Canadian Sediment Quality Guidelines for the Protection of Aquatic Life

SUMMARY TABLES

Update 2002

Table 1. Interim freshwater sediment quality guidelines (ISQGs; dry weight), probable effect levels (PELs; dry weight), and incidence (%) of adverse biological effects in concentration ranges defined by these values.[*]

Substance	ISQG	PEL	% = ISQG	ISQG < % < PEL	% = PEL
Acenaphthene [See Polycyclic aromatic hydrocarbons (PAHs)]					
Acenaphthylene [See Polycyclic aromatic hydrocarbons (PAHs)]					
Anthracene [See Polycyclic aromatic hydrocarbons (PAHs)]					
Aroclor 1254 [See Polychlorinated biphenyls (PCBs)]					
Arsenic	5.9 $mg \cdot kg^{-1}$	17.0 $mg \cdot kg^{-1}$	5	25	12
Benz*(a)*anthracene [See Polycyclic aromatic hydrocarbons (PAHs)]					
Benzo*(a)*pyrene [See Polycyclic aromatic hydrocarbons (PAHs)]					
Cadmium	0.6 $mg \cdot kg^{-1}$	3.5 $mg \cdot kg^{-1}$	11	12	47
Chlordane	4.50 $\mu g \cdot kg^{-1}$	8.87 $\mu g \cdot kg^{-1}$	2	17	70
Chromium	37.3 $mg \cdot kg^{-1}$	90.0 $mg \cdot kg^{-1}$	2	19	49
Chrysene [See Polycyclic aromatic hydrocarbons (PAHs)]					
Copper	35.7 $mg \cdot kg^{-1}$	197 $mg \cdot kg^{-1}$	4	38	44
DDTs					
DDD[†] (2,2-Bis(*p*-chlorophenyl)-1,1,-dichloroethane; Dichloro diphenyl dichloroethane)	3.54 $\mu g \cdot kg^{-1}$	8.51 $\mu g \cdot kg^{-1}$	3	30	85
DDE[†] (1,1-Dichloro-2,2,bis(*p*-chlorophenyl)-ethene; Diphenyl dichloro ethylene)	1.42 $\mu g \cdot kg^{-1}$	6.75 $\mu g \cdot kg^{-1}$	6	20	47
DDT[†] (2,2-Bis(*p*-chlorophenyl)-1,1,1-trichloroethane; Dichloro diphenyl trichloroethane)	1.19 $\mu g \cdot kg^{-1}$ [‡]	4.77 $\mu g \cdot kg^{-1}$ [§]	8	5	59
Dibenz*(a,h)*anthracene [See Polycyclic aromatic hydrocarbons (PAHs)]					
Dieldrin	2.85 $\mu g \cdot kg^{-1}$	6.67 $\mu g \cdot kg^{-1}$	1	10	60
Endrin	2.67 $\mu g \cdot kg^{-1}$	62.4 $\mu g \cdot kg^{-1}$	1	64	59
Fluoranthene [See Polycyclic aromatic hydrocarbons (PAHs)]					
Fluorene [See Polycyclic aromatic hydrocarbons (PAHs)]					

Continued.

Table 1. Continued.

Substance	ISQG	PEL	% = ISQG	ISQG < % < PEL	% = PEL
Heptachlor epoxide	0.60 µg·kg^{-1}	2.74 µg·kg^{-1}	3	12	67
Hexachlorocyclohexane [See Lindane]					
Lead	35.0 mg·kg^{-1}	91.3 mg·kg^{-1}	5	23	42
Lindane (Hexachlorocyclohexane)	0.94 µg·kg^{-1}	1.38 µg·kg^{-1}	0	50	49
Mercury	0.17 mg·kg^{-1}	0.486 mg·kg^{-1}	8	34	36
2-Methylnaphthalene [See Polycyclic aromatic hydrocarbons (PAHs)]					
Naphthalene [See Polycyclic aromatic hydrocarbons (PAHs)]					
Nonylphenol and its ethoxylates	1.4 mg·kg^{-1} †††,***				
PAHs [See Polycyclic aromatic hydrocarbons (PAHs)]					
PCBs [See Polychlorinated biphenyls (PCBs)]					
PCDD/Fs [see Polychlorinated dibenzo-*p*-dioxins and polychlorinated dibenzofurans]					
Phenanthrene [See Polycyclic aromatic hydrocarbons (PAHs)]					
Polychlorinated biphenyls (PCBs)					
Aroclor 1254	60 µg·kg^{-1} #	340 µg·kg^{-1} **			
Total PCBs	34.1 µg·kg^{-1}	277 µg·kg^{-1}	4	40	50
Polychlorinated dibenzo-*p*-dioxins and polychlorinated dibenzofurans	0.85 ng·TEQ/kg dw §§	21.5 ng·TEQ/kg dw §§	0##	24##	46##
Polycyclic aromatic hydrocarbons (PAHs)					
Acenaphthene	6.71 µg·kg^{-1} ‡	88.9 µg·kg^{-1} §			
Acenaphthylene	5.87 µg·kg^{-1} ‡	128 µg·kg^{-1} §			
Anthracene	46.9 µg·kg^{-1} ‡	245 µg·kg^{-1} §			
Benz*(a)*anthracene	31.7 µg·kg^{-1}	385 µg·kg^{-1}	13	6	38
Benzo*(a)*pyrene	31.9 µg·kg^{-1}	782 µg·kg^{-1}	11	16	30
Chrysene	57.1 µg·kg^{-1}	862 µg·kg^{-1}	8	14	25
Dibenz*(a,h)*anthracene	6.22 µg·kg^{-1} ‡	135 µg·kg^{-1} §			
Fluoranthene	111 µg·kg^{-1}	2355 µg·kg^{-1}	8	23	49
Fluorene	21.2 µg·kg^{-1} ‡	144 µg·kg^{-1} §			
2-Methylnaphthalene	20.2 µg·kg^{-1} ‡	201 µg·kg^{-1} §			
Naphthalene	34.6 µg·kg^{-1} ‡	391 µg·kg^{-1} §			
Phenanthrene	41.9 µg·kg^{-1}	515 µg·kg^{-1}	4	17	44
Pyrene	53.0 µg·kg^{-1}	875 µg·kg^{-1}	7	16	32
Pyrene [See Polycyclic aromatic hydrocarbons (PAHs)]					
Toxaphene	0.1 µg·kg^{-1} ††	— ‡‡			
Zinc	123 mg·kg^{-1}	315 mg·kg^{-1}	5	32	36

* ISQGs and PELs presented here have been calculated using a modification of the NSTP approach (CCME 1995).
† Sum of *p,p´* and *o,p´* isomers.
‡ Provisional; adoption of marine ISQG.
§ Provisional; adoption of marine PEL.
# Provisional; adoption of lowest effect level from Ontario (Persaud et al. 1993).
** Provisional; 1% TOC; adoption of severe effect level of 34 µg·g^{-1} TOC from Ontario (Persaud et al. 1993).
†† Provisional; 1% TOC; adoption of the chronic sediment quality criterion of 0.01 µg·g^{-1} TOC of the New York State Department of Environmental Conservation (NYSDEC 1994).
‡‡ No PEL derived.
§§ Values are expressed as toxic equivalency (TEQ) units, based on WHO 1998 TEF values for fish.

[##] Expressed on a TEQ basis using NP TEFs; assumes 1% TOC.
[***]Provisional; use of equilibrium partitioning approach.
[†††]Note that the incidence of adverse biological effects below the TEL, between the TEL and PEL, and above the PEL were 22%, 24% and 65%, respectively, prior to the application of a safety factor.

Table 2. Interim marine sediment quality guidelines (ISQGs; dry weight), probable effect levels (PELs; dry weight), and incidence (%) of adverse biological effects in concentration ranges defined by these values.[*]

Substance	ISQG	PEL	% = ISQG	ISQG < % < PEL	% = PEL
Acenaphthene [See Polycyclic aromatic hydrocarbons; (PAHs)]					
Acenaphthylene [See Polycyclic aromatic hydrocarbons (PAHs)]					
Anthracene [See Polycyclic aromatic hydrocarbons (PAHs)]					
Aroclor 1254 [See Polychlorinated biphenyls (PCBs)]					
Arsenic	7.24 $mg \cdot kg^{-1}$	41.6 $mg \cdot kg^{-1}$	3	13	47
Benz*(a)*anthracene [See Polycyclic aromatic hydrocarbons (PAHs)]					
Benzo*(a)*pyrene [See Polycyclic aromatic hydrocarbons (PAHs)]					
Cadmium	0.7 $mg \cdot kg^{-1}$	4.2 $mg \cdot kg^{-1}$	6	20	71
Chlordane	2.26 $\mu g \cdot kg^{-1}$	4.79 $\mu g \cdot kg^{-1}$	9	12	17
Chromium	52.3 $mg \cdot kg^{-1}$	160 $mg \cdot kg^{-1}$	4	15	53
Chrysene [See Polycyclic aromatic hydrocarbons (PAHs)]					
Copper	18.7 $mg \cdot kg^{-1}$	108 $mg \cdot kg^{-1}$	9	22	56
DDTs					
DDD[†] (2,2-Bis(*p*-chlorophenyl)-1,1,-dichloroethane; Dichloro diphenyl dichloroethane)	1.22 $\mu g \cdot kg^{-1}$	7.81 $\mu g \cdot kg^{-1}$	4	11	46
DDE[†] (1,1-Dichloro-2,2,bis(*p*-chlorophenyl)-ethene; Diphenyl dichloro ethylene)	2.07 $\mu g \cdot kg^{-1}$	374 $\mu g \cdot kg^{-1}$	5	16	50
DDT[†] (2,2-Bis(*p*-chlorophenyl)-1,1,1-trichloroethane; Dichloro diphenyl trichloroethane)	1.19 $\mu g \cdot kg^{-1}$	4.77 $\mu g \cdot kg^{-1}$	8	5	59
Dibenz*(a,h)*anthracene [See Polycyclic aromatic hydrocarbons (PAHs)]					
Dieldrin	0.71 $\mu g \cdot kg^{-1}$	4.30 $\mu g \cdot kg^{-1}$	4	13	50
Endrin	2.67 $\mu g \cdot kg^{-1}$ ‡	62.4 $\mu g \cdot kg^{-1}$ §			
Fluoranthene [See Polycyclic aromatic hydrocarbons (PAHs)]					
Fluorene [See Polycyclic aromatic hydrocarbons (PAHs)]					
Heptachlor epoxide	0.60 $\mu g \cdot kg^{-1}$ ‡	2.74 $\mu g \cdot kg^{-1}$ §			
Hexachlorocyclohexane [See Lindane]					
Lead	30.2 $mg \cdot kg^{-1}$	112 $mg \cdot kg^{-1}$	6	26	58
Lindane (Hexachlorocyclohexane)	0.32 $\mu g \cdot kg^{-1}$	0.99 $\mu g \cdot kg^{-1}$	3	21	26

Continued.

Table 2. Continued.

Substance	ISQG	PEL	% = ISQG	ISQG < % < PEL	% = PEL
Mercury	0.13 mg·kg^{-1}	0.70 mg·kg^{-1}	8	24	37
2-Methylnaphthalene [See Polycyclic aromatic hydrocarbons (PAHs)]					
Naphthalene [See Polycyclic aromatic hydrocarbons (PAHs)]					
Nonylphenol and its ethoxylates	1.0 mg·kg^{-1} ‡‡,§§				
PAHs [See Polycyclic aromatic hydrocarbons (PAHs)]					
PCBs [See Polychlorinated biphenyls (PCBs)]					
PCDD/Fs [see Polychlorinated dibenzo-*p*-dioxins and polychlorinated dibenzo furans					
Phenanthrene [See Polycyclic aromatic hydrocarbons (PAHs)]					
Polychlorinated biphenyls (PCBs)					
Aroclor 1254	63.3 µg·kg^{-1}	709 µg·kg^{-1}	1	24	76
Total PCBs	21.5 µg·kg^{-1}	189 µg·kg^{-1}	16	37	55
Polychlorinated dibenzo-*p*-dioxins and polychlorinated dibenzo furans	0.85 ng TEQ/kg dw^{++}	21.5 ng TEQ/kg dw^{++}			
Polycyclic aromatic hydrocarbons (PAHs)					
Acenaphthene	6.71 µg·kg^{-1}	88.9 µg·kg^{-1}	8	29	57
Acenaphthylene	5.87 µg·kg^{-1}	128 µg·kg^{-1}	7	14	51
Anthracene	46.9 µg·kg^{-1}	245 µg·kg^{-1}	9	20	75
Benz*(a)*anthracene	74.8 µg·kg^{-1}	693 µg·kg^{-1}	9	16	78
Benzo*(a)*pyrene	88.8 µg·kg^{-1}	763 µg·kg^{-1}	8	22	71
Chrysene	108 µg·kg^{-1}	846 µg·kg^{-1}	9	19	72
Dibenz*(a,h)*anthracene	6.22 µg·kg^{-1}	135 µg·kg^{-1}	16	12	65
Fluoranthene	113 µg·kg^{-1}	1 494 µg·kg^{-1}	10	20	80
Fluorene	21.2 µg·kg^{-1}	144 µg·kg^{-1}	12	20	70
2-Methylnaphthalene	20.2 µg·kg^{-1}	201 µg·kg^{-1}	0	23	82
Naphthalene	34.6 µg·kg^{-1}	391 µg·kg^{-1}	3	19	71
Phenanthrene	86.7 µg·kg^{-1}	544 µg·kg^{-1}	8	23	78
Pyrene	153 µg·kg^{-1}	1 398 µg·kg^{-1}	7	19	83
Pyrene [See Polycyclic aromatic hydrocarbons (PAHs)]					
Toxaphene	0.1 µg·kg^{-1} #	— **			
Zinc	124 mg·kg^{-1}	271 mg·kg^{-1}	4	27	65

* ISQGs and PELs presented here have been calculated using a modification of the NSTP approach (CCME 1995).

† Sum of *p,p´* and *o,p´* isomers.

‡ Provisional; adoption of freshwater ISQG.

§ Provisional; adoption of freshwater PEL.

\# Provisional; 1% TOC; adoption of the chronic sediment quality criterion of 0.01 µg·g^{-1}TOC of the New York State Department of Environmental Conservation (NYSDEC 1994).

** No PEL derived.

++ Values are expressed as toxic equivalency (TEQ) units, based on WHO 1998 TEF values for fish.

‡‡ Expressed as a TEQ basis using NP TEF; assumes 1% TOC.

§§ Provisional; use of equillibrium partitioning approach.

References

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Canadian Council of Ministers of the Environment. 2002. Canadian sediment quality guidelines for the protection of aquatic life: Summary tables. Updated. In: Canadian environmental quality guidelines, 1999, Canadian Council of Ministers of the Environment, Winnipeg.

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