTACHMENT 1.
DATA MANAGEMENT AND DATA SELECTION

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Tables

1 Data Management

1.1 Laboratory Replicates

Chemical concentrations obtained from the analysis of laboratory duplicates or replicates (two or more analyses on the same sample) are averaged for a closer representation of the "true" concentration as compared to the results of a single analysis for all matrices. Averaging rules are dependent on whether the individual results are detected concentrations or reporting limits (RLs) for undetected analytes. If all concentrations are detects for a given parameter, the values are simply averaged arithmetically. If all concentrations are undetected for a given parameter, the minimum RL is reported. If the concentrations are a mixture of detected concentrations and RLs, any two or more detected concentrations are averaged arithmetically and RLs are ignored. If there is a single detected concentration and one or more RLs, the detected concentration is reported. The latter two rules are applied regardless of whether the RLs are higher or lower than the detected concentration.

1.2 Location Averaging

The baseline surface sediment dataset contains averaged results of chemical concentrations of discrete samples collected at a single sampling location that were submitted to the laboratory as individual samples and analyzed separately. Location averaging was conducted with surface sediment samples for the purposes of mapping. The averaging rules used for location averaging are the same as for laboratory replicates described above. A sampling location with averaged chemical concentrations is presented as a single "sample" in the ecological risk assessment (ERA) text and data tables. This type of averaging is performed in the following instances.

- The chemical concentrations obtained from the analyses of a surface sediment sample, and its field duplicate or replicate, are averaged to obtain a single concentration of the chemical for the sampling location.
- Surface sediment data have been collected repeatedly at certain locations within a six-month period.[1] For these locations that have multiple samples collected at different times, the results of these individual samples are averaged to a single chemical concentration for that location.

[1] An assumption was made in the memorandum describing the baseline surface sediment dataset (Windward 2006a) that two or more samples collected from the same location within a six-month period reflect spatial variability, rather than temporal variability. Therefore, these results were averaged together. For multiple samples collected more than six months apart from the same location, such as data collected within monitoring programs, any differences in chemical concentrations also reflect temporal variability. Therefore, only the most recent sample from those locations was included in the baseline surface sediment dataset; no averaging occurred in these situations.

- The baseline surface sediment dataset contains two locations that were re-sampled in a different sampling event, outside of a monitoring program. These sample results were also averaged to obtain a single representative result for that location.

1.3 Significant Figures and Rounding

The laboratories reported results with different numbers of significant figures depending on the instrument, parameter, and the concentration relative to the RL. The reported (or assessed) precision of each observation is explicitly stored in the project database as a record of the number of significant figures assigned by the laboratory. The tracking of significant figures becomes important when calculating averages and performing other data summaries.

When a calculation involves addition, such as totaling polychlorinated biphenyls (PCBs) or polycyclic aromatic hydrocarbons (PAHs), the calculation can only be as precise as the least precise number that went into the calculation. For example (assuming two significant figures):

> 210 + 19 = 229, but this would be reported as 230 because the trailing zero in the number 210 is not significant.

When a calculation involves multiplication or division, such as when carbon normalizing is used, all significant figures are carried through the calculation, and then the total result is rounded at the end of the calculation to reflect the value used in the calculation with the fewest significant figures. For example:

> 59.9 x 1.2 = 71.88, to be reported as 72 because there are two significant figures in the number 1.2.

When rounding, if the number following the last significant figure is less than 5, the digit is left unchanged. If the number following the last significant figure is equal to or greater than 5, the digit is increased by 1.

1.4 Dilutions

All analyte concentrations within the calibration range of the instrument in the lowest analytical dilution are selected as the final result. Any analyte concentrations that exceed the calibration range and are qualified as estimated by the laboratory as an exceedance (E-qualified) are rejected by the data validator. The values for these analytes are selected from the analysis of the sample dilution in which the analyte concentration is within the calibration range of the instrument. In cases where the result from the lowest analytical dilution is qualified by the laboratory or the validator, the validator uses best professional judgment to determine whether or not the qualification warrants the selection of the result from another analytical dilution as the final result.

1.5 MULTIPLE RESULTS FOR THE SAME ANALYTE USING ONE ANALYTICAL METHOD

Multiple analyses of a sample for a group of analytes can occur as a result of laboratory quality assurance (QA) issues that may only affect a subset of the analyte group. In these cases, there may be multiple results for certain analytes. The data validator uses the following rules to select a single value when multiple results are reported by the laboratory for a single analyte in a single sample using the same method.

- If all results are detected without qualification as an estimated value (i.e., J- or E-qualifier), then the result from the lowest analytical dilution is selected. If multiple, unqualified results from the same analytical dilution are available, the highest concentration is selected as a health-protective approach.
- If a mixture of estimated (i.e., J-qualified) and unqualified detected results are reported, then the unqualified detected result is selected.
- If all results are reported as detected with estimated qualification, the "best result" is selected using best professional, technical judgment.
- If both undetected and detected results are reported, then the detected result is selected.
- If all results are reported as undetected, then the lowest RL is selected.

1.6 MULTIPLE RESULTS FOR AN ANALYTE DETERMINED BY DIFFERENT ANALYTICAL METHODS

In cases where a single analyte is reported by more than one method, the preferred method is identified in the quality assurance project plan. The results of this method are selected as the final value by the data validator unless the validator identifies a QA issue that warrants the selection of the results from an alternative method. These instances and the justification for decisions are documented in the data validation report. In cases where the results are generated in two separate analytical groups that are not submitted to the validator together, the QA manager is responsible for evaluating the results and determining the most appropriate final result.

1.7 CALCULATING TOTALS

Concentrations for analyte sums are calculated as follows:

- **Total PCBs** are calculated, in accordance with the methods of the Washington State Sediment Management Standards (SMS), using only detected values for seven Aroclor mixtures.[2] For individual samples in which none of the seven Aroclor mixtures is detected, total PCBs are given a value equal to the highest RL of the seven Aroclors and assigned a U-qualifier indicating the lack of detected concentrations.

[2] Aroclors 1016, 1221, 1232, 1242, 1248, 1254, and 1260.

- **Total low-molecular-weight PAHs (LPAHs), high-molecular-weight PAHs (HPAHs), PAHs, and benzofluoranthenes** are also calculated in accordance with the methods of the SMS. Total LPAHs are the sum of detected concentrations for naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, and anthracene. Total HPAHs are the sum of detected concentrations for fluoranthene, pyrene, benzo(a)anthracene, chrysene, total benzofluoranthenes, benzo(a)pyrene, indeno(1,2,3,-c,d)pyrene, dibenzo(a,h)anthracene, and benzo(g,h,i)perylene. Total benzofluoranthenes are the sum of the b (i.e., benzo(b)fluoranthene), j, and k isomers. Because the j isomer is rarely quantified, this sum is typically calculated with only the b and k isomers. For samples in which all individual compounds within any of the three groups described above are undetected, the single highest RL for that sample represents the sum.
- **Total dichlorodiphenyltrichloroethanes (DDTs)** are calculated using only detected values for the six DDT isomers: 2,4′-dichlorodiphenyldichloroethane (DDD); 4,4′-DDD; 2,4′-dichlorodiphenyldichloroethylene (DDE); 4,4′-DDE; 2,4′-DDT; and 4,4′-DDT. For individual samples in which none of the isomers are detected, total DDTs are given a value equal to the highest RL of the six isomers and assigned a U-qualifier, indicating the lack of detected concentrations.
- **Total chlordane** is calculated using only detected values for the following compounds: alpha-chlordane, gamma-chlordane, oxychlordane, cis-nonachlor, and trans-nonachlor. For individual samples in which none of these compounds is detected, total chlordane is given a value equal to the highest RL of the five compounds listed above and assigned a U-qualifier, indicating the lack of detected concentrations.

1.8 Calculation of PCB Congener TEQs

PCB congener toxic equivalents (TEQs) are calculated using the World Health Organization (WHO) consensus toxic equivalency factor (TEF) values for fish, birds (Van den Berg et al. 1998) and mammals (Van den Berg et al. 2006) as presented in Table 1. The TEQ is calculated as the sum of each congener concentration multiplied by the corresponding TEF value. When the congener concentration is reported as non-detected, then the TEF is multiplied by zero, half the RL or the full RL, depending on the calculation method specified.

Table 1. PCB congener TEF values

PCB Congener Number	TEF Value for Fish (unitless)	TEF Value for Birds (unitless)	TEF Value for Mammals (unitless)
77	0.0001	0.05	0.0001
81	0.0005	0.1	0.0003
105	< 0.000005	0.0001	0.00003
114	< 0.000005	0.0001	0.00003
118	< 0.000005	0.00001	0.00003

Table 1. PCB congener TEF values, cont.

PCB Congener Number	TEF Value for Fish (unitless)	TEF Value for Birds (unitless)	TEF Value for Mammals (unitless)
123	< 0.000005	0.00001	0.00003
126	0.005	0.1	0.1
156	< 0.000005	0.0001	0.00003
157	< 0.000005	0.0001	0.00003
167	< 0.000005	0.00001	0.00003
169	0.00005	0.001	0.03
189	< 0.000005	0.00001	0.00003

PCB – polychlorinated biphenyl
TEF – toxic equivalency factor

1.9 Calculation of Dioxin/Furan Congener TEQs

Dioxin/furan congener TEQs are calculated using the WHO consensus TEF values (Van den Berg et al. 2006) for mammals as presented in Table 2. The TEQ is calculated as the sum of each congener concentration multiplied by the corresponding TEF value. When the congener concentration is reported as undetected, then the TEF is multiplied by zero, half the RL, or the full RL, depending on the calculation method specified.

Table 2. Dioxin/furan congener TEF values for mammals

Dioxin/Furan Congener	Fish TEF Value (unitless)	Bird TEF Value (unitless)	Mammal TEF Value (unitless)
1,2,3,4,6,7,8-Heptachlorodibenzofuran	0.01	0.01	0.01
1,2,3,4,6,7,8-Heptachlorodibenzo-*p*-dioxin	0.001	0.001	0.01
1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.01	0.01	0.01
1,2,3,4,7,8-Hexachlorodibenzofuran	0.1	0.1	0.1
1,2,3,4,7,8-Hexachlorodibenzo-*p*-dioxin	0.5	0.05	0.1
1,2,3,6,7,8-Hexachlorodibenzofuran	0.1	0.1	0.1
1,2,3,6,7,8-Hexachlorodibenzo-*p*-dioxin	0.01	0.01	0.1
1,2,3,7,8,9-Hexachlorodibenzofuran	0.1	0.1	0.1
1,2,3,7,8,9-Hexachlorodibenzo-*p*-dioxin	0.01	0.1	0.1
1,2,3,7,8-Pentachlorodibenzofuran	0.05	0.1	0.03
1,2,3,7,8-Pentachlorodibenzo-*p*-dioxin	1	1	1
2,3,4,6,7,8-Hexachlorodibenzofuran	0.1	0.1	0.1
2,3,4,7,8-Pentachlorodibenzofuran	0.5	1	0.3
2,3,7,8-Tetrachlorodibenzofuran	0.05	1	0.1
2,3,7,8-Tetrachlorodibenzo-*p*-dioxin	1	1	1
Octachlorodibenzofuran	0.0001	0.0001	0.0003
Octachlorodibenzo-*p*-dioxin	0.0001	0.0001	0.0003

TEF – toxic equivalency factor

1.10 DATA RULES FOR ESTIMATING WHOLE-BODY TISSUE CONCENTRATIONS

Whole-body tissue concentrations were estimated from fillet and carcass data for English sole and hepatopancreas and edible meat data for crabs. Reconstituted whole-body tissue concentrations were calculated using the following equations:

$$C_{WB} = (C_{fillet} \times f_{fillet}) + (C_{carcass} \times f_{carcass})$$

Where:

C_{WB}	=	estimated whole-body tissue concentration (mg/kg ww)
C_{fillet}	=	fillet tissue concentration (mg/kg ww)
f_{fillet}	=	average fraction of whole-body weight that is fillet (average fillet weight fraction of individual fish that are included in composite sample)
$C_{carcass}$	=	carcass tissue concentration (mg/kg ww)
$f_{carcass}$	=	average fraction of whole-body weight that is carcass (non-fillet) (average carcass weight fraction of individual fish that are included in composite sample)

Reconstituted whole-body crab tissue concentrations will be calculated using the following equation:

$$C_{WB} = (C_{hepatopancreas} \times f_{hepatopancreas}) + (C_{ediblemeat} \times f_{ediblemeat})$$

Where:

C_{WB}	=	estimated whole-body tissue concentration (mg/kg ww)
$C_{hepatopancreas}$	=	hepatopancreas tissue concentration (mg/kg ww)
$F_{hepatopancreas}$	=	average fraction of whole-body weight that is hepatopancreas (average hepatopancreas weight fraction of individual fish that are included in composite sample)
$C_{edible\ meat}$	=	carcass tissue concentration (mg/kg ww)
$F_{edible\ meat}$	=	average fraction of whole-body weight that is carcass (non-fillet) (average carcass weight fraction of individual fish that are included in composite sample)

For reconstituted whole-body concentrations that include a non-detected value for at least one tissue-type composite, the non-detected value(s) will be represented in the calculation by the detection limit; the final reconstituted whole-body result in this case will be treated as a detected result. In cases where all tissue-type composites are non-detected values, the final reconstituted whole-body result will be flagged as a non-detected result (U-qualified), and the weighted sum of the two non-detected values will be used to represent the non-detected whole body concentration.

2 Data Selection

This attachment presents details regarding the data that comprise the tissue and sediment datasets used to calculate risks in the East Waterway (EW) ERA.

2.1 TISSUE DATASET

The tissue dataset for the ERA is comprised predominately of supplemental remedial investigation (SRI) data (Windward (2008a, 2010a, c), with limited data also included from four other studies. These studies include EVS (unpublished), ESG (1999), King County (1999) and Windward (2006b). A summary of the available tissue data is provided in Table 3.

Table 3. Summary of tissue data used in the EW ERA

Species	Year of Sample Collection	Sampling Event	No. of Samples	No. of Individuals per Sample	Sample Type	Analytes	Source
English sole	2008	EW-Fish Collection 2008	11	5	whole body	PCBs (Aroclors), pesticides, SVOCs, metals, inorganic arsenic, butyltins, lipids, dioxins/furans (subset of samples), PCB congeners (subset of samples)	Windward (2010a, c)
	2005	EW-Fish Collection 2005	2	5	skinless fillet and remainder[a]	PCBs (Aroclors), mercury, lipids,	Windward (2006b)
Brown rockfish	2008	EW-Fish Collection 2008	14	1	whole body	PCBs (Aroclors), pesticides, SVOCs, metals, inorganic arsenic, butyltins, lipids, dioxins/furans (subset of samples), PCB congeners (subset of samples)	Windward (2010a, c)
	2005	EW-Fish Collection 2005	2	1		PCBs (Aroclors), mercury, lipids,	Windward (2006b)
Shiner surfperch	2008	EW-Fish Collection 2008	8	10	whole body	PCBs (Aroclors), pesticides, SVOCs, metals, inorganic arsenic, butyltins, lipids, dioxins/furans (subset of samples), PCB congeners (subset of samples)	Windward (2010a, c)
	2005	EW-Fish Collection 2005	3	6 to 8		PCBs (Aroclors), mercury, lipids,	Windward (2006b)
Juvenile Chinook salmon	2009	EW-Chinook sampling 2009	1	165	stomach contents	metals, PAHs	Windward (2010d)
		EW-Chinook sampling 2009	6	4 to 36	whole body	PCBs (Aroclors), pesticides, SVOCs, metals, butyltins, lipids	Windward (2010d)
	2002	EW-Salmon	6	7 to 8		PCBs (Aroclors), mercury, lipids	Windward (2002b)

Table 3. Summary of tissue data used in the EW ERA (cont.)

Species	Year of Sample Collection	Sampling Event	No. of Samples	No. of Individuals per Sample	Sample Type	Analytes	Source
Dungeness crab[b]	2008	EW-Fish Collection 2008	1	7	edible meat	PCBs (Aroclors), pesticides, SVOCs, metals, inorganic arsenic, butyltins, lipids, dioxins/furans (subset of samples), PCB congeners (subset of samples)	Windward (2010a, c)
		EW-Fish Collection 2008			hepatopancreas	PCBs (Aroclors), pesticides, SVOCs, metals, inorganic arsenic, butyltins, lipids, dioxins/furans (subset of samples), PCB congeners (subset of samples)	Windward (2010a, c)
Red rock crab[b]	2008	EW-Fish Collection 2008	8	7	edible meat	PCBs (Aroclors), pesticides, SVOCs, metals, inorganic arsenic, butyltins, lipids, dioxins/furans (subset of samples), PCB congeners (subset of samples)	Windward (2010a, c)
	2008	EW-Fish Collection 2008			hepatopancreas		
Mussels	2008	EW-Fish Collection 2008	11	89 to 101	soft tissue	PCBs (Aroclors), pesticides, SVOCs, metals, inorganic arsenic, butyltins, lipids, dioxins/furans (subset of samples)	Windward (2010a, c)
	1997	KC WQA	3	50 to 100		PCBs (Aroclors), SVOCs, pesticides, metals, butyltins, lipids, solids	King County (1999)
	1996	KC WQA	3	50 to 100		PCBs (Aroclors), SVOCs, pesticides, metals, butyltins, lipids, solids	King County (1999)
Shrimp	2008	EW-Fish Collection 2008	1	26	whole body	PCBs (Aroclors), pesticides, SVOCs, metals, inorganic arsenic, butyltins, lipids	Windward (2010a, c)
Clams[c]	2008	EW-Clam Survey	22	1 to 15	soft tissue	PCBs (Aroclors), pesticides, SVOCs, metals, inorganic arsenic, butyltins, lipids, dioxins/furans (subset of samples), PCB congeners (subset of samples)	Windward (2010a, b)
Benthic invertebrates	2008	EW Benthic Survey	13	not determined	whole body	PCBs (Aroclors), PAHs, metals, butyltins, lipids	Windward (2009)
Sand sole[e]	2005	EW-Fish Collection 2005	6	1	whole body	PCBs (Aroclors), metals, lipids, solids	Windward (2006b)

Table 3. Summary of tissue data used in the EW ERA (cont.)

[a] The results for the fillet composite samples and the remainder composite samples were weighted based on the fraction of the whole-body mass represented by each sample in order to calculate whole-body results (Windward 2006b).

[b] Data from hepatopancreas composite samples were mathematically combined with data from composite samples of edible meat to form composite samples of edible meat plus hepatopancreas. Whole-body (i.e., edible meat plus hepatopancreas) crab concentrations were calculated using the relative weights and concentrations of the edible meat and hepatopancreas.

[c] Clams include intertidal clams (butter clams, littleneck clams, soft-shell clams and cockles) and geoducks that were collected subtidally. Geoduck tissue residues were evaluated as part of the EW HHRA for the EW, but in this ERA, they were addressed only as an uncertainty for the benthic invertebrate evaluation because of the lack of relevant toxicity data for geoducks. Because geoducks are not a component of the diets of any of the ecological receptors, their tissue data were not used to quantify exposures.

[d] Twelve separate samples were analyzed for butyltins as shown on Map A.2-6.

[e] Sand sole data were evaluated in the uncertainty analysis as a surrogate for brown rockfish data.

ERA – ecological risk assessment

EW – East Waterway

FS – feasibility study

HHRA – human health risk assessment

KC – King County

PAH – polycyclic aromatic hydrocarbon

PCB – polychlorinated biphenyl

SRI – supplemental remedial investigation

SVOC – semivolatile organic compound

TBT – tributyltin

WQA – water quality assessment

The chemistry results available for each tissue sample are provided in Table 4. There are two issues to be noted with regard to this dataset:

1. **"Supercomposite" samples analyzed for select chemicals –** For the species that were analyzed on a site-wide basis (English sole, crabs, shiner surfperch), unique composite samples, "supercomposites" were created for the analysis of dioxins and furans and PCB congeners. The rationale for the compositing is provided in (Windward 2010a). For species with home ranges that are smaller than the site (i.e., clams, geoduck and rockfish), a subset of samples were analyzed for dioxins and furans and PCB congeners.
2. **Re-analysis for select chemicals –** There were several analytes for which the original analyses were not sufficiently sensitive. These analytes included organochlorine pesticides, bis(2-ethylhexyl) phthalate (BEHP), and pentachlorophenol. Additional, more sensitive, analyses were conducted in order to improve the data quality for these analytes. The additional analyses (US Environmental Protection Agency [EPA] 8041 for pentachlorophenol, EPA 8270-SIM for BEHP and Method 1699M for pesticides) were also conducted on super composite samples. The results for the supercomposite samples (described above) were then used in the risk assessment and the original results were rejected for the purposes of the ERA. Three pesticides (toxaphene, delta benzene hexachloride and gamma chlordane) were not included in the reanalysis, and thus the original results for these three pesticides were retained for the ERA.

Table 4. Analytes for ERA tissue samples

Species Common Name	Sample Type	Sample Name	Metals	Organometals	PAHs	Phthalates	Other SVOCs	PCB Aroclors	PCB congeners	Pesticides by 8081	Pesticides by 1699M	Dioxin/furan	Conventionals
English sole	whole-body composite	EW-08-ES-WB-comp1	x	x	x	x[a]	x[b]	x		x			x
	whole-body composite	EW-08-ES-WB-comp10	x	x	x	x[a]	x[b]	x		x[c]			x
	whole-body composite	EW-08-ES-WB-comp11	x	x	x	x[a]	x[b]	x		x[c]			x
	whole-body composite	EW-08-ES-WB-comp2	x	x	x	x[a]	x[b]	x		x[c]			x
	whole-body composite	EW-08-ES-WB-comp3	x	x	x	x[a]	x[b]	x		x[c]			x
	whole-body composite	EW-08-ES-WB-comp4	x	x	x	x[a]	x[b]	x		x[c]			x
	whole-body composite	EW-08-ES-WB-comp5	x	x	x	x[a]	x[b]	x		x[c]			x
	whole-body composite	EW-08-ES-WB-comp6	x	x	x	x[a]	x[b]	x		x[c]			x
	whole-body composite	EW-08-ES-WB-comp7	x	x	x	x[a]	x[b]	x		x[c]			x
	whole-body composite	EW-08-ES-WB-comp8	x	x	x	x[a]	x[b]	x		x[c]			x
	whole-body composite	EW-08-ES-WB-comp9	x	x	x	x[a]	x[b]	x		x[c]			x
	whole-body supercomposite	EW08-ES-WB-SUPCOMP1				x[d]	x[d]		x			x	x
	whole-body supercomposite	EW08-ES-WB-SUPCOMP2				x[d]	x[d]		x		x	x	x
	whole-body supercomposite	EW08-ES-WB-SUPCOMP3				x[d]	x[d]		x			x	x
	whole-body composite	EW-ES-comp01-WBcalc-05	x					x					x
	whole-body composite	EW-ES-comp02-WBcalc-05	x					x					x

Table 4. Analytes for ERA tissue samples (cont.)

Species Common Name	Sample Type	Sample Name	Metals	Organometals	PAHs	Phthalates	Other SVOCs	PCB Aroclors	PCB congeners	Pesticides by 8081	Pesticides by 1699M	Dioxin/furan	Conventionals
Sand sole	whole body	EW-TR002-PM-09-WB-05	x						x				
	whole body	EW-TR003-PM-02-WB-05	x					x					x
	whole body	EW-TR003-PM-04-WB-05	x					x					x
	whole body	EW-TR003-PM-05-WB-05	x					x					x
	whole body	EW-TR004-PM-06-WB-05	x					x					x
	whole body	EW-TR004-PM-07-WB-05	x					x					x
	whole body	EW-TR002-PM-09-WB-05	x					x					x
	whole body	EW-TR003-PM-02-WB-05	x					x					x
Butter clam	whole-body composite	EW-B03-BC-03-comp1	x	x	x	x	x	x		x[c]	x		x
	whole-body composite	EW-B06-BC-01-comp1	x	x	x	x	x	x	x	x[c]		x	x
	whole-body composite	EW-B06-BC-01-comp2	x	x	x	x	x	x		x[c]	x		x
	whole-body composite	EW-B08-BC-01-comp1	x	x	x	x	x	x		x[c]			x
	whole-body composite	EW-B08-BC-01-comp2	x	x	x	x	x	x		x[c]	x		x
	whole-body composite	EW-B10-BC-01-comp1	x	x	x	x	x	x	x	x[c]		x	x
	whole-body composite	EW-B10-BC-01-comp2	x	x	x	x	x	x		x[c]	x		x
Cockle	whole-body composite	EW-B08-CN-02-comp1	x	x	x	x	x	x	x	x[c]	x	x	x
	whole-body composite	EW-B10-CN-05-comp1	x	x	x	x	x	x		x[c]			x
Eastern softshell	whole-body composite	EW-B09-MY-M-comp1	x	x	x	x	x	x			x		x
Native littleneck clam	whole-body composite	EW-B08-NL-03-comp1	x		x			x					
	whole-body composite	EW-B10-NL-06-comp1	x										
Red rock and Dungeness crab	whole-body supercomposite	EW08-RRDC-WBcalc-SUPCOMP1				x[d]	x[d]		x			x	x
	whole-body supercomposite	EW08-RRDC-WBcalc-SUPCOMP2				x[d]	x[d]		x			x	x
	whole-body supercomposite	EW08-RRDC-WBcalc-SUPCOMP3				x[d]	x[d]		x		x	x	x

Table 4. Analytes for ERA tissue samples (cont.)

Species Common Name	Sample Type	Sample Name	Metals	Organometals	PAHs	Phthalates	Other SVOCs	PCB Aroclors	PCB congeners	Pesticides by 8081	Pesticides by 1699M	Dioxin/furan	Conventionals
Red rock crab	whole-body composite	EW-08-RR-WBcalc-comp1	x	x	x	x[a]	x[b]	x		x[c]			x
	whole-body composite	EW-08-RR-WBcalc-comp2	x	x	x	x[a]	x[b]	x		x[c]			x
	whole-body composite	EW-08-RR-WBcalc-comp3	x	x	x	x[a]	x[b]	x		x[c]			x
	whole-body composite	EW-08-RR-WBcalc-comp4	x	x	x	x[a]	x[b]	x		x[c]			x
	whole-body composite	EW-08-RR-WBcalc-comp5	x	x	x	x[a]	x[b]	x		x[c]			x
	whole-body composite	EW-08-RR-WBcalc-comp6	x	x	x	x[a]	x[b]	x		x[c]			x
	whole-body composite	EW-08-RR-WBcalc-comp7	x	x	x	x[a]	x[b]	x		x[c]			x
	whole-body composite	EW-08-RR-WBcalc-comp8	x	x	x	x[a]	x[b]	x		x[c]			x
Mussel	whole-body composite	EW-08-MS-WB-comp1	x	x	x	x[a]	x[b]	x		x[c]			x
	whole-body composite	EW-08-MS-WB-comp10	x	x	x	x[a]	x[b]	x		x[c]			x
	whole-body composite	EW-08-MS-WB-comp11	x	x	x	x[a]	x[b]	x		x[c]			x
	whole-body composite	EW-08-MS-WB-comp2	x	x	x	x[a]	x[b]	x		x[c]			x
	whole-body composite	EW-08-MS-WB-comp3	x	x	x	x[a]	x[b]	x		x[c]			x
	whole-body composite	EW-08-MS-WB-comp4	x	x	x	x[a]	x[b]	x		x[c]			x
	whole-body composite	EW-08-MS-WB-comp5	x	x	x	x[a]	x[b]	x		x[c]			x
	whole-body composite	EW-08-MS-WB-comp6	x	x	x	x[a]	x[b]	x		x[c]			x
	whole-body composite	EW-08-MS-WB-comp7	x	x	x	x[a]	x[b]	x		x[c]			x
	whole-body composite	EW-08-MS-WB-comp8	x	x	x	x[a]	x[b]	x		x[c]			x
	whole-body composite	EW-08-MS-WB-comp9	x	x	x	x[a]	x[b]	x		x[c]			x
	whole-body supercomposite	EW08-MS-WB-SUPCOMP1				x[d]	x[d]				x		
	whole-body supercomposite	EW08-MS-WB-SUPCOMP2				x[d]	x[d]						
	whole-body supercomposite	EW08-MS-WB-SUPCOMP3				x[d]	x[d]						
	whole-body composite	L11052-40[h]	x	x	x	x	x	x					x
	whole-body composite	L11052-41[h]	x	x	x	x	x	x					x

Table 4. Analytes for ERA tissue samples (cont.)

Species Common Name	Sample Type	Sample Name	Metals	Organometals	PAHs	Phthalates	Other SVOCs	PCB Aroclors	PCB congeners	Pesticides by 8081	Pesticides by 1699M	Dioxin/furan	Conventionals
	whole-body composite	L11052-42[h]	x	x	x	x	x	x					x
	whole-body composite	L9819-35[h]	x	x	x	x	x	x		x[c]			x
	whole-body composite	L9819-36[h]	x	x	x	x	x	x		x[c]			x
	whole-body composite	L9819-37[h]	x	x	x	x	x	x		x[c]			x
Shiner surfperch	whole-body composite	EW-SS-Comp01-WB-05[e]	x					x					x
	whole-body composite	EW-SS-Comp02-WB-05[e]	x					x					x
	whole-body composite	EW-SS-Comp03-WB-05[d]	x					x					x
	whole-body composite	EW-08-SS-WB-comp1	x	x	x	x[a]	x[b]	x		x[c]			x
	whole-body composite	EW-08-SS-WB-comp2	x	x	x	x[a]	x[b]	x		x[c]			x
	whole-body composite	EW-08-SS-WB-comp3	x	x	x	x[a]	x[b]	x		x[c]			x
	whole-body composite	EW-08-SS-WB-comp4	x	x	x	x[a]	x[b]	x		x[c]			x
	whole-body composite	EW-08-SS-WB-comp5	x	x	x	x[a]	x[b]	x		x[c]			x
	whole-body composite	EW-08-SS-WB-comp6	x	x	x	x[a]	x[b]	x		x[c]			x
	whole-body composite	EW-08-SS-WB-comp7	x	x	x	x[a]	x[b]	x		x[c]			x
	whole-body composite	EW-08-SS-WB-comp8	x	x	x	x[a]	x[b]	x		x[c]			x
	whole-body supercomposite	EW08-SS-WB-SUPCOMP1				x[d]	x[c]		x		x	x	x
	whole-body supercomposite	EW08-SS-WB-SUPCOMP2				x[d]	x[c]		x			x	x
	whole-body supercomposite	EW08-SS-WB-SUPCOMP3				x[d]	x[c]		x			x	x

Table 4. Analytes for ERA tissue samples (cont.)

Species Common Name	Sample Type	Sample Name	Metals	Organometals	PAHs	Phthalates	Other SVOCs	PCB Aroclors	PCB congeners	Pesticides by 8081	Pesticides by 1699M	Dioxin/furan	Conventionals
Brown rockfish	individual whole body	EW-08-SB002-BR-01	x	x	x	x	x	x		x[c]			x
	individual whole body	EW-08-SB002-BR-02	x	x	x	x	x	x	x	x[c]		x	x
	individual whole body	EW-08-SB003-BR-03	x	x	x	x	x	x		x[c]			x
	individual whole body	EW-08-SB004-BR-04	x	x	x	x	x	x		x[c]	x		x
	individual whole body	EW-08-SB005-BR-05	x	x	x	x	x	x		x[c]	x		x
	individual whole body	EW-08-SB006-BR-06	x	x	x	x	x	x	x	x[c]	x	x	x
	individual whole body	EW-08-SB007-BR-07	x	x	x	x	x	x		x[c]	x		x
	individual whole body	EW-08-SB008-BR-08	x	x	x	x	x	x	x	x[c]	x	x	x
	individual whole body	EW-08-SB009-BR-09	x	x	x	x	x	x	x	x[c]	x	x	x
	individual whole body	EW-08-SB011-BR-11	x	x	x	x	x	x	x	x[c]	x	x	x
	individual whole body	EW-08-SB012-BR-10	x	x	x	x	x	x	x	x[c]	x	x	x
	individual whole body	EW-08-SB012-BR-12	x	x	x	x	x	x		x[c]			x
	individual whole body	EW-08-SB013-BR-13	x	x	x			x		x[c]	x		x
	individual whole body	EW-TR003-RF-01-WB-01-05[e]	x					x					x
	individual whole body	EW-TR003-RF-01-WB-02-05[e]	x					x					x
Juvenile Chinook salmon	stomach contents	EW09-CHN-SC-COMP-01	x		X[h]								x
	whole body	EW09-CHN-H-comp01	x	x	x	x	x	x		x			x
	whole body	EW09-CHN-H-comp02	x	x	x	x	x	x		x			x
	whole body	EW09-CHN-H-comp03	x	x	x	x	x	x		x			x
	whole body	EW09-CHN-W-comp01	x		x	x	x	x		x			x
	whole body	EW09-CHN-W-comp02	x	x	x	x	x	x		x			x
	whole body	EW09-CHN-W-comp03	x	x	x	x	x	x		x			x
	whole body	EW-S27-H-comp1	x					x					x
	whole body	EW-S27-H-comp2	x					x					x

Table 4. Analytes for ERA tissue samples (cont.)

Species Common Name	Sample Type	Sample Name	Metals	Organometals	PAHs	Phthalates	Other SVOCs	PCB Aroclors	PCB congeners	Pesticides by 8081	Pesticides by 1699M	Dioxin/furan	Conventionals
	whole body	EW-S27-H-comp3	x					x					x
	whole body	EW-S27-W-comp1	x					x					x
	whole body	EW-S27-W-comp2	x					x					x
	whole body	EW-S27-W-comp3	x					x					x
Shrimp	Whole body	EW-08-SR-WB-comp1	x		x	x	x	x					x
Infaunal benthic invertebrates (multiple species)	whole body	EW08-BI01-T	x		x			x					x
	whole body	EW08-BI02E-T	x		x			x					x
	whole body	EW08-BI02W-T	x	x	x			x					x
	whole body	EW08-BI03-T	x		x			x					x
	whole body	EW08-BI04-T	x		x			x					x
	whole body	EW08-BI05-T	x	x	x			x					x
	whole body	EW08-BI06-T	x	x	x			x					x
	whole body	EW08-BI07-T	x		x			x					x
	whole body	EW08-BI08-T	x		x			x					x
	whole body	EW08-BI09-T	x	x	x			x					x
	whole body	EW08-BI10-T	x		x			x					x
	whole body	EW08-BI11-T	x		x			x					x
	whole body	EW08-BI12-T	x		x			x					x
	whole body	EW09-BI03N-T		x									x
	whole body	EW09-BI03S-T		x									x
	whole body	EW09-BI04N-T		x									x
	whole body	EW09-BI04S-T		x									x
	whole body	EW09-BI08N-T		x									x
	whole body	EW09-BI08S-T		x									x

Table 4. Analytes for ERA tissue samples (cont.)

Species Common Name	Sample Type	Sample Name	Metals	Organometals	PAHs	Phthalates	Other SVOCs	PCB Aroclors	PCB congeners	Pesticides by 8081	Pesticides by 1699M	Dioxin/furan	Conventionals
	whole body	EW09-BI10N-T		x									x
	whole body	EW09-BI10S-T		x									x

[a] All phthalates except for bis(2-ethylhexyl) phthalate.

[b] All other SVOCs except for phenol.

[c] Data for three pesticides not analyzed by EPA 1699M (GC/MS/MS) only (toxaphene, delta benzene hexachloride and gamma chlordane).

[d] Additional analyses conducted for bis(2-ethylhexyl)phthalate and pentachlorophenol.

[e] Data from Windward (2006).

[f] Data from EVS (unpublished).

[g] Data from ESG (1999).

[h] Sample was also analyzed for alkylated PAH.

EPA – US Environmental Protection Agency

GC/MS/MS – gas chromatography/mass spectrometry/mass spectrometry

PAH – polyaromatic hydrocarbon

PCB – polychlorinated biphenyl

SVOC – semivolatile organic compound

2.2 Sediment Dataset

The sediment dataset for the ERA is comprised of data collected from 15 studies, the largest of which was the SRI surface sediment characterization that included 99 samples (Windward 2010e). A summary of the available sediment data is provided in Table 5.

Table 5. Summary of available surface sediment data used in the EW ERA

Sampling Date	Sampling Event	No. of Samples	Analyses	Source
2009	EW Subtidal Surface Sediment Composites	13	PCB congeners, dioxin and furan congeners	Windward (2010e)
2009	EW intertidal MIS composites	4	metals, organometals, SVOCs, Aroclors, PCB congeners, dioxin and furan congeners, pesticides, conventionals	Windward (2010e)
2009	EW SRI Surface Sediment Characterization	99	metals, organometals, SVOCs, Aroclors, pesticides, grain size, conventionals	Windward (2010e)
2009	EW T30 Post-Dredge Monitoring 2009	17	metals, SVOCs, Aroclors, grain size, conventionals	Windward (2010e)
2008	EW Recontamination Monitoring 2008	12	metals, SVOCs, Aroclors, grain size, conventionals	Windward (2008c)
2007	East Waterway – Slip 27	7	metals, organometals, SVOCs, Aroclors, pesticides, grain size, conventionals	Windward (2007a)
2007	Recontamination Monitoring 2007	24	metals, SVOCs, Aroclors, pesticides, grain size, conventionals	Windward (2008b)
2006	Recontamination Monitoring 2006	21	Metals, SVOCs, Aroclors, pesticides, grain size, conventionals	Windward (2007b)
2005	Post-Dredge Monitoring 2005 Phase2	9	metals, SVOCs, Aroclors, pesticides, grain size, conventionals	Anchor and Windward (2005)
2005	USCG Pier 36 Post-Dredge Sediment Characterization	11	metals, SVOCs, Aroclors, grain size, conventionals	Hart Crowser (2005)
2001	EW/HI Nature and Extent Phase 1	62	metals, SVOCs, Aroclors, pesticides, grain size, conventionals	Windward (2002a)
2001	EW/HI Nature and Extent Phase 2	22	metals, SVOCs, Aroclors, pesticides, grain size, conventionals	Windward (2002a)
2000	T-18 Post-Dredge Monitoring	13	metals, organometals, PAHs, Aroclors, pesticides, conventionals	Windward (2001)
1996	KC CSO 96	4	metals, SVOCs, Aroclors, grain size, conventionals	King County (1996)
1996	Pier 36-underpier	2	metals, SVOCs, Aroclors, pesticides, conventionals	Tetra Tech (1996)
1995	HI Remedial Investigation 95	3	metals, SEM metals, organometals, SVOCs, Aroclors, pesticides, grain size, conventionals	EVS (1996a, b)
1995	KC CSO 95	6	metals, SVOCs, Aroclors, pesticides, TPH, grain size, conventionals	King County (1995)

CSO – combined sewer overflow
EW – East Waterway
ERA – human health risk assessment
HI – Harbor Island
KC – King County
MIS – multi-increment sampling
PAH – polycyclic aromatic hydrocarbon
PCB – polychlorinated biphenyl
SEM – simultaneously extracted metals
SVOC – semivolatile organic compound
T-18 – Terminal 18
TPH – total petroleum hydrocarbons
USCG – US Coast Guard

The chemistry results available for each sediment sample are provided in Table 6. There are two issues to be noted with regard to this dataset:

1. **Composite samples –** All of the samples are individual grab samples with the exception of 13 subtidal composite samples that were created for the analysis of dioxins and furans and PCB congeners and 4 multi-increment sampling (MIS) samples, which were created to characterize intertidal sediments and were analyzed for all analytes.
2. **Location trumping –** For a total of 24 locations in the EW, there were multiple samples collected at the same location (locations within 10 ft of one another were considered to be the same location for these purposes). The most recent results were selected for the location in these cases on a chemical-specific basis. The older samples which were affected by the presence of more recent data are identified with a "yes" in the "trumped" column in Table 6. For example, if the older sample was analyzed for pesticides and the more recent sample was not analyzed for pesticides, the older pesticide results would be retained for use with the more recent results for other analytes.

Table 6. ERA surface sediment dataset

Task/ Location Name	Sample Name	Tidal Stratum	Lower Depth	Grab or Comp	Trumped[a]	Metals	Metals_SEM	Butyltins	PAHs	Phthalates	Other SVOCs	PCB Aroclors	PCB Cong	Pesticides	VOCs	Dioxin/furan	Petroleum	Grain size	Conventionals
East Waterway - Slip 27																			
EW-S27-1G	EW-S27-1G-010	subtidal	10	grab	no	x		x	x	x	x	x		x				x	x
EW-S27-2G	EW-S27-101G-010[b]	subtidal	10	grab	no	x		x	x	x	x	x		x				x	x
EW-S27-2G	EW-S27-2G-010	subtidal	10	grab	no	x		x	x	x	x	x		x				x	x
EW-S27-3G	EW-S27-3G-010	subtidal	10	grab	no	x		x	x	x	x	x		x				x	x
EW-S27-4G	EW-S27-4G-010	subtidal	10	grab	no	x		x	x	x	x	x		x				x	x
EW-S27-5G	EW-S27-5G-010	subtidal	10	grab	no	x		x	x	x	x	x		x				x	x
EW-S27-9G	EW-S27-9G-010	subtidal	10	grab	no	x		x	x	x	x	x		x				x	x
EW RCM 2008																			
EW-RM-02	EW-RM08-02	subtidal	10	grab	no	x			x	x	x	x						x	x
EW-RM-03	EW-RM08-03	subtidal	10	grab	no	x			x	x	x	x						x	x
EW-RM-10	EW-RM08-10	subtidal	10	grab	no	x			x	x	x	x						x	x
EW-RM-15	EW-RM08-15	subtidal	9	grab	no	x			x	x	x	x						x	x
EW-RM-20	EW-RM08-20	subtidal	10	grab	no	x			x	x	x	x						x	x
EW-RM-27	EW-RM08-27	subtidal	10	grab	no	x			x	x	x	x						x	x
EW-RM-30	EW-RM08-30	subtidal	10	grab	no	x			x	x	x	x						x	x
EW-RM-32	EW-RM08-32	subtidal	10	grab	no	x			x	x	x	x						x	x
EW-RM-34	EW-RM08-101[b]	subtidal	10	grab	no	x			x	x	x	x						x	x
EW-RM-34	EW-RM08-34	subtidal	10	grab	no	x			x	x	x	x						x	x
EW-RM-38	EW-RM08-38	subtidal	10	grab	no	x			x	x	x	x						x	x
EW-RM-42	EW-RM08-42	subtidal	8	grab	no	x			x	x	x	x						x	x
EW Surface Sed Comps																			
EW09-CS-001	EW09-CS-001-010	subtidal	10	comp	no								x			x			
EW09-CS-002	EW09-CS-002-010	subtidal	10	comp	no								x			x			
EW09-CS-003	EW09-CS-003-010	subtidal	10	comp	no								x			x			
EW09-CS-004	EW09-CS-004-010	subtidal	10	comp	no								x			x			
EW09-CS-005	EW09-CS-005-010	subtidal	10	comp	no								x			x			
EW09-CS-006	EW09-CS-006-010	subtidal	10	comp	no								x			x			
EW09-CS-007	EW09-CS-007-010	subtidal	10	comp	no								x			x			

Table 6. ERA surface sediment dataset (cont.)

Task/ Location Name	Sample Name	Tidal Stratum	Lower Depth	Grab or Comp	Trumped[a]	Metals	Metals_SEM	Butyltins	PAHs	Phthalates	Other SVOCs	PCB Aroclors	PCB Cong	Pesticides	VOCs	Dioxin/furan	Petroleum	Grain size	Conventionals
EW09-CS-008	EW09-CS-008-010	subtidal	10	comp	no								x			x			
EW09-CS-009	EW09-CS-009-010	subtidal	10	comp	no								x			x			
EW09-CS-010	EW09-CS-010-010	subtidal	10	comp	no								x			x			
EW09-CS-011	EW09-CS-011-010	subtidal	10	comp	no								x			x			
EW09-CS-012	EW09-CS-012-010	subtidal	10	comp	no								x			x			
EW09-CS-013	EW09-CS-013-010	subtidal	10	comp	no								x			x			
EW09-ITSED-AWMIS	EW09-ITSED-AWMIS-01	intertidal	25	MIS comp	no	x		x	x	x	x	x	x	x		x			x
EW09-ITSED-AWMIS	EW09-ITSED-AWMIS-02	intertidal	25	MIS comp	no	x		x	x	x	x	x	x	x		x			x
EW09-ITSED-AWMIS	EW09-ITSED-AWMIS-03	intertidal	25	MIS comp	no	x		x	x	x	x	x	x	x		x			x
EW09-ITSED-PAMIS	EW09-ITSED-PAMIS-01	intertidal	25	MIS comp	no	x		x	x	x	x	x	x	x		x			x
EW Surface Sed Rd 1																			
EW09-SS-001	EW09-SS-001-010	subtidal	10	grab	no	x			x	x	x	x						x	x
EW09-SS-003	EW09-SS-003-010	subtidal	10	grab	no	x		x	x	x	x	x						x	x
EW09-SS-005	EW09-SS-005-010	subtidal	10	grab	no	x			x	x	x	x						x	x
EW09-SS-008	EW09-SS-008-010	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW09-SS-011	EW09-SS-011-010	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW09-SS-013	EW09-SS-013-010	subtidal	10	grab	no	x		x	x	x	x	x		x				x	x
EW09-SS-014	EW09-SS-014-010	subtidal	10	grab	no	x			x	x	x	x						x	x
EW09-SS-019	EW09-SS-019-010	subtidal	10	grab	no	x			x	x	x	x						x	x
EW09-SS-020	EW09-SS-020-010	subtidal	10	grab	no	x			x	x	x	x						x	x
EW09-SS-021	EW09-SS-021-010	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW09-SS-023	EW09-SS-023-010	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW09-SS-024	EW09-SS-024-010	subtidal	10	grab	no	x		x	x	x	x	x						x	x
EW09-SS-025	EW09-SS-025-010	subtidal	10	grab	no	x			x	x	x	x						x	x
EW09-SS-027	EW09-SS-027-010	subtidal	10	grab	no	x		x	x	x	x	x						x	x
EW09-SS-029	EW09-SS-029-010	subtidal	10	grab	no	x		x	x	x	x	x						x	x
EW09-SS-030	EW09-SS-030-010	subtidal	10	grab	no	x		x	x	x	x	x		x				x	x
EW09-SS-031	EW09-SS-031-010	subtidal	10	grab	no	x			x	x	x	x						x	x
EW09-SS-032	EW09-SS-032-010	subtidal	10	grab	no	x			x	x	x	x						x	x
EW09-SS-033	EW09-SS-033-010	subtidal	10	grab	no	x		x	x	x	x	x		x				x	x
EW09-SS-034	EW09-SS-034-010	subtidal	10	grab	no	x		x	x	x	x	x						x	x

Table 6. ERA surface sediment dataset (cont.)

Task/ Location Name	Sample Name	Tidal Stratum	Lower Depth	Grab or Comp	Trumped[a]	Metals	Metals_SEM	Butyltins	PAHs	Phthalates	Other SVOCs	PCB Aroclors	PCB Cong	Pesticides	VOCs	Dioxin/furan	Petroleum	Grain size	Conventionals
EW09-SS-035	EW09-SS-035-010	subtidal	10	grab	no	x			x	x	x	x						x	x
EW09-SS-036	EW09-SS-036-010	subtidal	10	grab	no	x		x	x	x	x	x						x	x
EW09-SS-038	EW09-SS-038-010	subtidal	10	grab	no	x		x	x	x	x	x		x				x	x
EW09-SS-100	EW09-SS-100-010	subtidal	10	grab	no	x		x	x	x	x	x						x	x
EW09-SS-101	EW09-SS-101-010	subtidal	10	grab	no	x			x	x	x	x						x	x
EW09-SS-102	EW09-SS-102-010	subtidal	10	grab	no	x			x	x	x	x						x	x
EW09-SS-102	EW09-SS-302-010[b]	subtidal	10	grab	no	x			x	x	x	x						x	x
EW09-SS-104	EW09-SS-104-010	subtidal	10	grab	no	x			x	x	x	x						x	x
EW09-SS-109	EW09-SS-109-010	subtidal	10	grab	no	x			x	x	x	x						x	x
EW09-SS-110	EW09-SS-110-010	subtidal	10	grab	no	x		x	x	x	x	x		x				x	x
EW09-SS-111	EW09-SS-111-010	subtidal	10	grab	no	x			x	x	x	x						x	x
EW09-SS-113	EW09-SS-113-010	subtidal	10	grab	no	x		x	x	x	x	x		x				x	x
EW09-SS-114	EW09-SS-114-010	subtidal	10	grab	no	x		x	x	x	x	x						x	x
EW09-SS-116	EW09-SS-116-010	subtidal	10	grab	no	x			x	x	x	x						x	x
EW09-SS-116	EW09-SS-301-010[b]	subtidal	10	grab	no	x			x	x	x	x						x	x
EW09-SS-119	EW09-SS-119-010	subtidal	10	grab	no	x		x	x	x	x	x						x	x
EW09-SS-120	EW09-SS-120-010	subtidal	10	grab	no	x			x	x	x	x						x	x
EW09-SS-122	EW09-SS-122-010	subtidal	10	grab	no	x		x	x	x	x	x		x				x	x
EW09-SS-126	EW09-SS-126-010	subtidal	10	grab	no	x		x	x	x	x	x						x	x
EW09-SS-127	EW09-SS-127-010	subtidal	10	grab	no	x		x	x	x	x	x						x	x
EW09-SS-129	EW09-SS-129-010	subtidal	10	grab	no	x		x	x	x	x	x		x				x	x
EW09-SS-130	EW09-SS-130-010	subtidal	10	grab	no	x			x	x	x	x						x	x
EW09-SS-132	EW09-SS-132-010	subtidal	10	grab	no	x		x	x	x	x	x						x	x
EW09-SS-200	EW09-SS-200-010	subtidal	10	grab	no	x		x	x	x	x	x		x				x	x
EW09-SS-200	EW09-SS-300-010[b]	subtidal	10	grab	no	x		x	x	x	x	x		x				x	x
EW09-SS-202	EW09-SS-202-010	subtidal	10	grab	no	x		x	x	x	x	x						x	x
EW09-SS-204	EW09-SS-204-010	subtidal	10	grab	no	x		x	x	x	x	x		x				x	x
EW09-SS-207	EW09-SS-207-010	subtidal	10	grab	no	x		x	x	x	x	x						x	x
EW09-SS-211	EW09-SS-211-010	subtidal	10	grab	no	x		x	x	x	x	x						x	x
EW09-SS-216	EW09-SS-216-010	subtidal	10	grab	no	x		x	x	x	x	x						x	x
EW09-SS-217	EW09-SS-217-010	subtidal	10	grab	no	x			x	x	x	x						x	x

Table 6. ERA surface sediment dataset (cont.)

Task/ Location Name	Sample Name	Tidal Stratum	Lower Depth	Grab or Comp	Trumped[a]	Metals	Metals_SEM	Butyltins	PAHs	Phthalates	Other SVOCs	PCB Aroclors	PCB Cong	Pesticides	VOCs	Dioxin/furan	Petroleum	Grain size	Conventionals
EW09-SS-218	EW09-SS-218-010	subtidal	8.5	grab	no	x		x	x	x	x	x						x	x
EW09-SS-219	EW09-SS-219-010	subtidal	10	grab	no	x		x	x	x	x	x						x	x
EW09-SS-220	EW09-SS-220-010	subtidal	10	grab	no	x		x	x	x	x	x		x				x	x
EW Surface Sed Rd 2																			
EW09-SS-009	EW09-SS-009-010	subtidal	10	grab	no	x			x	x	x	x						x	x
EW09-SS-012	EW09-SS-012-010	subtidal	10	grab	no	x			x	x	x	x						x	x
EW09-SS-017	EW09-SS-017-010	subtidal	10	grab	no	x		x	x	x	x	x						x	x
EW09-SS-022	EW09-SS-022-010	subtidal	10	grab	no	x		x	x	x	x	x						x	x
EW09-SS-026	EW09-SS-026-010	subtidal	10	grab	no	x			x	x	x	x						x	x
EW09-SS-028	EW09-SS-028-010	subtidal	10	grab	no	x			x	x	x	x						x	x
EW09-SS-028	EW09-SS-303-010[b]	subtidal	10	grab	no	x			x	x	x	x						x	x
EW09-SS-037	EW09-SS-037-010	subtidal	10	grab	no	x			x	x	x	x						x	x
EW09-SS-039	EW09-SS-039-010	subtidal	10	grab	no	x			x	x	x	x						x	x
EW09-SS-040	EW09-SS-040-010	subtidal	10	grab	no	x			x	x	x	x						x	x
EW09-SS-103	EW09-SS-103-010	subtidal	10	grab	no	x			x	x	x	x						x	x
EW09-SS-105	EW09-SS-105-010	subtidal	10	grab	no	x		x	x	x	x	x		x				x	x
EW09-SS-105	EW09-SS-304-010[b]	subtidal	10	grab	no	x		x	x	x	x	x		x				x	x
EW09-SS-108	EW09-SS-108-010	subtidal	10	grab	no	x		x	x	x	x	x						x	x
EW09-SS-112	EW09-SS-112-010	subtidal	10	grab	no	x			x	x	x	x						x	x
EW09-SS-115	EW09-SS-115-010	subtidal	10	grab	no	x		x	x	x	x	x						x	x
EW09-SS-118	EW09-SS-118-010	subtidal	10	grab	no	x		x	x	x	x	x		x				x	x
EW09-SS-121	EW09-SS-121-010	subtidal	10	grab	no	x			x	x	x	x						x	x
EW09-SS-123	EW09-SS-123-010	subtidal	10	grab	no	x		x	x	x	x	x		x				x	x
EW09-SS-124	EW09-SS-124-010	subtidal	10	grab	no	x		x	x	x	x	x		x				x	x
EW09-SS-125	EW09-SS-125-010	subtidal	10	grab	no	x			x	x	x	x						x	x
EW09-SS-128	EW09-SS-128-010	subtidal	10	grab	no	x			x	x	x	x						x	x
EW09-SS-131	EW09-SS-131-010	subtidal	10	grab	no	x			x	x	x	x						x	x
EW09-SS-133	EW09-SS-133-010	subtidal	10	grab	no	x		x	x	x	x	x						x	x
EW09-SS-134	EW09-SS-134-010	subtidal	10	grab	no	x			x	x	x	x						x	x
EW09-SS-201	EW09-SS-201-010	subtidal	10	grab	no	x		x	x	x	x	x						x	x
EW09-SS-203	EW09-SS-203-010	subtidal	5	grab	no	x		x	x	x	x	x		x				x	x

Table 6. ERA surface sediment dataset (cont.)

Task/ Location Name	Sample Name	Tidal Stratum	Lower Depth	Grab or Comp	Trumped[a]	Metals	Metals_SEM	Butyltins	PAHs	Phthalates	Other SVOCs	PCB Aroclors	PCB Cong	Pesticides	VOCs	Dioxin/furan	Petroleum	Grain size	Conventionals
EW09-SS-205	EW09-SS-205-010	subtidal	10	grab	no	x		x	x	x	x	x		x				x	x
EW09-SS-206	EW09-SS-206-010	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW09-SS-208	EW09-SS-208-010	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW09-SS-208	EW09-SS-305-010[b]	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW09-SS-209	EW09-SS-209-010	subtidal	10	grab	no	x			x	x	x	x						x	x
EW09-SS-210	EW09-SS-210-010	subtidal	10	grab	no	x			x	x	x	x						x	x
EW09-SS-212	EW09-SS-212-010	subtidal	10	grab	no	x		x	x	x	x	x						x	x
EW09-SS-213	EW09-SS-213-010	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW09-SS-214	EW09-SS-214-010	subtidal	10	grab	no	x		x	x	x	x	x						x	x
EW09-SS-215	EW09-SS-215-010	subtidal	10	grab	no	x		x	x	x	x	x						x	x
EW09-SS-221	EW09-SS-221-010	subtidal	10	grab	no	x			x	x	x	x						x	x
EW09-SS-222	EW09-SS-222-010	subtidal	10	grab	no	x			x	x	x	x						x	x
EW09-SS-223	EW09-SS-223-010	subtidal	7	grab	no	x			x	x	x	x						x	x
LSO-01	LSO-01SE-080723	subtidal	10	grab	no				x	x	x	x							x
EW T30 PDM 2009																			
T30-01	T30-09-01	subtidal	10	grab	no	x			x	x	x	x						x	x
T30-03	T30-09-03	subtidal	10	grab	no	x			x	x	x	x						x	x
T30-03	T30-09-101[b]	subtidal	10	grab	no	x			x	x	x	x						x	x
T30-04	T30-09-04	subtidal	10	grab	no	x			x	x	x	x							x
T30-06	T30-09-06	subtidal	10	grab	no	x			x	x	x	x							x
T30-07	T30-09-07	subtidal	10	grab	no	x			x	x	x	x						x	x
T30-09	T30-09-09	subtidal	10	grab	no	x			x	x	x	x						x	x
T30-13	T30-09-13	subtidal	10	grab	no	x			x	x	x	x							x
T30-14	T30-09-14	subtidal	10	grab	no	x			x	x	x	x						x	x
T30-20	T30-09-20	subtidal	10	grab	no	x			x	x	x	x						x	x
T30-21	T30-09-21	subtidal	10	grab	no	x			x	x	x	x						x	x
T30-24	T30-09-24	subtidal	10	grab	no	x			x	x	x	x							x
T30-26	T30-09-26	subtidal	10	grab	no	x			x	x	x	x						x	x
T30-27	T30-09-27	subtidal	10	grab	no	x			x	x	x	x							x
T30-28	T30-09-28	subtidal	10	grab	no	x			x	x	x	x							x
T30-29	T30-09-29	subtidal	10	grab	no	x			x	x	x	x						x	x

Table 6. ERA surface sediment dataset (cont.)

Task/ Location Name	Sample Name	Tidal Stratum	Lower Depth	Grab or Comp	Trumped[a]	Metals	Metals_SEM	Butyltins	PAHs	Phthalates	Other SVOCs	PCB Aroclors	PCB Cong	Pesticides	VOCs	Dioxin/furan	Petroleum	Grain size	Conventionals
T30-31	T30-09-31	subtidal	10	grab	no	x			x	x	x	x							x
EW/HI Nature and Extent Phase 1																			
EW-100	EW-100-b-010	subtidal	10	grab	no						x								x
EW-100	EW-100-comp-010	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-101	EW-101-a-010	subtidal	10	grab	no						x								x
EW-101	EW-101-comp-010	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-102	EW-102-c-010	subtidal	10	grab	no						x								x
EW-102	EW-102-comp-010	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-104	EW-104-a-010	subtidal	10	grab	no						x								x
EW-104	EW-104-comp-010	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-105	EW-105-c-010	subtidal	10	grab	no						x								x
EW-105	EW-105-comp-010	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-106	EW-106-a-010	subtidal	10	grab	no						x								x
EW-106	EW-106-comp-010	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-107	EW-107-a-010	subtidal	10	grab	no						x								x
EW-107	EW-107-comp-010	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-108	EW-108-b-010	subtidal	10	grab	no						x								x
EW-108	EW-108-comp-010	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-111	EW-111-a-010	subtidal	10	grab	no						x								x
EW-111	EW-111-comp-010	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-112	EW-112-a-010	subtidal	10	grab	no						x								x
EW-112	EW-112-comp-010	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-113	EW-113-a-010	subtidal	10	grab	no						x								x
EW-113	EW-113-comp-010	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-113	EW-140-a-010[b]	subtidal	10	grab	no						x								x
EW-113	EW-140-comp-010[b]	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-114	EW-114-a-010	subtidal	10	grab	no						x								x
EW-114	EW-114-comp-010	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-115	EW-115-b-010	subtidal	10	grab	no						x								x
EW-115	EW-115-comp-010	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-117	EW-117-comp-010	subtidal	10	grab	no	x			x	x	x	x		x				x	x

Table 6. ERA surface sediment dataset (cont.)

Task/ Location Name	Sample Name	Tidal Stratum	Lower Depth	Grab or Comp	Trumped[a]	Metals	Metals_SEM	Butyltins	PAHs	Phthalates	Other SVOCs	PCB Aroclors	PCB Cong	Pesticides	VOCs	Dioxin/furan	Petroleum	Grain size	Conventionals
EW-117	EW-117-d-010	subtidal	10	grab	no						x								x
EW-118	EW-118-a-010	subtidal	10	grab	no						x								x
EW-118	EW-118-comp-010	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-119	EW-119-a-010	subtidal	10	grab	no						x								x
EW-119	EW-119-comp-010	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-120	EW-120-a-010	subtidal	10	grab	no						x								x
EW-120	EW-120-comp-010	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-120	EW-139-a-010[b]	subtidal	10	grab	no						x								x
EW-120	EW-139-comp-010[b]	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-121	EW-121-comp-010	subtidal	10	grab	**yes**									x					
EW-122	EW-122-comp-010	subtidal	10	grab	**yes**									x					
EW-123	EW-123-comp-010	subtidal	10	grab	**yes**									x					
EW-124	EW-124-comp-010	subtidal	10	grab	**yes**									x					
EW-125	EW-125-comp-010	subtidal	10	grab	**yes**									x					
EW-126	EW-126-b-010	subtidal	10	grab	no						x								x
EW-126	EW-126-comp-010	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-127	EW-127-comp-010	subtidal	10	grab	**yes**									x					
EW-129	EW-129-comp-010	subtidal	10	grab	**yes**									x					
EW-130	EW-130-comp-010	subtidal	10	grab	**yes**									x					
EW-132	EW-132-comp-010	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-132	EW-132-f-010	subtidal	10	grab	no						x								x
EW-141	EW-141-a-010	subtidal	10	grab	no						x								x
EW-141	EW-141-comp-010	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-142	EW-142-a-010	subtidal	10	grab	no						x								x
EW-142	EW-142-comp-010	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW/HI Nature and Extent Phase 2																			
EW-103	EW-103-comp-010	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-103	EW-103-i-010	subtidal	10	grab	no						x								x
EW-109	EW-109-comp-010	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-109	EW-109-i-010	subtidal	10	grab	no						x								x
EW-110	EW-110-a-010	subtidal	10	grab	no						x								x

Table 6. ERA surface sediment dataset (cont.)

Task/ Location Name	Sample Name	Tidal Stratum	Lower Depth	Grab or Comp	Trumped[a]	Metals	Metals_SEM	Butyltins	PAHs	Phthalates	Other SVOCs	PCB Aroclors	PCB Cong	Pesticides	VOCs	Dioxin/furan	Petroleum	Grain size	Conventionals
EW-110	EW-110-comp-010	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-116	EW-116-b-010	subtidal	10	grab	no						x								x
EW-116	EW-116-comp-010	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-128	EW-128-comp-010	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-128	EW-128-k-010	subtidal	10	grab	no						x								x
EW-133	EW-133-comp-010	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-133	EW-133-f-010	subtidal	10	grab	no						x								x
EW-134	EW-134-comp-010	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-134	EW-134-f-010	subtidal	10	grab	no						x								x
EW-135	EW-135-comp-010	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-135	EW-135-e-010	subtidal	10	grab	no						x								x
EW-136	EW-136-comp-010	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-136	EW-136-k-010	subtidal	10	grab	no						x								x
EW-137	EW-137-comp-010	subtidal	10	grab	**yes**									x					
EW-138	EW-138-comp-010	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-138	EW-138-f-010	subtidal	10	grab	no						x								x
HIRI95																			
EW-01	EW-01	subtidal	10	grab	no	x		x	x	x	x	x		x					x
EW-10	EW-10	subtidal	10	grab	no	x	x	x	x	x	x	x		x				x	x
EW-12	EW-12	subtidal	10	grab	**yes**		x							x					x
KC CSO 95																			
HN00	L6393-1	subtidal	2	grab	no	x			x	x	x	x		x			x	x	x
HN10C	L6393-7	subtidal	2	grab	no														x
HN10N	L6393-2	subtidal	2	grab	**yes**	x					x			x			x		x
HN10S	L6393-4	subtidal	2	grab	no	x			x	x	x	x		x			x	x	x
HN20N	L6393-3	subtidal	2	grab	no	x			x	x	x	x		x			x	x	x
HN20S	L6393-5	subtidal	2	grab	**yes**	x					x			x			x		x
KC CSO 96																			
HN10N	L10422-1	subtidal	2	grab	no	x			x	x	x	x							x
HN10N	L9553-2	subtidal	2	grab	no	x												x	
HN20S	L10422-2	subtidal	2	grab	no	x			x	x	x	x							x

Table 6. ERA surface sediment dataset (cont.)

Task/ Location Name	Sample Name	Tidal Stratum	Lower Depth	Grab or Comp	Trumped[a]	Metals	Metals_SEM	Butyltins	PAHs	Phthalates	Other SVOCs	PCB Aroclors	PCB Cong	Pesticides	VOCs	Dioxin/furan	Petroleum	Grain size	Conventionals
HN20S	L9553-5	subtidal	2	grab	no	x												x	
Pier36-underpier																			
USGC-1	USCG-1	subtidal	2	grab	no	x			x	x	x	x		x					x
USGC-2	USCG-2	subtidal	2	grab	no	x			x	x	x	x		x					x
PostDredge Monitoring-2005 Phase2																			
EW-PDM-1	EW-PDM-S1	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-PDM-11	EW-PDM-S11	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-PDM-12	EW-PDM-S12	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-PDM-13	EW-PDM-S13	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-PDM-17	EW-PDM-S17	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-PDM-2	EW-PDM-S2	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-PDM-3	EW-PDM-S3	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-PDM-48	EW-PDM-S48	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-PDM-5	EW-PDM-S5	subtidal	10	grab	no	x			x	x	x	x		x				x	x
Recontamination Monitoring 2006																			
EW-RM-1	EW-RM06-1	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-RM-10	EW-RM06-10	subtidal	10	grab	**yes**						x								
EW-RM-15	EW-RM06-15	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-RM-16	EW-RM06-101[b]	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-RM-16	EW-RM06-16	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-RM-18	EW-RM06-18	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-RM-19	EW-RM06-19	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-RM-2	EW-RM06-2	subtidal	10	grab	**yes**						x			x					
EW-RM-20	EW-RM06-20	subtidal	10	grab	**yes**						x			x					
EW-RM-21	EW-RM06-21	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-RM-23	EW-RM06-23	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-RM-24	EW-RM06-24	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-RM-25	EW-RM06-25	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-RM-26	EW-RM06-26	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-RM-28	EW-RM06-28	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-RM-3	EW-RM06-3	subtidal	10	grab	**yes**						x			x					

Table 6. ERA surface sediment dataset (cont.)

Task/ Location Name	Sample Name	Tidal Stratum	Lower Depth	Grab or Comp	Trumped[a]	Metals	Metals_SEM	Butyltins	PAHs	Phthalates	Other SVOCs	PCB Aroclors	PCB Cong	Pesticides	VOCs	Dioxin/furan	Petroleum	Grain size	Conventionals
EW-RM-4	EW-RM06-4	subtidal	10	grab	**yes**						x								
EW-RM-5	EW-RM06-5	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-RM-6	EW-RM06-6	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-RM-7	EW-RM06-7	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-RM-8	EW-RM06-8	subtidal	10	grab	no	x			x	x	x	x		x				x	x
Recontamination Monitoring 2007																			
EW-RM-10	EW-RM07-10	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-RM-15	EW-RM07-15	subtidal	5	grab	**yes**									x					
EW-RM-27	EW-RM07-27	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-RM-29	EW-RM07-29	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-RM-30	EW-RM07-30	subtidal	10	grab	**yes**									x					
EW-RM-32	EW-RM07-32	subtidal	10	grab	**yes**									x					
EW-RM-33	EW-RM07-33	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-RM-34	EW-RM07-34	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-RM-35	EW-RM07-35	subtidal	5	grab	no	x			x	x	x	x		x				x	x
EW-RM-36	EW-RM07-36	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-RM-37	EW-RM07-102[b]	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-RM-37	EW-RM07-37	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-RM-38	EW-RM07-38	subtidal	7	grab	**yes**									x					
EW-RM-39	EW-RM07-39	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-RM-4	EW-RM07-4	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-RM-40	EW-RM07-40	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-RM-41	EW-RM07-41	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-RM-42	EW-RM07-42	subtidal	10	grab	**yes**									x					
EW-RM-43	EW-RM07-43	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-RM-44	EW-RM07-44	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-RM-45	EW-RM07-101[b]	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-RM-45	EW-RM07-45	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-RM-46	EW-RM07-46	subtidal	10	grab	no	x			x	x	x	x		x				x	x
EW-RM-47	EW-RM07-47	subtidal	10	grab	no	x			x	x	x	x		x				x	x
T18-PDM																			

Table 6. ERA surface sediment dataset (cont.)

Task/ Location Name	Sample Name	Tidal Stratum	Lower Depth	Grab or Comp	Trumped[a]	Metals	Metals_SEM	Butyltins	PAHs	Phthalates	Other SVOCs	PCB Aroclors	PCB Cong	Pesticides	VOCs	Dioxin/furan	Petroleum	Grain size	Conventionals
PDM-01	PDM-01	subtidal	10	grab	no	x		x	x			x		x					x
PDM-02	PDM-02	subtidal	10	grab	**yes**			x						x					
PDM-03	PDM-03	subtidal	10	grab	no	x		x	x			x		x					x
PDM-05	PDM-05	subtidal	10	grab	**yes**			x											
PDM-06	PDM-06	subtidal	10	grab	no	x			x			x		x					x
PDM-07	PDM-07	subtidal	10	grab	no	x			x			x		x					x
PDM-08	PDM-08	subtidal	10	grab	no	x		x	x			x		x					x
PDM-09	PDM-09	subtidal	10	grab	no	x			x			x		x					x
PDM-10	PDM-10	subtidal	10	grab	no	x		x	x			x		x					x
PDM-11	PDM-11	subtidal	10	grab	no	x			x			x		x					x
PDM-15	PDM-15	subtidal	10	grab	no	x		x	x			x		x					X
USCG P36 PostDredge Sed Char																			
S-1/3/5	S-1/3/5	subtidal	10	grab	no	x			x	x	x	x						x	X
S-2/4/6	S-2/4/6	subtidal	10	grab	no	x			x	x	x	x						x	X
S-61a	S-61a	subtidal	10	grab	no	x			x	x	x	x						x	X
S-61b	S-61b	subtidal	10	grab	no	x			x	x	x	x						x	X
S-62	S-62	subtidal	10	grab	no	x			x	x	x	x						x	X
S-63/40	S-63/40	subtidal	10	grab	no	x			x	x	x	x						x	X
S-64/40	S-64/40	subtidal	10	grab	no	x			x	x	x	x						x	X
S-65	S-65	subtidal	10	grab	no	x			x	x	x	x						x	X
S-66/40	S-66/40	subtidal	10	grab	no	x			x	x	x	x						x	x
S-66/40	S-68[b]	subtidal	10	grab	no	x			x	x	x	x						x	x
S-67/40	S-67/40	subtidal	10	grab	no	x			x	x	x	x						x	x

[a] A “yes” in the trumped column indicates that a more recent sample was collected at this location, which superseded some (but not all) of the chemistry data from the older sample. The chemistry data that was not trumped is indicated in the table.

[b] Field duplicate

CSO – combined sewer overflow
FD – field duplicate
HI – Harbor Island
ID – identification
PAH – polycyclic aromatic hydrocarbon
PCB – polychlorinated biphenyl
SEM – simultaneously extracted metals
VOC – volatile organic compound

2.3 WATER DATASET

2.3.1 Surface water data

The surface water dataset for the ERA consists of data collected in 2008 and 2009 for the SRI and data collected in 1996–1997 by King County as part of its water quality assessment (WQA) (Table 7). King County collected 188 samples from three locations at two depths along a transect in the EW near the Hanford CSO outfall. Sampling was conducted on a weekly basis from October 1996 to June 1997. The SRI dataset consists of 59 samples collected during five separate sampling events (two dry season events, two wet season events, and one storm event) at five locations at two depths (Map A.2-5). The semivolatile organic compound data collected by King County as part of its WQA were not used in this ERA because of the higher analytical detection limits compared with the SRI/feasibility study detection limits for some of the compounds; these data will be presented in the SRI. However, the metals datasets were combined for use in this ERA because the ranges of detected concentrations were generally comparable between the two datasets (Table 8).

Table 7. Summary of surface water data used in the EW ERA

Year of Sample Collection	Sampling Event	No. of Samples Analyzed	Analytes	Source
2008–2009	SRI/FS	59	metals (filtered and unfiltered), PCBs congeners, SVOCs, TBT, and conventionals	Windward (2010f)
1996–1997	King County WQA	188[a]	metals (filtered and unfiltered), SVOCs,[b] and conventional	King County (1999)

a Samples analyzed only for conventional parameters are not included in the number of samples analyzed.

b SVOC data collected by King County were not used in this ERA because of the higher analytical sensitivity for organic chemicals in the SRI/FS dataset.

ERA – ecological risk assessment
EW – East Waterway
FS – feasibility study
PCB – polychlorinated biphenyl
SRI – supplemental remedial investigation
SVOC – semivolatile organic compound
TBT – tributyltin
WQA – water quality assessment

Table 8. ERA surface water dataset

Location ID	No. of Samples	Conventionals	Metals	Organometals	Other SVOCs	PAHs	PCBs	Phthalates
King County WQA Dataset								
HNF/C	73	X	X					
HNF/E	64	X	X					
HNF/W	64	X	X					
EW SRI/FS Dataset								
EW-SW-1	14	X	X	X	X	X	X	X
EW-SW-2	13	X	X	X	X	X	X	X
EW-SW-3	10	X	X	X	X	X	X	X
EW-SW-4	2	X	X	X	X	X	X	X
EW-SW-5	9	X	X	X	X	X	X	X
EW-SW-6	11	X	X	X	X	X	X	X

EW – East Waterway
HHRA – human health risk assessment
FS – feasibility study
ID – identification
PAH – polycyclic aromatic hydrocarbon
PCB – polychlorinated biphenyl
SRI – supplemental remedial investigation
SVOC – semivolatile organic compound
WQA – water quality assessment

2.3.2 Porewater data

The ERA includes an evaluation of risk to benthic invertebrates from exposure to volatile organic compounds (VOCs) in porewater. Therefore, sediment porewater data were collected from the EW and analyzed for VOCs for the EW SRI. No historical data are available for VOCs in EW porewater. Thirteen porewater samples were collected in July 2010 from four intertidal areas in the EW.

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ATTACHMENT 2
RESULTS OF THE COI SCREEN

This attachment presents the results of the chemical of interest (COI) screen described in Section A.2.5 of the East Waterway (EW) ecological risk assessment. The set of criteria that needed to be met for COI selection for each of the receptors of concern (ROCs) are presented in Table A.2-15. Table 1 of this attachment lists the detection frequencies for chemicals analyzed in the EW and indicates which of the individual criteria were met for each chemical. The individual criteria in Table 1 are as follows:

- **C1**: SMS value was available
- **C2**: Chemical was detected in at least one surface sediment sample
- **C3**: Chemical was detected in 5% or more of the surface sediment samples
- **C4**: Chemical was identified as a bioaccumulative chemical in EPA (2000)
- **C5**: Chemical was detected in at least one crab tissue sample
- **C6**: Chemical was detected in at least one tissue sample or any type
- **C7**: Chemical was detected in at least one fish tissue sample
- **C8**: Chemical was detected in at least one surface water sample
- **C9**: Chemical was detected in at least one porewater sample
- **C10**: Chemical has no sediment criteria
- **C11**: Chemicals with highest number of exceedances of SMS values

Table 2 identifies whether the particular set of criteria for each ROC and type of evaluation were met.[1] The sets of criteria for each ROC and type of evaluation are as follows:

- Benthic invertebrate community
  - Sediment: C1 and C2, or C3
  - Porewater: C9
  - Surface water: C8
  - Tissue: TBT C10, total PCBs and mercury C11

[1] The benthic invertebrate community tissue evaluation was not included in the COI screen; instead it was determined that the COPCs would include mercury, TBT, and total PCBs.

- Crab
  - Tissue: at least two of C3, C4, and C5
  - Surface water: C8
- Fish
  - Tissue: at least two of C3, C4, and C7
  - Diet: C3 and C6
  - Surface water: C8
- Wildlife
  - At least two of C3, C4, and C6

Table 1. Detection frequencies for EW chemicals and criteria for COI selection

Chemical	Detection Frequency						Criterion Met?								
	Surface Sediment	Crab Tissue	Any Tissue Type	Fish Tissue	Surface Water	Porewater	C1 (SMS Available)	C2 (Detected in Surface Sediment)	C3 (Detected in > 5% of Surface Sediment)	C4 (Bioaccumulative Chemical)	C5 (Detected in Crab)	C6 (Detected in Any Tissue)	C7 (Detected in Any Fish Tissue)	C8 (Detected in Surface Water)	C9 (Detected in Porewater)
Metals															
Aluminum	na	na	na	na	na	na	no	na	no	no	na	na	na	na	na
Antimony	4/187	8/9	43/89	5/39	283/351	na	**yes**	**yes**	no	no	**yes**	**yes**	**yes**	**yes**	na
Arsenic	162/231	9/9	91/91	39/39	357/357	na	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	na
Arsenic (inorganic)	na	9/9	64/64	32/32	na	na	no	na	na	no	**yes**	**yes**	**yes**	na	na
Barium	na	na	na	na	na	na	no	na	na	no	na	na	na	na	na
Beryllium	na	na	na	na	1/223	na	no	na	na	no	na	na	na	**yes**	na
Cadmium	155/231	9/9	45/89	2/39	356/363	na	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	na
Chromium	231/231	8/9	86/89	37/39	293/333	na	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	na
Chromium VI	na	na	na	na	na	na	no	na	no	**yes**	na	na	na	na	na
Cobalt	111/111	9/9	42/86	6/39	236/345	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
Copper	231/231	9/9	89/89	39/39	353/353	na	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	na
Iron	na	na	na	na	na	na	no	na	no	no	na	na	na	na	na
Lead	228/231	0/9	20/89	1/39	291/363	na	**yes**	**yes**	**yes**	**yes**	no	**yes**	**yes**	**yes**	na
Manganese	na	na	na	na	na	na	no	na	no	no	na	na	na	na	na
Mercury	233/239	9/9	97/107	57/57	78/142	na	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	na
Methylmercury	na	na	na	na	na	na	no	na	no	**yes**	na	na	na	na	na
Molybdenum	71/111	9/9	64/83	25/39	na	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	na	na
Nickel	219/220	5/9	37/89	9/39	262/347	na	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	na
Selenium	0/118	9/9	82/83	38/39	117/351	na	no	no	no	**yes**	**yes**	**yes**	**yes**	**yes**	na
Silver	97/231	9/9	19/89	1/39	1/363	na	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	na
Thallium	0/111	0/9	9/83	1/39	319/363	na	no	no	no	no	no	**yes**	**yes**	**yes**	na
Vanadium	111/111	9/9	62/83	18/39	302/303	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
Zinc	231/231	9/9	89/89	39/39	322/362	na	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	na
Organometals															
Monobutyltin as ion	10/59	0/8	4/81	0/37	5/59	na	no	**yes**	**yes**	no	no	**yes**	no	**yes**	na
Dibutyltin as ion	26/60	1/9	16/82	4/37	2/59	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
Tributyltin as ion	60/67	1/9	71/85	32/37	1/59	na	no	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	na
PAHs															
1-Methylnaphthalene	36/141	6/9	55/84	25/39	3/59	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
2-Chloronaphthalene	0/176	0/9	0/75	0/38	0/59	na	no	no	no	no	no	no	no	no	na
2-Methylnaphthalene	87/240	6/9	53/90	25/39	4/59	na	**yes**	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
Acenaphthene	126/240	9/9	70/90	31/39	12/59	na	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	na
Acenaphthylene	109/240	7/9	65/90	31/39	0/59	na	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	no	na
Anthracene	209/240	8/9	72/90	29/39	2/59	na	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	na
Benzo(a)anthracene	226/240	7/9	50/90	5/39	1/59	na	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	na
Benzo(a)pyrene	225/240	7/9	49/90	7/39	0/59	na	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	no	na

Table 1. Detection frequencies for EW chemicals and criteria for COI selection (cont.)

Chemical	Detection Frequency						Criterion Met?								
	Surface Sediment	Crab Tissue	Any Tissue Type	Fish Tissue	Surface Water	Porewater	C1 (SMS Available)	C2 (Detected in Surface Sediment)	C3 (Detected in > 5% of Surface Sediment)	C4 (Bioaccumulative Chemical)	C5 (Detected in Crab)	C6 (Detected in Any Tissue)	C7 (Detected in Any Fish Tissue)	C8 (Detected in Surface Water)	C9 (Detected in Porewater)
Benzo(b)fluoranthene	228/240	8/9	58/90	15/39	0/59	na	no	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	no	na
Benzo(e)pyrene	na	na	1/1	1/1	na	na	no	na	no	no	na	**yes**	**yes**	na	na
Benzo(g,h,i)perylene	212/240	8/9	58/90	16/39	0/59	na	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	no	na
Benzo(k)fluoranthene	222/240	8/9	57/90	14/39	0/59	na	no	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	no	na
Total benzofluoranthenes	228/240	8/9	58/90	15/39	0/59	na	**yes**	**yes**	**yes**	no	**yes**	**yes**	**yes**	no	na
Chrysene	230/240	7/9	52/90	5/39	4/59	na	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	na
Dibenzo(a,h)anthracene	156/240	7/9	46/90	12/39	0/59	na	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	no	na
Dibenzofuran	107/240	9/9	66/90	31/39	1/59	na	**yes**	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
Fluoranthene	233/240	8/9	52/90	3/39	15/59	na	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	na
Fluorene	144/240	9/9	70/90	31/39	3/59	na	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	na
Indeno(1,2,3-cd)pyrene	210/240	8/9	56/90	15/39	0/59	na	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	no	na
Naphthalene	118/240	4/9	25/90	13/39	17/59	2/13	**yes**	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	**yes**
Perylene	na	6/7	30/60	2/31	na	na	no	na	no	no	**yes**	**yes**	**yes**	na	na
Phenanthrene	230/240	8/9	63/90	17/39	13/59	na	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	na
Pyrene	235/240	8/9	50/90	3/39	15/59	na	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	na
Total HPAHs	237/240	9/9	66/90	16/39	21/59	na	**yes**	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
Total LPAHs	230/240	9/9	78/90	31/39	28/59	na	**yes**	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
Total PAHs	237/240	9/9	81/90	31/39	35/59	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
Phthalates															
Bis(2-ethylhexyl) phthalate	207/231	0/3	0/48	0/25	3/59	na	**yes**	**yes**	**yes**	no	no	no	no	**yes**	na
Butyl benzyl phthalate	101/231	0/9	0/75	0/38	0/59	na	**yes**	**yes**	**yes**	no	no	no	no	no	na
Diethyl phthalate	19/231	0/9	0/75	0/38	2/59	na	**yes**	**yes**	**yes**	no	no	no	no	**yes**	na
Dimethyl phthalate	15/231	0/9	0/75	0/38	0/59	na	**yes**	**yes**	**yes**	no	no	no	no	no	na
Di-n-butyl phthalate	32/231	0/9	0/75	0/38	0/59	na	**yes**	**yes**	**yes**	no	no	no	no	no	na
Di-n-octyl phthalate	9/231	0/9	0/75	0/38	0/59	na	**yes**	**yes**	no	no	no	no	no	no	na
Other SVOCs															
1,2,4-Trichlorobenzene	7/231	0/9	0/75	0/38	0/59	0/13	**yes**	**yes**	no	**yes**	no	no	no	no	no
1,2-Dichlorobenzene	2/231	0/9	0/75	0/38	0/59	0/13	**yes**	**yes**	no	**yes**	no	no	no	no	no
1,2-Diphenylhydrazine	na	na	0/6	na	na	na	no	na	no	no	na	no	na	na	na
1,3-Dichlorobenzene	2/214	0/9	0/75	0/38	0/59	0/13	**yes**	**yes**	no	**yes**	no	no	no	no	no
1,4-Dichlorobenzene	146/231	0/9	1/75	1/38	1/59	0/13	**yes**	**yes**	**yes**	**yes**	no	**yes**	**yes**	**yes**	no
2,4,5-Trichlorophenol	0/176	0/9	0/75	0/38	0/59	na	no	no	no	no	no	no	no	no	na
2,4,6-Trichlorophenol	0/176	0/9	0/75	0/38	0/59	na	no	no	no	no	no	no	no	no	na
2,4-Dichlorophenol	0/176	0/9	0/75	0/38	0/59	na	no	no	no	no	no	no	no	no	na
2,4-Dimethylphenol	14/231	0/9	0/75	0/38	0/59	na	**yes**	**yes**	**yes**	no	no	no	no	no	na
2,4-Dinitrophenol	0/176	0/9	0/75	0/38	0/59	na	no	no	no	no	no	no	no	no	na
2,4-Dinitrotoluene	1/176	0/9	0/75	0/38	0/59	na	no	**yes**	no	no	no	no	no	no	na
2,6-Dinitrotoluene	0/176	0/9	0/75	0/38	0/59	na	no	no	no	no	no	no	no	no	na
2-Chlorophenol	0/176	0/9	0/75	0/38	0/59	na	no	no	no	no	no	no	no	no	na

Table 1. Detection frequencies for EW chemicals and criteria for COI selection (cont.)

Chemical	Detection Frequency						Criterion Met?								
	Surface Sediment	Crab Tissue	Any Tissue Type	Fish Tissue	Surface Water	Porewater	C1 (SMS Available)	C2 (Detected in Surface Sediment)	C3 (Detected in > 5% of Surface Sediment)	C4 (Bioaccumulative Chemical)	C5 (Detected in Crab)	C6 (Detected in Any Tissue)	C7 (Detected in Any Fish Tissue)	C8 (Detected in Surface Water)	C9 (Detected in Porewater)
2-Methylphenol	6/231	0/9	6/75	0/38	0/59	na	**yes**	**yes**	no	no	no	**yes**	no	no	na
2-Nitroaniline	0/176	0/9	0/75	0/38	0/59	na	no	no	no	no	no	no	no	no	na
2-Nitrophenol	0/176	0/9	0/75	0/38	0/59	na	no	no	no	no	no	no	no	no	na
3,3'-Dichlorobenzidine	0/174	0/9	0/69	0/38	0/59	na	no	no	no	no	no	no	no	no	na
3-Nitroaniline	0/175	0/9	0/72	0/38	0/59	na	no	no	no	no	no	no	no	no	na
4,6-Dinitro-o-cresol	0/176	0/9	0/75	0/38	0/59	na	no	no	no	no	no	no	no	no	na
4-Bromophenyl phenyl ether	0/176	0/9	0/75	0/38	0/59	na	no	no	no	**yes**	no	no	no	no	na
4-Chloro-3-methylphenol	0/176	0/9	0/75	0/38	0/59	na	no	no	no	no	no	no	no	no	na
4-Chloroaniline	0/174	0/9	0/69	0/38	0/59	na	no	no	no	no	no	no	no	no	na
4-Chlorophenyl phenyl ether	0/176	0/9	0/75	0/38	0/59	na	no	no	no	**yes**	no	no	no	no	na
4-Methylphenol	48/231	0/9	0/75	0/38	0/59	na	**yes**	**yes**	**yes**	no	no	no	no	no	na
4-Nitroaniline	0/176	0/9	0/75	0/38	0/59	na	no	no	no	no	no	no	no	no	na
4-Nitrophenol	0/176	0/9	0/75	0/38	0/59	na	no	no	no	no	no	no	no	no	na
Aniline	1/160	0/9	0/75	0/38	0/59	na	no	**yes**	no	no	no	no	no	no	na
Benzidine	na	na	na	na	na	na	no	na	no	no	na	na	na	na	na
Benzoic acid	3/231	0/8	24/74	0/38	0/59	na	**yes**	**yes**	no	no	no	**yes**	no	no	na
Benzyl alcohol	0/11	0/9	0/75	0/38	0/59	na	no	no	no	no	no	no	no	no	na
Benzyl alcohol	2/220	0/9	0/75	0/38	0/59	na	**yes**	**yes**	no	no	no	no	no	no	na
Biphenyl	na	na	1/1	1/1	na	na	no	na	no	no	na	**yes**	**yes**	na	na
bis(2-chloroethoxy)methane	0/176	0/9	0/75	0/38	0/59	na	no	no	no	no	no	no	no	no	na
bis(2-chloroethyl)ether	0/176	0/9	0/75	0/38	0/59	na	no	no	no	no	no	no	no	no	na
bis(2-chloroisopropyl)ether	1/176	0/9	0/75	0/38	0/59	na	no	**yes**	no	no	no	no	no	no	na
Caffeine	na	na	0/6	na	na	na	no	na	no	no	na	no	na	na	na
Carbazole	85/133	0/9	0/75	0/38	0/59	na	no	**yes**	**yes**	no	no	no	no	no	na
Coprostanol	na	na	0/6	na	na	na	no	na	no	no	na	no	na	na	na
Dibenzothiophene	na	na	1/1	1/1	na	na	no	na	no	no	na	**yes**	**yes**	na	na
Hexachlorobenzene	0/231	0/9	0/75	0/38	0/59	na	**yes**	no	no	**yes**	no	no	no	no	na
Hexachlorobutadiene	0/231	0/9	0/75	0/38	0/59	0/13	**yes**	no	no	**yes**	no	no	no	no	no
Hexachlorocyclopentadiene	0/174	0/9	0/75	0/38	0/59	na	no	no	no	**yes**	no	no	no	no	na
Hexachloroethane	0/176	0/9	0/75	0/38	0/59	na	**yes**	no	no	**yes**	no	no	no	no	na
Isophorone	0/176	0/9	0/75	0/38	0/59	na	no	no	no	no	no	no	no	no	na
n-Nitroso-di-n-propylamine	1/176	0/9	0/75	0/38	0/59	na	no	**yes**	no	no	no	no	no	no	na
n-Nitrosodimethylamine	0/160	0/9	0/75	0/38	0/59	na	no	no	no	no	no	no	no	no	na
n-Nitrosodiphenylamine	2/231	0/9	0/75	0/38	0/59	na	**yes**	**yes**	no	no	no	no	no	no	na
Nitrobenzene	0/176	0/9	0/75	0/38	0/59	na	no	no	no	no	no	no	no	no	na
Pentachlorophenol	10/231	0/3	2/48	0/25	0/59	na	**yes**	**yes**	no	**yes**	no	**yes**	no	no	na
Phenol	94/231	8/9	8/75	0/38	0/59	na	**yes**	**yes**	**yes**	no	**yes**	**yes**	no	no	na
Retene	na	na	na	na	na	na	no	na	no	no	na	na	na	na	na

Table 1. Detection frequencies for EW chemicals and criteria for COI selection (cont.)

Chemical	Detection Frequency						Criterion Met?								
	Surface Sediment	Crab Tissue	Any Tissue Type	Fish Tissue	Surface Water	Porewater	C1 (SMS Available)	C2 (Detected in Surface Sediment)	C3 (Detected in > 5% of Surface Sediment)	C4 (Bioaccumulative Chemical)	C5 (Detected in Crab)	C6 (Detected in Any Tissue)	C7 (Detected in Any Fish Tissue)	C8 (Detected in Surface Water)	C9 (Detected in Porewater)
PCBs															
PCB-001	12/13	3/3	10/18	4/12	18/57	na	no	yes	yes	no	yes	yes	yes	yes	na
PCB-002	13/13	3/3	7/18	1/12	9/57	na	no	yes	yes	no	yes	yes	yes	yes	na
PCB-003	13/13	3/3	9/18	3/12	15/57	na	no	yes	yes	no	yes	yes	yes	yes	na
PCB-004	13/13	3/3	17/18	11/12	39/57	na	no	yes	yes	no	yes	yes	yes	yes	na
PCB-005	12/13	0/3	4/18	3/12	1/57	na	no	yes	yes	no	no	yes	yes	yes	na
PCB-006	13/13	3/3	16/18	10/12	32/57	na	no	yes	yes	no	yes	yes	yes	yes	na
PCB-007	13/13	3/3	13/18	7/12	6/57	na	no	yes	yes	no	yes	yes	yes	yes	na
PCB-008	13/13	0/3	12/18	9/12	49/57	na	no	yes	yes	yes	no	yes	yes	yes	na
PCB-009	13/13	3/3	14/18	8/12	15/57	na	no	yes	yes	no	yes	yes	yes	yes	na
PCB-010	11/13	0/3	10/18	7/12	4/57	na	no	yes	yes	no	no	yes	yes	yes	na
PCB-011	8/13	0/3	7/18	6/12	10/57	na	no	yes	yes	no	no	yes	yes	yes	na
PCB-012	13/13	3/3	12/18	6/12	6/57	na	no	yes	yes	no	yes	yes	yes	yes	na
PCB-013	13/13	3/3	12/18	6/12	6/57	na	no	yes	yes	no	yes	yes	yes	yes	na
PCB-014	0/13	0/3	0/18	0/12	0/57	na	no	no	no	no	no	no	no	no	na
PCB-015	13/13	3/3	14/18	8/12	46/57	na	no	yes	yes	no	yes	yes	yes	yes	na
PCB-016	13/13	3/3	17/18	11/12	43/57	na	no	yes	yes	no	yes	yes	yes	yes	na
PCB-017	13/13	3/3	18/18	12/12	50/57	na	no	yes	yes	no	yes	yes	yes	yes	na
PCB-018	13/13	3/3	18/18	12/12	50/57	na	no	yes	yes	yes	yes	yes	yes	yes	na
PCB-019	13/13	3/3	16/18	10/12	28/57	na	no	yes	yes	no	yes	yes	yes	yes	na
PCB-020	13/13	3/3	18/18	12/12	46/57	na	no	yes	yes	no	yes	yes	yes	yes	na
PCB-021	13/13	3/3	17/18	11/12	46/57	na	no	yes	yes	no	yes	yes	yes	yes	na
PCB-022	13/13	3/3	18/18	12/12	46/57	na	no	yes	yes	no	yes	yes	yes	yes	na
PCB-023	5/13	0/3	7/18	5/12	0/57	na	no	yes	yes	no	no	yes	yes	no	na
PCB-024	13/13	2/3	11/18	7/12	2/57	na	no	yes	yes	no	yes	yes	yes	yes	na
PCB-025	13/13	3/3	17/18	11/12	52/57	na	no	yes	yes	no	yes	yes	yes	yes	na
PCB-026	13/13	3/3	18/18	12/12	44/57	na	no	yes	yes	no	yes	yes	yes	yes	na
PCB-027	13/13	3/3	18/18	12/12	43/57	na	no	yes	yes	no	yes	yes	yes	yes	na
PCB-028	13/13	3/3	18/18	12/12	46/57	na	no	yes	yes	yes	yes	yes	yes	yes	na
PCB-029	13/13	3/3	18/18	12/12	44/57	na	no	yes	yes	no	yes	yes	yes	yes	na
PCB-030	13/13	3/3	18/18	12/12	50/57	na	no	yes	yes	no	yes	yes	yes	yes	na
PCB-031	13/13	3/3	18/18	12/12	49/57	na	no	yes	yes	no	yes	yes	yes	yes	na
PCB-032	13/13	3/3	18/18	12/12	43/57	na	no	yes	yes	no	yes	yes	yes	yes	na
PCB-033	13/13	3/3	17/18	11/12	46/57	na	no	yes	yes	no	yes	yes	yes	yes	na
PCB-034	12/13	3/3	15/18	9/12	1/57	na	no	yes	yes	no	yes	yes	yes	yes	na
PCB-035	13/13	3/3	6/18	0/12	3/57	na	no	yes	yes	no	yes	yes	no	yes	na
PCB-036	1/13	2/3	5/18	0/12	0/57	na	no	yes	yes	no	yes	yes	no	no	na
PCB-037	13/13	3/3	16/18	10/12	29/57	na	no	yes	yes	no	yes	yes	yes	yes	na
PCB-038	3/13	2/3	13/18	8/12	0/57	na	no	yes	yes	no	yes	yes	yes	no	na

Table 1. Detection frequencies for EW chemicals and criteria for COI selection (cont.)

Chemical	Detection Frequency						Criterion Met?								
	Surface Sediment	Crab Tissue	Any Tissue Type	Fish Tissue	Surface Water	Porewater	C1 (SMS Available)	C2 (Detected in Surface Sediment)	C3 (Detected in > 5% of Surface Sediment)	C4 (Bioaccumulative Chemical)	C5 (Detected in Crab)	C6 (Detected in Any Tissue)	C7 (Detected in Any Fish Tissue)	C8 (Detected in Surface Water)	C9 (Detected in Porewater)
PCB-039	12/13	3/3	11/18	5/12	5/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-040	13/13	3/3	18/18	12/12	51/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-041	13/13	3/3	11/18	5/12	12/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-042	13/13	3/3	18/18	12/12	38/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-043	13/13	3/3	16/18	10/12	3/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-044	13/13	3/3	18/18	12/12	55/57	na	no	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	na
PCB-045	13/13	3/3	18/18	12/12	26/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-046	13/13	3/3	15/18	9/12	16/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-047	13/13	3/3	18/18	12/12	55/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-048	13/13	3/3	18/18	12/12	30/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-049	13/13	3/3	18/18	12/12	55/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-050	13/13	3/3	18/18	12/12	48/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-051	13/13	2/3	17/18	12/12	54/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-052	13/13	3/3	18/18	12/12	55/57	na	no	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	na
PCB-053	13/13	3/3	18/18	12/12	48/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-054	13/13	2/3	16/18	11/12	5/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-055	10/13	2/3	9/18	4/12	0/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	no	na
PCB-056	13/13	3/3	18/18	12/12	38/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-057	12/13	2/3	16/18	11/12	0/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	no	na
PCB-058	3/13	0/3	0/18	0/12	0/57	na	no	**yes**	**yes**	no	no	no	no	no	na
PCB-059	13/13	3/3	18/18	12/12	19/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-060	13/13	3/3	18/18	12/12	30/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-061	13/13	3/3	18/18	12/12	50/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-062	13/13	3/3	18/18	12/12	19/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-063	13/13	3/3	18/18	12/12	7/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-064	13/13	3/3	18/18	12/12	48/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-065	13/13	3/3	18/18	12/12	55/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-066	13/13	3/3	18/18	12/12	50/57	na	no	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	na
PCB-067	13/13	3/3	13/18	7/12	3/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-068	13/13	3/3	16/18	10/12	38/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-069	13/13	3/3	18/18	12/12	55/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-070	13/13	3/3	18/18	12/12	50/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-071	13/13	3/3	18/18	12/12	51/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-072	13/13	3/3	18/18	12/12	3/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-073	12/13	3/3	11/18	7/12	1/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-074	13/13	3/3	18/18	12/12	50/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-075	13/13	3/3	18/18	12/12	19/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-076	13/13	3/3	18/18	12/12	50/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-077	13/13	3/3	18/18	12/12	28/57	na	no	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	na

Table 1. Detection frequencies for EW chemicals and criteria for COI selection (cont.)

Chemical	Detection Frequency						Criterion Met?								
	Surface Sediment	Crab Tissue	Any Tissue Type	Fish Tissue	Surface Water	Porewater	C1 (SMS Available)	C2 (Detected in Surface Sediment)	C3 (Detected in > 5% of Surface Sediment)	C4 (Bioaccumulative Chemical)	C5 (Detected in Crab)	C6 (Detected in Any Tissue)	C7 (Detected in Any Fish Tissue)	C8 (Detected in Surface Water)	C9 (Detected in Porewater)
PCB-078	0/13	0/3	0/18	0/12	0/57	na	no	no	no	no	no	no	no	no	na
PCB-079	12/13	3/3	17/18	11/12	1/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-080	2/13	0/3	0/18	0/12	0/57	na	no	**yes**	**yes**	no	no	no	no	no	na
PCB-081	13/13	1/3	7/18	3/12	0/57	na	no	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	no	na
PCB-082	13/13	3/3	15/18	9/12	20/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-083	8/13	3/3	4/18	1/12	12/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-084	13/13	3/3	18/18	12/12	41/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-085	13/13	3/3	18/18	12/12	28/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-086	13/13	3/3	18/18	12/12	48/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-087	13/13	3/3	18/18	12/12	48/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-088	0/13	0/3	0/18	0/12	0/57	na	no	no	no	no	no	no	no	no	na
PCB-089	13/13	0/3	9/18	6/12	1/57	na	no	**yes**	**yes**	no	no	**yes**	**yes**	**yes**	na
PCB-090	13/13	3/3	18/18	12/12	53/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-091	13/13	3/3	18/18	12/12	44/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-092	13/13	3/3	18/18	12/12	44/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-093	13/13	3/3	18/18	12/12	7/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-094	12/13	3/3	11/18	5/12	2/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-095	13/13	3/3	18/18	12/12	56/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-096	13/13	3/3	17/18	11/12	4/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-097	13/13	3/3	18/18	12/12	48/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-098	13/13	3/3	4/18	1/12	0/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	no	na
PCB-099	13/13	3/3	18/18	12/12	50/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-100	13/13	3/3	18/18	12/12	7/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-101	13/13	3/3	18/18	12/12	53/57	na	no	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	na
PCB-102	13/13	3/3	18/18	12/12	8/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-103	13/13	3/3	18/18	12/12	13/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-104	10/13	2/3	13/18	8/12	1/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-105	13/13	3/3	18/18	12/12	46/57	na	no	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	na
PCB-106	0/13	0/3	0/18	0/12	0/57	na	no	no	no	no	no	no	no	no	na
PCB-107	13/13	3/3	18/18	12/12	12/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-108	13/13	3/3	18/18	12/12	48/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-109	13/13	3/3	18/18	12/12	18/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-110	13/13	3/3	18/18	12/12	50/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-111	7/13	3/3	16/18	12/12	0/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	no	na
PCB-112	0/13	0/3	1/18	1/12	0/57	na	no	no	no	no	no	**yes**	**yes**	no	na
PCB-113	13/13	3/3	18/18	12/12	53/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-114	13/13	3/3	18/18	12/12	0/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	no	na
PCB-115	0/13	0/3	0/18	0/12	2/57	na	no	no	no	no	no	no	no	**yes**	na
PCB-116	13/13	3/3	18/18	12/12	28/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na

Table 1. Detection frequencies for EW chemicals and criteria for COI selection (cont.)

Chemical	Detection Frequency						Criterion Met?								
	Surface Sediment	Crab Tissue	Any Tissue Type	Fish Tissue	Surface Water	Porewater	C1 (SMS Available)	C2 (Detected in Surface Sediment)	C3 (Detected in > 5% of Surface Sediment)	C4 (Bioaccumulative Chemical)	C5 (Detected in Crab)	C6 (Detected in Any Tissue)	C7 (Detected in Any Fish Tissue)	C8 (Detected in Surface Water)	C9 (Detected in Porewater)
PCB-117	13/13	3/3	11/18	8/12	10/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-118	13/13	3/3	18/18	12/12	53/57	na	no	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	na
PCB-119	13/13	3/3	18/18	12/12	48/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-120	13/13	3/3	18/18	12/12	3/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-121	9/13	2/3	15/18	12/12	0/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	no	na
PCB-122	13/13	3/3	7/18	1/12	3/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-123	13/13	3/3	18/18	12/12	8/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-124	13/13	3/3	18/18	12/12	12/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-125	13/13	3/3	18/18	12/12	48/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-126	13/13	2/3	17/18	12/12	0/57	na	no	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	no	na
PCB-127	0/13	3/3	8/18	4/12	0/57	na	no	no	no	no	**yes**	**yes**	**yes**	no	na
PCB-128	13/13	3/3	18/18	12/12	39/57	na	no	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	na
PCB-129	13/13	3/3	18/18	12/12	46/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-130	13/13	3/3	18/18	12/12	22/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-131	13/13	3/3	17/18	11/12	3/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-132	13/13	3/3	18/18	12/12	46/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-133	13/13	3/3	18/18	12/12	10/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-134	13/13	3/3	18/18	12/12	16/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-135	13/13	3/3	17/18	11/12	44/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-136	13/13	3/3	18/18	12/12	47/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-137	13/13	3/3	17/18	12/12	13/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-138	13/13	3/3	18/18	12/12	46/57	na	no	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	na
PCB-139	13/13	3/3	18/18	12/12	4/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-140	13/13	3/3	18/18	12/12	4/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-141	13/13	3/3	18/18	12/12	43/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-142	0/13	0/3	0/18	0/12	0/57	na	no	no	no	no	no	no	no	no	na
PCB-143	5/13	0/3	0/18	0/12	0/57	na	no	**yes**	**yes**	no	no	no	no	no	na
PCB-144	13/13	3/3	18/18	12/12	29/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-145	4/13	0/3	4/18	3/12	0/57	na	no	**yes**	**yes**	no	no	**yes**	**yes**	no	na
PCB-146	13/13	3/3	18/18	12/12	38/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-147	13/13	3/3	18/18	12/12	57/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-148	13/13	3/3	18/18	12/12	1/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-149	13/13	3/3	18/18	12/12	57/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-150	13/13	3/3	18/18	12/12	5/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-151	13/13	3/3	17/18	11/12	44/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-152	13/13	3/3	13/18	7/12	1/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-153	13/13	3/3	18/18	12/12	46/57	na	no	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	na
PCB-154	13/13	3/3	18/18	12/12	16/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-155	13/13	3/3	18/18	12/12	1/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na

Table 1. Detection frequencies for EW chemicals and criteria for COI selection (cont.)

Chemical	Detection Frequency						Criterion Met?								
	Surface Sediment	Crab Tissue	Any Tissue Type	Fish Tissue	Surface Water	Porewater	C1 (SMS Available)	C2 (Detected in Surface Sediment)	C3 (Detected in > 5% of Surface Sediment)	C4 (Bioaccumulative Chemical)	C5 (Detected in Crab)	C6 (Detected in Any Tissue)	C7 (Detected in Any Fish Tissue)	C8 (Detected in Surface Water)	C9 (Detected in Porewater)
PCB-156	13/13	3/3	18/18	12/12	33/57	na	no	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	na
PCB-157	13/13	3/3	18/18	12/12	33/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-158	13/13	3/3	18/18	12/12	39/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-159	13/13	3/3	18/18	12/12	5/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-160	0/13	0/3	0/18	0/12	0/57	na	no	no	no	no	no	no	no	no	na
PCB-161	0/13	0/3	0/18	0/12	0/57	na	no	no	no	no	no	no	no	no	na
PCB-162	13/13	3/3	18/18	12/12	0/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	no	na
PCB-163	13/13	3/3	18/18	12/12	46/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-164	13/13	3/3	18/18	12/12	28/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-165	11/13	3/3	16/18	11/12	1/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-166	13/13	3/3	18/18	12/12	39/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-167	13/13	3/3	18/18	12/12	21/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-168	13/13	3/3	18/18	12/12	46/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-169	0/13	3/3	9/18	6/12	6/57	na	no	no	no	**yes**	**yes**	**yes**	**yes**	**yes**	na
PCB-170	13/13	3/3	18/18	12/12	42/57	na	no	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	na
PCB-171	13/13	3/3	18/18	12/12	32/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-172	13/13	3/3	18/18	12/12	23/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-173	13/13	3/3	18/18	12/12	32/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-174	13/13	3/3	18/18	12/12	45/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-175	13/13	3/3	18/18	12/12	4/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-176	13/13	3/3	18/18	12/12	29/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-177	13/13	3/3	18/18	12/12	45/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-178	13/13	3/3	18/18	12/12	31/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-179	13/13	3/3	18/18	12/12	40/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-180	13/13	3/3	18/18	12/12	54/57	na	no	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	na
PCB-181	13/13	3/3	18/18	12/12	1/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-182	13/13	3/3	18/18	12/12	1/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-183	13/13	3/3	18/18	12/12	40/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-184	13/13	3/3	17/18	12/12	0/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	no	na
PCB-185	13/13	3/3	14/18	9/12	12/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-186	0/13	0/3	0/18	0/12	0/57	na	no	no	no	no	no	no	no	no	na
PCB-187	13/13	3/3	18/18	12/12	44/57	na	no	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	na
PCB-188	13/13	3/3	18/18	12/12	1/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-189	13/13	3/3	18/18	12/12	9/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-190	13/13	3/3	18/18	12/12	29/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-191	13/13	3/3	18/18	12/12	10/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-192	0/13	0/3	0/18	0/12	0/57	na	no	no	no	no	no	no	no	no	na
PCB-193	13/13	3/3	18/18	12/12	54/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na
PCB-194	13/13	3/3	18/18	12/12	36/57	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na

Table 1. Detection frequencies for EW chemicals and criteria for COI selection (cont.)

Chemical	Detection Frequency						Criterion Met?								
	Surface Sediment	Crab Tissue	Any Tissue Type	Fish Tissue	Surface Water	Porewater	C1 (SMS Available)	C2 (Detected in Surface Sediment)	C3 (Detected in > 5% of Surface Sediment)	C4 (Bioaccumulative Chemical)	C5 (Detected in Crab)	C6 (Detected in Any Tissue)	C7 (Detected in Any Fish Tissue)	C8 (Detected in Surface Water)	C9 (Detected in Porewater)
PCB-195	13/13	3/3	18/18	12/12	20/57	na	no	yes	yes	yes	yes	yes	yes	yes	na
PCB-196	13/13	3/3	18/18	12/12	36/57	na	no	yes	yes	no	yes	yes	yes	yes	na
PCB-197	13/13	3/3	18/18	12/12	5/57	na	no	yes	yes	no	yes	yes	yes	yes	na
PCB-198	13/13	3/3	18/18	12/12	35/57	na	no	yes	yes	no	yes	yes	yes	yes	na
PCB-199	13/13	3/3	18/18	12/12	35/57	na	no	yes	yes	no	yes	yes	yes	yes	na
PCB-200	13/13	3/3	18/18	12/12	11/57	na	no	yes	yes	no	yes	yes	yes	yes	na
PCB-201	13/13	3/3	18/18	12/12	13/57	na	no	yes	yes	no	yes	yes	yes	yes	na
PCB-202	13/13	3/3	18/18	12/12	18/57	na	no	yes	yes	no	yes	yes	yes	yes	na
PCB-203	13/13	3/3	18/18	12/12	34/57	na	no	yes	yes	no	yes	yes	yes	yes	na
PCB-204	0/13	2/3	5/18	3/12	0/57	na	no	no	no	no	yes	yes	yes	no	na
PCB-205	13/13	3/3	18/18	12/12	5/57	na	no	yes	yes	no	yes	yes	yes	yes	na
PCB-206	13/13	3/3	18/18	12/12	45/57	na	no	yes	yes	yes	yes	yes	yes	yes	na
PCB-207	13/13	3/3	18/18	12/12	2/57	na	no	yes	yes	no	yes	yes	yes	yes	na
PCB-208	13/13	3/3	18/18	12/12	6/57	na	no	yes	yes	no	yes	yes	yes	yes	na
PCB-209	13/13	3/3	18/18	12/12	18/57	na	no	yes	yes	yes	yes	yes	yes	yes	na
Total PCB Congeners	13/13	3/3	18/18	12/12	57/57	na	no	yes	yes	no	yes	yes	yes	yes	na
Aroclor-1016	0/240	0/9	0/102	0/51	na	na	no	no	no	yes	no	no	no	na	na
Aroclor-1016/1242	na	na	6/6	6/6	na	na	no	na	no	no	na	yes	yes	na	na
Aroclor-1221	0/240	0/9	0/108	0/57	na	na	no	no	no	yes	no	no	no	na	na
Aroclor-1232	0/240	0/9	0/108	0/57	na	na	no	no	no	yes	no	no	no	na	na
Aroclor-1242	9/240	0/9	0/102	0/51	na	na	no	yes	no	yes	no	no	no	na	na
Aroclor-1248	66/240	0/9	5/108	5/57	na	na	no	yes	yes	yes	no	yes	yes	na	na
Aroclor-1254	188/240	3/9	73/108	44/57	na	na	no	yes	yes	yes	yes	yes	yes	na	na
Aroclor-1260	225/240	9/9	100/108	56/57	na	na	no	yes	yes	yes	yes	yes	yes	na	na
Aroclor-1262	0/122	na	0/6	0/6	na	na	no	no	no	no	na	no	no	na	na
Aroclor-1268	0/122	na	0/6	0/6	na	na	no	no	no	yes	na	no	no	na	na
Total PCBs	227/240	9/9	104/108	56/57	na	na	yes	yes	yes	no	yes	yes	yes	na	na
Pesticides															
2,4'-DDD	0/79	0/1	2/25	2/17	na	na	no	no	no	no	no	yes	yes	na	na
2,4'-DDE	0/79	0/1	0/25	0/17	na	na	no	no	no	no	no	no	no	na	na
2,4'-DDT	0/79	0/1	0/25	0/17	na	na	no	no	no	no	no	no	no	na	na
4,4'-DDD	6/143	1/1	16/25	11/17	na	na	no	yes	no	yes	yes	yes	yes	na	na
4,4'-DDE	2/143	1/1	12/25	11/17	na	na	no	yes	no	yes	yes	yes	yes	na	na
4,4'-DDT	0/142	0/1	10/25	10/17	na	na	no	no	no	yes	no	yes	yes	na	na
Total DDTs	8/143	1/1	16/25	11/17	na	na	yes	yes	yes	yes	yes	yes	yes	na	na
Aldrin	1/91	0/1	0/25	0/17	na	na	yes	yes	no	yes	no	no	no	na	na
Dieldrin	0/91	0/1	10/25	10/17	na	na	yes	no	no	yes	no	yes	yes	na	na
Total aldrin/dieldrin	1/91	0/1	10/25	10/17	na	na	no	yes	no	no	no	yes	yes	na	na
alpha-BHC	0/88	0/1	2/25	2/17	na	na	no	no	no	yes	no	yes	yes	na	na

Table 1. Detection frequencies for EW chemicals and criteria for COI selection (cont.)

Chemical	Detection Frequency						Criterion Met?								
	Surface Sediment	Crab Tissue	Any Tissue Type	Fish Tissue	Surface Water	Porewater	C1 (SMS Available)	C2 (Detected in Surface Sediment)	C3 (Detected in > 5% of Surface Sediment)	C4 (Bioaccumulative Chemical)	C5 (Detected in Crab)	C6 (Detected in Any Tissue)	C7 (Detected in Any Fish Tissue)	C8 (Detected in Surface Water)	C9 (Detected in Porewater)
beta-BHC	0/88	0/1	0/25	0/17	na	na	no	no	no	**yes**	no	no	no	na	na
gamma-BHC	0/91	0/1	0/25	0/17	na	na	**yes**	no	no	**yes**	no	no	no	na	na
delta-BHC	0/88	0/9	0/71	0/38	na	na	no	no	no	**yes**	no	no	no	na	na
alpha-Chlordane	0/91	0/1	12/25	11/17	na	na	no	no	no	**yes**	no	**yes**	**yes**	na	na
beta-Chlordane	0/62	0/1	13/19	11/11	na	na	no	no	no	**yes**	no	**yes**	**yes**	na	na
gamma-Chlordane	0/29	0/9	0/68	0/38	na	na	no	no	no	**yes**	no	no	no	na	na
Total chlordane	1/91	1/1	15/25	11/17	na	na	**yes**	**yes**	no	**yes**	**yes**	**yes**	**yes**	na	na
Chlordane	na	na	na	na	na	na	no	na	no	**yes**	na	na	na	na	na
Chlorpyrifos	na	0/1	0/19	0/11	na	na	no	na	no	**yes**	no	no	no	na	na
alpha-Endosulfan	0/88	0/1	0/24	0/17	na	na	no	no	no	**yes**	no	no	no	na	na
beta-Endosulfan	0/88	0/1	7/25	7/17	na	na	no	no	no	**yes**	no	**yes**	**yes**	na	na
Endosulfan sulfate	0/88	0/1	0/25	0/17	na	na	no	no	no	**yes**	no	no	no	na	na
Endrin	0/88	0/1	0/25	0/17	na	na	no	no	no	**yes**	no	no	no	na	na
Endrin aldehyde	0/88	0/1	0/24	0/17	na	na	no	no	no	**yes**	no	no	no	na	na
Endrin ketone	0/88	0/1	0/19	0/11	na	na	no	no	no	**yes**	no	no	no	na	na
Heptachlor	0/91	0/1	1/25	0/17	na	na	**yes**	no	no	**yes**	no	**yes**	no	na	na
Heptachlor epoxide	0/88	1/1	2/25	1/17	na	na	no	no	no	**yes**	**yes**	**yes**	**yes**	na	na
Isodrin	na	0/1	0/19	0/11	na	na	no	na	no	no	no	no	no	na	na
Methoxychlor	0/88	0/1	0/25	0/17	na	na	no	no	no	**yes**	no	no	no	na	na
Mirex	0/79	0/1	10/25	9/17	na	na	no	no	no	**yes**	no	**yes**	**yes**	na	na
cis-Nonachlor	0/79	1/1	12/25	11/17	na	na	no	no	no	**yes**	**yes**	**yes**	**yes**	na	na
trans-Nonachlor	1/79	1/1	15/25	11/17	na	na	no	**yes**	no	**yes**	**yes**	**yes**	**yes**	na	na
Octachlorostyrene	na	0/1	0/19	0/11	na	na	no	na	no	no	no	no	no	na	na
Oxychlordane	0/79	1/1	1/24	0/17	na	na	no	no	no	**yes**	**yes**	**yes**	no	na	na
Toxaphene	0/79	0/9	0/71	0/38	na	na	no	no	no	**yes**	no	no	no	na	na
VOCs															
1,1,1-Trichloroethane	na	na	na	na	na	0/13	no	na	no	no	na	na	na	na	no
1,1,2,2-Tetrachloroethane	na	na	na	na	na	0/13	no	na	no	no	na	na	na	na	no
1,1,2-Trichloroethane	na	na	na	na	na	0/13	no	na	no	no	na	na	na	na	no
1,1-Dichloroethane	na	na	na	na	na	0/13	no	na	no	no	na	na	na	na	no
1,1-Dichloroethene	na	na	na	na	na	0/13	no	na	no	no	na	na	na	na	no
1,2-Dichloroethane	na	na	na	na	na	0/13	no	na	no	no	na	na	na	na	no
1,2-Dichloroethene (total)	na	na	na	na	na	na	no	na	no	no	na	na	na	na	na
1,2-Dichloropropane	na	na	na	na	na	0/13	no	na	no	no	na	na	na	na	no
2-Hexanone	na	na	na	na	na	0/13	no	na	no	no	na	na	na	na	no
Acetone	na	na	na	na	na	0/13	no	na	no	no	na	na	na	na	no
Benzene	na	na	na	na	na	2/13	no	na	no	no	na	na	na	na	**yes**
Bromodichloromethane	na	na	na	na	na	0/13	no	na	no	no	na	na	na	na	no
Bromoform	na	na	na	na	na	0/13	no	na	no	no	na	na	na	na	no

Table 1. Detection frequencies for EW chemicals and criteria for COI selection (cont.)

Chemical	Detection Frequency						Criterion Met?								
	Surface Sediment	Crab Tissue	Any Tissue Type	Fish Tissue	Surface Water	Porewater	C1 (SMS Available)	C2 (Detected in Surface Sediment)	C3 (Detected in > 5% of Surface Sediment)	C4 (Bioaccumulative Chemical)	C5 (Detected in Crab)	C6 (Detected in Any Tissue)	C7 (Detected in Any Fish Tissue)	C8 (Detected in Surface Water)	C9 (Detected in Porewater)
Bromomethane	na	na	na	na	na	0/13	no	na	no	no	na	na	na	na	no
Carbon disulfide	na	na	na	na	na	0/13	no	na	no	no	na	na	na	na	no
Carbon tetrachloride	na	na	na	na	na	0/13	no	na	no	no	na	na	na	na	no
Chlorobenzene	na	na	na	na	na	0/13	no	na	no	no	na	na	na	na	no
Chloroethane	na	na	na	na	na	0/13	no	na	no	no	na	na	na	na	no
Chloroform	na	na	na	na	na	0/13	no	na	no	no	na	na	na	na	no
Chloromethane	na	na	na	na	na	0/13	no	na	no	no	na	na	na	na	no
cis-1,3-Dichloropropene	na	na	na	na	na	0/13	no	na	no	no	na	na	na	na	no
Dibromochloromethane	na	na	na	na	na	0/13	no	na	no	no	na	na	na	na	no
Dichloromethane	na	na	na	na	na	0/13	no	na	no	no	na	na	na	na	no
Ethylbenzene	na	na	na	na	na	0/13	no	na	no	no	na	na	na	na	no
Methyl ethyl ketone	na	na	na	na	na	0/13	no	na	no	no	na	na	na	na	no
Methyl isobutyl ketone	na	na	na	na	na	0/13	no	na	no	no	na	na	na	na	no
Styrene	na	na	na	na	na	0/13	no	na	no	no	na	na	na	na	no
Tetrachloroethene	na	na	na	na	na	0/13	no	na	no	no	na	na	na	na	no
Toluene	na	na	na	na	na	0/13	no	na	no	no	na	na	na	na	no
trans-1,3-Dichloropropene	na	na	na	na	na	0/13	no	na	no	no	na	na	na	na	no
Trichloroethene	na	na	na	na	na	0/13	no	na	no	no	na	na	na	na	no
Vinyl chloride	na	na	na	na	na	0/13	no	na	no	no	na	na	na	na	no
Total xylenes	na	na	na	na	na	0/13	no	na	no	no	na	na	na	na	no
Dioxins/Furans															
2,3,7,8-TCDD	7/13	3/3	12/18	9/12	na	na	no	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	na	na
1,2,3,7,8-PeCDD	9/13	3/3	9/18	6/12	na	na	no	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	na	na
1,2,3,4,7,8-HxCDD	8/13	3/3	6/18	3/12	na	na	no	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	na	na
1,2,3,6,7,8-HxCDD	13/13	3/3	14/18	11/12	na	na	no	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	na	na
1,2,3,7,8,9-HxCDD	12/13	2/3	5/18	3/12	na	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	na	na
1,2,3,4,6,7,8-HpCDD	13/13	3/3	17/18	11/12	na	na	no	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	na	na
OCDD	13/13	3/3	18/18	12/12	na	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	na	na
2,3,7,8-TCDF	13/13	3/3	16/18	12/12	na	na	no	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	na	na
1,2,3,7,8-PeCDF	10/13	3/3	13/18	10/12	na	na	no	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	na	na
2,3,4,7,8-PeCDF	13/13	3/3	14/18	10/12	na	na	no	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	na	na
1,2,3,4,7,8-HxCDF	13/13	0/3	5/18	5/12	na	na	no	**yes**	**yes**	**yes**	no	**yes**	**yes**	na	na
1,2,3,6,7,8-HxCDF	12/13	3/3	10/18	7/12	na	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	na	na
1,2,3,7,8,9-HxCDF	0/13	0/3	0/18	0/12	na	na	no	no	no	no	no	no	no	na	na
2,3,4,6,7,8-HxCDF	12/13	3/3	12/18	9/12	na	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	na	na
1,2,3,4,6,7,8-HpCDF	13/13	0/3	8/18	6/12	na	na	no	**yes**	**yes**	no	no	**yes**	**yes**	na	na
1,2,3,4,7,8,9-HpCDF	10/13	1/3	2/18	1/12	na	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	na	na
OCDF	13/13	3/3	13/18	7/12	na	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	na	na
Total TCDD	0/13	2/3	11/18	8/12	na	na	no	no	no	no	**yes**	**yes**	**yes**	na	na

Table 1. Detection frequencies for EW chemicals and criteria for COI selection (cont.)

Chemical	Detection Frequency						Criterion Met?								
	Surface Sediment	Crab Tissue	Any Tissue Type	Fish Tissue	Surface Water	Porewater	C1 (SMS Available)	C2 (Detected in Surface Sediment)	C3 (Detected in > 5% of Surface Sediment)	C4 (Bioaccumulative Chemical)	C5 (Detected in Crab)	C6 (Detected in Any Tissue)	C7 (Detected in Any Fish Tissue)	C8 (Detected in Surface Water)	C9 (Detected in Porewater)
Total PeCDD	0/13	1/3	7/18	6/12	na	na	no	no	no	no	**yes**	**yes**	**yes**	na	na
Total HxCDD	5/13	0/3	2/18	2/12	na	na	no	**yes**	**yes**	no	no	**yes**	**yes**	na	na
Total HpCDD	13/13	3/3	14/18	9/12	na	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	na	na
Total TCDF	0/13	0/3	6/18	6/12	na	na	no	no	no	no	no	**yes**	**yes**	na	na
Total PeCDF	0/13	2/3	4/18	2/12	na	na	no	no	no	no	**yes**	**yes**	**yes**	na	na
Total HxCDF	2/13	2/3	3/18	1/12	na	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	na	na
Total HpCDF	11/13	2/3	10/18	6/12	na	na	no	**yes**	**yes**	no	**yes**	**yes**	**yes**	na	na

BHC – benzene hexachloride
C– criteria
COI – chemical of interest
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethylene
DDT – dichlorodiphenyltrichloroethane
DF – detection frequency
DL – detection limit
EW – East Waterway
HPAH – high-molecular-weight polycyclic aromatic hydrocarbon
HpCDD – heptachlorodibenzo-p-dioxin
HpCDF – heptachlorodibenzofuran
HxCDD – hexachlorodibenzo-p-dioxin
HxCDF – hexachlorodibenzofuran
LPAH – low-molecular-weight polycyclic aromatic hydrocarbon
na – not analyzed
OCDF – octachlorodibenzofuran
PAH – polycyclic aromatic hydrocarbon
PCB – polychlorinated biphenyl
PeCDD – pentachlorodibenzo-p-dioxin
PeCDF – pentachlorodibenzofuran
SMS – Washington State Sediment Management Standards
SVOC – semivolatile organic compound
TCDD – tetrachlorodibenzo-*p*-dioxin
TCDF – tetrachlorodibenzofuran
VOC – volatile organic compound

Table 2. Results of COI screen

Chemical	Selected as a COI? (by ROC and Type of Evaluation)								
	Benthic Invertebrate Community[a]			Crab		Fish			Wildlife
	Surface Sediment (C1 and C2, or C3)	Porewater (C9)	Surface Water (C8)	Tissue (at least two of C3, C4, and C5)	Surface Water (C8)	Tissue (al leat two of C3, C4, and C7)	Diet (both C3 and C6)	Surface Water (C8)	Diet (at least two of C3, C4, and C6)
Metals									
Aluminum	no	no	no	no	no	ne	no	no	no
Antimony	**yes**	no	**yes**	no	**yes**	ne	no	**yes**	no
Arsenic	**yes**	no	**yes**	**yes**	**yes**	ne	**yes**	**yes**	**yes**
Arsenic (inorganic)	no	no	no	no	no	ne	no	no	no
Barium	no	no	no	no	no	ne	n0	no	no
Beryllium	no	no	**yes**	no	**yes**	ne	no	**yes**	no
Cadmium	**yes**	no	**yes**	**yes**	**yes**	ne	**yes**	**yes**	**yes**
Chromium	**yes**	no	**yes**	**yes**	**yes**	ne	**yes**	**yes**	**yes**
Chromium VI	no	no	no	no	no	ne	no	no	no
Cobalt	**yes**	no	**yes**	**yes**	**yes**	ne	**yes**	**yes**	**yes**
Copper	**yes**	no	**yes**	**yes**	**yes**	ne	**yes**	**yes**	**yes**
Iron	no	no	no	no	no	ne	no	no	no
Lead	**yes**	no	**yes**	**yes**	**yes**	ne	**yes**	**yes**	**yes**
Manganese	no	no	no	no	no	ne	no	no	no
Mercury	**yes**	no	**yes**	**yes**	**yes**	**yes**	ne	**yes**	**yes**
Methylmercury	no	no	no	no	no	no	ne	no	no
Molybdenum	**yes**	no	no	**yes**	no	ne	**yes**	no	**yes**
Nickel	**yes**	no	**yes**	**yes**	**yes**	ne	**yes**	**yes**	**yes**
Selenium	no	no	**yes**	**yes**	**yes**	**yes**	ne	**yes**	**yes**
Silver	**yes**	no	**yes**	**yes**	**yes**	ne	**yes**	**yes**	**yes**
Thallium	no	no	**yes**	no	**yes**	ne	no	**yes**	no
Vanadium	**yes**	no	**yes**	**yes**	**yes**	ne	**yes**	**yes**	**yes**

Table 2. Results of COI screen (cont.)

Chemical	Selected as a COI? (by ROC and Type of Evaluation)								
	Benthic Invertebrate Community[a]			Crab		Fish			Wildlife
	Surface Sediment (C1 and C2, or C3)	Porewater (C9)	Surface Water (C8)	Tissue (at least two of C3, C4, and C5)	Surface Water (C8)	Tissue (al leat two of C3, C4, and C7)	Diet (both C3 and C6)	Surface Water (C8)	Diet (at least two of C3, C4, and C6)
Zinc	**yes**	no	**yes**	**yes**	**yes**	ne	**yes**	**yes**	**yes**
Organometals									
Monobutyltin as ion	**yes**	no	**yes**	no	**yes**	no	ne	**yes**	**yes**
Dibutyltin as ion	**yes**	no	**yes**	**yes**	**yes**	**yes**	ne	**yes**	**yes**
Tributyltin as ion	**yes**	no	**yes**	**yes**	**yes**	**yes**	ne	**yes**	**yes**
PAHs									
1-Methylnaphthalene	**yes**	no	**yes**	**yes**	**yes**	ne	**yes**	**yes**	**yes**
2-Chloronaphthalene	no	no	no	no	no	ne	no	no	no
2-Methylnaphthalene	**yes**	no	**yes**	**yes**	**yes**	ne	**yes**	**yes**	**yes**
Acenaphthene	**yes**	no	**yes**	**yes**	**yes**	ne	**yes**	**yes**	**yes**
Acenaphthylene	**yes**	no	no	**yes**	no	ne	**yes**	no	**yes**
Anthracene	**yes**	no	**yes**	**yes**	**yes**	ne	**yes**	**yes**	**yes**
Benzo(a)anthracene	**yes**	no	**yes**	**yes**	**yes**	ne	**yes**	**yes**	**yes**
Benzo(a)pyrene	**yes**	no	no	**yes**	no	ne	**yes**	no	**yes**
Benzo(b)fluoranthene	**yes**	no	no	**yes**	no	ne	**yes**	no	**yes**
Benzo(e)pyrene	no	no	no	no	no	ne	no	no	no
Benzo(g,h,i)perylene	**yes**	no	no	**yes**	no	ne	**yes**	no	**yes**
Benzo(k)fluoranthene	**yes**	no	no	**yes**	no	ne	**yes**	no	**yes**
Total benzofluoranthenes	**yes**	no	no	**yes**	no	ne	**yes**	no	**yes**
Chrysene	**yes**	no	**yes**	**yes**	**yes**	ne	**yes**	**yes**	**yes**
Dibenzo(a,h)anthracene	**yes**	no	no	**yes**	no	ne	**yes**	no	**yes**
Dibenzofuran	**yes**	no	**yes**	**yes**	**yes**	ne	**yes**	**yes**	**yes**
Fluoranthene	**yes**	no	**yes**	**yes**	**yes**	ne	**yes**	**yes**	**yes**
Fluorene	**yes**	no	**yes**	**yes**	**yes**	ne	**yes**	**yes**	**yes**
Indeno(1,2,3-cd)pyrene	**yes**	no	no	**yes**	no	ne	**yes**	no	**yes**

Table 2. Results of COI screen (cont.)

Chemical	Selected as a COI? (by ROC and Type of Evaluation)								
	Benthic Invertebrate Community[a]			Crab		Fish			Wildlife
	Surface Sediment (C1 and C2, or C3)	Porewater (C9)	Surface Water (C8)	Tissue (at least two of C3, C4, and C5)	Surface Water (C8)	Tissue (al leat two of C3, C4, and C7)	Diet (both C3 and C6)	Surface Water (C8)	Diet (at least two of C3, C4, and C6)
Naphthalene	**yes**	**yes**	**yes**	**yes**	**yes**	ne	**yes**	**yes**	**yes**
Perylene	no	no	no	no	no	ne	no	no	no
Phenanthrene	**yes**	no	**yes**	**yes**	**yes**	ne	**yes**	**yes**	**yes**
Pyrene	**yes**	no	**yes**	**yes**	**yes**	ne	**yes**	**yes**	**yes**
Total HPAHs	**yes**	no	**yes**	**yes**	**yes**	ne	**yes**	**yes**	**yes**
Total LPAHs	**yes**	no	**yes**	**yes**	**yes**	ne	**yes**	**yes**	**yes**
Total PAHs	**yes**	no	**yes**	**yes**	**yes**	ne	**yes**	**yes**	**yes**
Phthalates									
Bis(2-ethylhexyl) phthalate	**yes**	no	**yes**	no	**yes**	no	ne	**yes**	no
Butyl benzyl phthalate	**yes**	no	no	no	no	no	ne	no	no
Diethyl phthalate	**yes**	no	**yes**	no	**yes**	no	ne	**yes**	no
Dimethyl phthalate	**yes**	no	no	no	no	no	ne	no	no
Di-n-butyl phthalate	**yes**	no	no	no	no	no	ne	no	no
Di-n-octyl phthalate	**yes**	no	no	no	no	no	ne	no	no
Other SVOCs									
1,2,4-Trichlorobenzene	**yes**	no	no	no	no	no	ne	no	no
1,2-Dichlorobenzene	**yes**	no	no	no	no	no	ne	no	no
1,2-Diphenylhydrazine	no	no	no	no	no	no	ne	no	no
1,3-Dichlorobenzene	**yes**	no	no	no	no	no	ne	no	no
1,4-Dichlorobenzene	**yes**	no	**yes**	**yes**	**yes**	**yes**	ne	**yes**	**yes**
2,4,5-Trichlorophenol	no	no	no	no	no	no	ne	no	no
2,4,6-Trichlorophenol	no	no	no	no	no	no	ne	no	no
2,4-Dichlorophenol	no	no	no	no	no	no	ne	no	no
2,4-Dimethylphenol	**yes**	no	no	no	no	no	ne	no	no
2,4-Dinitrophenol	no	no	no	no	no	no	ne	no	no

Table 2. Results of COI screen (cont.)

Chemical	Selected as a COI? (by ROC and Type of Evaluation)								
	Benthic Invertebrate Community[a]			Crab		Fish			Wildlife
	Surface Sediment (C1 and C2, or C3)	Porewater (C9)	Surface Water (C8)	Tissue (at least two of C3, C4, and C5)	Surface Water (C8)	Tissue (al leat two of C3, C4, and C7)	Diet (both C3 and C6)	Surface Water (C8)	Diet (at least two of C3, C4, and C6)
2,4-Dinitrotoluene	no	no	no	no	no	no	ne	no	no
2,6-Dinitrotoluene	no	no	no	no	no	no	ne	no	no
2-Chlorophenol	no	no	no	no	no	no	ne	no	no
2-Methylphenol	**yes**	no	no	no	no	no	ne	no	no
2-Nitroaniline	no	no	no	no	no	no	ne	no	no
2-Nitrophenol	no	no	no	no	no	no	ne	no	no
3,3'-Dichlorobenzidine	no	no	no	no	no	no	ne	no	no
3-Nitroaniline	no	no	no	no	no	no	ne	no	no
4,6-Dinitro-o-cresol	no	no	no	no	no	no	ne	no	no
4-Bromophenyl phenyl ether	no	no	no	no	no	no	ne	no	no
4-Chloro-3-methylphenol	no	no	no	no	no	no	ne	no	no
4-Chloroaniline	no	no	no	no	no	no	ne	no	no
4-Chlorophenyl phenyl ether	no	no	no	no	no	no	ne	no	no
4-Methylphenol	**yes**	no	no	no	no	no	ne	no	no
4-Nitroaniline	no	no	no	no	no	no	ne	no	no
4-Nitrophenol	no	no	no	no	no	no	ne	no	no
Aniline	no	no	no	no	no	no	ne	no	no
Benzidine	no	no	no	no	no	no	ne	no	no
Benzoic acid	**yes**	no	no	no	no	no	ne	no	no
Benzyl alcohol	no	no	no	no	no	no	ne	no	no
Benzyl alcohol	**yes**	no	no	no	no	no	ne	no	no
Biphenyl	no	no	no	no	no	no	ne	no	no
bis(2-chloroethoxy)methane	no	no	no	no	no	no	ne	no	no
bis(2-chloroethyl)ether	no	no	no	no	no	no	ne	no	no
bis(2-chloroisopropyl)ether	no	no	no	no	no	no	ne	no	no

Table 2. Results of COI screen (cont.)

Chemical	Selected as a COI? (by ROC and Type of Evaluation)								
	Benthic Invertebrate Community[a]			Crab		Fish			Wildlife
	Surface Sediment (C1 and C2, or C3)	Porewater (C9)	Surface Water (C8)	Tissue (at least two of C3, C4, and C5)	Surface Water (C8)	Tissue (al leat two of C3, C4, and C7)	Diet (both C3 and C6)	Surface Water (C8)	Diet (at least two of C3, C4, and C6)
Caffeine	no	no	no	no	no	no	ne	no	no
Carbazole	**yes**	no	no	no	no	no	ne	no	no
Coprostanol	no	no	no	no	no	no	ne	no	no
Dibenzothiophene	no	no	no	no	no	no	ne	no	no
Hexachlorobenzene	no	no	no	no	no	no	ne	no	no
Hexachlorobutadiene	no	no	no	no	no	no	ne	no	no
Hexachlorocyclopentadiene	no	no	no	no	no	no	ne	no	no
Hexachloroethane	no	no	no	no	no	no	ne	no	no
Isophorone	no	no	no	no	no	no	ne	no	no
n-Nitroso-di-n-propylamine	no	no	no	no	no	no	ne	no	no
n-Nitrosodimethylamine	no	no	no	no	no	no	ne	no	no
n-Nitrosodiphenylamine	**yes**	no	no	no	no	no	ne	no	no
Nitrobenzene	no	no	no	no	no	no	ne	no	no
Pentachlorophenol	**yes**	no	no	no	no	no	ne	no	**yes**
Phenol	**yes**	no	no	**yes**	no	no	ne	no	**yes**
Retene	no	no	no	no	no	no	ne	no	no
PCBs									
Total PCBs	**yes**	no	**yes**	**yes**	**yes**	**yes**	ne	**yes**	**yes**
Pesticides									
2,4'-DDD	no	no	no	no	no	no	ne	no	no
2,4'-DDE	no	no	no	no	no	no	ne	no	no
2,4'-DDT	no	no	no	no	no	no	ne	no	no
4,4'-DDD	no	no	no	**yes**	no	**yes**	ne	no	**yes**
4,4'-DDE	no	no	no	**yes**	no	**yes**	ne	no	**yes**
4,4'-DDT	no	no	no	no	no	**yes**	ne	no	**yes**

Table 2. Results of COI screen (cont.)

Chemical	Selected as a COI? (by ROC and Type of Evaluation)								
	Benthic Invertebrate Community[a]			Crab		Fish			Wildlife
	Surface Sediment (C1 and C2, or C3)	Porewater (C9)	Surface Water (C8)	Tissue (at least two of C3, C4, and C5)	Surface Water (C8)	Tissue (al leat two of C3, C4, and C7)	Diet (both C3 and C6)	Surface Water (C8)	Diet (at least two of C3, C4, and C6)
Total DDTs	**yes**	no	no	**yes**	no	**yes**	ne	no	**yes**
Aldrin	**yes**	no	no	no	no	no	ne	no	no
Dieldrin	no	no	no	no	no	**yes**	ne	no	**yes**
Total aldrin/dieldrin	no	no	no	no	no	no	ne	no	no
alpha-BHC	no	no	no	no	no	**yes**	ne	no	**yes**
beta-BHC	no	no	no	no	no	no	ne	no	no
gamma-BHC	no	no	no	no	no	no	ne	no	no
delta-BHC	no	no	no	no	no	no	ne	no	no
alpha-Chlordane	no	no	no	no	no	**yes**	ne	no	**yes**
beta-Chlordane	no	no	no	no	no	**yes**	ne	no	**yes**
gamma-Chlordane	no	no	no	no	no	no	ne	no	no
Total chlordane	**yes**	no	no	**yes**	no	**yes**	ne	no	**yes**
Chlordane	no	no	no	no	no	no	ne	no	no
Chlorpyrifos	no	no	no	no	no	no	ne	no	no
alpha-Endosulfan	no	no	no	no	no	no	ne	no	no
beta-Endosulfan	no	no	no	no	no	**yes**	ne	no	**yes**
Endosulfan sulfate	no	no	no	no	no	no	ne	no	no
Endrin	no	no	no	no	no	no	ne	no	no
Endrin aldehyde	no	no	no	no	no	no	ne	no	no
Endrin ketone	no	no	no	no	no	no	ne	no	no
Heptachlor	no	no	no	no	no	no	ne	no	**yes**
Heptachlor epoxide	no	no	no	**yes**	no	**yes**	ne	no	**yes**
Isodrin	no	no	no	no	no	no	ne	no	no
Methoxychlor	no	no	no	no	no	no	ne	no	no
Mirex	no	no	no	no	no	**yes**	ne	no	**yes**

Table 2. Results of COI screen (cont.)

Chemical	Selected as a COI? (by ROC and Type of Evaluation)								
	Benthic Invertebrate Community[a]			Crab		Fish			Wildlife
	Surface Sediment (C1 and C2, or C3)	Porewater (C9)	Surface Water (C8)	Tissue (at least two of C3, C4, and C5)	Surface Water (C8)	Tissue (al leat two of C3, C4, and C7)	Diet (both C3 and C6)	Surface Water (C8)	Diet (at least two of C3, C4, and C6)
cis-Nonachlor	no	no	no	**yes**	no	**yes**	ne	no	**yes**
trans-Nonachlor	no	no	no	**yes**	no	**yes**	ne	no	**yes**
Octachlorostyrene	no	no	no	no	no	no	ne	no	no
Oxychlordane	no	no	no	**yes**	no	no	ne	no	**yes**
Toxaphene	no	no	no	no	no	no	ne	no	no
VOCs									
1,1,1-Trichloroethane	no	no	no	no	no	no	ne	no	no
1,1,2,2-Tetrachloroethane	no	no	no	no	no	no	ne	no	no
1,1,2-Trichloroethane	no	no	no	no	no	no	ne	no	no
1,1-Dichloroethane	no	no	no	no	no	no	ne	no	no
1,1-Dichloroethene	no	no	no	no	no	no	ne	no	no
1,2-Dichloroethane	no	no	no	no	no	no	ne	no	no
1,2-Dichloroethene (total)	no	no	no	no	no	no	ne	no	no
1,2-Dichloropropane	no	no	no	no	no	no	ne	no	no
2-Hexanone	no	no	no	no	no	no	ne	no	no
Acetone	no	no	no	no	no	no	ne	no	no
Benzene	no	**yes**	no	no	no	no	ne	no	no
Bromodichloromethane	no	no	no	no	no	no	ne	no	no
Bromoform	no	no	no	no	no	no	ne	no	no
Bromomethane	no	no	no	no	no	no	ne	no	no
Carbon disulfide	no	no	no	no	no	no	ne	no	no
Carbon tetrachloride	no	no	no	no	no	no	ne	no	no
Chlorobenzene	no	no	no	no	no	no	ne	no	no
Chloroethane	no	no	no	no	no	no	ne	no	no
Chloroform	no	no	no	no	no	no	ne	no	no

Table 2. Results of COI screen (cont.)

Chemical	Selected as a COI? (by ROC and Type of Evaluation)								
	Benthic Invertebrate Community[a]			Crab		Fish			Wildlife
	Surface Sediment (C1 and C2, or C3)	Porewater (C9)	Surface Water (C8)	Tissue (at least two of C3, C4, and C5)	Surface Water (C8)	Tissue (al leat two of C3, C4, and C7)	Diet (both C3 and C6)	Surface Water (C8)	Diet (at least two of C3, C4, and C6)
Chloromethane	no	no	no	no	no	no	ne	no	no
cis-1,3-Dichloropropene	no	no	no	no	no	no	ne	no	no
Dibromochloromethane	no	no	no	no	no	no	ne	no	no
Dichloromethane	no	no	no	no	no	no	ne	no	no
Ethylbenzene	no	no	no	no	no	no	ne	no	no
Methyl ethyl ketone	no	no	no	no	no	no	ne	no	no
Methyl isobutyl ketone	no	no	no	no	no	no	ne	no	no
Styrene	no	no	no	no	no	no	ne	no	no
Tetrachloroethene	no	no	no	no	no	no	ne	no	no
Toluene	no	no	no	no	no	no	ne	no	no
trans-1,3-Dichloropropene	no	no	no	no	no	no	ne	no	no
Trichloroethene	no	no	no	no	no	no	ne	no	no
Vinyl chloride	no	no	no	no	no	no	ne	no	no
Total xylenes	no	no	no	no	no	no	ne	no	no
Dioxins/Furans			no		no				
2,3,7,8-TCDD	**yes**	no	no	**yes**	no	**yes**	ne	no	**yes**
1,2,3,7,8-PeCDD	**yes**	no	no	**yes**	no	**yes**	ne	no	**yes**
1,2,3,4,7,8-HxCDD	**yes**	no	no	**yes**	no	**yes**	ne	no	**yes**
1,2,3,6,7,8-HxCDD	**yes**	no	no	**yes**	no	**yes**	ne	no	**yes**
1,2,3,7,8,9-HxCDD	**yes**	no	no	**yes**	no	**yes**	ne	no	**yes**
1,2,3,4,6,7,8-HpCDD	**yes**	no	no	**yes**	no	**yes**	ne	no	**yes**
OCDD	**yes**	no	no	**yes**	no	**yes**	ne	no	**yes**
2,3,7,8-TCDF	**yes**	no	no	**yes**	no	**yes**	ne	no	**yes**
1,2,3,7,8-PeCDF	**yes**	no	no	**yes**	no	**yes**	ne	no	**yes**
2,3,4,7,8-PeCDF	**yes**	no	no	**yes**	no	**yes**	ne	no	**yes**

Table 2. Results of COI screen (cont.)

Chemical	Selected as a COI? (by ROC and Type of Evaluation)								
	Benthic Invertebrate Community[a]			Crab		Fish			Wildlife
	Surface Sediment (C1 and C2, or C3)	Porewater (C9)	Surface Water (C8)	Tissue (at least two of C3, C4, and C5)	Surface Water (C8)	Tissue (al leat two of C3, C4, and C7)	Diet (both C3 and C6)	Surface Water (C8)	Diet (at least two of C3, C4, and C6)
1,2,3,4,7,8-HxCDF	**yes**	no	no	**yes**	no	**yes**	ne	no	**yes**
1,2,3,6,7,8-HxCDF	**yes**	no	no	**yes**	no	**yes**	ne	no	**yes**
1,2,3,7,8,9-HxCDF	no	no	no	no	no	no	ne	no	no
2,3,4,6,7,8-HxCDF	**yes**	no	no	**yes**	no	**yes**	ne	no	**yes**
1,2,3,4,6,7,8-HpCDF	**yes**	no	no	no	no	**yes**	ne	no	**yes**
1,2,3,4,7,8,9-HpCDF	**yes**	no	no	**yes**	no	**yes**	ne	no	**yes**
OCDF	**yes**	no	no	**yes**	no	**yes**	ne	no	**yes**
Total TCDD	no	no	no	no	no	no	ne	no	no
Total PeCDD	no	no	no	no	no	no	ne	no	no
Total HxCDD	**yes**	no	no	no	no	**yes**	ne	no	**yes**
Total HpCDD	**yes**	no	no	**yes**	no	**yes**	ne	no	**yes**
Total TCDF	no	no	no	no	no	no	ne	no	no
Total PeCDF	no	no	no	no	no	no	ne	no	no
Total HxCDF	**yes**	no	no	**yes**	no	**yes**	ne	no	**yes**
Total HpCDF	**yes**	no	no	**yes**	no	**yes**	ne	no	**yes**

[s] The benthic invertebrate community tissue evaluation was not included in the COI screen; instead it was determined that the COPCs would include mercury, TBT, and total PCBs.

BHC – benzene hexachloride
C – criteria
COI – chemical of interest
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethylene
DDT – dichlorodiphenyltrichloroethane
DF – detection frequency
DL – detection limit
HPAH – high-molecular-weight polycyclic aromatic hydrocarbon
HpCDD – heptachlorodibenzo-*p*-dioxin
HpCDF – heptachlorodibenzofuran
HxCDD – hexachlorodibenzo-*p*-dioxin
HxCDF – hexachlorodibenzofuran
LPAH – low-molecular-weight polycyclic aromatic hydrocarbon
ne – not evaluated (Chemical was evaluated for COI selection based on either the fish tissue and fish dietary pathways, but not both. Metals (excluding mercury and selenium) and PAHs were evaluated for the fish dietary pathway and all other chemicals were evaluated for the fish tissue pathway.)
OCDF – octachlorodibenzofuran
PAH – polycyclic aromatic hydrocarbon
PCB – polychlorinated biphenyl
PeCDD – pentachlorodibenzo-*p*-dioxin
PeCDF – pentachlorodibenzofuran
ROC – receptor of concern
SVOC – semivolatile organic compound
TBT – tributyltin
TCDD – tetrachlorodibenzo-*p*-dioxin
TCDF – tetrachlorodibenzofuran
VOC – volatile organic compound

REFERENCES

EPA. 2000. Bioaccumulation testing and interpretation for the purpose of sediment quality assessment: status and needs. Appendix: Chemical-specific summary tables. EPA-823-R-00-001. Bioaccumulation Analysis Workgroup, US Environmental Protection Agency, Washington, DC.

ATTACHMENT 3
TOXICITY STUDIES CONSIDERED IN THE SELECTION OF BENTHIC INVERTEBRATE TRVS

Table of Contents

Table 1. Toxicity studies considered for the selection of benthic invertebrate tissue-residue TRVs

Chemical	Chemical Form	Test Species	NOAEL (mg/kg ww)	LOAEL (mg/kg ww)	Exposure Route and Duration	Endpoint	Effect	Source
Tributyltin	tributyltin chloride	dog whelk (*Nucella lapillus*)	na	**0.12**	water for 2 years	reproduction	sterilization of females	Gibbs et al. (1988)
Tributyltin	tributyltin chloride	polychaete (*Armandia brevis*)	0.22	0.54	sediment for 42 days	growth	reduced growth	Meador and Rice (2001)
Tributyltin	tributyltin chloride	blue mussel	0.79	1.1	water for 96 hours	growth	reduced growth	Widdows and Page (1993)
Tributyltin	tributyltin chloride	polychaete (*Neanthes arenaceodentata)*	0.60	1.3	water for 10 weeks	growth, reproduction	reduced growth and reproductive success	Moore et al.(1991)
Tributyltin	bis(tributyltin) oxide	Pacific oyster	na	1.3	water and sediment for 56 days	growth	reduced growth	Waldock and Thain (1983)
Tributyltin	tributyltin chloride	blue mussel	na	1.8	water for 36 hours	growth	reduced growth	Page et al. (1998)
Tributyltin	form not specified	soft-shell clam	na	2.9	water for 28 days	growth	reduced growth	Kure and Depledge (1994)
Tributyltin	tributyltin chloride	polychaete (*Neanthes arenaceodentata)*	1.3	3.4	water for 10 weeks	survival	reduced survival	Moore et al.(1991)
Tributyltin	tributyltin chloride	amphipod (*Hyalella azteca*)	na	6.4	water for 4 weeks	survival	reduced survival (LC50)	Borgmann et al. (1996)
Tributyltin	tributyltin chloride	amphipod (*Eohaustorius washingtonianus*)	na	9.0	water for 10 days	survival	reduced survival (LC50)	Meador (1997)
Tributyltin	tributyltin chloride	polychaete (*Armandia brevis*)	na	9.4	water for 10 days	survival	reduced survival (LC50)	Meador (1997)
Tributyltin	tributyltin chloride	amphipod (*Eohaustorius estuarius*)	na	12	water for 10 days	survival	reduced survival (LC50)	Meador (1993)
Tributyltin	tributyltin chloride	zebra mussel	12.6	na	water for 35 days	growth, survival	no effect on growth or survival	Becker van Slooten and Tarradellas (1994)

Table 1. Toxicity studies considered for the selection of benthic invertebrate tissue-residue TRVs (cont.)

Chemical	Chemical Form	Test Species	NOAEL (mg/kg ww)	LOAEL (mg/kg ww)	Exposure Route and Duration	Endpoint	Effect	Source
Tributyltin	tributyltin chloride	amphipod (*Rhepoxynius abronius)*	na	15	water for 10 days	survival	reduced survival (LC50)	Meador (1997)
Tributyltin	tributyltin chloride	amphipod (*Rhepoxynius abronius)*	na	16	water for 4 days	survival	reduced survival (LC50)	Meador (1993)
Tributyltin	tributyltin chloride	amphipod (*Rhepoxynius abronius)*	na	19	sediment for 10 days	survival	reduced survival (LC50)	Meador et al. (1997)
Tributyltin	tributyltin chloride	polychaete (*Armandia brevis*)	na	21	sediment for 10 days	survival	reduced survival (LC50)	Meador et al. (1997)
Tributyltin	tributyltin chloride	amphipod (*Hyalella azteca*)	na	23.2	water for 4 weeks	survival	reduced survival (LC50)	Borgmann et al. (1996)
Total PCBs	Aroclor 1016	grass shrimp	na	1.1	water for 96 hours	survival	reduced survival	Hansen et al. (1974)
Total PCBs	Aroclor 1254	crayfish	1.2	na	water for 21 days	survival	no effect on survival	Sanders and Chandler (1972)
Total PCBs	Aroclor 1254	pink shrimp	1.3	3.9	water for 48 hours	survival	reduced survival	Duke et al. (1970)
Total PCBs	Aroclor 1254	pink shrimp	na	16	water for 20 days	survival	reduced survival	Duke et al. (1970)
Total PCBs	Aroclor 1254	grass shrimp	18	27	water for 16 days	survival	reduced survival	Nimmo et al (1974)
Total PCBs	Aroclor 1242	amphipod (*Hyalella azteca*)	28.9	na	water for 11 weeks	survival, growth, reproduction	no effect on survival, growth or reproduction	Borgmann et al. (1990)
Total PCBs	Aroclor 1016	American oyster	4.0	32	water for 96 hours	growth	reduced growth	Hansen et al. (1974)
Total PCBs	Aroclor 1254	Eastern oyster	8.1	33	water for 96 hours	growth	reduced growth	Duke et al. (1970)
Total PCBs	Aroclor 1254	pink shrimp	na	33	water for 20 days	survival	reduced survival	Duke et al. (1970)
Total PCBs	Aroclor 1254	polychaete (*Armandia brevis*)	na	36	sediment for 28 days	growth	reduced growth	Rice et al. (2000)
Total PCBs	Aroclor 1016	brown shrimp	3.8	42	water for 96 hours	survival	reduced survival	Hansen et al. (1974)
Total PCBs	Aroclor 1242	amphipod (*Gammarus pseudolimnaeus*)	na	76	water for 60 days	reproduction	reduced number of young per adult	Nebeker and Puglisi (1974)
Total PCBs	Aroclor 1254	Eastern oyster	101	119	water for 24 weeks	growth	reduced growth	Lowe et al. (1972)

Table 1. Toxicity studies considered for the selection of benthic invertebrate tissue-residue TRVs (cont.)

Chemical	Chemical Form	Test Species	NOAEL (mg/kg ww)	LOAEL (mg/kg ww)	Exposure Route and Duration	Endpoint	Effect	Source
Total PCBs	Aroclor 1248	amphipod (*Gammarus pseudolimnaeus*)	127	552	water for 60 days	reproduction	reduced number of young per adult	Nebeker and Puglisi (1974)
Mercury	not specified	copepod	0.048	0.096	diet for 4 hours	reproduction	reduced egg production	Hook and Fisher (2002)
Mercury	methyl mercuric chloride	water flea (*Daphnia magna*)	na	1.64[a]	water for 21 days	reproduction	reduced number young produced	Biesinger et al. (1982)
Mercury	mercuric chloride	water flea (*Daphnia magna*)	2.33[a]	na	water for 21 days	survival	reduced survival	Biesinger et al. (1982)
Mercury	mercuric chloride	water flea (*Daphnia magna*)	1.53[a]	2.33[a]	water for 21 days	reproduction	reduced number young produced	Biesinger et al. (1982)
Mercury	methyl mercuric chloride	water flea (*Daphnia magna*)	7.57[a]	18.38[a]	water for 21 days	survival	reduced survival	Biesinger et al. (1982)
Mercury	phenylmercuric acetate	Eastern oyster	na	23	water for 19 days	survival	reduced survival	Kopfler (1974)

[a] Converted from dry weight to wet weight based on 10% moisture in organisms (Biesinger et al. 1982).

LC50 – concentration lethal to 50% of an exposed population

LOAEL – lowest observed effect level

na – not available

NOAEL – no observed effect level

PCB – polychlorinated biphenyl

TRV – toxicity reference value

ww – wet weight

Table 2. Decapod toxicity studies considered for the selection of crab tissue-residue TRVs

Chemical	Chemical Form	Test Species	Tissue Type	NOAEL (mg/kg ww)	LOAEL (mg/kg ww)	Exposure Route and Duration	Endpoint	Effect	Source
Arsenic	sodium arsenate	grass shrimp	whole body	1.28	na	water and diet for 28 days	survival	no effect on survival	Lindsay and Sanders (1990)
Arsenic	sodium arsenate	brown shrimp	whole body	na	21	water for 180 hours	survival	reduced survival	Madsen (1992)
Cadmium	cadmium chloride	grass shrimp	whole body	0.6	na	sediment for 14 days	survival	no effect on survival	Rule and Alden (1996)
Cadmium	form not specified	grass shrimp	whole body	2.0	2.6	water for 21 days	survival	reduced survival	Vernberg et al. (1977)
Cadmium	cadmium chloride	virile crayfish	whole body	na	5.7[a]	water for 2 weeks	survival	reduced survival	Mirenda (1986b)
Cadmium	cadmium chloride	fiddler crab	whole body	na	6.4[a]	water for 24 days	survival	reduced survival	Weis (1978)
Cadmium	form of cadmium not specified	soldier crab	whole body	na	7.4	sediment for 21 days	survival	reduced survival	Weimin et al. (1994)
Cadmium	cadmium chloride	grass shrimp	whole body	na	9.0	water for 6 weeks	survival	reduced survival	Pesch and Stewart (1980)
Cadmium	cadmium chloride	grass shrimp	whole body	14.9	22	water for 5 months	survival	reduced survival	Thorp et al. (1979)
Cadmium	cadmium chloride	shore crab	whole body	8.4	23	water for 40 days	survival	reduced survival	Jennings and Rainbow (1979)
Cadmium	cadmium chloride	northern clearwater crayfish	whole body	534	na	water for 8 days	survival	no effect on survival	Gillespie et al. (1977)
Cadmium	cadmium chloride	Norway lobster	muscle	0.13	na	diet for 50 days	survival	no effect on survival	Canli and Furness (1995)
Cadmium	cadmium chloride	Norway lobster	muscle	0.58	na	water for 30 days	survival	no effect on survival	Canli and Furness (1995)
Cadmium	cadmium chloride	White River crayfish	muscle	1.4	na	water for 21 days	survival	no effect on survival	Dickson et al. (1982)
Cadmium	cadmium chloride	shore crab	muscle	4.9	9.5	water for 40 days	survival	reduced survival	Jennings and Rainbow (1979)
Cadmium	cadmium chloride	Norway lobster	hepatopancreas	5.7	na	diet for 50 days	survival	no effect on survival	Canli and Furness (1995)

Table 2. Decapod toxicity studies considered for the selection of crab tissue-residue TRVs (cont.)

Chemical	Chemical Form	Test Species	Tissue Type	NOAEL (mg/kg ww)	LOAEL (mg/kg ww)	Exposure Route and Duration	Endpoint	Effect	Source
Cadmium	cadmium chloride	Norway lobster	hepatopancreas	46	na	water for 30 days	survival	no effect on survival	Canli and Furness (1995)
Chromium	potassium dichromate	sand crab (juvenile)	whole body	1	3.2	water for 30 days	growth	reduction in growth	Mortimer and Miller (1994)
Copper	not specified	banana prawn	whole body	na	26	water for 2 weeks	growth	reduction in growth	Ahsanullah and Ying (1995)
Copper	not specified	grass shrimp	whole body	40	na	sediment for 14 days	survival	no effect on survival	Rule and Alden (1996)
Copper	copper sulfate	rusty crayfish	whole body	50	na	water for 48 hours	survival	no effect on survival	Evans (1980)
Copper	not specified	ghost shrimp	whole body	na	145.9	water for 14 days	survival	LC50	Ahsanullah et al. (1981)
Mercury	mercuric chloride	Norway lobster	hepatopancreas	0.99	na	diet for 50 days	survival	no effect on survival	Canli and Furness (1995)
Mercury	mercuric chloride	shore crab	hepatopancreas	na	1	water for 32 hours	survival	reduction in survival	Bianchini and Gilles (1996)
Mercury	mercuric chloride	Norway lobster	hepatopancreas	1.43	na	water for 30 days	survival	no effect on survival	Canli and Furness (1995)
Silver	silver thiosulfate	American red crayfish	muscle	0.5	na	diet for 80 days	survival	no effect on survival	Mann et al. (2004)
Silver	silver thiosulfate	American red crayfish	hepatopancreas	86.3	na	diet for 80 days	survival	no effect on survival	Mann et al. (2004)
Vanadium	vanadyl chloride	Monaco shrimp	whole body	0.6	na	water for 21 days	survival	no effect on survival	Miramand et al. (1981)
Zinc	zinc sulfate	virile crayfish	whole body	12.7	35.2	water for 2 weeks	survival	reduced survival	Mirenda (1986a)
Tributyltin	tributyltin chloride	blue crab (juvenile)	whole body	0.12	na	diet for 16 days	growth	no effect on body weight	Rice et al. (1989)
1,4-dichloro benzene	1,4-dichloro benzene	sand crab	whole body	na	0.74[a]	water for 150 hours	survival	reduced survival	Mortimer and Connell (1994)
Naphthalene	naphthalene	spot shrimp	whole body	na	0.050	water for 24 hours	survival	reduced survival	Sanborn and Malins (1977)

Table 2. Decapod toxicity studies considered for the selection of crab tissue-residue TRVs (cont.)

Chemical	Chemical Form	Test Species	Tissue Type	NOAEL (mg/kg ww)	LOAEL (mg/kg ww)	Exposure Route and Duration	Endpoint	Effect	Source
Total PCBs	Aroclor 1016	grass shrimp	whole body	na	1.1	water for 96 hours	survival	reduced survival	Hansen et al. (1974)
Total PCBs	Aroclor 1254	crayfish	whole body	1.2	na	water for 21 days	survival	no effect on survival	Sanders and Chandler (1972)
Total PCBs	Aroclor 1254	pink shrimp	whole body	1.3	3.9	water for 48 hours	survival	reduced survival	Duke et al. (1970)
Total PCBs	Aroclor 1254	pink shrimp	whole body	na	16	water for 20 days	survival	reduced survival	Duke et al. (1970)
Total PCBs	Aroclor 1254	grass shrimp	whole body	18	27	water for 16 days	survival	reduced survival	Nimmo et al (1970)
Total PCBs	Aroclor 1016	horseshoe crab	whole body	na	31.9	water for 96 days	survival	reduced survival	Neff and Giam (1977)
Total PCBs	Aroclor 1254	pink shrimp	whole body	na	33	water for 20 days	survival	reduced survival	Duke et al. (1970)
Total PCBs	Aroclor 1016	brown shrimp	whole body	3.8	42	water for 96 hours	survival	reduced survival	Hansen et al. (1974)
Total PCBs	Aroclor 1254	blue crab	whole body	23	na	water for 20 days	survival	no effect on survival	Duke et al. (1970)
2,3,7,8-TCDD	2,3,7,8-TCDD	signal crayfish	whole body	na	0.003[b]	single injection	survival	25% mortality after 45 days	Ashley et al. (1996)
Chlordane	chlordane (technical grade)	pink shrimp	whole body	0.71	1.7	water for 96 hours	survival	reduced survival	Parrish et al. (1976)
Chlordane	chlordane (technical grade)	grass shrimp	whole body	4.8	9.1	water for 96 hours	survival	reduced survival	Parrish et al. (1976)
Heptachlor epoxide	heptachlor epoxide (analytical grade)	pink shrimp	whole body	0.054	0.18	water for 96 hours	survival	reduced survival	Schimmel et al. (1976)
Heptachlor epoxide	heptachlor epoxide (analytical grade)	grass shrimp	whole body	0.55	2.5	water for 96 hours	survival	reduced survival	Schimmel et al. (1976)
p,p-DDT	p,p-DDT	water nymph crayfish	whole body	0.046	na	water for 72 hours	survival	no effect on survival	Johnson et al. (1971)
p,p-DDT	Total DDT (DDE and DDT)	pink shrimp	whole body	na	0.06	water for 56 days	survival	reduced survival	Nimmo et al. (1970)

Table 2. Decapod toxicity studies considered for the selection of crab tissue-residue TRVs (cont.)

Chemical	Chemical Form	Test Species	Tissue Type	NOAEL (mg/kg ww)	LOAEL (mg/kg ww)	Exposure Route and Duration	Endpoint	Effect	Source
p,p-DDT	p,p-DDT	grass shrimp	whole body	0.10	na	water for 72 hours	survival	no effect on survival	Johnson et al. (1971)

[a] These studies did not indicate whether concentrations in tissue were based on wet or dry weight, so dry weight was assumed. A moisture content of 80% was used to convert concentrations from dry to wet weight.

[b] Tissue-based LOAEL estimated based on injected dose.

DDE – dichlorodiphenyldichloroethylene

DDT – dichlorodiphenyltrichloroethane

LOAEL – lowest observed effect level

na – not available

NOAEL – no observed effect level

PCB – polychlorinated biphenyl

TCDD – tetrachlorodibenzo-p-dioxin

TRV – toxicity reference value

ww – wet weight

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ATTACHMENT 4
TOXICITY STUDIES CONSIDERED IN THE SELECTION OF POREWATER TRVS

Naphthalene was the only chemical that was detected in a porewater sample for which there was no water quality criteria. Therefore, a literature search for toxicity data for aqueous exposure to naphthalene was conducted. Table 1 summarizes the toxicity studies that were considered in the selection of a porewater TRV for naphthalene.

Table 1. Toxicity studies considered for the selection of porewater TRVs for naphthalene

Species Scientific Name	Species Common Name	Endpoint	Exposure Duration (days)	Exposure Type[a]	Chemical Analysis[b]	Media Type[c]	Concentration[d]	Min[d]	Max[d]	Unit	Media Type[e]	Reference
Fish												
Cyprinodon variegatus	sheepshead minnow	LC50	1	S	U	F	2,400	NR	NR	µg/L	SW	Anderson et al. (1974)
Etroplus suratensis	pearl spot	LC50	4	R	U	F	23,000	NR	NR	µg/L	SW	Ansari and Farshchi (1997)
Gambusia affinis	western mosquitofish	LC50*	1	S	U	F	220,000	NR	NR	µg/L	FW	Wallen et al. (1957)
Gambusia affinis	western mosquitofish	LC50*	2	S	U	F	165,000	NR	NR	µg/L	FW	Wallen et al. (1957)
Gambusia affinis	western mosquitofish	LC50*	4	S	U	F	150,000	NR	NR	µg/L	FW	Wallen et al. (1957)
Lepomis humilis	orangespotted sunfish	NR-LETH	0.0426	S	U	F	NR	4,000	5,000	µg/L	FW	Shelford (1917)
Lepomis macrochirus	bluegill	LC50	4	S	U	F	31,026.5	NR	NR	µg/L	FW	Epsey Huston (2000)
Lepomis macrochirus	bluegill	LC50	4	S	U	F	32,980.2	NR	NR	µg/L	FW	Epsey Huston (2000)
Lepomis macrochirus	bluegill	NR-LETH	4	S	U	F	100,000	NR	NR	µg/L	FW	Epsey Huston (2000)
Lepomis macrochirus	bluegill	NR-LETH	4	S	U	F	100,000	NR	NR	µg/L	FW	Epsey Huston (2000)
Melanotaenia fluviatilis	crimson-spotted rainbowfish	LC50	4	NR	M	A	1,174	NR	NR	µg/L	FW	Pollino and Holdway (2002)
Melanotaenia fluviatilis	crimson-spotted rainbowfish	LC50	4	NR	M	A	213	NR	NR	µg/L	FW	Pollino and Holdway (2002)
Melanotaenia fluviatilis	crimson-spotted rainbowfish	LC50	4	NR	M	A	313	NR	NR	µg/L	FW	Pollino and Holdway (2002)
Melanotaenia fluviatilis	crimson-spotted rainbowfish	LC50	4	NR	M	A	315	NR	NR	µg/L	FW	Pollino and Holdway (2002)
Melanotaenia fluviatilis	crimson-spotted rainbowfish	LC50	4	NR	M	A	372	NR	NR	µg/L	FW	Pollino and Holdway (2002)
Melanotaenia fluviatilis	crimson-spotted rainbowfish	LC50	4	NR	M	A	438	NR	NR	µg/L	FW	Pollino and Holdway (2002)
Melanotaenia fluviatilis	crimson-spotted rainbowfish	LC50	4	NR	M	A	470	NR	NR	µg/L	FW	Pollino and Holdway (2002)

Table 1. Toxicity studies considered for the selection of porewater TRVs for naphthalene (cont.)

Species Scientific Name	Species Common Name	Endpoint	Exposure Duration (days)	Exposure Type[a]	Chemical Analysis[b]	Media Type[c]	Concentration[d]	Min[d]	Max[d]	Unit	Media Type[e]	Reference
Melanotaenia fluviatilis	crimson-spotted rainbowfish	LC50	4	NR	M	A	520	NR	NR	µg/L	FW	Pollino and Holdway (2002)
Melanotaenia fluviatilis	crimson-spotted rainbowfish	LC50	4	NR	M	A	520	NR	NR	µg/L	FW	Pollino and Holdway (2002)
Melanotaenia fluviatilis	crimson-spotted rainbowfish	LC50	4	NR	M	A	553	NR	NR	µg/L	FW	Pollino and Holdway (2002)
Melanotaenia fluviatilis	crimson-spotted rainbowfish	LC50	4	NR	M	A	640	NR	NR	µg/L	FW	Pollino and Holdway (2002)
Melanotaenia fluviatilis	crimson-spotted rainbowfish	LC50	4	NR	M	A	686	NR	NR	µg/L	FW	Pollino and Holdway (2002)
Melanotaenia fluviatilis	crimson-spotted rainbowfish	LC50	4	NR	M	A	705	NR	NR	µg/L	FW	Pollino and Holdway (2002)
Melanotaenia fluviatilis	crimson-spotted rainbowfish	LC50	4	NR	M	A	837	NR	NR	µg/L	FW	Pollino and Holdway (2002)
Melanotaenia fluviatilis	crimson-spotted rainbowfish	LC50	4	NR	M	A	961	NR	NR	µg/L	FW	Pollino and Holdway (2002)
Melanotaenia fluviatilis	crimson-spotted rainbowfish	LC50	4	R	M	A	510	NR	NR	µg/L	FW	Pollino and Holdway (2002)
Micropterus salmoides	largemouth bass	LC50	3	F	M	A	>240	NR	NR	µg/L	FW	Black et al. (1983)
Micropterus salmoides	largemouth bass	LC50	7	F	M	A	510	330	1,160	µg/L	FW	Black et al. (1983)
Micropterus salmoides	largemouth bass	LC50	7	F	M	A	680	310	9,700	µg/L	FW	Millemann et al. (1984)
Oncorhynchus gorbuscha	pink salmon	LC50	4	S	M	A	1,240	950	1,620	µg/L	SW	Korn et al. (1979)
Oncorhynchus gorbuscha	pink salmon	LC50	4	S	M	A	1,370	1,110	1,680	µg/L	SW	Korn et al. (1979)
Oncorhynchus gorbuscha	pink salmon	LC50	4	S	M	A	1,840	1,220	2,800	µg/L	SW	Korn et al. (1979)
Oncorhynchus gorbuscha	pink salmon	LC50*	1	S	M	A	1,380	1,090	1,750	µg/L	SW	Korn et al. (1977)
Oncorhynchus gorbuscha	pink salmon	LC50*	1	S	M	A	1,560	1,300	1,870	µg/L	SW	Korn et al. (1977)
Oncorhynchus gorbuscha	pink salmon	LC50*	1	S	M	A	1,840	1,220	2,800	µg/L	SW	Korn et al. (1977)
Oncorhynchus gorbuscha	pink salmon	LC50	4	F	M	A	1,200	NR	NR	µg/L	SW	Moles and Rice (1983)

Table 1. Toxicity studies considered for the selection of porewater TRVs for naphthalene (cont.)

Species Scientific Name	Species Common Name	Endpoint	Exposure Duration (days)	Exposure Type[a]	Chemical Analysis[b]	Media Type[c]	Concentration[d]	Min[d]	Max[d]	Unit	Media Type[e]	Reference
Oncorhynchus gorbuscha	pink salmon	LC50	40	F	M	A	1,200	NR	NR	µg/L	SW	Moles and Rice (1983)
Oncorhynchus gorbuscha	pink salmon	LC50	2	F	U	F	1,010	NR	NR	µg/L	SW	Rice and Thomas (1989)
Oncorhynchus gorbuscha	pink salmon	LC50	2	F	U	F	890	NR	NR	µg/L	SW	Rice and Thomas (1989)
Oncorhynchus gorbuscha	pink salmon	LC50	2	F	U	F	900	NR	NR	µg/L	SW	Rice and Thomas (1989)
Oncorhynchus gorbuscha	pink salmon	LC50	2	F	U	F	960	NR	NR	µg/L	SW	Rice and Thomas (1989)
Oncorhynchus gorbuscha	pink salmon	LC50	2	F	U	F	990	NR	NR	µg/L	SW	Rice and Thomas (1989)
Oncorhynchus gorbuscha	pink salmon	LC50	1	NR	NR	F	920	780	1080	µg/L	SW	Rice and Thomas (1989)
Oncorhynchus kisutch	coho salmon	LOEC	3	S	U	A	3,200	NR	NR	µg/L	SW	Holland et al. (1960)
Oncorhynchus kisutch	coho salmon	LOEC	3	S	U	A	5,600	NR	NR	µg/L	FW	Holland et al. (1960)
Oncorhynchus kisutch	coho salmon	NR-LETH	< 1.8	S	U	A	5,600	NR	NR	µg/L	FW	Holland et al. (1960)
Oncorhynchus kisutch	coho salmon	LC50	4	R	M	A	>11,800	NR	NR	µg/L	FW	Korn and Rice (1981)
Oncorhynchus kisutch	coho salmon	LC50	4	R	M	A	5,600	NR	NR	µg/L	FW	Korn and Rice (1981)
Oncorhynchus kisutch	coho salmon	LC50	4	F	M	A	3,220	NR	NR	µg/L	FW	Moles (1980)
Oncorhynchus kisutch	coho salmon	LC50	4	F	M	A	2,100	NR	NR	µg/L	FW	Moles et al. (1981)
Oncorhynchus kisutch	coho salmon	LC50	4	F	NR	F	2,100	NR	NR	µg/L	FW	Office of Pesticide Programs (2000)
Oncorhynchus kisutch	coho salmon	LC50	2	F	M	A	~1,130	NR	NR	µg/L	SW	Stickle et al. (1982)
Oncorhynchus kisutch	coho salmon	LC50	2	F	M	A	~1,500	NR	NR	µg/L	FW	Stickle et al. (1982)
Oncorhynchus kisutch	coho salmon	LC50	2	F	M	A	~1,550	NR	NR	µg/L	SW	Stickle et al. (1982)
Oncorhynchus kisutch	coho salmon	LC50	2	F	M	A	~730	NR	NR	µg/L	SW	Stickle et al. (1982)

Table 1. Toxicity studies considered for the selection of porewater TRVs for naphthalene (cont.)

Species Scientific Name	Species Common Name	Endpoint	Exposure Duration (days)	Exposure Type[a]	Chemical Analysis[b]	Media Type[c]	Concentration[d]	Min[d]	Max[d]	Unit	Media Type[e]	Reference
Oncorhynchus kisutch	coho salmon	LC50	2	F	M	A	~830	NR	NR	µg/L	SW	Stickle et al. (1982)
Oncorhynchus kisutch	coho salmon	LC50	2	F	M	A	~880	NR	NR	µg/L	SW	Stickle et al. (1982)
Oncorhynchus kisutch	coho salmon	LC50	2	F	M	A	~950	NR	NR	µg/L	SW	Stickle et al. (1982)
Oncorhynchus mykiss	rainbow trout	LC50	4	F	U	F	2,250	NR	NR	µg/L	FW	Bergman and Anderson (1977)
Oncorhynchus mykiss	rainbow trout	NR-LETH	4	F	U	F	5,600	NR	NR	µg/L	FW	Bergman and Anderson (1977)
Oncorhynchus mykiss	rainbow trout	LC50	23	F	M	A	120	100	140	µg/L	FW	Black et al. (1983)
Oncorhynchus mykiss	rainbow trout	LC50	27	F	M	A	110	100	140	µg/L	FW	Black et al. (1983)
Oncorhynchus mykiss	rainbow trout	LC50	4	F	M	A	1,600	NR	NR	µg/L	FW	DeGraeve et al. (1982)
Oncorhynchus mykiss	rainbow trout	LC50	4	S	U	F	1,800	910	2,820	µg/L	FW	Edsall (1991)
Oncorhynchus mykiss	rainbow trout	LC50	4	S	U	F	2,600	1,500	4,050	µg/L	FW	Edsall (1991)
Oncorhynchus mykiss	rainbow trout	LC50	4	S	U	F	4,400	3,300	5,400	µg/L	FW	Edsall (1991)
Oncorhynchus mykiss	rainbow trout	LC50	4	S	U	F	4,500	NR	NR	µg/L	FW	Edsall (1991)
Oncorhynchus mykiss	rainbow trout	LC50	4	S	U	F	5,500	4,070	6,700	µg/L	FW	Edsall (1991)
Oncorhynchus mykiss	rainbow trout	LC50	4	S	U	F	6,100	3,680	9,840	µg/L	FW	Edsall (1991)
Oncorhynchus mykiss	rainbow trout	LC50	27	F	M	A	120	90	160	µg/L	FW	Millemann et al. (1984)
Oreochromis mossambicus	Mozambique tilapia	LC50	4	NR	NR	F	7,900	NR	NR	µg/L	FW	Dange (1986)
Pimephales promelas	fathead minnow	LC50	4	F	U	F	4,900	NR	NR	µg/L	FW	Bergman and Anderson (1977)
Pimephales promelas	fathead minnow	LC50	4	F	M	A	9,930	NR	NR	µg/L	FW	Bio Dynamics Inc. (1987)
Pimephales promelas	fathead minnow	NR-LETH	1	F	M	A	24,740	NR	NR	µg/L	FW	Bio Dynamics Inc. (1987)

Table 1. Toxicity studies considered for the selection of porewater TRVs for naphthalene (cont.)

Species Scientific Name	Species Common Name	Endpoint	Exposure Duration (days)	Exposure Type[a]	Chemical Analysis[b]	Media Type[c]	Concentration[d]	Min[d]	Max[d]	Unit	Media Type[e]	Reference
Pimephales promelas	fathead minnow	NR-LETH	1	F	M	A	24,740	NR	NR	µg/L	FW	Bio Dynamics Inc. (1987)
Pimephales promelas	fathead minnow	NR-LETH	3.875	F	M	A	24,740	NR	NR	µg/L	FW	Bio Dynamics Inc. (1987)
Pimephales promelas	fathead minnow	NR-LETH	3.875	F	M	A	24,740	NR	NR	µg/L	FW	Bio Dynamics Inc. (1987)
Pimephales promelas	fathead minnow	LC50	4	F	M	A	6,140	NR	NR	µg/L	FW	Broderius et al. (1995)
Pimephales promelas	fathead minnow	NR-LETH	NR	NR	M	A	NR	11,700	16,600	µg/L	FW	De Maagd et al. (1997)
Pimephales promelas	fathead minnow	LC50	4	F	M	A	7,900	NR	NR	µg/L	FW	DeGraeve et al. (1982)
Pimephales promelas	fathead minnow	NR-LETH	30	NR	M	A	4,380	NR	NR	µg/L	FW	DeGraeve et al. (1982)
Pimephales promelas	fathead minnow	LC50	4	F	M	A	6,140	5,790	6,500	µg/L	FW	Geiger et al. (1985)
Pimephales promelas	fathead minnow	LC50	1	F	M	A	7,760	7,390	8,140	µg/L	FW	Holcombe et al. (1984)
Pimephales promelas	fathead minnow	LC50	2	F	M	A	6,350	5,950	6,770	µg/L	FW	Holcombe et al. (1984)
Pimephales promelas	fathead minnow	LC50	3	F	M	A	6,080	5,740	6,440	µg/L	FW	Holcombe et al. (1984)
Pimephales promelas	fathead minnow	LC50	4	F	M	A	6,080	5,740	6,440	µg/L	FW	Holcombe et al. (1984)
Pimephales promelas	fathead minnow	LC50	4	S	M	A	1,990	1,300	4,010	µg/L	FW	Millemann et al. (1984)
Pimephales promelas	fathead minnow	NR-LETH	30 dph	NR	M	A	440	NR	NR	µg/L	FW	Syracuse Research Corp. (2000)
Terapon jarbua	tigerfish	LC50	1	S	U	F	22,500	NR	NR	µg/L	SW	Dange and Masurekar (1984)
Terapon jarbua	tigerfish	LC50	2	S	U	F	20,000	NR	NR	µg/L	SW	Dange and Masurekar (1984)
Terapon jarbua	tigerfish	LC50	3	S	U	F	18,000	NR	NR	µg/L	SW	Dange and Masurekar (1984)
Terapon jarbua	tigerfish	LC50	4	S	U	F	15,500	NR	NR	µg/L	SW	Dange and Masurekar (1984)
Tilapia zillii	tilapia	LC50	4	NR	U	F	5,900	NR	NR	µg/L	FW	El-Sayed et al. (1995)
Benthic Invertebrates												

Table 1. Toxicity studies considered for the selection of porewater TRVs for naphthalene (cont.)

Species Scientific Name	Species Common Name	Endpoint	Exposure Duration (days)	Exposure Type[a]	Chemical Analysis[b]	Media Type[c]	Concentration[d]	Min[d]	Max[d]	Unit	Media Type[e]	Reference
Artemia salina	brine shrimp	LC50	1	S	U	F	83 (10,600 µg/L)	NR	NR	mmol/m[3]	SW	Abernethy et al (1986)
Artemia salina	brine shrimp	LC50	1	S	U	F	83 (10,600 µg/L)	NR	NR	mmol/m[3]	SW	Abernethy et al (1986)
Artemia sp.	brine shrimp	LC50	2	S	U	F	12,500	4,520	20,500	µg/L	FW	MacLean and Doe (1989)
Artemia sp.	brine shrimp	LC50	2	S	U	F	9,820	6,540	13,100	µg/L	FW	MacLean and Doe (1989)
Callinectes sapidus	blue crab	LC50*	1	F	M	A	1,980	1,500	2,590	µg/L	SW	Sabourin (1982)
Callinectes sapidus	blue crab	LC50*	1	F	M	A	2,250	680	2,780	µg/L	SW	Sabourin (1982)
Callinectes sapidus	blue crab	LC50*	1	F	M	A	3,120	2,240	3,400	µg/L	SW	Sabourin (1982)
Cancer magister	Dungeness or edible crab	LC50	4	S	M	A	> 2,000	NR	NR	µg/L	SW	Caldwell et al. (1977)
Cancer magister	Dungeness or edible crab	NR-LETH	≤ 1.5	R	M	F	12	NR	NR	µg/L	SW	Sanborn and Malins (1977)
Chironomus attenuatus	midge	LC50	1	S	U	F	13,300	NR	NR	µg/L	FW	Darville (1982)
Chironomus attenuatus	midge	LC50	1	S	U	F	13,900	NR	NR	µg/L	FW	Darville (1982)
Chironomus attenuatus	midge	LC50	1	S	U	F	13,000	NR	NR	µg/L	FW	Darville and Wilhm (1984)
Chironomus attenuatus	midge	LC50	1	S	U	F	13,100	NR	NR	µg/L	FW	Darville and Wilhm (1984)
Chironomus tentans	midge	LC50	2	S	M	A	2,810	2,550	3,120	µg/L	FW	Millemann et al. (1984)
Crassostrea gigas	Pacific oyster	LC50*	2	S	U	F	110,000	NR	NR	µg/L	SW	Legore (1974)
Daphnia magna	water flea	EC50	2	F	M	A	1,960	NR	NR	µg/L	FW	Bio Dynamics Inc. (1987)
Daphnia magna	water flea	NR-LETH	1	F	M	A	5,150	NR	NR	µg/L	FW	Bio Dynamics Inc. (1987)
Daphnia magna	water flea	NR-LETH	1	F	M	A	5,150	NR	NR	µg/L	FW	Bio Dynamics Inc. (1987)
Daphnia magna	water flea	LC50	1	S	M	A	13,200	NR	NR	µg/L	FW	Crider et al. (1982)
Daphnia magna	water flea	LC50	1	S	M	A	6,600	NR	NR	µg/L	FW	Crider et al. (1982)
Daphnia magna	water flea	LC50	2	S	M	A	3,400	NR	NR	µg/L	FW	Crider et al. (1982)
Daphnia magna	water flea	LC50	2	S	M	A	4,100	NR	NR	µg/L	FW	Crider et al. (1982)

Table 1. Toxicity studies considered for the selection of porewater TRVs for naphthalene (cont.)

Species Scientific Name	Species Common Name	Endpoint	Exposure Duration (days)	Exposure Type[a]	Chemical Analysis[b]	Media Type[c]	Concentration[d]	Min[d]	Max[d]	Unit	Media Type[e]	Reference
Daphnia magna	water flea	LC10	2	NR	U	F	11,900	NR	NR	µg/L	FW	Dow Chemical Co. (1987)
Daphnia magna	water flea	LC50	2	NR	U	F	17,400	NR	NR	µg/L	FW	Dow Chemical Co. (1987)
Daphnia magna	water flea	LC50	2	NR	U	F	25,400	NR	NR	µg/L	FW	Dow Chemical Co. (1987)
Daphnia magna	water flea	NR-LETH	2	NR	U	F	32,000	NR	NR	µg/L	FW	Dow Chemical Co. (1987)
Daphnia magna	water flea	LC50	2	S	U	F	22,600	17,800	27,200	µg/L	FW	Eastmond et al. (1984)
Daphnia magna	water flea	LC50	2	S	U	F	17,699.8	NR	NR	µg/L	FW	Epsey Huston and Associates Inc. (2000)
Daphnia magna	water flea	LC50	2	S	U	F	19,767.5	NR	NR	µg/L	FW	Epsey Huston and Associates Inc. (2000)
Daphnia magna	water flea	NR-LETH	2	S	U	F	100,000	NR	NR	µg/L	FW	Epsey Huston and Associates Inc. (2000)
Daphnia magna	water flea	NR-LETH	2	S	U	F	32,000	NR	NR	µg/L	FW	Epsey Huston and Associates Inc. (2000)
Daphnia magna	water flea	EC50	1	S	U	F	15,000	NR	NR	µg/L	FW	Juttner et al. (1995)
Daphnia magna	water flea	LC50	1	S	U	F	17,000	11,000	25,000	µg/L	FW	LeBlanc (1980)
Daphnia magna	water flea	LC50	2	S	U	F	8,600	5,000	15,000	µg/L	FW	LeBlanc (1980)
Daphnia magna	water flea	LC50	2	S	U	F	11,400	7,890	14,800	µg/L	FW	MacLean and Doe (1989)
Daphnia magna	water flea	LC50	2	S	U	F	12,300	8,880	15,700	µg/L	FW	MacLean and Doe (1989)
Daphnia magna	water flea	LC50	2	S	M	A	2,160	1,790	2,560	µg/L	FW	Millemann et al. (1984)
Daphnia pulex	water flea	LC50	2	S	U	F	NR	2,920	3,890	µg/L	FW	Geiger and Buikema (1982)
Daphnia pulex	water flea	LC50	4	S	M	A	1,000	NR	NR	µg/L	FW	Trucco et al. (1983)
Diaptomus forbesi	calanoid copepod	LC50	4	S	U	F	67,800	NR	NR	µg/L	FW	Saha and Konar (1983)
Diporeia sp.	scud	LC50	28	R	M	A	1,266	NR	NR	umol/g	FW	Landrum et al. (2003)
Elasmopus pectinicrus	scud	LC50	1	R	U	F	3,650	3,180	4,200	µg/L	SW	Lee and Nicol (1978)
Elasmopus pectinicrus	scud	LC50	2	R	U	F	2,800	2,530	3,110	µg/L	SW	Lee and Nicol (1978)
Elasmopus pectinicrus	scud	LC50	4	R	U	F	2,680	2,460	2,910	µg/L	SW	Lee and Nicol (1978)
Eualus suckleyi	shortscale eualid	LC50	4	F	U	F	1,390	NR	NR	µg/L	SW	Rice and Thomas (1989)

Table 1. Toxicity studies considered for the selection of porewater TRVs for naphthalene (cont.)

Species Scientific Name	Species Common Name	Endpoint	Exposure Duration (days)	Exposure Type[a]	Chemical Analysis[b]	Media Type[c]	Concentration[d]	Min[d]	Max[d]	Unit	Media Type[e]	Reference
Eurytemora affinis	calanoid copepod	LC50	1	S	M	A	3,798	NR	NR	µg/L	SW	Ott et al. (1978)
Gammarus minus	scud	LC50	2	S	M	A	3,930	NR	NR	µg/L	FW	Millemann et al. (1984)
Hemigrapsus nudus	shore crab	LC50	8	F	U	F	NR	1,100	2,800	µg/L	SW	Gharrett and Rice (1987)
Katelysia opima	marine bivalve	LC50	1	S	U	F	74,000	NR	NR	µg/L	SW	Dange and Masurekar (1984)
Katelysia opima	marine bivalve	LC50	2	S	U	F	68,000	NR	NR	µg/L	SW	Dange and Masurekar (1984)
Katelysia opima	marine bivalve	LC50	3	S	U	F	64,000	NR	NR	µg/L	SW	Dange and Masurekar (1984)
Katelysia opima	marine bivalve	LC50	4	S	U	F	57,000	NR	NR	µg/L	SW	Dange and Masurekar (1984)
Macrobrachium kistnensis	shrimp	LC50	1	S	U	F	NR	> 4,000	<6,000	µg/L	FW	Jaiswal et al. (1989)
Macrobrachium kistnensis	shrimp	LC50	1	S	U	F	NR	> 4,000	<6,000	µg/L	FW	Jaiswal et al. (1989)
Macrobrachium kistnensis	shrimp	LC50	1	S	U	F	NR	> 4,000	<6,000	µg/L	FW	Jaiswal et al. (1989)
Macrobrachium kistnensis	shrimp	LC50	1	S	U	F	NR	> 4,000	<6,000	µg/L	FW	Jaiswal et al. (1989)
Macrobrachium kistnensis	shrimp	LC50	1	S	U	F	NR	> 4,000	<6,000	µg/L	FW	Jaiswal et al. (1989)
Macrobrachium kistnensis	shrimp	LC50	1	S	U	F	NR	> 4,000	<6,000	µg/L	FW	Jaiswal et al. (1989)
Macrobrachium kistnensis	shrimp	LC50	2	R	U	F	~4000	NR	NR	µg/L	FW	Jaiswal et al. (1989)
Macrobrachium kistnensis	shrimp	LC50	2	R	U	F	NR	>2,000	<4,000	µg/L	FW	Jaiswal et al. (1989)
Macrobrachium kistnensis	shrimp	LC50	2	R	U	F	NR	>2,000	<4,000	µg/L	FW	Jaiswal et al. (1989)
Macrobrachium kistnensis	shrimp	LC50	2	R	U	F	NR	>2,000	<4,000	µg/L	FW	Jaiswal et al. (1989)
Macrobrachium kistnensis	shrimp	LC50	2	R	U	F	NR	>4,000	<6,000	µg/L	FW	Jaiswal et al. (1989)
Macrobrachium kistnensis	shrimp	LC50	2	R	U	F	NR	>4,000	<6,000	µg/L	FW	Jaiswal et al. (1989)

Table 1. Toxicity studies considered for the selection of porewater TRVs for naphthalene (cont.)

Species Scientific Name	Species Common Name	Endpoint	Exposure Duration (days)	Exposure Type[a]	Chemical Analysis[b]	Media Type[c]	Concentration[d]	Min[d]	Max[d]	Unit	Media Type[e]	Reference
Macrobrachium kistnensis	shrimp	LC50	3	R	U	F	NR	>2,000	<3,000	µg/L	FW	Jaiswal et al. (1989)
Macrobrachium kistnensis	shrimp	LC50	3	R	U	F	NR	>2,000	<4,000	µg/L	FW	Jaiswal et al. (1989)
Macrobrachium kistnensis	shrimp	LC50	3	R	U	F	NR	>2,000	<4,000	µg/L	FW	Jaiswal et al. (1989)
Macrobrachium kistnensis	shrimp	LC50	3	R	U	F	NR	>2,000	<4,000	µg/L	FW	Jaiswal et al. (1989)
Macrobrachium kistnensis	shrimp	LC50	3	R	U	F	NR	>2,000	<4,000	µg/L	FW	Jaiswal et al. (1989)
Macrobrachium kistnensis	shrimp	LC50	3	R	U	F	NR	>2,000	<4,000	µg/L	FW	Jaiswal et al. (1989)
Macrobrachium kistnensis	shrimp	LC50	4	R	U	F	~2,000	NR	NR	µg/L	FW	Jaiswal et al. (1989)
Macrobrachium kistnensis	shrimp	LC50	4	R	U	F	~2,000	NR	NR	µg/L	FW	Jaiswal et al. (1989)
Macrobrachium kistnensis	shrimp	LC50	4	R	U	F	~2,000	NR	NR	µg/L	FW	Jaiswal et al. (1989)
Macrobrachium kistnensis	shrimp	LC50	4	R	U	F	NR	>2,000	<4,000	µg/L	FW	Jaiswal et al. (1989)
Macrobrachium kistnensis	shrimp	LC50	4	R	U	F	NR	>2,000	<4,000	µg/L	FW	Jaiswal et al. (1989)
Macrobrachium kistnensis	shrimp	LC50	4	R	U	F	NR	>2,000	<4,000	µg/L	FW	Jaiswal et al. (1989)
Neanthes arenaceodentata	polychaete worm	LC50	4	NR	U	F	3,800	NR	NR	µg/L	SW	Neff et al. (1976)
Neanthes arenaceodentata	polychaete worm	LC50	4	S	M	A	3,800	3,500	4,100	µg/L	SW	Rossi and Neff (1978)
Neomysis americana	opossum shrimp	LC50	4	R	M	F	1,250	NR	NR	µg/L	SW	Hargreaves et al. (1982)
Neomysis americana	opossum shrimp	LC50	4	R	M	F	1,350	NR	NR	µg/L	SW	Hargreaves et al. (1982)
Neomysis americana	opossum shrimp	LC50	4	R	M	F	1,420	NR	NR	µg/L	SW	Hargreaves et al. (1982)
Neomysis americana	opossum shrimp	LC50	4	R	M	F	800	NR	NR	µg/L	SW	Hargreaves et al. (1982)
Neomysis americana	opossum shrimp	LT50	~ 0.42	R	M	F	~1,800	NR	NR	µg/L	SW	Hargreaves et al. (1982)

Table 1. Toxicity studies considered for the selection of porewater TRVs for naphthalene (cont.)

Species Scientific Name	Species Common Name	Endpoint	Exposure Duration (days)	Exposure Type[a]	Chemical Analysis[b]	Media Type[c]	Concentration[d]	Min[d]	Max[d]	Unit	Media Type[e]	Reference
Neomysis americana	opossum shrimp	LT50	~ 0.63	R	M	F	~1,600	NR	NR	µg/L	SW	Hargreaves et al. (1982)
Neomysis americana	opossum shrimp	LT50	~ 0.833	R	M	F	~1,800	NR	NR	µg/L	SW	Hargreaves et al. (1982)
Neomysis americana	opossum shrimp	LT50	~ 0.833	R	M	F	~1,800	NR	NR	µg/L	SW	Hargreaves et al. (1982)
Neomysis americana	opossum shrimp	LT50	~ 0.833	R	M	F	~1,800	NR	NR	µg/L	SW	Hargreaves et al. (1982)
Neomysis americana	opossum shrimp	LT50	~ 1.04	R	M	F	~1,400	NR	NR	µg/L	SW	Hargreaves et al. (1982)
Neomysis americana	opossum shrimp	LT50	~ 1.5	R	M	F	~1,600	NR	NR	µg/L	SW	Hargreaves et al. (1982)
Neomysis americana	opossum shrimp	LT50	~ 1.6	R	M	F	~1,600	NR	NR	µg/L	SW	Hargreaves et al. (1982)
Neomysis americana	opossum shrimp	LT50	~ 1.75	R	M	F	~1,600	NR	NR	µg/L	SW	Hargreaves et al. (1982)
Neomysis americana	opossum shrimp	LT50	~ 2.08	R	M	F	~1,400	NR	NR	µg/L	SW	Hargreaves et al. (1982)
Neomysis americana	opossum shrimp	LT50	~ 2	R	M	F	~1,200	NR	NR	µg/L	SW	Hargreaves et al. (1982)
Neomysis americana	opossum shrimp	LT50	~ 3.3	R	M	F	~1,000	NR	NR	µg/L	SW	Hargreaves et al. (1982)
Neomysis americana	opossum shrimp	LT50	~ 3.3	R	M	F	~1,400	NR	NR	µg/L	SW	Hargreaves et al. (1982)
Neomysis americana	opossum shrimp	LT50	~ 3.75	R	M	F	~1,400	NR	NR	µg/L	SW	Hargreaves et al. (1982)
Neomysis americana	opossum shrimp	LT50	~ 4.08	R	M	F	~1,200	NR	NR	µg/L	SW	Hargreaves et al. (1982)
Neomysis americana	opossum shrimp	LT50	~ 4.375	R	M	F	~1,200	NR	NR	µg/L	SW	Hargreaves et al. (1982)
Neomysis americana	opossum shrimp	LC50	4	F	M	A	1,280	NR	NR	µg/L	SW	Smith and Hargreaves (1983)
Neomysis americana	opossum shrimp	LC50	4	F	M	A	850	NR	NR	µg/L	SW	Smith and Hargreaves (1983)
Palaemonetes pugio	daggerblade grass shrimp	LC50	1	S	U	F	2,600	NR	NR	µg/L	SW	Anderson et al.(1974)
Palaemonetes pugio	daggerblade grass shrimp	LC50	4	NR	U	F	2,400	NR	NR	µg/L	SW	Neff et al. (1976)

Table 1. Toxicity studies considered for the selection of porewater TRVs for naphthalene (cont.)

Species Scientific Name	Species Common Name	Endpoint	Exposure Duration (days)	Exposure Type[a]	Chemical Analysis[b]	Media Type[c]	Concentration[d]	Min[d]	Max[d]	Unit	Media Type[e]	Reference
Palaemonetes pugio	daggerblade grass shrimp	LC50	1	S	U	F	2,600	2,340	2,890	µg/L	SW	Tatem (1975)
Palaemonetes pugio	daggerblade grass shrimp	LC50	2	S	U	F	2,600	2,340	2,890	µg/L	SW	Tatem (1975)
Palaemonetes pugio	daggerblade grass shrimp	LC50	4	S	U	F	2,350	2,330	2,370	µg/L	SW	Tatem (1975)
Palaemonetes pugio	daggerblade grass shrimp	LC50*	2	NR	U	F	2,350	NR	NR	µg/L	SW	Tatem and Anderson (1973)
Palaemonetes pugio	daggerblade grass shrimp	LC50	4	S	M	A	2,350	NR	NR	µg/L	SW	Tatem et al. (1978)
Pandalus goniurus	humpy shrimp	LC50	4	S	M	A	1,020	770	1,340	µg/L	SW	Korn et al. (1979)
Pandalus goniurus	humpy shrimp	LC50	4	S	M	A	2,160	1,760	2,640	µg/L	SW	Korn et al. (1979)
Pandalus goniurus	humpy shrimp	LC50	4	S	M	A	971	780	1,220	µg/L	SW	Korn et al. (1979)
Pandalus goniurus	humpy shrimp	LC50*	1	S	M	A	1,290	1,080	1,550	µg/L	SW	Korn et al. (1977)
Pandalus goniurus	humpy shrimp	LC50*	1	S	M	A	2,060	NR	NR	µg/L	SW	Korn et al. (1977)
Pandalus goniurus	humpy shrimp	LC50*	1	S	M	A	2,210	1,810	2,700	µg/L	SW	Korn et al. (1977)
Pandalus platyceros	spot shrimp	NR-LETH	≤1.5	R	M	F	12	NR	NR	µg/L	SW	Sanborn and Malins (1977)
Penaeus aztecus	brown shrimp	LC50	1	S	U	F	2,500	NR	NR	µg/L	SW	Anderson et al. (1974)
Penaeus aztecus	brown shrimp	LC50	4	S	M	A	2,500	NR	NR	µg/L	SW	Tatem et al. (1978)
Physa gyrina	pouch snail	LC50	2	S	M	A	5,020	3,740	5,790	µg/L	FW	Millemann et al. (1984)
Scylla serrata	crab	NR-LETH	15	R	U	F	11,000	NR	NR	µg/L	SW	Kulkarni and Masurekar (1984)
Scylla serrata	crab	NR-LETH	15	R	U	F	11,000	NR	NR	µg/L	SW	Kulkarni and Masurekar (1984)
Scylla serrata	crab	NR-LETH	15	R	U	F	11,000	NR	NR	µg/L	SW	Kulkarni and Masurekar (1984)
Scylla serrata	crab	LC100	4	R	U	F	26,000	NR	NR	µg/L	SW	Vijayavel and Balasubramanian (2006)
Scylla serrata	crab	LC50	4	R	U	F	17,770	NR	NR	µg/L	SW	Vijayavel and Balasubramanian (2006)
Scylla serrata	crab	NR-LETH	4	R	U	F	26,000	NR	NR	µg/L	SW	Vijayavel and Balasubramanian (2006)
Somatochlora cingulata	dragonfly	LC50	4	S	U	F	NR	1,000	2,500	µg/L	FW	Correa and Coler (1983)

Table 1. Toxicity studies considered for the selection of porewater TRVs for naphthalene (cont.)

Species Scientific Name	Species Common Name	Endpoint	Exposure Duration (days)	Exposure Type[a]	Chemical Analysis[b]	Media Type[c]	Concentration[d]	Min[d]	Max[d]	Unit	Media Type[e]	Reference
Strongylocentrotus droebachiensis	green sea urchin	NR-LETH	2	S	M	A	3,070	NR	NR	µg/L	SW	Falk-Petersen et al. (1982)
Strongylocentrotus droebachiensis	green sea urchin	NR-LETH	2	S	M	A	2,700	NR	NR	µg/L	SW	Saethre et al. (1984)
Strongylocentrotus droebachiensis	green sea urchin	NR-LETH	4	S	M	A	2,780	NR	NR	µg/L	SW	Saethre et al. (1984)
Tanytarsus dissimilis	midge	LC50	2	S	U	F	12,200	NR	NR	µg/L	FW	Darville (1982)
Tanytarsus dissimilis	midge	LC50	2	S	U	F	13,700	NR	NR	µg/L	FW	Darville (1982)
Tanytarsus dissimilis	midge	LC50	2	S	U	F	12,600	NR	NR	µg/L	FW	Darville and Wilhm (1984)
Tanytarsus dissimilis	midge	LC50	2	S	U	F	20,700	NR	NR	µg/L	FW	Darville and Wilhm (1984)

a Exposure type: F = flow through; R = renewal; S = static.

b Chemical analysis: M = measured; U = unmeasured.

c Concentration type: A = active ingredient; F = formulation.

d Single concentration or concentration range, as reported in the ECOTOX database.

e Media type: FW = fresh water; SW = saltwater.

* Indicates the reported endpoint acronym in the study was modified in ECOTOX to conform to the standard database acronym terminology.

LC50 – concentration that was lethal to 50% of an exposed population

LC100 – concentration that was lethal to 100% of an exposed population

LT50 – amount of time for 50% mortality of test organisms

NR – not reported

NR-LETH – 100% mortality of test organisms

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ATTACHMENT 5
TOXICITY STUDIES CONSIDERED IN THE SELECTION OF FISH TRVS

This attachment contains toxicity studies considered in the selection of fish toxicity reference values that were used in the chemical of potential concern screen in Section A.2.5.2. Table 1 presents studies considered for the tissue-residue screen that measured chemicals in whole-body fish. Table 2 presents studies considered for the tissue-residue screen that measured chemicals in fish eggs or embryos and that estimated whole-body concentrations using egg:adult conversion factors. Table 3 presents studies considered for the dietary screen for fish.

Table 1. Toxicity studies considered for the selection of fish tissue-residue TRVs based on concentrations measured in whole-body tissue

Chemical	Chemical Form	Test Species	Whole-body NOAEL (mg/kg ww)	Whole-body LOAEL (mg/kg ww)	Exposure Route and Duration	Endpoint	Effect	Source
Mercury	methylmercuric chloride	fathead minnow	na	0.39	diet in multiple generations	reproduction	reduced spawning success	Hammerschmidt et al. (2002)
Mercury	mercuric chloride	guppy	0.2	na	sediment and water for 20 days	survival	no effect on survival	Kudo and Mortimer (1979)
Mercury	methylmercuric chloride	mummichog	0.2	0.47	water for 42 days	survival	reduced survival	Matta et al. (2001)
Mercury	methylmercuric chloride	golden shiner	0.23	0.536	diet for 90 days	survival behavior	altered predator avoidance (potential for reduced survival)	Webber and Haines (2003)
Mercury	methylmercuric chloride	fathead minnow	na	0.714	diet for at least 21 days	reproduction	reduced spawning success	Sandheinrich and Miller (2006)
Mercury	mercuric chloride	fathead minnow	0.8	1.31	diet for 60 days	growth	reduced growth	Snarski and Olson (1982)
Mercury	mercuric chloride	brook trout	2.7	3.4	water for 756 days	reproduction	reduced number of viable eggs	McKim et al. (1976)
Mercury	mercuric chloride	creek chub	na	3.72	water for 48 hours	survival	reduced survival	Kim et al. (1977)
Mercury	mercuric chloride	fathead minnow	2.75	4.18	water for 60 days	survival	reduced survival	Snarski and Olson (1982)
Mercury	mercuric chloride	goldfish	na	4.4	water for 4 days	survival	reduced survival	Heisinger et al. (1979)
Mercury	mercuric chloride	fathead minnow	2.84	4.47	water for 287 days	reproduction	reduced spawning	Snarski and Olson (1982)
Mercury	methylmercury	rainbow trout	5.0	na	water for 84 days	growth, survival	no effect on growth or survival	Lock (1975)
Mercury	methylmercuric chloride	rainbow trout	8.63	na	water for 24 days	growth	no effect on growth	Phillips and Buhler (1978)
Mercury	mercuric chloride	brook trout	9.4	na	water for 756 days	growth, survival	no effect on growth or survival	McKim et al. (1976)
Mercury	methylmercuric chloride	rainbow trout	na	10	diet for 84 days	growth	reduced growth	Rodgers and Beamish (1982)
Mercury	methylmercuric chloride	fathead minnow	10.9	na	water for 336 days	growth, survival	no effect on growth or survival	Olson et al. (1975)

Table 1. Toxicity studies considered for the selection of fish tissue-residue TRVs based on concentrations measured in whole-body tissue (cont.)

Chemical	Chemical Form	Test Species	Whole-body NOAEL (mg/kg ww)	Whole-body LOAEL (mg/kg ww)	Exposure Route and Duration	Endpoint	Effect	Source
Mercury	methylmercuric chloride	mummichog	1.1	11	diet for 42 days	reproduction	reduced fertilization success	Matta et al. (2001)
Mercury	methylmercuric chloride	rainbow trout	na	11.2	water for 12 to 33 days	survival	no effect on survival	Niimi and Kissoon (1994)
Mercury	methylmercuric chloride	rainbow trout	12	na	water for 75 days	growth, survival	no effect on growth or survival	Niimi and Lowe-Jinde (1984)
Mercury	methylmercuric chloride	rainbow trout	29	na	diet for 84 days	survival	no effect on survival	Rodgers and Beamish (1982)
Selenium[a]	selenite and selenomethionine	Atlantic salmon	0.116 - 0.412[b]	na	diet for 8 weeks	growth, survival	no effect on survival, body weight gain	Lorentzen et al. (1994)
Selenium[a]	organoselenium	fathead minnow	0.44	na	diet for 11 weeks	growth	no effect on growth	Bertram and Brooks (1986)
Selenium[a]	seleno-L-methionine, selenate, and selenite	fathead minnow	1.5[b]	na	diet for 135 days	reproduction	no effect on reproduction	Ogle and Knight (1989)
Selenium[a]	seleno-DL-methionine	Chinook salmon	1.1[b]	2.1[b]	diet for 90 days	growth	reduced growth	Hamilton et al. (1990)
Selenium[a]	selenomethionine	cutthroat trout	2.27[b]	na	maternal transfer to eggs from dietary exposure for 124 weeks	reproduction	larval deformities and mortality	Hardy et al. (2010)
Selenium[a]	selenite	largemouth bass	3.1	na	water for 120 days	survival	reduced survival	Lemly (1982)
Selenium[a]	seleno-L-methionine, selenate, and selenite	bluegill	1.4[b]	3.2[b]	maternal transfer to eggs from aqueous and dietary exposure for 140 days	reproduction	larval mortality	Coyle et al. (1993)
Selenium[a]	selenite and organoselenium	bluegill	1.1	5.45	maternal transfer to eggs from dietary and aqueous exposure	reproduction	larval deformities	Hermanutz et al. (1996)
Selenium[a]	seleno-L-methionine	white sturgeon	2.94[b]	4.5[b]	diet for 8 weeks	growth	reduced growth	Tashjian et al. (2006)
Selenium[a]	sodium selenite	bluegill	na	4.6	water and diet for 365 days	survival, growth, and reproduction	reduced growth, survival, and progeny survival	Hermanutz et al. (1992)

Table 1. Toxicity studies considered for the selection of fish tissue-residue TRVs based on concentrations measured in whole-body tissue (cont.)

Chemical	Chemical Form	Test Species	Whole-body NOAEL (mg/kg ww)	Whole-body LOAEL (mg/kg ww)	Exposure Route and Duration	Endpoint	Effect	Source
Selenium[a]	seleno-DL-methionine	Chinook salmon	2.52[b]	4.64[b]	diet for 120 days	survival	reduced fingerling survival following seawater challenge	Hamilton et al. (1990)
Selenium[a]	selenite	bluegill	4.8	na	water for 120 days	survival	no effect on survival	Lemly (1982)
Selenium[a]	selenate, organoselenium and selenite	razorback sucker	8.4[b]	na	water and diet for 28 days	survival	no effect on survival	Beyers and Sodergren (2002)
Selenium[a]	organoselenium	fathead minnow	na	8.6[b]	diet for 7 to 8 days	growth	reduced growth	Bennett et al. (1986)
Selenium[a]	selenate and organoselenium	fathead minnow	na	9.5- 15.2[b]	water and diet for 25 days	growth	reduced growth	Dobbs et al. (1996)
Dibutyltin	dibutyltin dichloride	guppy	5.5	na	water for 4 weeks	growth, survival	no effect on growth or survival	Wester (1990)
Tributyltin	tributyltin oxide	rainbow trout	na	0.29	water for 21 days	growth	reduced body weight	Triebskorn et al. (1994)
Tributyltin	tributyltin oxide	Japanese medaka	na	2.39	dietary exposure for 3 weeks	reproduction	reduced hatching, swim-up, and embryonic success	Nirmala et al. (1999)
1,4-Dichloro-benzene	1,4-dichlorobenzene	rainbow trout	na	1,505	single injection	survival	LC50 at 96 hours following injection	Kaiser et al. (1984)
Total PCBs	Aroclor 1260	common barbel	na	0.520[c]	maternal exposure for 50 days	reproduction	reduced fecundity	Hugla and Thome (1999)
Total PCBs	Aroclor 1254	Chinook salmon	0.980	na	diet for 4 weeks	growth, survival	no effect on growth or survival	Powell et al. (2003)
Total PCBs	Aroclor 1260	common barbel	0.52	2.64[c]	dietary exposure for 75 days	reproduction	lack of spawning in first reproductive season; egg and larval mortality	Hugla and Thome (1999)
Total PCBs	Aroclor 1254	rainbow trout	8.0	na	diet for 32 weeks	growth, survival	no effect on growth or survival	Lieb et al. (1974)
Total PCBs	Aroclor 1254	sheepshead minnow	1.9	9.3	water for 28 days	reproduction	decreased fry survival in the first week after hatch	Hansen et al. (1974a)
Total PCBs	Aroclor 1254	pinfish	na	14	water for 14 to 35 days	survival	reduced survival	Hansen et al. (1971)

Table 1. Toxicity studies considered for the selection of fish tissue-residue TRVs based on concentrations measured in whole-body tissue (cont.)

Chemical	Chemical Form	Test Species	Whole-body NOAEL (mg/kg ww)	Whole-body LOAEL (mg/kg ww)	Exposure Route and Duration	Endpoint	Effect	Source
Total PCBs	Aroclor 1268	mummichog	15	na	diet for 6 weeks	reproduction	no effect on fertilization, hatching, or larval survival	Matta et al. (2001)
Total PCBs	Clophen A50	common minnow	na	25	diet for 40 days	reproduction	reduction in time to hatch, fry mortality	Bengtsson (1980)
Total PCBs	Aroclor 1260	channel catfish	32	na	diet for 193 days	growth, survival	no effect on growth or survival	Mayer et al. (1977)
Total PCBs	Aroclor 1254	spot	27	46[d]	water for 20 days	survival	reduced survival	Hansen et al. (1971)
Total PCBs	Aroclor 1260	fathead minnow	na	50	water for 30 days	growth	reduced offspring body weight	DeFoe et al. (1978)
Total PCBs	Aroclor 1254	brook trout	31	71[e]	water for 128 days (10 days prior to hatch and 118 days after)	reproduction	reduced fry growth	Mauck et al. (1978)
Total PCBs	Aroclor 1016	pinfish	na	106	water for 33 days	survival	50% mortality	Hansen et al. (1974b)
Total PCBs	Aroclor 1016	sheepshead minnow	110	na	water for 4 weeks	reproduction	no effect on fertilization success, survival of embryos, or fry survival	Hansen et al. (1975)
Total PCBs	Aroclor 1254: 1260 mixture	rainbow trout	120	na	water for 90 days	survival	no effect on survival	Mayer et al. (1985)
Total PCBs	Aroclor 1254: 1260 mixture	rainbow trout	70	120	water for 90 days	growth	reduced growth	Mayer et al. (1985)
Total PCBs	Aroclor 1254	brook trout	71	125	water for 128 days (10 days prior to hatch and 118 days after)	reproduction	reduced fry survival	Mauck et al. (1978)
Total PCBs	Aroclor 1016	sheepshead minnow	57	200	water for 4 weeks	survival	reduced fry survival	Hansen et al. (1975)
Total PCBs	Clophen A50	goldfish	na	250	water for 5 to 21 days	survival	reduced survival	Hattula and Karlog (1972)
Total PCBs	Aroclor 1254	fathead minnow	na	196 (male)	water for 8 months	reproduction	reduced spawning	Nebeker et al. (1974)

Table 1. Toxicity studies considered for the selection of fish tissue-residue TRVs based on concentrations measured in whole-body tissue (cont.)

Chemical	Chemical Form	Test Species	Whole-body NOAEL (mg/kg ww)	Whole-body LOAEL (mg/kg ww)	Exposure Route and Duration	Endpoint	Effect	Source
Total PCBs	Aroclor 1242, 1254, or 1260	fathead minnow	na	1.86 – 749	water for 100 to 300 hours	survival	range of lethal body burdens (concentration associated with mortality of individuals)	van Wezel et al. (1995)
2,3,7,8-TCDD	2,3,7,8-TCDD	lake whitefish	0.000046	0.000085	diet for 30 days	growth	reduced body weight	Fisk et al. (1997)
2,3,7,8-TCDD	2,3,7,8-TCDD	rainbow trout	0.000072	0.000150	diet for 30 days	growth	reduced body weight	Fisk et al. (1997)
2,3,7,8-TCDD	2,3,7,8-TCDD	rainbow trout	na	0.000780	water for 2 and 6 hours	growth	reduced body weight	Branson et al. (1985)
2,3,7,8-TCDD	2,3,7,8-TCDD	rainbow trout	na	0.000980	water for approx. 28 days	growth, survival	reduced survival and growth	Mehrle et al. (1988)
2,3,7,8-TCDD	2,3,7,8-TCDD	brook trout	0.001486	na	diet for 182 days	survival, growth, and reproduction	no effect on survival, growth, gonadal development, or egg production	Tietge et al. (1998)
2,3,7,8-TCDD	2,3,7,8-TCDD	coho salmon	0.000125	0.002170	water for 96 hours	growth, survival	reduced growth and survival	Miller et al. (1979)
2,3,7,8-TCDD	2,3,7,8-TCDD	medaka	na	0.002410	water for 12 days	growth	reduced body weight	Schmieder et al. (1995)
2,3,7,8-TCDD	2,3,7,8-TCDD	fathead minnow	na	0.069	water for 28 days	survival	reduced survival	Adams et al. (1986)
2,3,7,8-TCDD	2,3,7,8-TCDD	rainbow trout	0.00157	1.38	days for 105 days	growth, survival	reduced growth and survival	Hawkes and Norris (1977)
Total DDTs	DDT mixture	golden shiner	0.025	na	diet for 6-15 days	survival	no effect on survival	Courtney and Reed (1971)
Total DDTs	DDT mixture	cutthroat trout	1.8	1.8	water for 612 days	survival	reduced survival at 111 days	Allison et al. (1964)
Total DDTs	DDT (total)	brook trout	1.92	na	diet for 120 days	survival	no effect on survival	Macek and Korn (1970)
Total DDTs	DDT (total)	cutthroat trout	1.2	2.0	water for 20 months	survival	reduced survival at 4 months	Allison et al. (1963)
Total DDTs	DDT (total)	brook trout	na	2.8 – 3.0	diet for 156 days	reproduction	offspring (sac-fry and embryo) mortality	Macek (1968b)
Total DDTs	DDT (total)	Chinook salmon	0.62	3.65	diet for 40 days	survival	reduced survival	Buhler et al. (1969)

Table 1. Toxicity studies considered for the selection of fish tissue-residue TRVs based on concentrations measured in whole-body tissue (cont.)

Chemical	Chemical Form	Test Species	Whole-body NOAEL (mg/kg ww)	Whole-body LOAEL (mg/kg ww)	Exposure Route and Duration	Endpoint	Effect	Source
Total DDTs	DDT (total)	rainbow trout	4.67	na	diet for 140 days	growth, survival	no effect on survival or growth	Macek et al. (1970)
Total DDTs	DDT (total)	killifish	na	5.2	water for 24 hours	survival	25% mortality at 24 hours	Crawford and Guarino (1976)
Total DDTs	DDT mixture	cutthroat trout	3.9	5.5	diet for 612 days	survival	reduced survival	Allison et al. (1964)
Total DDTs	DDT (total)	brook trout fry	7.6	na	diet for 156 days	growth, survival	no effect on survival or growth	Macek (1968b)
Total DDTs	DDT (total)	brook trout	11.2	na	diet for 31 weeks	growth	increased growth	Macek (1968a)
Total DDTs	DDT (total)	Chinook salmon	11.4	12.1	diet for 40 days	survival	reduced survival	Buhler et al. (1969)
Total DDTs	DDT (total)	brook trout	na	20.2 – 45.8	diet for 26 weeks	survival	reduced survival during stress (starvation)	Macek (1968a)
Total DDTs	DDT (total)	green sunfish, pumpkinseed	na	24	water for 290 days	survival	reduced survival	Hamelink et al. (1971)
Total DDTs	DDT mixture	Atlantic menhaden	24	na	diet for 48 days and observed for 109 days following exposure	growth	no effect on growth	Warlen et al. (1977)
Total DDTs	DDT (total)	mosquito fish	na	26.5	water for 216 days	survival	reduced survival	Pillai et al. (1977)
Total DDTs	DDT (total)	fathead minnow	40	na	diet and water for 266 days	survival	no effect on survival	Jarvinen et al. (1976, 1977)
Total DDTs	DDT (total)	coho salmon	16.6	69.6	diet for 60 days	survival	reduced survival	Buhler et al. (1969)
Total DDTs	DDT (total)	sailfin molly	51.4	92.7	water for 221 days	growth, survival	reduced survival and growth	Benton et al. (1994)
Total DDTs	DDT (total)	goldfish	140	200	diet and water for up to 258 days	survival	reduced survival	Rhead and Perkins (1984)
Dieldrin	Dieldrin	rainbow trout	0.12	0.20	diet and water for 16 weeks	survival	33% mortality	Shubat and Curtis (1986)
Dieldrin	Dieldrin	rainbow trout	1.4	na	diet for 16 weeks	growth	no effect on growth	Shubat and Curtis (1986)
Endosulfan	technical endosulfan[f]	spot	na	0.031	water for 96 hours	survival	reduced survival (65%)	Schimmel et al. (1977)
Endosulfan	technical endosulfan[f]	pinfish	0.195	0.272	water for 96 hours	survival	reduced survival (65%)	Schimmel et al. (1977)

Table 1. Toxicity studies considered for the selection of fish tissue-residue TRVs based on concentrations measured in whole-body tissue (cont.)

Chemical	Chemical Form	Test Species	Whole-body NOAEL (mg/kg ww)	Whole-body LOAEL (mg/kg ww)	Exposure Route and Duration	Endpoint	Effect	Source
Endosulfan	technical endosulfan[f]	mullet	na	0.360	water for 96 hours	survival	reduced survival (60%)	Schimmel et al. (1977)
Total chlordane	alpha-chlordane and gamma-chlordane	goldfish	0.19 – 0.71	na	diet and water for 96 hours	survival	no effect on survival	Moore et al. (1977)
Total chlordane	cis-chlordane	goldfish	na	1.36	water for 24 hours	survival	reduced survival	Feroz and Khan (1979)
Total chlordane	technical chlordane	pinfish	na	16.6	water for 96 hours	survival	30% mortality	Parrish et al. (1976)
Total chlordane	technical chlordane	sheepshead minnow	87	281	water for 28 days	survival	reduced survival (75% survival)	Parrish et al. (1976)
Heptachlor epoxide	technical heptachlor	bluegill	na	0.8 – 0.9	diet for up to 140 days	growth	reduction in average body weight	Andrews et al. (1966)
Heptachlor epoxide	technical heptachlor	bluegill	na	1.66 – 2.4	water for 24 hours	survival	90% mortality	Andrews et al. (1966)
Mirex	mirex	sheepshead minnow	1.9	na	water for 10 weeks	survival	no effect on survival	Tagatz (1976) or (1976)
Mirex	mirex	brook trout	6.3	na	diet for 104 days	growth, survival	no effect on survival or growth	Skea et al. (1981)
Mirex	mirex	fathead minnow	129	156	water for 120 days	reproduction	reduced spawning success	Buckler et al. (1981)

[a] For selenium, only studies reporting tissue concentrations in fish exposed to dietary organic selenium were considered; water-only exposure to selenium or exposure only to inorganic selenium in the diet is not environmentally relevant, as discussed in DeForest and Adams ([in press]).

[b] Dry weight concentration converted to wet weight assuming 80% moisture in fish.

[c] Whole-body tissue residues were the weighted sum of 10 different tissues (i.e., blood, brain, muscle, skin, liver, gonads, adipose tissues, kidney, digestive tract, and skeleton) (Leroy 2007). Tissue concentrations were converted from dry weight to wet weight assuming 20% solids; all endpoints except first reproductive season spawning were evaluated 1 year after exposure.

[d] Mortality did not appear to be directly related to PCB tissue concentration because tissue concentration increased with exposure duration.

[e] At the LOAEL, growth was significantly less than control at 48 days after hatching but not at 118 days after hatching. At NOAEL and LOAEL concentrations, study provides tissue concentrations only after 7 days and 118 days of exposure. LOAEL and NOAEL are tissue concentrations in fry at 118 days post hatch. Tissue concentrations at 7 days post-hatch associated with no effects (1.8 mg/kg ww) and low effects (3.2 mg/kg ww) were lower than the concentration at 118 days post-hatch.

[f] Technical endosulfan is 70% alpha-endosulfan and 30% beta-endosulfan.

DDT – dichlorodiphenyltrichloroethane
dw – dry weight
LOAEL – lowest-observed-adverse-effect level
na – not available
NOAEL – no-observed-adverse-effect level
PCB – polychlorinated biphenyl
TCDD – tetrachlorodibenzo-*p*-dioxin
TRV – toxicity reference value
ww – wet weight

Table 2. Toxicity studies considered for the selection of fish tissue-residue TRVs based on whole-body tissue concentrations estimated from egg data

Chemical	Chemical Form	Test Species	Whole-Body NOAEL (mg/kg ww)	Whole-Body LOAEL (mg/kg ww)	Exposure Route and Duration	Endpoint	Effect	Source
Tributyltin	tributyltin oxide	Japanese whiting	na	0.73 – 1.37[a]	maternal exposure to eggs from dietary exposure for 30 days	reproduction	reduced floating egg rate, hatchability, and number of viable larvae	Shimasaki et al. (2006)
Tributyltin	tributyltin oxide	Japanese medaka	na	1.05[a]	maternal exposure to eggs from dietary exposure for 3 weeks	reproduction	reduced swim-up success and hatchability	Nakayama et al. (2005)
Total PCBs	Aroclor 1254	rainbow trout	na	1.64[b]	maternal exposure to eggs from dietary exposure for 60 days	reproduction	reduced fry growth in offspring	Hendricks et al. (1981)
Total PCBs	Aroclor 1254	Atlantic croaker	na	3.2[c]	maternal exposure to eggs from dietary exposure for 2 weeks	reproduction	reduced larval growth	McCarthy et al. (2003)
Total PCBs	Aroclor 1254	brook trout	na	77.9[c]	water for 21 days	reproduction	reduced hatchability (75%)	Freeman and Idler (1975)
2,3,7,8-TCDD	2,3,7,8-TCDD	lake trout	0.000087[d]	0.000102[d]	maternal transfer to eggs from dietary exposure for 11 weeks prior to spawning	reproduction	reduced sac-fry survival	Walker et al. (1994)
2,3,7,8-TCDD	2,3,7,8-TCDD	lake trout	0.000038[d]	0.000102[d]	water for 48 hours	reproduction	reduced early life-stage survival	Spitsbergen et al. (1991)
2,3,7,8-TCDD	2,3,7,8-TCDD	lake trout	0.000090[d]	0.000108[d]	water for 48 hours	reproduction	reduced early life-stage survival	Guiney et al. (1996)
2,3,7,8-TCDD	2,3,7,8-TCDD	lake trout	0.000059[d]	0.000128[d]	maternal transfer to eggs from dietary exposure for 11 weeks prior to spawning	reproduction	reduced sac-fry survival	Walker et al. (1994)
2,3,7,8-TCDD	2,3,7,8-TCDD	lake trout	0.000087[d]	0.000141[d]	water for 48 hours	reproduction	reduced early life-stage and sac-fry survival	Walker et al. (1991); Walker et al. (1992)
2,3,7,8-TCDD	2,3,7,8-TCDD	brook trout	0.000215[d]	0.000225[d]	maternal transfer to eggs from dietary exposure throughout egg development	reproduction	reduced swim-up and juvenile survival	Johnson et al. (1998)
2,3,7,8-TCDD	2,3,7,8-TCDD	brook trout	0.000346[d]	0.000474[d]	water for 48 hours	reproduction	reduced sac-fry survival	Walker and Peterson (1994)

Table 2. Toxicity studies considered for the selection of fish tissue-residue TRVs based on whole-body tissue concentrations estimated from egg data (cont.)

Chemical	Chemical Form	Test Species	Whole-Body NOAEL (mg/kg ww)	Whole-Body LOAEL (mg/kg ww)	Exposure Route and Duration	Endpoint	Effect	Source
2,3,7,8-TCDD	2,3,7,8-TCDD	lake trout	0.000310[d]	0.000579[d]	water for 48 hours	reproduction	reduced sac-fry growth (length) and hatchability	Walker et al. (1991)
2,3,7,8-TCDD	2,3,7,8-TCDD	lake herring	0.000448[d]	0.000691[d]	water for 100 days	reproduction	reduced early life-stage growth and survival	Elonen et al. (1998); Spehar et al. (1997)
2,3,7,8-TCDD	2,3,7,8-TCDD	rainbow trout	na	0.000714[d]	water for 48 hours	reproduction	reduced sac-fry survival	Walker et al. (1992)
2,3,7,8-TCDD	2,3,7,8-TCDD	fathead minnow	0.000602[d]	0.001114[d]	water for 100 days	reproduction	reduced early life-stage growth and survival	Elonen et al. (1998); Spehar et al. (1997)
2,3,7,8-TCDD	2,3,7,8-TCDD	mummichog	na	0.001626[d]	water for through hatch or 30 days post-hatch	reproduction	reduced hatchability	Prince and Cooper (1995)
2,3,7,8-TCDD	2,3,7,8-TCDD	channel catfish	0.000986[d]	0.002189[d]	water for 100 days	reproduction	reduced early life-stage growth and survival	Elonen et al. (1998); Spehar et al. (1997)
2,3,7,8-TCDD	2,3,7,8-TCDD	medaka	0.001165[d]	0.002429[d]	water for 100 days	reproduction	reduced early life-stage growth and survival	Elonen et al. (1998); Spehar et al. (1997)
2,3,7,8-TCDD	2,3,7,8-TCDD	white sucker	0.002171[d]	0.003123[d]	water for 100 days	reproduction	reduced early life-stage growth and survival	Elonen et al. (1998); Spehar et al. (1997)
2,3,7,8-TCDD	2,3,7,8-TCDD	northern pike	0.003046[e]	0.004608[e]	water for 100 days	reproduction	reduced early life-stage growth and survival	Elonen et al. (1998); Spehar et al. (1997)
2,3,7,8-TCDD	2,3,7,8-TCDD	zebra fish	0.001085[e]	0.005120[e]	water for 100 days	reproduction	reduced early life-stage growth and survival	Elonen et al. (1998); Spehar et al. (1997)

[a] Whole-body maternal tissue concentrations estimated from egg concentration reported in study using an egg:adult conversion factor of 8.6, based on the data reported in Nirmala et al. (1999).

[b] Whole-body maternal tissue concentrations estimated from egg concentration reported in study using an egg:adult conversion factor of 4.69, based on the rainbow trout data reported in Niimi (1983).

[c] Whole-body maternal tissue concentrations estimated from egg concentration reported in study using an egg:adult conversion factor of 2.71, based on the average of five fish species reported in Niimi (1983).

[d] Whole-body maternal tissue concentrations estimated from egg concentration reported in study using an egg:adult conversion factor of 2.56, based on the data reported in Tietge et al. (1998).

dw – dry weight
LOAEL – lowest-observed-adverse-effect level
na – not available
NOAEL – no-observed-adverse-effect level
PCB – polychlorinated biphenyl
TCDD – tetrachlorodibenzo-*p*-dioxin
TRV – toxicity reference value
ww – wet weight

Table 3. Toxicity studies considered for the selection of fish dietary TRVs

Chemical	Chemical Form	Test Species	NOAEL (mg/kg dw)[a]	LOAEL (mg/kg dw)[a]	Exposure Route and Duration	Endpoint	Effect	Source
Arsenic	sodium arsenite	rainbow trout	20[b]	30	diet for 6 weeks	growth	reduced body weight	Oladimeji et al. (1984)
Arsenic	disodium arsenate heptahydrate	rainbow trout	8	44	diet for 16 weeks	growth	reduced body weight	Cockell et al. (1991)
Arsenic	disodium arsenate heptahydrate	rainbow trout	na	49	diet for 24 weeks	growth	reduced body weight	Cockell et al. (1991)
Arsenic	disodium arsenate heptahydrate	rainbow trout	na	55	diet for 8 days	growth	reduced body weight	Cockell et al. (1992)
Arsenic	disodium arsenate	rainbow trout	na	58	diet for 12 days	growth	reduced body weight	Cockell and Bettger (1993)
Arsenic	disodium arsenate heptahydrate	rainbow trout	32	60	diet for 12 days	growth	reduced body weight	Cockell et al. (1992)
Arsenic	disodium arsenate heptahydrate	rainbow trout	33[c]	65	diet for 24 weeks	growth	reduced body weight	Cockell et al. (1991)
Arsenic	disodium arsenate	rainbow trout	na	137	diet for 8 days	growth	reduced body weight	Cockell and Hilton (1988)
Arsenic	arsenic trioxide	rainbow trout	na	180	diet for 8 days	growth	reduced body weight	Cockell and Hilton (1988)
Arsenic	disodium arsenate heptahydrate	striped bass	52.3	188.8	diet for 6 days	growth	reduced body weight	Blazer et al. (1997)
Cadmium	cadmium nitrate	brown rockfish	na	**0.5**[d]	diet for 60 days	growth	reduced growth rate and condition factor	Kim et al. (2004); Kang et al. (2005)
Cadmium	cadmium chloride	rainbow trout	69	na	diet and water for 60 days	growth, survival	no effect on body weight, length, or survival	Mount et al. (1994)
Cadmium	cadmium nitrate	rockfish	125[d]	na	diet for 60 days	survival	no effect on survival	Kim et al. (2004) Kang et al. (2005)
Cadmium	cadmium chloride	guppy	171[e]	na	diet for 10 to 30 days	growth	no effect on growth	Hatakeyama and Yasuno (1982)
Cadmium	cadmium chloride	adult guppy	210	na	diet for 2 months	reproduction	no effect on fry survival or premature embryos	Hatakeyama and Yasuno (1987)

Table 3. Toxicity studies considered for the selection of fish dietary TRVs (cont.)

Chemical	Chemical Form	Test Species	NOAEL (mg/kg dw)[a]	LOAEL (mg/kg dw)[a]	Exposure Route and Duration	Endpoint	Effect	Source
Cadmium	cadmium	Atlantic salmon	250[d]	na	diet for 4 weeks	growth	no effect on growth rate (body weight)	Lundebye et al. (1999)
Cadmium	cadmium chloride	guppy	274	na	diet for 30 days	growth	no effect on body weight	Hatakeyama and Yasuno (1987)
Cadmium	cadmium chloride	rainbow trout	294[d]	na	diet for 15 to 30 days	growth, survival	no effect on growth rate or survival	Baldisserotto et al. (2005)
Cadmium	cadmium chloride	rainbow trout	471	na	diet for 28 days	growth, survival	no effect on growth rate or survival	Franklin et al. (2005)
Cadmium	cadmium chloride	guppy	500	800	diet for 7 months	reproduction	reduced number of fry produced	Hatakeyama and Yasuno (1987)
Cadmium	cadmium chloride	guppy	na	1,250	diet for 7 months	growth, survival	reduced female growth and survival	Hatakeyama and Yasuno (1987)
Cadmium	cadmium nitrate	rainbow trout	786[d]	1,395[d]	diet for 30 days	survival	57% survival	Szebedinsky et al. (2001)
Cadmium	cadmium nitrate	rainbow trout	1,395[d]	2,265[d]	diet for 30 days	growth	reduced specific growth rate (weight)	Szebedinsky et al. (2001)
Cadmium	cadmium sulfate	rainbow trout	na	10,000[d]	diet for 28 days	survival	39% mortality	Handy (1993)
Chromium	trivalent chromium	grey mullet	9.42	na	diet and sediment for 8 weeks	growth	increase in growth	Walsh et al. (1994)
Copper	copper sulfate	channel catfish	8	16	diet for 16 weeks	growth	reduced growth	Murai et al. (1981)
Copper	copper sulfate pentahydrate	channel catfish	40	na	diet for 13 weeks	growth	no effect on growth	Gatlin and Wilson (1986)
Copper	copper sulfate	rockfish	50	100	diet for 60 days	growth	reduced growth rate	Kang et al. (2005)
Copper	copper sulfate pentahydrate	Atlantic salmon	98	na	diet for 12 weeks	growth, survival	no effect on survival or growth	Lorentzen et al. (1998)
Copper	copper sulfate	rainbow trout	200	na	diet for 32 days	survival	no effect on survival	Handy (1992)
Copper	copper sulfate	rainbow trout	684	na	diet for 42 days	growth	no effect on growth	Miller et al. (1993)
Copper	copper sulfate pentahydrate	Atlantic salmon	691.3	na	diet for 4 weeks	growth	no effect on body length, weight, or condition factor	Berntssen et al. (1999b)
Copper	copper sulfate pentahydrate	Atlantic salmon	500	700	diet for 3 months	growth	reduced growth	Lundebye et al. (1999)
Copper	copper sulfate pentahydrate	rainbow trout	287	730	diet for 8 weeks	growth	reduced growth	Lanno et al. (1985b)

Table 3. Toxicity studies considered for the selection of fish dietary TRVs (cont.)

Chemical	Chemical Form	Test Species	NOAEL (mg/kg dw)[a]	LOAEL (mg/kg dw)[a]	Exposure Route and Duration	Endpoint	Effect	Source
Copper	copper sulfate pentahydrate	rainbow trout	730	na	diet for 8 weeks	survival	no effect on survival	Lanno et al. (1985b)
Copper	copper sulfate pentahydrate	rainbow trout	na	796	diet for 16 weeks	growth	reduced growth	Lanno et al. (1985a)
Copper	copper chloride	rainbow trout	440	830[f]	diet and water for 60 days	survival	reduced survival	Mount et al. (1994)
Copper	copper sulfate	Atlantic salmon	638	868	diet for 3 months	growth	reduced growth	Berntssen et al. (1999a)
Copper	copper chloride	rainbow trout	1,000	na	diet and water for 60 days	growth	no effect on body weight or length	Mount et al. (1994)
Copper	copper sulfate pentahydrate	rainbow trout	1,042	na	diet for 28 days	growth, survival	no effect on survival or growth	Kamunde et al. (2001)
Copper	copper sulfate pentahydrate	zebrafish	1,368	na	diet for 260 days	survival, growth, reproduction	no effect on survival, growth, reproduction	Alsop et al. (2007)
Copper	copper sulfate pentahydrate	grey mullet	na	2,397	diet for 67 days	growth	reduced growth	Baker et al. (1998)
Copper	copper sulfate	rainbow trout	10,000	na	diet for 28 days	survival	no effect on survival	Handy (1993)
Lead	lead nitrate	rainbow trout	210	na	diet and water for 60 days	survival, growth	no effect on survival, body weight and length	Mount et al. (1994)
Lead	not specified	rainbow trout	7,040	na	diet for 191 days	growth	no effect on growth	Goettl et al. (1976)
Silver	silver sulfide	rainbow trout	3000	na	diet for 58 days	growth	no effect on growth rate	Galvez and Wood (1999)
Vanadium	sodium orthovanadate	rainbow trout	na	10.2	diet for 12 weeks	growth	reduced body weight	Hilton and Bettger (1988)
Zinc	zinc chloride	rainbow trout	1,900	na	diet and water for 60 days	growth, survival	body weight and length; 97% survival	Mount et al. (1994)
Zinc	not specified	rainbow trout	1,000	2,000	diet for 6 weeks	growth	reduced growth	Takeda and Shimma (1977)
Benzo(a)pyrene	benzo(a)pyrene	rockfish	1.5	2.0	diet for 30 days	growth	reduced growth	Kim et al. (2008)
Benzo(a)pyrene	benzo(a)pyrene	English sole	47	116	diet for 10 to 12 days	growth	reduced growth	Rice et al.(2000)
Benzo(a)pyrene	benzo(a)pyrene	areolated grouper	81	na	diet for 4 weeks	growth, survival	no effect on survival or growth	Wu et al. (2003)

Table 3. Toxicity studies considered for the selection of fish dietary TRVs (cont.)

Chemical	Chemical Form	Test Species	NOAEL (mg/kg dw)[a]	LOAEL (mg/kg dw)[a]	Exposure Route and Duration	Endpoint	Effect	Source
Benzo(a)pyrene	benzo(a)pyrene	rainbow trout	100	1,000	diet for 28 days	growth	reduced growth	Hart and Heddle (1991)
Benzo(a)pyrene	benzo(a)pyrene	rainbow trout	na	1,000	diet for 18 months	growth	reduced growth	Hendricks et al. (1985)
Benzo(a)pyrene	benzo(a)pyrene	rainbow trout	1,000	na	diet for 18 months	survival	no effect on survival	Hendricks et al. (1985)
Total PAHs	PAH mixture[g]	Chinook salmon	280[h]	na	diet for 7 weeks	growth	no effect on growth	Palm et al. (2003)
Total PAHs	PAH mixture[g]	Chinook salmon	280[h]	na	diet for 4 weeks exposure, 2 weeks immuno-challenge	disease resistance[g]	no effect on disease resistance[g]	Palm et al. (2003)
Total PAHs	PAH mixture[i]	Chinook salmon	324	951	diet for 53 days	growth	reduced dry-weight body weight	Meador et al. (2006)

[a] Concentrations of elemental metal or specific PAH chemical, unless otherwise noted.

[b] Concentrations in figure and text in study did not agree: 20 mg/kg dw was mentioned both as an effect level and a no-effect level in the text; however, it was shown in the figure to be not significant. The NOAEL was assumed to be 20 mg/kg dw.

[c] Body weight gain reduced at 12 weeks in fish fed 33 mg/kg arsenic in diet but not at 24 weeks (body weight was recovered).

[d] Dietary dose was not reported as wet weight or dry weight and was assumed to be a dry-weight concentration.

[e] Growth reduced at day 10 in fish fed 171 mg/kg dw in diet but not at 20 days (growth was recovered).

[f] As reported in Mount et al. (1994), reduced survival at LOAEL (830 mg/kg dw) was likely due to elevated copper concentrations in water rather than form exposed to dietary copper.

[g] Mixture comprises the following 14 PAHs included in the Palm et al. (2003) diet: acenaphthene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene.

[h] Fish were exposed to *Listonella anguillarum* following PAH exposure. No difference was observed between PAH-exposed fish and controls in either fish that were vaccinated against the bacterium or those that weren't vaccinated.

[i] Mixture comprises the following 21 PAHs included in the Meador et al. (2006) diet: naphthalene, 2-methylnaphthalene, dimethylnaphthalene, dibenzothiophene, acenaphthene, fluorene, 1,8-dimethyl(9H)fluorene, phenanthrene, 9-ethylphenanthrene, 9-ethyl-10-methylphenanthrene, 1-methyl-7-isopropylphenanthrene, anthracene, fluoranthene, pyrene, methyl pyrene, benzo(a)anthracene, chrysene, benz(a)pyrene, benzo(k)fluoranthene, benzo(g,h,i)perylene, dibenzanthracene.

dw – dry weight
LOAEL – lowest-observed-adverse-effect level
na – not available
NOAEL – no-observed-adverse-effect level
PAH – polycyclic aromatic hydrocarbons
TRV – toxicity reference value

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ATTACHMENT 6
TOXICITY STUDIES CONSIDERED IN THE SELECTION OF WILDLIFE TRVS

Table of Contents

Table 1. Toxicity studies considered in the selection of bird dietary TRVs

Chemical	Chemical Form	Test Species	NOAEL (mg/kg bw/day)	LOAEL (mg/kg bw/day)	Exposure Route	Exposure Duration	Endpoint	Effect	Source
Arsenic	sodium arsenate	mallard	6.1	na	food	10 weeks	growth, survival	reduced growth in females	Camardese et al. (1990)
Arsenic	sodium arsenate	mallard	10	40	food	115 – 128 days	reproduction	delayed egg laying; depressed egg weight and shell thinning; decrease offspring body weight and production	Stanley et al. (1994)
Arsenic	sodium arsenite	mallard – young	25	50	food	154 days	survival	survival	USFWS (1964)
Cadmium	cadmium chloride	mallard young (females)	1.5	na	food	12 weeks	growth	no effect on body weight	Cain et al. (1983)
Cadmium	cadmium chloride	Japanese quail (chicks)	na	4.0	food	6 weeks	growth	reduced body weight in males	Richardson et al. (1974)
Cadmium	cadmium chloride	mallard	19	na	food	90 days	survival	no effect on survival	White and Finley (1978a)
Cadmium	cadmium chloride	mallard	20	na	food	30 – 90 days	survival, growth	no effect on body weight or adult survival	White and Finley (1978b)
Cadmium	cadmium chloride	mallard	1.5	20	food	30 – 90 days	reproduction	decreased egg production	White and Finley (1978b)
Cadmium	cadmium chloride	leghorn chicks	na	24	food	21 days	growth	reduced male body weight	Freeland and Cousins (1973)
Cadmium	cadmium chloride	leghorn chicks	na	40	food	20 days	growth	reduced male body weight	Pritzl et al. (1974)
Cadmium	cadmium chloride	mallard	16	47	food	42 days	growth	reduced body weight	DiGiulio and Scanlon (1984)
Chromium	chromium 3+ as $CrK(SO_4)_2$	black duck	1.0	5.0	food	10 months (and critical life stage)	reproduction	reduced duckling survival	Haseltine et al. (unpublished)
Chromium	Na_2CrO_4	Nichols chicks	7.7	na	food	22 days	growth, survival	reduced male adult survival and male body weight	Romoser et al. (1961)
Chromium	K_2 CrO_4	broiler chicks	na	105	food	2 weeks	growth, survival	reduced body weight and survival	Chung et al.(1985)

Table 1. Toxicity studies considered in the selection of bird dietary TRVs (cont.)

Chemical	Chemical Form	Test Species	NOAEL (mg/kg bw/day)	LOAEL (mg/kg bw/day)	Exposure Route	Exposure Duration	Endpoint	Effect	Source
Cobalt	cobalt chloride	broiler chicks	na	23.1	food	14 days	growth	reduced body weight and survival	Diaz et al. (1994)
Copper	copper sulfate, copper amino acid complex	broiler chicks	2.1	na	food	17 days	growth, survival	no effect on body weight or survival	Dozier et al. (2003)
Copper	copper sulfate (hydrous)	hisex-brown hens	11.2	na	food	90 days	reproduction, survival	no effect on damaged egg ratio, egg weight or survival	Balevi & Coskun (2004)
Copper	copper sulfate	chicks (day-old)	16	29	food	25 days	growth	reduced growth	Smith (1969)
Copper	copper sulfate	chicks	21	41	food	4 weeks	growth	reduced growth and gizzard erosion	Poupoulis and Jensen (1976)
Copper	copper chloride	chicks	na	66	food	8 – 22 days	growth	reduced body weight	Persia et al. (2004)
Copper	copper oxide	chicks	47	62	food	10 weeks	growth, survival	reduced growth and survival	Mehring et al. (1960)
Copper	copper sulfate	white leghorn layers (hens)	15	na	food	28 days	reproduction	no effect on egg weight or shell thickness	Lien et al. (2004)
Lead	lead nitrate	mallards, first-year	2.5	na	food	12 weeks	survival	no effect on survival	Finley et al. (1976)
Lead	metallic lead powder	American kestrel	5.82	na	food	5 – 7 months	survival/ reproduction	no effect on survival, fertility, egg production, or eggshell thinning	Pattee (1984)
Lead	lead acetate	Japanese quail	2.0	20	food	12 weeks	reproduction	reduced egg hatchability	Edens et al. (1976)
Lead	lead acetate	Japanese quail (chicks)	5.5	28	food	6 weeks	growth	reduced body weight	Morgan et al. (1975)
Mercury	methylmercury chloride	American kestrel	na	0.073	food	1 month prior to egg laying through egg laying period	reproduction	reduced number of fledglings	Albers et al. (2007)
Mercury	methylmercury chloride	great egret, one day old	na	0.091	food	14 weeks	growth	reduced growth	Spalding et al. (2000)
Mercury	methylmercury chloride	Japanese quail (chicks at hatching)	na	0.9	food	5 days	survival	reduced hatchling survival (16%)	Hill and Soares (1987)
Mercury	methylmercury chloride	zebra finch	0.72	1.4	food	76 days	survival	reduced survival	Scheuhammer (1988)

Table 1. Toxicity studies considered in the selection of bird dietary TRVs (cont.)

Chemical	Chemical Form	Test Species	NOAEL (mg/kg bw/day)	LOAEL (mg/kg bw/day)	Exposure Route	Exposure Duration	Endpoint	Effect	Source
Mercury	methylmercury chloride	northern bobwhite, 12 day old	0.43	1.6	food	6 weeks	survival	reduced survival	Spann et al. (1986)
Mercury	mercuric chloride	Japanese quail, one day old	0.80	1.6	food	10 weeks	reproduction	decrease in eggshell thickness	Stoewsand et al. (1971)
Mercury	dimethyl mercury	American kestrel	5.24	na	food	3 months	survival	no effect on eggshell thickness	Peakall and Lincer (1972)
Mercury	mercuric chloride	Japanese quail (chicks at hatching)	na	62	food	5 days	survival	decreased hatchling survival (12%)	Hill and Soares (1987)
Molybdenum	sodium molybdate	chicken	na	30	food	21 days	reproduction	reduced embryonic viability	Lepore and Miller (1965)
Nickel	nickel sulfate	broiler chicks	15	na	food	4 weeks	growth	body weight gain	Weber and Reid (1968)
Nickel	nickel sulfate	broiler chicks	na	33	food	4 weeks	growth	reduced body weight	Weber and Reid (1968)
Nickel	nickel acetate	broiler chicks	17	na	food	4 weeks	growth	body weight gain	Weber and Reid (1968)
Nickel	nickel acetate	broiler chicks	na	38	food	4 weeks	growth	reduced body weight	Weber and Reid (1968)
Nickel	nickel sulfate	mallard	na	107	food	90 days	survival, growth	reduced survival and body weight	Cain and Pafford (1981)
Nickel	nickel sulfate	mallard	77	na	food	90 days	survival, growth	no effect on survival or body weight	Cain and Pafford (1981)
Nickel	nickel sulfate	mallard	132	na	food	90 days	survival, growth, reproduction	no effect on adult survival; body weight; or hatchling weight	Eastin and O'Shea (1981)
Selenium	sodium selenite	broiler chicks	0.025	na	food	~40 days	growth, survival	no effect on body weight	Choct et al. (2004)
Selenium	sel-plex 50	broiler chicks	0.025	na	food	~40 days	growth, survival	no effect on body weight	Choct et al. (2004)
Selenium	selenomethionine	mallard	0.42	na	food	~100 days	reproduction	no effect on offspring growth or survival	Heinz et al. (1989)
Selenium	selenomethionine	mallard	na	0.82	food	~100 days	reproduction	reduced offspring growth and survival	Heinz et al. (1989)

Table 1. Toxicity studies considered in the selection of bird dietary TRVs (cont.)

Chemical	Chemical Form	Test Species	NOAEL (mg/kg bw/day)	LOAEL (mg/kg bw/day)	Exposure Route	Exposure Duration	Endpoint	Effect	Source
Selenium	Na_2SeO_3	mallard	0.50	na	food	4 weeks before laying to 3 weeks after hatching	reproduction	no embryo abnormalities	Heinz et al. (1987)
Selenium	Na_2SeO_3	mallard	na	1.0	food	4 weeks before laying to 3 weeks after hatching	reproduction	embryo abnormalities	Heinz et al. (1987)
Selenium	Na_2SeO_3	mallard	1.0	na	food	4 weeks before laying to 3 weeks after hatching	growth	no effect on adult growth	Heinz et al. (1987)
Selenium	selenomethionine	mallard	1.6	na	food	~100 days	survival, growth	no effect on body weight or adult survival	Heinz et al. (1989)
Selenium	Na_2SeO_3	mallard	na	2.5	food	4 weeks before laying to 3 weeks after hatching	growth	no effect on adult growth	Heinz et al. (1987)
Selenium	selenomethionine	screech owl	1.0	3.2	food	~ 3 months	growth, reproduction	reduced body weight, hatching success, survival, at 5 days, clutch size, egg size and mass	Wiemeyer and Hoffman (1996)
Selenium	Na_2SeO_3	mallard	4.6	na	food	42 days	survival	no effect on survival	Heinz et al. (1988)
Selenium	Na_2SeO_3	mallard	na	4.6	food	42 days	growth	reduced body weight	Heinz et al. (1988)
Selenium	Na_2SeO_3	mallard	2.1	na	food	42 days	growth	no effect on body weight	Heinz et al. (1988)
Selenium	Na_2SeO_3	mallard	na	10	food	4 weeks before laying to 3 weeks after hatching	survival	reduced adult survival	Heinz et al. (1987)
Selenium	Na_2SeO_3	mallard	2.5	na	food	4 weeks before laying to 3 weeks after hatching	survival	no effect on adult survival	Heinz et al. (1987)
Selenium	Na_2SeO_3	mallard	na	10	food	42 days	survival	no effect on survival	Heinz et al. (1988)

Table 1. Toxicity studies considered in the selection of bird dietary TRVs (cont.)

Chemical	Chemical Form	Test Species	NOAEL (mg/kg bw/day)	LOAEL (mg/kg bw/day)	Exposure Route	Exposure Duration	Endpoint	Effect	Source
Vanadium	ammonium meta-vanadate	white leghorn hens	2.0	na	food	6 weeks	reproduction	no effect on egg weight and egg quality	Davis et al. (2002)
Vanadium	ammonium meta-vanadate	white leghorn hens	1.2	2.3	food	4 weeks	growth	reduced body weight	Ousterhout and Berg (1981)
Vanadium	vanadium sulfate	mallard	11.4	na	food	12 weeks	growth, survival	no effect on body weight or survival	White and Dieter (1978)
Zinc	copper sulfate, copper amino acid complex	broiler chicks	17	na	food	17 days	growth, survival	no effect on body weight or survival	Dozier et al. (2003)
Zinc	zinc oxide, zinc sulfate, or zinc carbonate	white rock chicks	82	124	food	5 weeks	growth	reduced growth	Roberson and Schaible (1960)
Zinc	zinc sulfate	white leghorn hens	133	na	food and supplements	44 weeks	reproduction	no effect on egg hatchability	Stahl et al. (1990)
Zinc	zinc carbonate	mallard (7 weeks old)	na	300	food	60 days	survival	reduced survival, leg paralysis	Gasaway and Buss (1972)
Zinc	zinc acetate	Hubbard broiler chicks	330	659	food	5 weeks	growth and survival	reduced growth and survival	Oh et al. (1979)
Zinc	zinc chloride	chicks	na	344	food	8 – 22 days	growth	decrease in body weight	Persia et al. (2004)
Tributyltin	tributyltin oxide	Japanese quail	22.5	na	food	6 weeks	growth	reduced body weight	Schlatterer et al. (1993)
Tributyltin	tributyltin oxide	Japanese quail	1.3	3.2	food	6 weeks	reproduction	no hatched eggs per pair	Schlatterer et al. (1993)
Tributyltin	tributyltin oxide	Japanese quail	1.3	3.2	food	6 weeks	reproduction	reduced embryo survival in shell and reduced hatchability	Coenen et al. (1992)
Benzo(a)-anthracene	benzo(a)anthracene	northern bobwhite quail	0.58	na	food	60 days	survival	no effect on survival	Brausch et al. (2010)
Benzo(a)pyrene	benzo(a)pyrene	pigeons	na	1.4	weekly intramuscular injection	5 months	reproduction	reduced fertility, change in ovarian appearance	Hough et al. (1993)
Benzo(a)pyrene	benzo(a)pyrene	white rock chicken	33	na	food	30 days	growth	body weight gain	Rigdon and Neal (1963)
PAHs	aromatic hydrocarbon mixture including individual PAHs	mallard	8	40	food	7 months	growth	little change in body weight	Patton and Dieter (1980)

Table 1. Toxicity studies considered in the selection of bird dietary TRVs (cont.)

Chemical	Chemical Form	Test Species	NOAEL (mg/kg bw/day)	LOAEL (mg/kg bw/day)	Exposure Route	Exposure Duration	Endpoint	Effect	Source
PAHs	petroleum hydrocarbon mixture including PAHs)	mallard	400	na	food	7 months	survival	no effect on survival	Patton and Dieter (1980)
Pentachlorophenol	purified penta-chlorophenol	broiler chicks	22	63	food	8 weeks	growth	reduced growth	Prescott et al. (1982)
Pentachlorophenol	purified penta-chlorophenol	broiler chicks	191	na	food	8 weeks	survival	no effect on survival	Prescott et al. (1982)
Phenol	na	rat	60	120	gavage	gestational days 6 – 15	growth	decreased maternal body weight	Argus Research Laboratories (1997), as cited in IRIS (EPA 2006)
Phenol	na	rat	60	120	gavage	na	reproduction	decreased fetal body weight	Charles River Laboratories (1988) and NTP (1983), as cited in IRIS (EPA 2006)
Phenol	na	mouse	140	280	gavage	gestational days 6 – 15	survival and growth	reduced survival and body weight	NTP (1983b) as cited in IRIS (EPA 2006)
PCBs	Aroclor 1248	American kestrel	na	0.35	food	5.5 months	reproduction	reduced eggshell weight and thickness	Lowe and Stendell (1991)
PCBs	Aroclor 1248	screech owl	0.49	na	food	two generations	reproduction	no effect on eggshell thickness, egg production, hatching success, or fledging success	McLane and Hughes (1980)
PCBs	Aroclor 1242	Japanese quail	na	0.60	food	45 days	reproduction	eggshell thinning	Hill et al. (1976)
PCBs	Aroclor 1254	ringed turtle-dove	na	1.4	food	two generations	reproduction	reduced hatching success in second generation	Peakall et al. (1972); Peakall and Peakall (1973)
PCBs	Aroclor 1254	mallard	2.5	na	food	~ 1 month	reproduction	no effect on reproductive success	Custer and Heinz (1980)
PCBs	Aroclor 1254	mallard	3.9	na	food	4 months	reproduction	no effect on egg production or eggshell thinning	Risebrough and Anderson (1975)

Table 1. Toxicity studies considered in the selection of bird dietary TRVs (cont.)

Chemical	Chemical Form	Test Species	NOAEL (mg/kg bw/day)	LOAEL (mg/kg bw/day)	Exposure Route	Exposure Duration	Endpoint	Effect	Source
PCBs	1:1:1 ratio of Aroclor 1248:1254:1260	American kestrel	na	5 – 7	food	100 days until eggs hatched	reproduction	reduced egg laying in second generation (exposed in ovo); also some effect on clutch size and fledgling success	Fernie et al. (2000; 2001)
PCBs	1:1:1 ratio of Aroclor 1248:1254:1260	American kestrel	na	5 – 7	food	1 month prior to pairing until anticipated egg hatching	reproduction	cracked eggs, embryo abnormalities	Fernie et al. (2003b)
PCBs	1:1:1 ratio of Aroclor 1248:1254:1260	American kestrel	na	7	food	100 days	reproduction	reduced offspring survival and offspring body weight	Fernie et al. (2003a)
PCBs	Aroclor 1242	mallard	na	15	food	12 weeks	reproduction	decreased hatchability, embryo survival, and egg viability; increased embryo abnormalities	Haseltine and Prouty (1980)
2,3,7.8-TCDD	2,3,7.8-TCDD	ring-necked pheasant	0.000014	0.00014	intraperitoneal injection	weekly for 10 weeks	reproduction	reduced body weight, egg production, and survival of adults and embryos	Nosek et al. (1992)
2,3,7.8-TCDD	2,3,7.8-TCDD	cockerel	0.0001	0.001	oral intubation	20 – 21 days	survival	decreased survival	Schwetz et al. (1973)
Chlordane	tech chlordane	bobwhite quail	0.6	na	food	10 weeks	growth, survival	decreased body weight and adult survival	Ludke (1976)
Chlordane	exp chlordane (HCS 3260)	bobwhites (juvenile)	na	20	food	5 days	survival	50% survival	Hill et al. (1975); Heath et al. (1972)
Chlordane	exp chlordane (HCS 3260)	Japanese quail	na	21	food	5 days	survival	50% survival	Hill et al. (1975); Heath et al. (1972)
Chlordane	exp chlordane (HCS 3260)	ring-necked pheasant	na	25	food	5 days	survival	50% survival	Hill et al. (1975); Heath et al. (1972)
Chlordane	exp chlordane (HCS 3260)	mallard-young	na	115	food	5 days	survival	50% survival	Hill et al. (1975); Heath et al. (1972)
DDD	tech DDD	mallard	na	0.90	food	2 years	reproduction	reduced hatchling survival and egg production	Heath et al. (1969)

Table 1. Toxicity studies considered in the selection of bird dietary TRVs (cont.)

Chemical	Chemical Form	Test Species	NOAEL (mg/kg bw/day)	LOAEL (mg/kg bw/day)	Exposure Route	Exposure Duration	Endpoint	Effect	Source
DDE	"DDE"	barn owls	na	0.32	food	2 years (two nestings)	reproduction	eggshell breakage, reduced eggshell thickness and nestling survival	Mendenhall et al. (1983)
DDE	"DDE"	barn owls	0.32	na	food	2 years (two nestings)	survival	no effect on adult survival	Mendenhall et al. (1983)
DDE	"DDE"	American kestrel	na	0.35	food	14 days	reproduction	increased eggshell thinning and egg permeability	Peakall et al. (1973)
DDE	p,p'-DDE	mallard	na	0.90	food	2 years	reproduction	increase in cracked eggs, reduced hatchling survival/production, reduced shell thickness	Heath et al. (1969)
DDE	p,p′-DDE	black duck	na	1.0	food	7 months	reproduction	reduced shell thickness, egg weight, hatchability, and duckling survival	Longcore and Samson (1973)
DDE	DDE	mallard	na	1.0	food	30 days	reproduction	eggshell thinning	Kolaja (1977)
DDE	DDE	black duck	na	1.0	food	reproductive period (through incubation and hatching)	reproduction	eggshell thinning and cracking, reduced embryo and duckling survival	Longcore et al. (1971)
DDE	p,p′-DDE	American kestrel	na	1.0	food	1 year (two clutches)	reproduction	eggshell thinning	Wiemeyer and Porter (1970); Porter and Wiemeyer (1972)
DDT	tech DDT	mallard	0.18	na	food	11 months	reproduction	no effect on eggshell weight and thickness	Davison and Sell (1974)
DDT	p,p'-DDT	mallard	0.19	na	food	11 months	reproduction	no effect on eggshell weight and thickness	Davison and Sell (1974)
DDT	DDT	mallard	na	1.0	food	30 days	reproduction	eggshell thinning	Kolaja (1977)
Dieldrin	dieldrin	Japanese quail	0.06	na	food	four generation	survival, growth, reproduction	no effect on adult survival, body weight, fertility, hatchability, or production	Shellenberger (1978)
Dieldrin	dieldrin	mallard	0.063	na	food	24 days	growth, survival	no effect on body weight or adult survival	Nebeker et al. (1992)

Table 1. Toxicity studies considered in the selection of bird dietary TRVs (cont.)

Chemical	Chemical Form	Test Species	NOAEL (mg/kg bw/day)	LOAEL (mg/kg bw/day)	Exposure Route	Exposure Duration	Endpoint	Effect	Source
Dieldrin	dieldrin	barn owl	0.066	na	food	2 years (twp nestings)	survival, reproduction	no effect on adult survival, eggshell breakage/ thickness, nestling survival, hatching success, or clutch size	Mendenhall et al. (1983)
Dieldrin	dieldrin	quail	0.080	0.12	food	5 months	survival	17% survival vs. 9% in control	DeWitt (1956)
Dieldrin	dieldrin	mallard	na	0.16	food	> 1 year	reproduction	eggshell thinning	Lehner and Egbert (1969)
Dieldrin	dieldrin	pheasant	0.09	0.45	food	reproductive period	reproduction	reduced chicks per hen, hatchability, and chick survival	DeWitt (1956)
Dieldrin	dieldrin	bobwhite quail	0.24	0.47	food	2 months	survival	reduced survival	Fergin and Schafer (1977)
Dieldrin	dieldrin	white leghorn chicken	0.3	na	food	16 weeks	reproduction	no effect on egg hatchability or 14-day chick survival	Graves et al. (1969)
Dieldrin	dieldrin	mallard	0.49	na	food	11 months	reproduction	no effect on eggshell weight or thickness	Davison and Sell (1974)
Dieldrin	dieldrin	Japanese quail	0.54	na	food	75 days	reproduction	no effect on eggshell thickness	Hill et al. (1975)
Dieldrin	dieldrin	Japanese quail	na	0.60	food	up to 18 weeks	reproduction	reduced fertility	Walker et al. (1969a)
Dieldrin	dieldrin	pheasant	na	0.60	food	16 – 20 weeks	survival	100% mortality by 68 days	DeWitt (1956)
Dieldrin	dieldrin	white leghorn males	na	0.65	food	20 weeks	survival	reduced survival	Ahmed et al. (1978)
Dieldrin	dieldrin	quail	na	0.80	food	16 – 20 weeks	survival	100% mortality by 76 days; 24% in control	DeWitt (1956)
Dieldrin	dieldrin	red-light Sussex hybrids	na	0.83	food	13 months adults, 6 weeks chicks	growth	reduced body weight	Brown et al. (1974)
Dieldrin	dieldrin	red-light Sussex hybrids	0.83	na	food	13 months	reproduction	no effect on chick survival	Brown et al. (1974)
Dieldrin	dieldrin	ring-necked pheasant	na	0.86	food	8 weeks	reproduction	reduced offspring survival and egg production	Genelly and Rudd (1956)

Table 1. Toxicity studies considered in the selection of bird dietary TRVs (cont.)

Chemical	Chemical Form	Test Species	NOAEL (mg/kg bw/day)	LOAEL (mg/kg bw/day)	Exposure Route	Exposure Duration	Endpoint	Effect	Source
Dieldrin	dieldrin	mallard	na	0.92	food	11 months	reproduction	reduced eggshell weight and thickness	Davison and Sell (1974)
Dieldrin	dieldrin	mallard	0.92	na	food	11 months	survival, growth	no effect on body weight or adult survival	Davison and Sell (1974)
Endosulfan	endosulfan	gray partridge	10	na	food	4 weeks	reproduction	no effect on number of eggs hatched, egg fertility, or embryo and chick mortality.	(Abiola 1992)
gamma-BHC	gamma BHC	domestic mallard	1.6	3.6	oral intubation	8 weeks	reproduction	reduced eggshell thickness and clutch size and quality	Chakravarty and Lahiri (1986)
gamma-BHC	gamma BHC	domestic mallard	20	na	oral intubation	8 weeks	survival, growth	no effect on survival or body weight	Chakravarty et al. (1986)
Heptachlor	technical heptachlor	bobwhites (juvenile)	na	5	food	5 days	survival	50% survival	Hill et al. (1975); Heath et al. (1972)
Heptachlor	technical heptachlor	Japanese quail	na	6	food	5 days	survival	50% survival	Hill et al. (1975); Heath et al. (1972)
Heptachlor	technical heptachlor	ring-necked pheasant	na	13	food	5 days	survival	50% survival	Hill et al. (1975); Heath et al. (1972)
Heptachlor	technical heptachlor	mallard-young	na	104	food	5 days	survival	50% survival	Hill et al. (1975); Heath et al. (1972)

BHC – benzene hexachloride
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethylene
DDT – dichlorodiphenyltrichloroethane
LOAEL – lowest-observed-effect concentration
na – not available
NOAEL – no-observed-effect concentration
PA PCB – polychlorinated biphenyl
SVOC – semivolatile organic compound
TCDD – tetrachlorodibenzo-*p*-dioxin H – polycyclic aromatic hydrocarbon

Table 2. Toxicity studies considered in the selection of mammalian dietary TRVs

Analyte	Chemical Form	Test Species	NOAEL (mg/kg bw/day)	LOAEL (mg/kg bw/day)	Exposure Route	Exposure Duration	Endpoint	Effect	Source
Arsenic	sodium arsenite – $NaAsO_2$	Osborne-Mendel rat	na	5.4	food	2 years	growth	reduced female body weight	Byron et al. (1967)
Arsenic	sodium arsenite – $NaAsO_2$	Osborne-Mendel rat	2.6	na	food	2 years	growth	no effect on female body weight	Byron et al. (1967)
Cadmium	$CdCl_2$	Wistar rat	3.0	na	food	3 months	survival, growth	no effect on adult survival and growth	Loeser and Lorke (1977)
Cadmium	$CdCl_2$	Long-Evans rat	3.5	13	food	10 days (pregnancy)	growth	reduced maternal body weight	Machemer and Lorke (1981)
Cadmium	$CdCl_2$	Long-Evans rat	13	na	food	10 days	survival, reproduction	no effect on adult survival; fertility, fetus weight, fetus survival, or fetus malformations	Machemer and Lorke (1981)
Cadmium	$CdCl_2$	shrew	115	na	food	12 weeks	growth	no effect on female body weight	Dodds-Smith et al. (1992)
Cadmium	$CdCl_2$	shrew	na	115	food	12 weeks	growth	reduced male body weight	Dodds-Smith et al. (1992)
Cadmium	cadmium	Sprague-Dawley rat	na	189	food	12 weeks	growth, reproduction	reduced pup birth weight and adult body weight	Pond and Walker (1975)
Chromium	Cr picolinate	Sprague-Dawley rat	0.14	na	food	12 weeks	growth	no effect on body weight or growth rate	Hasten et al. (1997)
Chromium	$CrCl_3$ or Cr picolinate	Sprague-Dawley rat	8.3	na	food	20 weeks	growth, survival	no effect on body weight or survival	Anderson et al. (1997)
Chromium	chromic oxide green	rat	1,292	na	food	90 days	growth, reproduction	no effect on body weight, litter size, pregnancy rate, or pup malformation	Ivankovic and Preussman (1975)
Chromium	chromic oxide green	rat	1,466	na	food	2 years	growth, survival	no effect on body weight	Ivankovic and Preussman (1975)
Cobalt	cobaltous chloride	Sprague-Dawley rat	0.1[a]	1.0	diet	4 weeks	growth	reduced body weight	Chetty et al. (1979)
Cobalt	cobalt sulfate	guinea pigs	na	1.4	diet	5 weeks	survival	reduced survival	Mohiuddin et al. (1970)
Cobalt	cobalt sulfate	guinea pigs	1.4	na	diet	5 weeks	growth	no effect on body weight	Mohiuddin et al. (1970)
Cobalt	cobalt chloride	hooded rats	1.9	10	diet	3 days	growth	reduced body weight	Wellman et al. (1984)
Copper	$CuSO_4$	mink	na	26	food	357 days	reproduction	reduced kit survival and litter mass	Aulerich et al. (1982)

Table 2. Toxicity studies considered in the selection of mammalian dietary TRVs (cont.)

Analyte	Chemical Form	Test Species	NOAEL (mg/kg bw/day)	LOAEL (mg/kg bw/day)	Exposure Route	Exposure Duration	Endpoint	Effect	Source
Copper	$CuSO_4$	mink	18	na	food	357 days	reproduction	no effect on kit survival or litter mass	Aulerich et al. (1982)
Copper	$CuSO_4$	mink	43	na	food	153 – 657 days	growth	no effect on body weight	Aulerich et al. (1982)
Copper	$CuSO_4*5H_2O$	rat	137	na	food	13 weeks	survival	no effect on survival	NTP (1993)
Copper	$CuSO_4*5H_2O$	rat	67	137	food	13 weeks	growth	reduced body weight	NTP (1993)
Copper	$CuSO_4*5H_2O$	rat	93	197	food	2 weeks	growth	reduced body weight	NTP (1993)
Copper	copper chloride	shrew	267	na	food	weanlings for 12 weeks	survival, growth	no effect on body weight	Dodds-Smith et al. (1992)
Copper	$CuSO_4*5H_2O$	rat	305	na	food	2 weeks	survival	no effect on survival	NTP (1993)
Copper	$CuSO_4*5H_2O$	mouse	467	na	food	13 weeks	survival	no effect on survival	NTP (1993)
Copper	$CuSO_4*5H_2O$	mouse	227	467	food	13 weeks	growth	reduced body weight	NTP (1993)
Copper	$CuSO_4*5H_2O$	mouse	749	na	food	2 weeks	survival, growth	no effect on survival or body weight	NTP (1993)
Lead	lead acetate	rat	11	90	food	2 years	growth	reduced offspring weight and increased kidney damage	Azar et al. (1973)
Mercury	methylmercuric chloride	Wistar rat	na	0.0084	food	three generations	growth	reduced body weight	Verschuuren et al. (1976)
Mercury	methylmercuric chloride	Wistar rat	0.19	na	food	three generations	survival, reproduction	no effect on survival or reproduction	Verschuuren et al. (1976)
Mercury	methylmercuric chloride	mink	0.16	0.25	food	93 days	growth, survival	reduced growth, 40% mortality	Wobeser et al. (1976)
Mercury	methylmercury	mink	na	0.64	food	2 months	growth, survival	reduced growth, 100% mortality	Aulerich et al. (1974)
Molybdenum	soluble arsenite	mouse	na	2.58	food and drink water	three generation	reproduction, survival	decreased litter size	Schroeder and Mitchener (1971)
Nickel	NiCl2	Sprague-Dawley rat	20	na	food	14 days + 61 days untreated	growth	no effect on body weight	Nation et al. (1985)
Nickel	Ni	Wistar rat	na	20	food	three generations	reproduction	increased number of stillborns in F1 generation	Ambrose et al. (1976)
Nickel	$Ni(SO)_4$	Wistar rat	na	87	food	2 years	growth	reduced body weight	Ambrose et al. (1976)
Nickel	$Ni(SO)_4$	Wistar rat	8.4	na	food	2 years	growth	no effect on body weight	Ambrose et al. (1976)

Table 2. Toxicity studies considered in the selection of mammalian dietary TRVs (cont.)

Analyte	Chemical Form	Test Species	NOAEL (mg/kg bw/day)	LOAEL (mg/kg bw/day)	Exposure Route	Exposure Duration	Endpoint	Effect	Source
Nickel	nickel acetate	Webster Swiss mouse	na	169	food	4 weeks	growth	decreased body weight	Weber and Reid (1969)
Nickel	nickel acetate	Webster Swiss mouse	210	na	food	weanling thru reproduction	reproduction	no effect on number of pups weaned	Weber and Reid (1969)
Nickel	$Ni(SO)_4$	Wistar rat	230	na	food	2 years	survival	no effect on survival	Ambrose et al. (1976)
Nickel	nickel acetate	Webster Swiss mouse	na	313	food	weanling thru reproduction	reproduction	number of pups weaned	Weber and Reid (1969)
Nickel	$Ni(SO)_4$	beagle dog	2500	na	food	2 years	survival	no effect on survival	Ambrose et al. (1976)
Selenium	$NaSeO_3$ or seleniferous wheat	Sprague-Dawley rat	na	0.080	food	6 weeks	growth	decreased body weight	Halverson et al. (1966)
Selenium	$NaSeO_3$ or seleniferous wheat	Sprague-Dawley rat	0.055	na	food	6 weeks	growth	no effect on body weight	Halverson et al. (1966)
Selenium	$NaSeO_3$ or seleniferous wheat	Sprague-Dawley rat	na	0.14	food	6 weeks	survival	reduced survival	Halverson et al. (1966)
Selenium	$NaSeO_3$ or seleniferous wheat	Sprague-Dawley rat	0.13	na	food	6 weeks	survival	no effect on survival	Halverson et al. (1966)
Selenium	L-seleno-methionine	Wistar rat	na	0.16	food	110 days	growth	reduced body weight	Behne et al. (1992)
Selenium	selenite	Wistar rat	0.16	na	food	110 days	growth	no effect on body weight	Behne et al. (1992)
Selenium	Na_2SeO_3, nano-Se, or organic selenium	Sprague-Dawley rat	0.17	0.28	food	13 weeks	growth	reduced body weight	Jia et al. (2005)
Selenium	seleno-methionine	hamster	0.36	na	food	21 days	growth	no effect on body weight	Julius et al. (1983)
Selenium	seleno-methionine	hamster	na	0.76	food	21 days	growth	reduced body weight	Julius et al. (1983)
Selenium	Na_2SeO_3	hamster	na	3.4	food	21 days	growth	reduced body weight	Julius et al. (1983)
Selenium	Na_2SeO_3	hamster	na	5.8	food	21 days	survival	reduced female survival	Julius et al. (1983)
Thallium	thallium sulfate	rat	0.74	na	drink water	60 days	growth	no effect on body weight	(Formigli et al. 1986)

Table 2. Toxicity studies considered in the selection of mammalian dietary TRVs (cont.)

Analyte	Chemical Form	Test Species	NOAEL (mg/kg bw/day)	LOAEL (mg/kg bw/day)	Exposure Route	Exposure Duration	Endpoint	Effect	Source
Vanadium	vanadium sulfate	mouse	1.05	na	food and drink water	lifetime (1 year)	growth	no effect on body weight	Schroeder and Balassa (1967)
Vanadium	sodium meta-vanadate	Wistar rat	na	2.7	food	10 weeks	growth	reduced body weight	Adachi et al. (2000)
Vanadium	sodium meta-vanadate	Sprague-Dawley rat	na	6.5	food	reproduction period	growth, reproduction	reduced maternal body weight and reduced offspring survival	Elfant and Keen (1987)
Zinc	zinc oxide	Sprague-Dawley rat	160	320	food	gestation	reproduction	reduced fetal growth and increased number of resorptions	Schlicker and Cox (1968)
Zinc	zinc carbonate	rat	80	400	food	gestation	reproduction	reduced pup survival and body weight	Sutton and Nelson (1937)
Zinc	zinc oxide	ferret	149	433	food	2weeks – 6 months	growth	reduced body weight	Straube et al. (1980)
Zinc	zinc carbonate	rat	400	799	food	gestation	growth	reduced body weight	Sutton and Nelson (1937)
Zinc	zinc oxide	ferret	433	858	food	2 weeks – 6 months	survival	reduced survival	Straube et al. (1980)
Tributyltin	tributyltin chloride	Wistar rat	0.4	2.0	food	multi-generational	reproduction	reduced pup body weight	Omura et al. (2001)
Tributyltin	tributyltin chloride	Wistar rat	na	2.0	food	reproduction period	reproduction	reduced pup body weight	Makita et al. (2003); Makita et al. (2004)
Tributyltin	bis(tri-n-butyltin) oxide	Wistar rat	0.21	2.1	food	106 weeks	growth, survival	reduced male body weight and reduced survival	Wester et al. (1990)
Tributyltin	tributyltin chloride	Wistar rat	2.0	10	food	multi-generational	reproduction	reduced pup body weight and percentage of live pups	Ogata et al. (2001)
Dibutyltin	dibutyltin dichloride	Wistar rat	3.8	7.6	gavage	3 days during pregnancy	growth	reduced maternal body weight	Harazono and Ema (2003)
Dibutyltin	dibutyltin dichloride	Wistar rat		7.6	gavage	3 days during pregnancy	reproduction, growth	reduced number of implantations, reduced number of females pregnant, increased rate of post-implantation loss, reduced maternal body weight	Ema et al. (2003)
Benzo(a)pyrene	benzo(a)-pyrene	mouse	2.0[b]	10	gavage	gestation (10 days)	reproduction	reduced pup body weight, reduced testes weight	MacKenzie and Angevine (1981)
Benzo(a)pyrene	benzo(a)-pyrene	mouse	33.3	na	food	up to 115 days	survival	no effect on survival	Neal and Rigdon (1967)

Table 2. Toxicity studies considered in the selection of mammalian dietary TRVs (cont.)

Analyte	Chemical Form	Test Species	NOAEL (mg/kg bw/day)	LOAEL (mg/kg bw/day)	Exposure Route	Exposure Duration	Endpoint	Effect	Source
Naphthalene	naphthalene	rat	50	150	gavage	gestational days 6 to 15	growth	reduced maternal body weight gain	Navarro et al. (1991)
Naphthalene	naphthalene	mouse	133	na	gavage	90 days	survival, growth	no effect on body weight or adult survival	Shopp et al. (1984)
Naphthalene	naphthalene	rat	na	300	gavage	8 days during pregnancy	survival, reproduction	reduced maternal survival, reduced litter size	Plasterer et al. (1985)
1-methylnaphthalene	1-methyl-naphthalene	B6C3F1 mouse	150	na	food	81 weeks	growth	no effect on body weight	Murata et al. (1993)
2-methylnaphthalene	2-methyl-napthalene	mouse	54	114	food	81 weeks	growth	reduced body weight	Murata et al. (1997)
Phenol	phenol	rat	60	120	gavage	gestational days 6 to 15	growth	reduced maternal body weight	Argus Research Laboratories 1997 (as cited in IRIS (EPA 2006))
Phenol	phenol	rat	60	120	gavage	gestational days 6 to 15	reproduction	decreased fetal body weight	Charles River Laboratories 1988 and NTP 1983a (as cited in IRIS (EPA 2006))
Phenol	phenol	mouse	140	280	gavage	gestational days 6 to 15	survival, growth	reduced survival and body weight	NTP 1983b (as cited in IRIS (EPA 2006))
PCBs (Clophen A50)	Clophen A50	mink	na	0.089	food	18 months	reproduction	reduced kit growth	Brunström et al. (2001)
PCBs (Aroclor 1254)	Aroclor 1254	mink	na	0.13	food	6 months	reproduction	reduced kit growth rate	Wren et al. (1987)
PCBs (Aroclor 1254)	Aroclor 1254	mink	na	0.22	food	4 and 9 months prior to giving birth	reproduction	number of offspring per female, decrease in pup body weight	Ringer (1983)
PCBs (Aroclor 1254)	Aroclor 1254	mink	0.13	0.26	food	4 months	reproduction	Number of kits born alive (0% at 4 weeks)	Aulerich and Ringer (1977)
PCBs (Clophen A50)	Clophen A50	mink	0.27	na	food	18 months	growth	maternal body weight	Brunström et al. (2001)
PCBs (Aroclor 1254)	Aroclor 1254	mink	na	0.39	food	88 – 102 days	reproduction	number of kits whelped and born alive (0%)	Aulerich et al. (1985)
PCB (mixture composition not reported)	unknown PCB mixture	mink	na	0.51	food	66 days	reproduction	number of kits born alive	Jensen et al. (1977)
PCBs (Aroclor 1242)	Aroclor 1242	mink	na	0.65	food	8 months	reproduction	reproductive failure	Bleavins et al. (1980)

Table 2. Toxicity studies considered in the selection of mammalian dietary TRVs (cont.)

Analyte	Chemical Form	Test Species	NOAEL (mg/kg bw/day)	LOAEL (mg/kg bw/day)	Exposure Route	Exposure Duration	Endpoint	Effect	Source
PCBs (Aroclor 1254)	Aroclor 1254	mink	na	1.31	food	4 weeks	weight gain in adults	weight gain in adults	Hornshaw et al. (1986)
PCBs (Aroclor 1254)	Aroclor 1254	mink	na	1.64	food	3 months	reproduction	all whelps stillborn	Kihlstrom et al. (1992)
PCBs (Aroclor 1254)	Aroclor 1254	mink	1.2	1.8	food	28 days	growth	female growth	Aulerich et al. (1986)
PCBs (Clophen A50)	Aroclor 1254	mink	na	2.0	food	3 months	reproduction	all whelps stillborn	Kihlstrom et al. (1992)
PCBs (Aroclor 1254)	Aroclor 1254	mink	1.5	2.4	food	28 days	growth	male and female growth	Aulerich et al. (1986)
PCBs (Aroclor 1016)	Aroclor 1016	mink	na	2.6	food	8 months	reproduction/ survival	birth weight and growth rate of kits, and 25 % adult female survival	Bleavins et al. (1980)
2,3,7,8-TCDD	2,3,7,8-TCDD	mink	na	0.0000088	food	131 – 132 days	reproduction	decreased survival in kits at 3 weeks	Hochstein et al. (2001)
2,3,7,8-TCDD	2,3,7,8-TCDD	Hartley guinea pig	0.00000065	0.0000049	food	90 days	growth	reduced body weight	DeCaprio et al. (1986)
2,3,7,8-TCDD	2,3,7,8-TCDD	Sprague-Dawley rat	0.0000010	0.000010	food	three generations	reproduction	reduced litter size and litter survival	Murray et al.(1979)
2,3,7,8-TCDD	2,3,7,8-TCDD	Hartley guinea pig	0.0000049	0.0000285	food	90 days	survival	reduced survival	DeCaprio et al. (1986)
2,3,7,8-TCDD	2,3,7,8-TCDD	mink	0.0000049	0.00005	food	125 days	survival, growth	reduced survival and body weight	Hochstein et al. (1998)
2,3,7,8-TCDD	2,3,7,8-TCDD	Sprague-Dawley rat	0.00010	na	food	three generations	growth	reduced body weight	Murray et al.(1979)
2,3,7,8-TCDD	2,3,7,8-TCDD	Sprague-Dawley rat	0.00001	0.001	food	2 years	survival, growth	reduced female survival, reduced body weight	Kociba et al. (1978)
2,3,7,8-TCDD	2,3,7,8-TCDD	Sprague-Dawley rat	na	0.00032	food	13 weeks	growth	reduced body weight	Van Birgelen et al. (1994)
Chlordane	tech chlordane	mouse	0.18	0.92	food	104 weeks	growth	reduced body weight in males	Khasawinah and Grutsch (1989)
Chlordane	tech chlordane	mouse	2.3	na	food	104 weeks	survival	no effect ton survival	Khasawinah and Grutsch (1989)
Chlordane	tech chlordane	Osborne-Mendel rat	1.5	8.0	food	104 weeks	growth, survival, reproduction	reduced body weight, adult survival, and viability of offspring	Ingle (1952)
Chlordane	tech chlordane	albino rat	4.9	11	food	407 days	growth	reduced body weight in males	Ambrose et al. (1953)
Chlordane	tech chlordane	albino rat	11	22	food	407 days	survival	reduced survival	Ambrose et al. (1953)

Table 2. Toxicity studies considered in the selection of mammalian dietary TRVs (cont.)

Analyte	Chemical Form	Test Species	NOAEL (mg/kg bw/day)	LOAEL (mg/kg bw/day)	Exposure Route	Exposure Duration	Endpoint	Effect	Source
Chlordane	tech chlordane	Sprague-Dawley rat	25	na	food	28 days	growth	no effect on body weight	Bondy et al. (2000)
Chlordane	tech chlordane	Sprague-Dawley rat	40	na	food	reproduction period	growth	no effect on body weight	Cassidy et al. (1994)
DDT	o,p'-DDT	Sprague-Dawley rat	0.24	na	food	two generations	reproduction	no effect on litter size and weight or uterine involution	Duby et al. (1971)
DDT	p,p'-DDT	mouse	0.6	na	food	five generations	survival, growth, reproduction	no effect on adult survival, growth, number of pregnancies, number of births, litter size, or pup growth/survival	Tarjan and Kemeny (1969)
DDT	p,p'- DDT	Sprague-Dawley rat	1.0	na	food	two generations	reproduction	no effect on litter size and weight or uterine involution	Duby et al. (1971)
Total DDT	tech DDT	Sprague-Dawley rat	1.2	na	food	two generations	reproduction	no effect on litter size and weight or uterine involution	Duby et al. (1971)
Total DDT	"DDT" – chemical form not specified, likely DDT mixture	mouse	na	1.3	food	120 days	reproduction	reduced litter size	Ware and Good (1967)
Total DDT	"DDT" – chemical form not specified, likely DDT mixture	mouse	1.3	na	food	120 days	survival	no effect on survival	Ware and Good (1967)
Total DDT	tech DDT	Sprague-Dawley rat	1.6	na	food	23 months	growth, survival, reproduction	no effect on adult survival, growth, viable litter size, or reproductive life-span	Ottoboni (1972)
Total DDT	tech DDT	Sprague-Dawley rat	na	2.0	food	7.5 weeks	reproduction	reduced fertility	Nickerson and Sniffen (1973)
Total DDT	"DDT" – chemical form not specified, likely DDT mixture	rat	0.8	4.0	food	2 years	reproduction	reduced number of young surviving to weaning	Fitzhugh (1948)
Total DDT	tech DDT	Sprague-Dawley rat	na	13.4	food	36 weeks	reproduction	reduced litter size, and mating and reproductive success	Jonsson et al. (1976)
DDT	p,p'-DDT	Wistar rat	1.6	16	food	6 months	reproduction	reduced offspring growth	Clement and Okey (1974)

Table 2. Toxicity studies considered in the selection of mammalian dietary TRVs (cont.)

Analyte	Chemical Form	Test Species	NOAEL (mg/kg bw/day)	LOAEL (mg/kg bw/day)	Exposure Route	Exposure Duration	Endpoint	Effect	Source
Total DDT	"DDT" – chemical form not specified, likely DDT mixture	white lab mouse	na	37	food	F0 mating, gestation and weaning+F1 breeding	survival	reduced survival	Cannon and Holcomb (1968)
Total DDT	tech DDT	Oldfield mouse	2.4	na	food	15 months	survival, reproduction	no effect on adult survival, litter size, or litters per pair	Wolfe et al. (1979)
DDT	o,p'-DDT	Wistar rat	4.0	na	food	18 – 23 weeks	reproduction	no effect on offspring survival, fertility, fecundity, or offspring growth	Wrenn et al. (1971)
Total DDT	tech DDT	Sprague-Dawley rat	6.7	na	food	36 weeks	reproduction	no effect on litter size, or mating and reproductive success	Jonsson et al. (1976)
Total DDT	tech DDT	mouse	9.2	46	food	six generations	survival, reproduction	reduced lifespan, reduced pup survival	Turusov et al. (1973)
Total DDT	tech DDT	Sprague-Dawley rat	13	na	food	37 weeks	survival	no effect on survival	Jonsson et al. (1976)
Total DDT	tech DDT (DDD, DDE, DDT)	Sprague-Dawley rat	16	na	food	three generations	survival, growth, reproduction	no effect on adult survival, growth, fertility, viability, stillbirths, litter size, abnormalities, or pup survival	Ottoboni (1969)
DDT	p,p'-DDT	mouse	18	na	food	2 years	survival	no effect on survival	Thorpe and Walker (1973)
Total DDT	pp'-DDT, pp'-DDD, pp′-DDE	Wistar rat	21	na	food	6 weeks	growth, survival	no effect on survival or male body weight	Banerjee et al. (1996)
Dieldrin	dieldrin	Carworth rat	na	0.19	food	three generations	reproduction	reduced offspring survival	Treon and Cleveland (1955)
Dieldrin	dieldrin	CFE rat	0.50	na	food	2 years	survival, growth	no effect on survival or body weight	Walker et al. (1969b)
Dieldrin	tech dieldrin	CFS Swiss mouse	0.92	na	food	120 days	survival	no effect on survival	Good and Ware (1969)
Dieldrin	tech dieldrin	CFS Swiss mouse	na	0.92	food	120 days	reproduction	reduced litter size	Good and Ware (1969)
Dieldrin	dieldrin	mouse	na	0.92	food	4 weeks prior to mating through gestation	reproduction	reduced pup survival	Virgo and Bellward (1977)

Table 2. Toxicity studies considered in the selection of mammalian dietary TRVs (cont.)

Analyte	Chemical Form	Test Species	NOAEL (mg/kg bw/day)	LOAEL (mg/kg bw/day)	Exposure Route	Exposure Duration	Endpoint	Effect	Source
Dieldrin	dieldrin	Carworth rat	2.2	na	food	6 months	growth	no effect on body weight	Treon and Cleveland (1955)
Dieldrin	dieldrin	Osborne-Mendel rat	0.8	4.1	food	2 years	survival	no effect on survival	Fitzhugh et al. (1964)
Dieldrin	dieldrin	Carworth rat	6.6	na	food	6 months	survival	no effect on survival	Treon and Cleveland (1955)
Dieldrin	dieldrin	Osborne-Mendel rat	12	na	food	2 years	growth	no effect on body weight	Fitzhugh et al. (1964)
Dieldrin	dieldrin	Carworth rat	na	26	food	6 months	survival	reduced survival	Treon and Cleveland (1955)
Dieldrin	dieldrin	Carworth rat	1.9	na	food	2 years	survival	no effect on survival	Treon and Cleveland (1955)
Endosulfan	technical endosulfan	mouse	0.84	2.5	food	24 months	survival, growth	male survival (males more sensitive than females), body weight	Hack et al. (1995)
Endosulfan	technical endosulfan	rat	0.65	3.3	food	104 weeks	growth	reduced body weight	Hack et al. (1995)
Endosulfan	technical endosulfan	rat	3.5	na	food	104 weeks	survival	no effect on survival	Hack et al. (1995)
gamma-BHC	gamma-BHC	NZ white rabbit	0.80	na	gavage	12 – 15 weeks	reproduction	no effect on fertilization rate, implantation, or embryo loss	Seiler et al. (1994)
gamma-BHC	gamma-BHC	rat	1.00	na	gavage	6 days lactation	survival, growth	no effect on maternal survival or maternal growth	Dalsenter et al. (1997a)
gamma-BHC	gamma-BHC	rat	na	3.75	gavage	gestation days 14 – 19	reproduction	reduced pup weight	Sircar and Lahiri (1989)
gamma-BHC	gamma-BHC	CD strain rat	6.1	na	food	three generations	survival, growth, reproduction	no effect on adult survival, body weight, pregnancy rate, or gestation period	Palmer et al. (1978)
gamma-BHC	gamma-BHC	Wistar rat	10	na	gavage	7 days first or second week post-natal	growth	no effect on body weight	Rivera et al. (1990)
gamma-BHC	gamma-BHC	Wistar rat	30	na	gavage	single dose at day 15 post-conception	reproduction	no effect on litter size, offspring survival, offspring body weight, or fertility	Dalsenter et al. (1997b)

Table 2. Toxicity studies considered in the selection of mammalian dietary TRVs (cont.)

Analyte	Chemical Form	Test Species	NOAEL (mg/kg bw/day)	LOAEL (mg/kg bw/day)	Exposure Route	Exposure Duration	Endpoint	Effect	Source
gamma-BHC	gamma-BHC	Wistar rat	64	na	food	2 weeks	growth	no effect on body weight	Srinivasan et al. (1991)
Heptachlor	technical heptachlor	mink	1.0	na	food	181 days	survival, growth, reproduction	no effect on adult survival, female body weight, or kit body weight	Crum et al. (1993)
Heptachlor	technical heptachlor	mink	na	1.8	food	181 days	survival, growth, reproduction	reduced adult survival, female body weight, and kit body weight	Crum et al. (1993)
Heptachlor	technical heptachlor	mink	3.1	na	food	28 days	growth	no effect on body weight	Aulerich et al. (1990)
Heptachlor	technical heptachlor	mink	na	5.7	food	28 days	growth	reduced body weight	Aulerich et al. (1990)
Heptachlor	technical heptachlor	mink	5.7	na	food	28 days	survival	no effect on survival	Aulerich et al. (1990)
Heptachlor	technical heptachlor	mink	na	6.2	food	28 days	survival	reduced survival	Aulerich et al. (1990)

[a] NOAEL estimated using an uncertainty factor of 10 (acute/subchronic LOAEL to chronic NOAEL).

[b] NOAEL estimated using an uncertainty factor of 5 (chronic LOAEL to chronic NOAEL).

BHC – benzene hexachloride

DDD – dichlorodiphenyldichloroethane

DDE – dichlorodiphenyldichloroethylene

DDT – dichlorodiphenyltrichloroethane

LOAEL – lowest-observed-effect concentration

na – not applicable

NOAEL – no-observed-effect concentration

PAH – polycyclic aromatic hydrocarbon

PCB – polychlorinated biphenyl

SVOC – semivolatile organic compound

TCDD – tetrachlorodibenzo-*p*-dioxin

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ATTACHMENT 7
WILDLIFE EXPOSURE DOSE CALCULATIONS

Table of Contents

Table 1. COPC concentrations in pigeon guillemot prey

COPC	Concentration in Prey (mg/kg ww)							Percentage of Prey Item in Diet (by ww)[a]							Concentration in Prey (mg/kg ww)
	Shiner Surf-perch	English Sole	Juvenile Chinook Salmon	Brown Rockfish	Crab	Shrimp	Mussel	Shiner Surf-perch	English Sole	Juvenile Chinook Salmon	Brown Rock-fish	Crab	Shrimp	Mussel	
Mercury	0.042	0.036	0.027	0.21	0.069	0.03	0.012	14.3	14.3	14.3	14.3	14.3	14.3	14.3	0.0609
Total PCBs	2.3	4.1	0.072	4	0.45	0.46	0.031	14.3	14.3	14.3	14.3	14.3	14.3	14.3	1.632
PCB TEQ	0.0000386	0.0000426	na	0.0000725	0.0000125	na	na	25	25	0	25	25	0	0	0.0000416
Total TEQ	0.0000435	0.0000466	na	0.000079	0.0000166	na	na	25	25	0	25	25	0	0	0.0000464

[a] PCB congeners and dioxin/furan congeners were not analyzed in juvenile Chinook salmon, shrimp, or mussels. Therefore, the fraction of shiner surfperch, English sole, brown rockfish, and crab in the diet were assumed to be equal (i.e., 25% for each) for PCB TEQ and total TEQ.

COPC – chemical of potential concern

na – not analyzed

PCB – polychlorinated biphenyl

TEQ – toxic equivalency quotient

ww – wet weight

Table 2. COPC concentrations in osprey prey

COPC	Concentration in Prey (mg/kg ww)		Percentage of Prey Item in Diet (by ww)		Concentration in Prey (mg/kg ww)
	Shiner Surfperch	Juvenile Chinook Salmon	Shiner Surfperch	Juvenile Chinook Salmon	
Total PCBs	2.3	0.072	50	50	1.19

COPC – chemical of potential concern

PCB – polychlorinated biphenyl

TEQ – toxic equivalency quotient

ww – wet weight

Table 3. COPC concentrations in river otter prey

COPC	Concentration in Prey (mg/kg ww)							Percentage of Prey Item in Diet (by ww)[a]							Concentration in Prey (mg/kg ww)
	Shiner Surf-perch	English Sole	Juvenile Chinook Salmon	Brown Rockfish	Crab	Clam	Mussel	Shiner Surf-perch	English Sole	Juvenile Chinook Salmon	Brown Rock-fish	Crab	Clam	Mussel	
Mercury	0.042	0.036	0.027	0.21	0.069	0.021	0.012	22	22	22	22	10	1	1	0.0765
Selenium	0.51	0.62	0.36	0.72	1.2	0.41	0.54	22	22	22	22	10	1	1	0.616
Total PCBs	2.3	4.1	0.072	4	0.45	0.069	0.031	22	22	22	22	10	1	1	2.350
PCB TEQ	0.0000143	0.0000374	no data	0.0000401	0.00000561	0.000000734	no data	29.3	29.3	0	29.3	10	1	0	0.0000275
Total TEQ	0.0000156	0.000039	no data	0.0000425	0.0000068	0.00000111	no data	29.3	29.3	0	29.3	10	1	0	0.0000291

[a] PCB congeners and dioxin/furan congeners were not analyzed in juvenile Chinook salmon or mussels. Therefore, the percentage of crab was kept the same at 10%, the percentage of clams was increased to 2%, and the remaining percentage (88%) was divided among the three fish species with data (i.e., 29.3% each for shiner surfperch, English sole, and brown rockfish) for PCB TEQ and total TEQ.

COPC – chemical of potential concern

PCB – polychlorinated biphenyl

TEQ – toxic equivalency quotient

ww – wet weight

Table 4. COPC concentrations in harbor seal prey

COPC	Concentration in Prey (mg/kg ww)				Percentage of Prey Item in Diet (by ww)[a]				Concentration in Prey (mg/kg)
	Shiner Surfperch	English Sole	Juvenile Chinook Salmon	Brown Rockfish	Shiner Surfperch	English Sole	Juvenile Chinook Salmon	Brown Rockfish	
Mercury	0.042	0.036	0.027	0.21	25	25	25	25	0.079
Total PCBs	2.3	4.1	0.072	4	25	25	25	25	2.62
PCB TEQs	0.0000143	0.0000374	na	0.0000401	33.3	33.3	0	33.3	0.000031
Total TEQ	0.0000156	0.000039	na	0.0000425	33.3	33.3	0	33.3	0.000032

[a] PCB congeners and dioxins/furan congeners were not analyzed in juvenile Chinook salmon; therefore, the fraction of shiner surfperch, English sole, and brown rockfish in the diet were assumed to be equal (i.e., 33.3% each) for PCB TEQ and total TEQ.

COPC – chemical of potential concern
PCB – polychlorinated biphenyl
ww – wet weight
na – not analyzed
TEQ – toxic equivalency quotient

Table 5. Calculated COPC exposure doses for pigeon guillemot

COPC	Concentration in Media			Ingestion Rate			Site Use Factor	Body Weight (kg)	Exposure Dose (mg/kg bw/day)
	Prey (mg/kg ww)	Water (mg/L)	Sediment (mg/kg dw)	Prey (kg/day)	Water (L/day)	Sediment (kg/day)			
Mercury	0.0609	0.0000058	0.29	0.097	0.036	0.0004	0.5	0.485	0.0062
Total PCBs	1.632	0.00000163	0.74	0.097	0.036	0.0004	0.5	0.485	0.16
PCB TEQs	0.0000416	0.00000000114	0.0000428	0.097	0.036	0.0004	0.5	0.485	0.0000042
Total TEQ	0.0000464	0.00000000114[a]	0.0000675	0.097	0.036	0.0004	0.5	0.485	0.0000047

[a] Dioxin/furan congeners were not analyzed in surface water samples, so total TEQ includes only PCB congeners.

bw – body weight
COPC – chemical of potential concern
dw – dry weight
PCB – polychlorinated biphenyl
TEQ – toxic equivalency quotient
ww – wet weight

Table 6. Calculated COPC exposure doses for osprey

COPC	Concentration in Media			Ingestion Rate			Site Use Factor	Body Weight (kg)	Exposure Dose (mg/kg bw/day)
	Prey (mg/kg ww)	Water (mg/L)	Sediment (mg/kg dw)	Prey (kg/day)	Water (L/day)	Sediment (kg/day)			
Total PCBs	1.19	0.000001516	1.6	0.36	0.084	0.00094	0.41	1.7	0.10

bw – body weight
COPC – chemical of potential concern
dw – dry weight
PCB – polychlorinated biphenyl
TEQ – toxic equivalency quotient
ww – wet weight

Table 7. Calculated COPC exposure doses for river otter

COPC	Concentration in Media			Ingestion Rate			Site Use Factor	Body Weight (kg)	Exposure Dose (mg/kg bw/day)
	Prey (mg/kg ww)	Water (mg/L)	Sediment (mg/kg dw)	Prey (kg/day)	Water (L/day)	Sediment (kg/day)			
Mercury	0.0765	0.0000058	0.29	1.1	0.69	0.0046	0.23	8.6	0.0023
Selenium	0.616	0.00014	0.49	1.1	0.69	0.0046	0.23	8.6	0.018
Total PCBs	2.350	0.00000163	0.74	1.1	0.69	0.0046	0.23	8.6	0.069
PCB TEQ	0.0000275	0.000000000595	0.00000556	1.1	0.69	0.0046	0.23	8.6	0.00000074
Total TEQ	0.0000291	0.000000000595[a]	0.0000245	1.1	0.69	0.0046	0.23	8.6	0.00000078

[a] Dioxin/furan congeners were not analyzed in surface water samples, so total TEQ includes only PCB congeners.

bw – body weight
dw – dry weight
COPC – chemical of potential concern
PCB – polychlorinated biphenyl
TEQ – toxic equivalency quotient
ww – wet weight

Table 8. Calculated COPC exposure doses for harbor seal

COPC	Concentration in Media			Ingestion Rate			Site Use Factor	Body Weight (kg)	Exposure Dose (mg/kg bw/day)
	Prey (mg/kg ww)	Water (mg/L)	Sediment (mg/kg dw)	Prey (kg/day ww)	Water (L/day)	Sediment (kg/day dw)			
Mercury	0.079	0.0000058	0.29	2.5	5.1	0.012	0.1	80.6	0.00025
Total PCBs	2.62	0.00000163	0.74	2.5	5.1	0.012	0.1	80.6	0.0081
PCB TEQ	0.000031	0.000000000595	0.00000556	2.5	5.1	0.012	0.1	80.6	0.000000095
Total TEQ	0.000032	0.000000000595[a]	0.0000245	2.5	5.1	0.012	0.1	80.6	0.00000010

[a] Dioxin/furan congeners were not analyzed in surface water samples, so total TEQ includes only PCB congeners.

bw – body weight
dw – dry weight
COPC – chemical of potential concern
PCB – polychlorinated biphenyl
TEQ – toxic equivalency quotient
ww – wet weight