

PROVINCE OF BRITISH COLUMBIA
ORDER OF THE LIEUTENANT GOVERNOR IN COUNCIL

Order in Council No. **083** , Approved and Ordered **FEB 1 2002**

Jona Campagnolo

Lieutenant Governor

Executive Council Chambers, Victoria

On the recommendation of the undersigned, the Lieutenant Governor, by and with the advice and consent of the Executive Council, orders that the Contaminated Sites Regulation, B.C. Reg. 375/96, is amended as set out in the attached Schedule.

DEPOSITED FEB 04 2002 B.C. REG. <u>17/2002</u>
--

Joyce Murray

Minister of Water, Land and Air Protection

Christy Clark

Presiding Member of the Executive Council

(This part is for administrative purposes only and is not part of the Order.)

Authority under which Order is made:

Act and section:- Waste Management Act, R.S.B.C. 1996, c. 482, sections 57 and 58

Other (specify):- oic 1480/96

February 5, 2002

resub 328/2001/88

SCHEDULE

1 **Section 1 of B.C. Reg. 375/96, the Contaminated Sites Regulation, is amended by adding the following definitions:**

“**generic numerical water standard**” means the concentration of a substance in water specified for a particular water use in Schedule 6;

“**Provincial health officer**” means the Provincial health officer appointed under the *Health Act*; .

2 **Section 2 (1) is amended by striking out “under section 26.1” and substituting “under section 26.1 (1), (2), (3), (4), (7) and (8)”.**

3 **Section 4 is amended**

(a) by repealing subsection (6) and substituting the following:

(6) A municipality undertaking to zone or rezone land is exempt from the duty to provide a site profile under section 26.1 (1) (b) (i) of the Act if

(a) the municipality does not have an ownership interest in the land, or

(b) the municipality

(i) does not intend to develop the parcel or parcels of land that it owns within the area being zoned or rezoned, and

(ii) at the time it is undertaking to zone or rezone the land it commits in writing to a manager to submit a site profile when development of the land begins, unless it is exempted when development of the land begins from the requirement to submit a site profile under other provisions of the Act and this regulation. , **and**

(b) by repealing subsection (9) and substituting the following:

(9) A person is exempt from the duty to provide a site profile under section 26.1 (1) (b) (iv) and (2) (b) of the Act if

(a) the person seeks to demolish or dismantle temporary camps and facilities that are associated with construction of rights of way and petroleum, natural gas, mineral or geothermal exploration and development,

(b) the person seeks to demolish or dismantle buildings or structures not associated with decommissioning a site, or

(c) the demolition does not involve any disturbance or excavation of soil other than that which is incidental to the demolition.

4 ***Section 9 is amended by adding the following subsection:***

- (6.1) For the purpose of determining the fee payable in Table 2 of Schedule 3, the size of a site must be determined as follows:
- (a) if the areal extent of the contamination of an affected legal parcel is known, the size of the site is the known areal extent of the contamination;
 - (b) if the areal extent of the contamination of an affected legal parcel is not known but the manager determines that a reasonable estimate of the areal extent can be made, the size of the site is the manager's estimate of the areal extent of the contamination;
 - (c) if neither paragraph (a) nor (b) applies with respect to the contamination of an affected legal parcel, the size of the site is the total area of the affected legal parcel;
 - (d) if the site includes more than one legal parcel, the size of the site is the aggregate of the areas of contamination determined for each legal parcel under paragraphs (a), (b) and (c), as applicable.

5 ***Section 11 (1) is amended by adding the following paragraph:***

- (d) the concentration of any substance in sediment is greater than or equal to the concentration established in a criterion or standard for that substance by the director.

6 ***Section 15 is amended by adding the following subsections:***

- (3) A person making an application for a preliminary determination under section 26.4 (2) (a) of the Act or a final determination under section 26.4 (3) of the Act may include in the application a recommendation of a professional expert listed on the roster established under section 49.1 (1) that the application be approved, in which case section 49.1 (2) applies.
- (4) If a manager rejects an application described in subsection (3), the manager must provide written reasons for the rejection, within 15 days of the rejection, to
 - (a) the applicant,
 - (b) the director, and
 - (c) the Association of Professional Engineers and Geoscientists of the Province of British Columbia.

7 ***Section 18 (3) (a) and (b) is amended by striking out "for any" and substituting "for each".***

8 ***The following section is added to Part 6:***

Application of risk-based standards for remediation at wide area sites

- 18.1** (1) A responsible person for remediation at a wide area site may request a decision from the director that the wide area site has been satisfactorily remediated with respect to a substance from a source specified under section 14 if
- (a) the risk to human health due to exposure to that substance at the site is less than or equal to a maximum value recommended by the medical health officer for the wide area site,
 - (b) the maximum value recommended by the medical health officer under paragraph (a) takes a form other than that of a hazard index or cancer risk, and
 - (c) the recommendation under paragraph (a) is reviewed and endorsed by the Provincial health officer.
- (2) A responsible person who makes a request under subsection (1) must
- (a) provide information to support and justify the basis for the request, and
 - (b) participate in and pay for a public community based consultation process, acceptable to and facilitated by the medical health officer, that
 - (i) is for the purpose of developing a recommendation on the acceptable level of human exposure and health risk for the site,
 - (ii) considers remediation options in relation to levels of human exposure and health risk at the site,
 - (iii) is conducted in conjunction with any requirement under section 27.5 of the Act and section 55 (1) of this regulation, and
 - (iv) is carried out over a time period not exceeding 6 months from the date of the request under subsection (1), unless the person making the request, the medical health officer and the director agree to an alternate time period.
- (3) The director must not make a decision under subsection (1) before receiving written recommendations with supporting rationale from the medical health officer respecting the matters described in subsection (1) (a) and a written review and endorsement of the recommendations from the Provincial health officer under subsection (1) (c).
- (4) Despite subsections (1) and (2), the director must consider a wide area site to have been satisfactorily remediated with respect to each substance from a source specified in section 14 without review and recommendation from the medical health officer if
- (a) for each non-threshold carcinogenic substance, the calculated human lifetime cancer risk due to exposure to that substance at the site is less than or equal to one in 100 000, and

- (b) for each substance for which a hazard index is calculated, the hazard index due to exposure of a human to that substance at the site is less than or equal to one.
- (5) A person who applies the risk-based standards of this section with respect to specified substances must also prepare an environmental impact report that identifies
 - (a) the potential onsite and offsite environmental impacts of each specified substance before and after the remediation, and
 - (b) procedures, including monitoring, designed to mitigate any significant potential impacts identified in paragraph (a).
- (6) A manager or the director may impose requirements to prevent or mitigate impacts identified
 - (a) in the environmental impact report prepared under subsection (5), or
 - (b) by the manager using other available data.

9 *Section 43 is amended by renumbering the section as section 43 (1) and by adding the following subsections:*

- (2) A person making an application described in subsection (1) respecting a site from which soil is to be relocated that is classified under section 53 (1) (i) as a low or moderate risk site may include in the application a recommendation of a professional expert listed on the roster established under section 49.1 (1) that the application be approved, in which case section 49.1 (2) applies.
- (3) If a manager rejects an application described in subsection (1), the manager must provide written reasons for the rejection, within 15 days of the rejection, to
 - (a) the applicant,
 - (b) the director, and
 - (c) the Association of Professional Engineers and Geoscientists of the Province of British Columbia.

10 *Section 44 (b) is amended by striking out “96 hours” and substituting “4 business days”.*

11 *Section 49 (2) is repealed and the following is substituted:*

- (2) In support of the application referred to in subsection (1), the person requesting the certificate of compliance or conditional certificate of compliance must provide to the manager the reports described in paragraphs (a) and (b) and ensure that the manager has information on the items described in paragraphs (c) and (d):
 - (a) preliminary and detailed site investigation reports;

- (b) a confirmation of remediation report which describes sampling and analyses carried out after remediation of the contamination including
 - (i) a description of sampling locations and methods used,
 - (ii) a schedule of sampling conducted, and
 - (iii) a summary and evaluation of results of field observations and of field and laboratory analyses of samples;
- (c) compliance with all conditions set by a manager under section 47 (3) if an approval in principle was issued prior to remediation;
- (d) the quality and performance of remediation measures on completion of remediation, including compliance with the remediation standards in this regulation.

12 ***Section 49.1 (2) is repealed and the following is substituted:***

- (2) On processing an application described in section 15 (3), 43 (1), 47 (1) or (4) or 49 (1), a manager may consider, in determining the manner and extent of the review that must be undertaken of the work on which the application is based, whether the application includes a recommendation of a professional expert, listed on the roster established under subsection (1), that the decision requested in the application be made.

13 ***Section 57 is amended***

(a) by repealing the marginal note and substituting “Notifications for independent remediation”, and

(b) by repealing subsection (1) and substituting the following:

- (1) A responsible person who carries out independent remediation of a site pursuant to section 28 (1) of the Act must, if the responsible person knows that one or more substances has migrated or is likely to have migrated to a neighbouring site and is or is likely causing contamination of the neighbouring site, provide the notification described in subsection (1.1).
- (1.1) The responsible person must provide written notification to the person or persons who own the neighbouring site and a copy of the notification to the manager, within 15 days after the responsible person becomes aware of the migration or likely migration of each substance to the neighbouring site, giving
 - (a) the name and address of the person or persons who own the site or sites to be remediated,
 - (b) the name, address and telephone number of the person to contact regarding the remediation activities to be undertaken at the site, and
 - (c) a general description of the nature of the migration or likely migration of each substance.

- (1.2) A person who has a duty to provide notification to a manager of commencement of independent remediation under section 28 (2) (a) of the Act must provide written notice to the manager within 3 days after the commencement of any remediation activity involving handling, management or treatment of contamination, other than activity which has the purpose of obtaining results for investigation purposes, giving
- (a) the legal description, including parcel identifier numbers and latitudinal and longitudinal references, and civic address of the parcel or parcels of land at the site to be remediated,
 - (b) the name and address of the person or persons who own the parcel or parcels of land at the site to be remediated,
 - (c) the name, address and telephone number of the person to contact regarding the remediation activities to be undertaken at the site, and
 - (d) a general description of the nature of the contaminated site and the remediation being conducted.

14 The following section is added to Part 14:

Notification of neighbouring site owners after site investigations

- 60.1** (1) A responsible person who carries out a site investigation that discloses that one or more substances has migrated or is likely to have migrated to a neighbouring site and is or is likely causing contamination of the neighbouring site must provide written notification described in subsection (2).
- (2) The responsible person for the investigated site must provide written notification to the person or persons who own the neighbouring site and a copy of the notification to the manager, within 15 days after the responsible person becomes aware of the migration or likely migration of each substance to the neighbouring site, giving
- (a) the name and address of the person or persons who own the investigated site,
 - (b) the name, address and telephone number of the person to contact regarding the investigation, and
 - (c) a general description of the nature of the migration or likely migration of each substance.

15 Schedule 1 is amended by adding “All Information Must be Provided and All Questions Answered” between “SITE PROFILE” and “I. CONTACT IDENTIFICATION”.

16 **Part II of Schedule 1 is amended**

(a) **by adding** “Please attach a site location map” **after** “II. SITE IDENTIFICATION”,
and

(b) **by striking out** “(All the Following Questions Must be Answered.)”.

17 **Part IV of Schedule 1 is amended by adding the following item:**

D	Contamination resulting from migration of substances from other properties?		
---	---	--	--

18 **The text following the heading for Part VI of Schedule 1 and preceding item A of that Part is repealed and the following substituted:**

Is there currently or to the best of your knowledge has there previously been on the site any landfilling, deposit or dumping of the following materials (please mark the appropriate column opposite the question):

19 **Part VI of Schedule 1 is amended in Item E by striking out** “roofing”.

20 **Schedule 2 is amended**

(a) **in Purpose or Activity 3 in Item E by striking out** “roofing”,

(b) **in Item E by adding the following Purposes or Activities:**

E	9. dry cleaning facilities or operations and dry cleaning chemical storage 10. sites which have been or likely have been contaminated by substances migrating from other properties
---	--

(c) **in Item I by adding the following Purpose or Activity:**

I	9. sawmills
---	-------------

21 **Item 1 (a) of Table 1 of Schedule 3 is amended by striking out in column II “\$50” and substituting “\$100”.**

22 **Table 2 of Schedule 3 is amended**

(a) **in item 1 (a) by adding** “not processed under section 15 (3)” **after** “determination”,
and

(b) by adding the following after item 1 (a):

Column I	Column II	Column III	Column IV	Column V	Column VI	Column VII
(b) Person requests a manager to make a final determination under section 15 (3).	\$50	\$50	\$75	\$50	\$50	\$75

23 *Section 2 of Table 2 of Schedule 3 is amended by adding the following after item 2 (e):*

Column I	Column II	Column III	Column IV	Column V	Column VI	Column VII
(f) Review of a risk assessment and/or environmental impact report not included in a remediation plan.	\$800	\$1 600	\$2 400	\$3 000	\$6 000	\$12 000

24 *Item 2.1 of Table 2 of Schedule 3 is amended*

(a) by deleting the text preceding paragraphs (a) to (e) and substituting the following:

2.1 **Reviews respecting applications involving a recommendation of a person on the roster of professional experts , and**

(b) by adding the following after item 2.1 (e):

Column I	Column II	Column III	Column IV	Column V	Column VI	Column VII
(f) Review of a risk assessment and/or environmental impact report not included in a remediation plan.	not applicable	not applicable	not applicable	not applicable	not applicable	not applicable

25 *Table 2 of Schedule 3 is amended*

(a) in item 3 (a) by adding “not processed under section 43 (2)” after “agreement”, and

(b) by adding the following after item 3 (a):

Column I	Column II	Column III	Column IV	Column V	Column VI	Column VII
(b) Contaminated soil relocation agreement processed under section 43 (2).	\$50	\$50	\$50	\$80	\$150	\$300

26 *Column I of item 4 (a) of Table 2 of Schedule 3 is repealed and the following is substituted:*

(a) Manager inspects, monitors and verifies remediation

27 ***Column II of item 11 of Table 3 of Schedule 3 is repealed and the following is substituted:***

11 substances corresponding to items 1 to 4 above which originate only from the use of a site as a vehicle service station or petroleum product dispensing facility

28 ***Schedules 4, 6 and 7 are repealed and the attached Schedules 4, 6 and 7 are substituted.***

SCHEDULE 4
GENERIC NUMERICAL SOIL STANDARDS¹

COLUMN I Substance	COLUMN II Agricultural (AL)	COLUMN III Urban Park (PL)	COLUMN IV Residential (RL)	COLUMN V Commercial (CL)	COLUMN VI Industrial (IL)
Inorganic Substances					
antimony	20	20	20	40	40
barium	750	500	500	2000	2000
beryllium	4	4	4	8	8
boron (hot water soluble)	2				
cobalt	40	50	50	300	300
cyanide (WAD) ²	0.5	10	10	100	100
cyanide (SAD) ³	5	50	50	500	500
fluoride	200	400	400	2000	2000
molybdenum	5	10	10	40	40
nickel	150	100	100	500	500
selenium	2	3	3	10	10
silver	20	20	20	40	40
sulphur (elemental)	500				
thallium ⁴	2				
tin	5	50	50	300	300
vanadium	200	200	200		
Chlorinated Hydrocarbons					
<i>chlorinated aliphatics</i>					
chlorinated aliphatics ⁵ (each)	0.1	5	5	50	50
<i>chlorinated benzenes</i>					
chlorobenzenes ⁶ (each)	0.05	2	2	10	10
dichlorobenzenes ⁷ (each)	0.1	1	1	10	10
hexachlorobenzene	0.05	2	2	10	10
monochlorobenzene	0.1	1	1	10	10
hexachlorocyclohexane	0.01				
Miscellaneous Organic Substances					
nonaqueous phase liquids	not present ⁸	not present ⁸	not present ⁸	not present ⁸	not present ⁸
odorous substances	not present ⁸	not present ⁸	not present ⁸	not present ⁸	not present ⁸
<i>petroleum hydrocarbons</i>					
VPHs ⁹	200	200	200	200	200
LEPHs ¹⁰	1000	1000	1000	2000	2000
HEPHs ¹¹	1000	1000	1000	5000	5000

GENERIC NUMERICAL SOIL STANDARDS¹ (CONTINUED)

COLUMN I Substance	COLUMN II Agricultural (AL)	COLUMN III Urban Park (PL)	COLUMN IV Residential (RL)	COLUMN V Commercial (CL)	COLUMN VI Industrial (IL)
Monocyclic Aromatic Hydrocarbons (MAHs) styrene	0.1	5	5	50	50
Phenolic Substances <i>chlorinated phenols</i> chlorinated phenols ¹² (each)	0.05	0.5	0.5	5	5
<i>nonchlorinated phenols</i> nonchlorinated phenols ¹³ (each)	0.1	1	1	10	10
Phthalic Acid Esters phthalic acid esters ¹⁴ (each)	30				
Polycyclic Aromatic Hydrocarbons (PAHs) benz[a]anthracene	0.1	1	1	10	10
benzo[b]fluoranthene	0.1	1	1	10	10
benzo[k]fluoranthene	0.1	1	1	10	10
dibenz[a,h]anthracene	0.1	1	1	10	10
indeno(1,2,3-c,d)pyrene	0.1	1	1	10	10
naphthalene	0.1	5	5	50	50
phenanthrene	0.1	5	5	50	50
pyrene	0.1	10	10	100	100

Footnotes

1. All values in µg/g unless otherwise stated. Substances must be analyzed using methods specified in protocols approved under section 53 or alternate methods acceptable to the director.
2. WAD means weak acid dissociable.
3. SAD means strong acid dissociable.
4. Standard has been adjusted based on analytical detection limit of 2 ug/g for substance.
5. Chlorinated aliphatics include:
 - chloroform
 - dichloroethane (1,1-, 1,2-)
 - dichloroethene (1,1-, 1,2-)
 - dichloromethane
 - 1,2-dichloropropane
 - 1,3-dichloropropene (cis and trans)
 - carbon tetrachloride
 - trichloroethane (1,1,1-, 1,1,2-)

6. Chlorobenzenes include:
 - trichlorobenzene
 - tetrachlorobenzene
 - pentachlorobenzene
7. Dichlorobenzenes include:
 - 1,2-dichlorobenzene
 - 1,3-dichlorobenzene
 - 1,4-dichlorobenzene
8. Soil must be remediated so that substances are not present in quantities in excess of that acceptable to a manager.
9. VPHs include:
 - volatile petroleum hydrocarbons with the exception of benzene, toluene, ethylbenzene and xylenes.
10. LEPHs include:
 - light extractable petroleum hydrocarbons with the exception of benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, dibenz[a,h]anthracene, indeno[1,2,3-c,d]pyrene, naphthalene, phenanthrene and pyrene.
11. HEPHs include:
 - heavy extractable petroleum hydrocarbons with the exception of benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, dibenz[a,h]anthracene, indeno[1,2,3-c,d]pyrene, naphthalene, phenanthrene and pyrene.
12. Chlorinated phenols include:
 - chlorophenol isomers (ortho, meta, para)
 - dichlorophenols (2,6-, 2,5-, 2,4-, 3,5-, 2,3-, 3,4-)
 - trichlorophenols (2,4,6-, 2,3,6-, 2,4,5-, 2,3,5-, 2,3,4-, 3,4,5-)
 - tetrachlorophenols (2,3,5,6-, 2,3,4,5-, 2,3,4,6-)
13. Nonchlorinated phenols include:
 - 2,4-dimethylphenol
 - 2,4-dinitrophenol
 - 2-methyl 4,6-dinitrophenol
 - nitrophenol (2-, 4-)
 - phenol
 - cresol
14. Phthalic acid esters include:
 - dibutyl phthalate (DBP)
 - di(2-ethylhexyl) phthalate (DEHP)

SCHEDULE 6
GENERIC NUMERICAL WATER STANDARDS¹

COLUMN I	COLUMN II	COLUMN III	COLUMN IV	COLUMN V
Substance	Aquatic Life ² (AW)	Irrigation ^{2,3} (IW)	Livestock ² (LW)	Drinking Water ⁴ (DW)
INORGANIC SUBSTANCES				
aluminum		5 000	5 000	200
ammonia	1 310 @ pH ≥ 8.5 ^{5,6} 3 700 @ pH 8.0 - < 8.5 ^{5,6} 11 300 @ pH 7.5 - < 8.0 ^{5,6} 18 500 @ pH 7.0 - < 7.5 ^{5,6} 18 400 @ pH < 7.0 ^{5,6} 2 300 @ pH ≥ 8.5 ^{7,8} 6 850 @ pH 8.0 - < 8.5 ^{7,8} 20 000 @ pH 7.5 - < 8.0 ^{7,8} 64 000 @ pH 7.0 - < 7.5 ^{7,8} 200 000 @ pH < 7.0 ^{7,8}			
antimony	200			6
arsenic	50 ⁶ , 120 ⁸	100	25	25
barium	10 000 ⁶ , 5 000 ⁸			1 000
beryllium	53 ⁶ , 1 000 ⁸	100	100	
boron	50 000 ⁸	500-6 000 ⁹	5 000	5 000
bromate				10
cadmium	0.1 @ H ≤ 30 ^{6,10} 0.3 @ H = 30 - < 90 ^{6,10} 0.5 @ H = 90 - < 150 ^{6,10} 0.6 @ H 150 - < 210 ^{6,10} 1 ⁸	5	80	5
calcium			1 000 mg/L	
chloride		100 – 700 mg/L ⁹		250 mg/L ¹¹
chlorine	20 ⁶ , 30 ⁸	1 000		
chromium	10 ^{6,12} , 90 ^{6,13} 150 ^{8,12} , 560 ^{8,13}	8 ¹² , 5 ¹³	50 ^{12,13}	50
cobalt	9	50	1 000	
copper	20 @ H < 50 ^{6,10} 30 @ H = 50 - < 75 ^{6,10} 40 @ H = 75 - < 100 ^{6,10} 50 @ H = 100 - < 125 ^{6,10} 60 @ H = 125 - < 150 ^{6,10} 70 @ H = 150 - < 175 ^{6,10} 80 @ H = 175 - < 200 ^{6,10} 90 @ H ≥ 200 ^{6,10} 20 ⁸	200	300	1 000 ¹¹

GENERIC NUMERICAL WATER STANDARDS¹ (CONTINUED)

COLUMN I	COLUMN II	COLUMN III	COLUMN IV	COLUMN V
Substance	Aquatic Life² (AW)	Irrigation^{2,3} (IW)	Livestock² (LW)	Drinking Water⁴ (DW)
cyanide (WAD) ¹⁴	50 ⁶ , 10 ⁸			
cyanide (SAD) ¹⁵				200
fluoride	2 000 @ H < 50 ^{6,10} 3 000 @ H ≥ 50 ^{6,10} 15 000 ⁸	1 000	1 000 ¹⁶	1 500
iron		5 000		300 ¹¹
lead	40 @ H < 50 ^{6,10} 50 @ H = 50 - < 100 ^{6,10} 60 @ H = 100 - < 200 ^{6,10} 110 @ H = 200 - < 300 ^{6,10} 160 @ H ≥ 300 ^{6,10} 20 ⁸	200	100	10
lithium		2 500 ⁹	5 000	
magnesium				100 mg/L ¹¹
manganese		200		50 ¹¹
mercury	1	1	2	1
molybdenum	10 000	10 - 30 ¹⁷	50	250
monochloramine	5 ¹⁸			3 000 ¹⁹
nickel	250 @ H < 60 ^{6,10} 650 @ H = 60 - < 120 ^{6,10} 1 100 @ H = 120 - < 180 ^{6,10} 1 500 @ H ≥ 180 ^{6,10} 83 ⁸	200	1000	
nitrate (as N)	400 mg/L ^{6,20}		100 mg/L ²¹	10 000 ²¹
nitrate and nitrite (as N)	400 mg/L ^{6,20}		100 mg/L ²¹	10 000 ²¹
nitrite (as N)	200 (Cl < 2 mg/L) ²² 400 (Cl = 2 - < 4 mg/L) ²² 600 (Cl = 4 - < 6 mg/L) ²² 800 (Cl = 6 - < 8 mg/L) ²² 1 000 (Cl = 8 - < 10 mg/L) ²² 2 000 (Cl ≥ 10 mg/L) ²²		10 000	3 200
salinity (as NaCl)	15 g/L ^{6,23,24} 10 g/L if natural salinity is 0 - < 3.5g/L ^{8,23,25} 20 g/L if natural salinity is 3.5 - < 13.5g/L ^{8,23,25} 40 g/L if natural salinity is 13.5 - 35g/L ^{8,23,25}			
selenium	10 ⁶ , 540 ⁸	20 ²⁶ , 50 ²⁷	50	10

GENERIC NUMERICAL WATER STANDARDS¹ (CONTINUED)

COLUMN I	COLUMN II	COLUMN III	COLUMN IV	COLUMN V
Substance	Aquatic Life² (AW)	Irrigation^{2,3} (IW)	Livestock² (LW)	Drinking Water⁴ (DW)
silver	0.5 @ H ≤ 100 ^{6,10} 15 @ H > 100 ^{6,10} 15 ⁸			
sodium				200 mg/L ¹¹
sulphate	1 000 mg/L		1 000mg/L	500 mg/L ¹¹
sulphide (as H ₂ S)	20 ^{6,8}			50 ¹¹
thallium	3			
titanium	1 000			
uranium	3 000 ⁶ , 1 000 ⁸	10	200	100
vanadium		100	100	
zinc	75 @ H ≤ 90 ^{6,10} 150 @ H = 90 - < 100 ^{6,10} 900 @ H = 100 - < 200 ^{6,10} 1 650 @ H = 200 - < 300 ^{6,10} 2 400 @ H = 300 - < 400 ^{6,10} 100 ⁸	1 000 @ pH ≤ 6.0 ²⁸ 2 000 @ pH 6.0 - < 7.0 ²⁸ 5 000 @ pH ≥ 7.0 ²⁸	2 000	5 000 ¹¹
ORGANIC SUBSTANCES				
Chlorinated Hydrocarbons				
<i>chlorinated aliphatics</i>				
hexachlorobutadiene, 1,3	1			
hexachlorocyclohexane ²⁹	0.1		4	4
vinyl chloride				2
<i>chlorinated benzenes</i>				
dichlorobenzene, 1,2-	7 ⁶ , 420 ⁸			3 ¹¹
dichlorobenzene, 1,3-	1 500			
dichlorobenzene, 1,4-	260			1 ¹¹
hexachlorobenzene			0.5	
monochlorobenzene	13 ⁶ , 120 ⁸			30 ¹¹
pentachlorobenzene	60			
tetrachlorobenzene, 1,2,3,4-	18			
trichlorobenzene, 1,2,3-	80			
trichlorobenzene, 1,2,4-	240 ⁶ , 54 ⁸			
<i>chlorinated ethanes</i>				
dichloroethane, 1,2-	1 000		5	5
<i>chlorinated ethenes</i>				
dichloroethylene, 1,1- (dichloroethene, 1,1-)				14

GENERIC NUMERICAL WATER STANDARDS¹ (CONTINUED)

COLUMN I	COLUMN II	COLUMN III	COLUMN IV	COLUMN V
Substance	Aquatic Life² (AW)	Irrigation^{2,3} (IW)	Livestock² (LW)	Drinking Water⁴ (DW)
tetrachloroethylene (tetrachloroethene, 1,1,2,2-)	1 100			30
trichloroethylene (trichloroethene, 1,1,2-)	200		50	50
Glycols				
ethylene glycol	1 920 mg/L			
propylene glycol, 1,2-	5 000 mg/L			
Halogenated Methanes				
dibromochloromethane			100	
dichlorobromomethane			100	
dichloromethane (methylene chloride)	980		50	50
tetrachloromethane (carbon tetrachloride)	130		5	5
tribromomethane (bromoform)			100	
trichloromethane (chloroform)	20 ⁶		100	100 ³⁰
Miscellaneous Organic Substances				
acrolein			3 ³¹	
aniline	20			
nitritotriacetic acid (NTA)				400
nonaqueous phase liquids	not present ³²	not present ³²	not present ³²	not present ³²
VPHw	1 500 ³³			
LEPHw	500 ³⁴			
VHw ₆₋₁₀	15 000 ^{35,36}	15 000 ^{35,36}	15 000 ^{35,36}	15 000 ^{35,36}
EHw ₁₀₋₁₉	5 000 ^{35,37}	5 000 ^{35,37}	5 000 ^{35,37}	5 000 ^{35,37}
Monocyclic Aromatic Hydrocarbons (MAHs)				
benzene	4 000 ^{6,38} , 1 000 ^{8,38}			5
ethylbenzene	2 000 ^{6,38} , 2 500 ^{8,38}			2.4 ¹¹
styrene	720			
toluene	390 ^{6,38,39} , 3300 ^{8,38,39}			24 ¹¹
xylenes (total)				300 ¹¹
Organotins				
di-n-butyltin	0.8			
tributyltin	0.08 ⁶ , 0.05 ^{8,31}		250	
tricyclohexyltin			250 ⁴⁰	

GENERIC NUMERICAL WATER STANDARDS¹ (CONTINUED)

COLUMN I	COLUMN II	COLUMN III	COLUMN IV	COLUMN V
Substance	Aquatic Life² (AW)	Irrigation^{2,3} (IW)	Livestock² (LW)	Drinking Water⁴ (DW)
triethyltin	4 ⁴⁰			
triphenyltin	0.2 ⁴⁰		800 ⁴⁰	
Phenolic Substances				
<i>chlorinated phenols</i>				
dichlorophenol	2.5 – 340 ^{6,8,41}		0.3 ¹¹	0.3 ¹¹
monochlorophenol	8.5 – 650 ^{6,8,41}		0.1 ¹¹	0.1 ¹¹
pentachlorophenol	1 – 27.5 ^{6,8,41}		30 ¹¹	30 ¹¹
tetrachlorophenol	2 – 180 ^{6,8,41}		1 ¹¹	1 ¹¹
trichlorophenol	1 – 270 ^{6,8,41}		2 ¹¹	2 ¹¹
<i>nonchlorinated phenols</i>				
nonchlorinated phenols (total)	10			
Phthalic Acid Esters				
dibutyl phthalate (DBP)	190			
di(2-ethylhexyl) phthalate (DEHP)	160			
Polycyclic Aromatic Hydrocarbons (PAHs)				
acenaphthene	60 ^{6,8}			
acridine	0.5			
anthracene	1			
benzo[a]anthracene	1			
benzo[a]pyrene	0.1 ^{6,8}			0.01
chrysene	1 ⁸			
fluoranthene	2			
fluorene	120 ^{6,8}			
naphthalene	10 ^{6,8}			
phenanthrene	3			
pyrene	0.2			
quinoline	34			
Pesticides				
aldicarb	10 ⁶ , 1.5 ⁸	54.9 ⁴² , 67.5 ⁴³	11	9
aldrin and dieldrin	0.04		0.7	0.7
atrazine	20 ⁶ , 100 ⁸	10	60	5
azinphos-methyl			20	20
bendiocarb			40	40
bromocil	50	0.2 ⁴⁴ , 0.6 ⁴⁵	1 100	
bromoxynil	50	0.35 ⁴³	11	5

GENERIC NUMERICAL WATER STANDARDS¹ (CONTINUED)

COLUMN I	COLUMN II	COLUMN III	COLUMN IV	COLUMN V
Substance	Aquatic Life² (AW)	Irrigation^{2,3} (IW)	Livestock² (LW)	Drinking Water⁴ (DW)
captan	28		10	
carbaryl	2 ⁶ , 3 ⁸		1 100	90
carbofuran	18		45	90
chlordane	0.06		7	7
chlorothalonil	2 ⁶ , 4 ⁸	5.8	170	
chlorpyrifos	0.035 ⁶ , 0.02 ⁸		24	90
cyanazine	20	0.5	10	10
2,4-D ⁴⁶	40		100	100
DDT ⁴⁷	0.01 ⁴⁸		30 ⁴⁸	30 ⁴⁸
deltamethrin	0.1 ³¹		2.5	
diazinon	0.03		14	20
dicamba	100	0.1 ³¹	122	120
diclofop-methyl	61	0.18	9	9
dimethoate	62		3	20
dinoseb	0.5	16 ⁴⁹ , 46 ⁵⁰ , 93 ⁴³	150 ⁵¹	10
diquat			70	70
diuron			150	150
endosulfan	0.2			
endrin	0.023		0.2	
glyphosate	650		280	280
heptachlor & heptachlor epoxide	0.1		3	3
lindane	0.1		4	4
linuron	70	0.5 ^{31,44} , 3.3 ⁴⁵		
malathion	16 ⁸		190	190
MCPA ⁵²	26 ⁶ , 42 ⁸	0.5 ³¹	25	
methoxychlor			900	900
metolachlor	80	28	50	50
metribuzin	10	0.5	80	80
paraquat (as dichloride)			10	10
parathion			50	50
phorate			2	2
picloram	290	0.5	190	190
simazine	100	0.5	10	10
2,4,5-T ⁵³			20	20
tebuthiuron	16	2 ^{31,45}	130	
temephos			280	280
terbufos			1	1
toxaphene ⁵⁴	0.08		5	
triallate	2.4		230	230
trifluralin	1		45	45

GENERIC NUMERICAL WATER STANDARDS¹ (CONTINUED)

COLUMN I	COLUMN II	COLUMN III	COLUMN IV	COLUMN V
Substance	Aquatic Life² (AW)	Irrigation^{2,3} (IW)	Livestock² (LW)	Drinking Water⁴ (DW)
RADIOACTIVE SUBSTANCES				
<i>Artificial radionuclides</i>				
¹³⁷ cesium				10 Bq/L
¹³¹ iodine				6 Bq/L
⁹⁰ strontium				5 Bq/L
³ tritium				7000 Bq/L
<i>Natural radionuclides</i>				
²²⁶ radium				0.6 Bq/L

Footnotes

- 1 All values are in µg/L unless otherwise stated. Substances must be analyzed using methods specified in protocols approved under section 53 or alternate methods acceptable to the director.
- 2(a) Aquatic life standards assume minimum 1:10 dilution available. Aquatic life standards are to protect freshwater life unless otherwise indicated.
- (b) Standards for all organic substances are for total substance concentrations. Any water sample to be analyzed for organic substances should not be filtered.
- (c) Standards for surface water samples to be analyzed for heavy metals, metalloids and inorganic ions are total substance concentrations. In addition, it is recommended that surface water samples being analyzed for heavy metals, metalloids and inorganic ions should also be analyzed for dissolved substance concentrations.
- (d) Standards for groundwater samples for heavy metals, metalloids and inorganic ions are for dissolved substance concentrations. In addition, it is recommended that groundwater samples being analyzed for metals, metalloids and inorganic ions should be analyzed for total substance concentrations.
- 3 Applies to irrigation of all soil types.
- 4 Drinking water standards are for unfiltered samples obtained at the point of consumption. Heavy metals, metalloids and inorganic ions are expressed as total substance concentrations unless otherwise indicated.
- 5 Standard varies with pH and temperature. 10° C is assumed. Consult director for further advice.
- 6 Standard to protect freshwater aquatic life.
- 7 Standard varies with pH, temperature and salinity. 10° C and 10 g/L is assumed. Consult director for further advice.
- 8 Standard to protect marine and/or estuarine aquatic life.
- 9 Standard varies depending on crop. Consult director for further advice.
- 10 H means water hardness in mg/L CaCO₃.
- 11 Standard to protect against taste and odour concerns.
- 12 Standard is specific to chromium (+6).
- 13 Standard is specific to chromium (+3).
- 14 WAD means weak acid dissociable.
- 15 SAD means strong acid dissociable.
- 16 Standard varies with type of livestock. Consult director for further advice.
- 17 Standard varies with crop, soil drainage and Mo:Cu ratio. Consult director for further advice.

- 18 Substance is extremely labile in water. Extended hold times are inappropriate. It is recommended that samples be analysed in the field or immediately upon receipt by laboratory.
- 19 Standard is specific for total chloramines.
- 20 Standard may not protect all amphibians. Consult director for further advice.
- 21 Where nitrate and nitrite are present, total nitrate plus nitrite-nitrogen should not exceed this value.
- 22 Standard varies with chloride concentration. Consult director for further advice.
- 23 Standard applies only if minimum 1:10 dilution available in receiving waterbody.
- 24 Freshwater is defined as water having a natural salinity < 1.5 g/L.
- 25 Standard varies with natural salinity of receiving waterbody.
- 26 Standard for continuous applications on crops.
- 27 Standard for intermittent application on crops.
- 28 Standard varies with soil pH.
- 29 Standard is applicable to all hexachlorocyclohexane isomers.
- 30 Standard is specific for total trihalomethanes.
- 31 Standard has been adjusted based on the reference analytical detection limit for the substance. The toxicologically-based value is less than the reference analytical detection limit for the substance. Therefore, the standard has been set to equal the reference analytical detection limit.
- 32 Water must be remediated so that nonaqueous phase liquids are not present in quantities in excess of that acceptable to a manager.
- 33 VPHw includes volatile petroleum hydrocarbons with the exception of benzene, toluene, ethylbenzene and xylenes. This generic standard may be modified by developing a site-specific standard. Consult director for further advice.
- 34 LEPHw includes light extractable petroleum hydrocarbons with the exception of acenaphthene, acridine, anthracene, fluorene, naphthalene and phenanthrene. This generic standard may be modified by developing a site-specific standard. Consult director for further advice.
- 35 Standard is applicable at all sites, irrespective of water use.
- 36 VHW₆₋₁₀ includes volatile petroleum hydrocarbons.
- 37 EHW₁₀₋₁₉ includes light extractable petroleum hydrocarbons.
- 38 This generic standard may be modified by developing a site-specific standard. Consult director for further advice.
- 39 Standard comes into effect January 1, 2002. Until that date applicable standard is 3000 µg/L.
- 40 No reference analytical method has been specified for substance. Consult director for further advice.
- 41 Standard varies with pH, temperature and substance isomer. Consult director for further advice.
- 42 Standard to protect crops other than legumes.
- 43 Standard to protect legumes.
- 44 Standard to protect crops other than cereals, tame hays and pasture.
- 45 Standard to protect cereals, tame hays and pasture crops.
- 46 2,4-D is 2,4-dichlorophenoxyacetic acid.
- 47 DDT is 2,2-bis(p-chlorophenyl)-1,1,1-trichloroethane.
- 48 Includes DDT metabolites.
- 49 Standard to protect all types of crops.
- 50 Standard to protect cereal crops and hay.
- 51 Standard to protect lactating dairy animals.
- 52 MCPA is 4-chloro-2-methylphenoxyacetic acid.
- 53 2,4,5-T is 2,4,5-trichlorophenoxyacetic acid.
- 54 Standard is applicable to all toxaphene isomers.

SCHEDULE 7
STANDARDS TRIGGERING CONTAMINATED SOIL RELOCATION AGREEMENTS¹

COLUMN I	COLUMN II	COLUMN III	COLUMN IV
Substance	Soil Relocation to Nonagricultural Land²	Soil Relocation to Agricultural Land³	Waste Disposal Prohibited Without Authorization⁴
Inorganic Substances			
antimony	20	20	40
arsenic	15	15	15
barium	500	750	2000
beryllium	4	4	8
boron (hot water soluble)		2	
cadmium	1.5	1.5	1.5
chromium (+3)	60	50	65
chromium (+6)	60	60	60
chromium (total)	60	50	60
cobalt	50	40	300
copper	90	90	90
cyanide (WAD) ⁵	10	0.5	100
cyanide (SAD) ⁶	50	5	500
fluoride	400	200	2000
lead	100	100	100
mercury	15	0.6	150
molybdenum	10	5	40
nickel	100	150	500
selenium	3	2	10
silver	20	20	40
sulphur (elemental)		500	
thallium		2	
tin	50	5	300
vanadium	200	200	
zinc	150	150	150
Chlorinated Hydrocarbons			
<i>chlorinated aliphatics</i>			
chlorinated aliphatics ⁷ (each)	5	0.1	50
<i>chlorinated benzenes</i>			
chlorobenzenes ⁸ (each)	2	0.05	10
dichlorobenzenes ⁹ (each)	1	0.1	10
hexachlorobenzene	2	0.05	10

STANDARDS TRIGGERING CONTAMINATED SOIL RELOCATION AGREEMENTS¹ (CONTINUED)

COLUMN I	COLUMN II	COLUMN III	COLUMN IV
Substance	Soil Relocation to Nonagricultural Land²	Soil Relocation to Agricultural Land³	Waste Disposal Prohibited Without Authorization⁴
monochlorobenzene	1	0.1	10
hexachlorocyclohexane		0.01	
<i>chlorinated ethenes</i>			
tetrachloroethylene	5	0.1	5
trichloroethylene	0.15	0.1	0.15
<i>miscellaneous chlorinated hydrocarbons</i>			
PCBs ¹⁰	5	0.5	50
PCDDs and PCDFs ¹¹	0.00035	0.00001	0.0025
Glycols			
ethylene glycol	1 500	1 500	1 500
Miscellaneous Organic Substances			
nonaqueous phase liquids	not present ¹²	not present ¹²	not present ¹²
odorous substances	not present ¹²	not present ¹²	not present ¹²
<i>petroleum hydrocarbons</i>			
VPHs ¹³	200	200	200
LEPHs ¹⁴	1000	1000	2000
HEPHs ¹⁵	1000	1000	5000
Monocyclic Aromatic Hydrocarbons (MAHs)			
benzene	0.04	0.04	0.04
ethylbenzene	1	1	20
styrene	5	0.1	50
toluene	1.5	1.5	2.5
xylene	5	0.1	20
Phenolic Substances			
<i>chlorinated phenols</i>			
chlorinated phenols ¹⁶ (each)	0.5	0.05	5
pentachlorophenol	0.15	0.15	0.15
<i>nonchlorinated phenols</i>			
nonchlorinated phenols ¹⁷ (each)	1	0.1	10

STANDARDS TRIGGERING CONTAMINATED SOIL RELOCATION AGREEMENTS¹ (CONTINUED)

COLUMN I	COLUMN II	COLUMN III	COLUMN IV
Substance	Soil Relocation to Nonagricultural Land²	Soil Relocation to Agricultural Land³	Waste Disposal Prohibited Without Authorization⁴
Phthalic Acid Esters phthalic acid esters ¹⁸ (each)		30	
Polycyclic Aromatic Hydrocarbons (PAHs)			
benz[a]anthracene	1	0.1	10
benzo[b]fluoranthene	1	0.1	10
benzo[k]fluoranthene	1	0.1	10
benzo[a]pyrene	1	0.1	10
dibenz[a,h]anthracene	1	0.1	10
indeno(1,2,3-c,d)pyrene	1	0.1	10
naphthalene	5	0.1	50
phenanthrene	5	0.1	50
pyrene	10	0.1	100
Pesticides			
DDT ^{19,20}	10	10	15

Footnotes

- 1 All values are in µg/g unless otherwise stated. Substances must be analyzed using methods specified in protocols approved under section 53 or alternate methods acceptable to the director.
- 2 Pursuant to section 28.1 of the Act and section 40 of this regulation, a soil relocation agreement is not required to relocate soil to a different site, other than a site used for agricultural land use, if the concentration of substances in the soil is less than specified in Column II.
- 3 Pursuant to section 28.1 of the Act and section 40 of this regulation, a soil relocation agreement is not required to relocate soil to a different site used for agricultural land use if the concentration of substances in the soil is less than specified in Column III.
- 4 Pursuant to section 41 of this regulation, the prohibition on waste disposal in sections 3 (2) and 3 (3) of the Act do not apply if the concentration of substances in the soil is less than specified in Column IV.
- 5 WAD means weak acid dissociable.
- 6 SAD means strong acid dissociable.
- 7 Chlorinated aliphatics include:
 - chloroform
 - dichloroethane (1,1-, 1,2-)
 - dichloroethene (1,1-, 1,2-)
 - dichloromethane
 - 1,2-dichloropropane
 - 1,3-dichloropropene (cis and trans)
 - 1,1,2,2-tetrachloroethane
 - carbon tetrachloride
 - trichloroethane (1,1,1-, 1,1,2-).

- 8 Chlorobenzenes include:
 trichlorobenzene
 tetrachlorobenzene
 pentachlorobenzene.
- 9 Dichlorobenzenes include:
 1,2-dichlorobenzene
 1,3-dichlorobenzene
 1,4-dichlorobenzene.
- 10 Polychlorinated biphenyls (PCBs) include Arochlor mixtures 1242, 1248, 1254 and 1260.
- 11 Polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs) expressed in 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) toxicity equivalents. NATO International Toxicity Equivalency Factors (I-TEFs) for congeners and isomers of PCDDs and PCDFs are as follows:

PCDD Congener	I-TEF	PCDF Congener	I-TEF
2,3,7,8-T ₄ CDD	1.0	2,3,7,8-T ₄ CDF	0.1
1,2,3,7,8-P ₅ CDD	0.5	2,3,4,7,8-P ₅ CDF	0.5
1,2,3,4,7,8-H ₆ CDD	0.1	1,2,3,7,8-P ₅ CDF	0.05
1,2,3,7,8,9-H ₆ CDD	0.1	1,2,3,4,7,8-H ₆ CDF	0.1
1,2,3,6,7,8-H ₆ CDD	0.1	1,2,3,7,8,9-H ₆ CDF	0.1
1,2,3,4,6,7,8-H ₇ CDD	0.01	1,2,3,6,7,8-H ₆ CDF	0.1
O ₈ CDD	0.001	2,3,4,6,7,8-H ₆ CDF	0.1
		1,2,3,4,6,7,8-H ₇ CDF	0.01
		1,2,3,4,7,8,9-H ₇ CDF	0.01
		O ₈ CDF	0.001

- 12 Soil must not be relocated with nonaqueous phase liquids or ordourous substances present in quantities in excess of that acceptable to a manager.
- 13 VPHs include volatile petroleum hydrocarbons with the exception of:
 benzene,
 toluene,
 ethylbenzene and
 xylenes.
- 14 LEPHs include light extractable petroleum hydrocarbons with the exception of:
 benz[a]anthracene,
 benzo[a]pyrene,
 benzo[b]fluoranthene,
 benzo[k]fluoranthene,
 dibenz[a,h]anthracene,
 indeno[1,2,3-c,d]pyrene,
 naphthalene,
 phenanthrene and
 pyrene.

- 15 HEPHs include heavy extractable petroleum hydrocarbons with the exception of:
benz[a]anthracene,
benzo[a]pyrene,
benzo[b]fluoranthene,
benzo[k]fluoranthene,
dibenz[a,h]anthracene,
indeno[1,2,3-c,d]pyrene,
naphthalene,
phenanthrene and
pyrene.
- 16 Chlorinated phenols include:
chlorophenol isomers (ortho, meta, para)
dichlorophenol (2,6-, 2,5-, 2,4-, 3,5-, 2,3-, 3,4-)
trichlorophenol (2,4,6-, 2,3,6-, 2,4,5-, 2,3,5-, 2,3,4-, 3,4,5-)
tetrachlorophenol (2,3,5,6-, 2,3,4,5-, 2,3,4,6-).
- 17 Nonchlorinated phenols include:
2,4-dimethylphenol
2,4-dinitrophenol
2-methyl 4,6-dinitrophenol
nitrophenol (2-, 4-)
phenol
cresol.
- 18 Phthalic acid esters include:
dibutyl phthalate (DBP)
di(2-ethylhexyl) phthalate (DEHP).
- 19 DDT is 2,2-bis(p-chlorophenyl)-1,1,1-trichloroethane.
- 20 Includes DDT metabolites.

29 *Schedule 5 is amended*

- (a) by repealing the matrices for arsenic, benzene, cadmium, chromium, ethylbenzene, toluene and zinc and substituting the attached ones, and*
- (b) by adding the attached matrices for DDT, ethylene glycol and mercury.*

SCHEDULE 5
MATRIX NUMERICAL SOIL STANDARDS¹
ARSENIC

COLUMN I	COLUMN II	COLUMN III	COLUMN IV	COLUMN V	COLUMN VI	Note
Site-specific Factor	SOIL STANDARD FOR PROTECTION OF SITE-SPECIFIC FACTOR					2
	Agricultural (AL)	Urban Park (PL)	Residential (RL)	Commercial (CL)	Industrial (IL)	
HUMAN HEALTH PROTECTION						
Intake of contaminated soil	100	100	100	300		3,4
Groundwater used for drinking water	15	15	15	15	15	5
ENVIRONMENTAL PROTECTION						
Toxicity to soil invertebrates and plants	50	50	50	100	100	
Livestock ingesting soil and fodder	25					
Major microbial functional impairment	NS					6
Groundwater flow to surface water used by aquatic life						
Freshwater	20	20	20	20	20	5
Marine	25	25	25	25	25	5
Groundwater used for livestock watering	15					5
Groundwater used for irrigation watering	25	25	25			5

Notes

1. All values in µg/g unless otherwise stated. Substances must be analyzed using methods specified in protocols approved under section 53 or alternate methods acceptable to the director.
2. The site-specific factors of human intake of contaminated soil and toxicity to soil invertebrates and plants specified in this matrix apply at all sites.
3. Standard has been derived based on results of clinical studies at sites. Standard represents the rounded sum of the toxicologically-based value plus the soil ingestion clinical study factor. For AL, PL and RL the soil ingestion clinical study factor is 80 µg/g. For CL soil ingestion the clinical study factor is 240 µg/g.
4. Intake pathway of exposure modeled is inadvertent ingestion of soil.
5. Standard has been adjusted based on a reference provincial background soil concentration. Standard represents the rounded sum of the toxicologically-based value plus the reference provincial background soil concentration. For all land uses, the reference provincial background soil concentration is 14.9 µg/g.
6. NS - no standard. Insufficient acceptable scientific data exists, so no standard is calculated.

MATRIX NUMERICAL SOIL STANDARDS¹

BENZENE

COLUMN I	COLUMN II	COLUMN III	COLUMN IV	COLUMN V	COLUMN VI	Note
Site-specific Factor	SOIL STANDARD FOR PROTECTION OF SITE-SPECIFIC FACTOR					2
	Agricultural (AL)	Urban Park (PL)	Residential (RL)	Commercial (CL)	Industrial (IL)	
HUMAN HEALTH PROTECTION						
Intake of contaminated soil	1000	1000	1000	4000		3
Groundwater used for drinking water	0.04	0.04	0.04	0.04	0.04	4
ENVIRONMENTAL PROTECTION						
Toxicity to soil invertebrates and plants	70	70	70	150	150	
Livestock ingesting soil and fodder	NS					5
Major microbial functional impairment	NS					5
Groundwater flow to surface water used by aquatic life						
Freshwater	10	10	10	10	10	
Marine	2.5	2.5	2.5	2.5	2.5	
Groundwater used for livestock watering	NS					6
Groundwater used for irrigation watering	NS	NS	NS			6

Notes

1. All values in µg/g unless otherwise stated. Substances must be analyzed using methods specified in protocols approved under section 53 or alternate methods acceptable to the director.
2. The site-specific factors of human intake of contaminated soil and toxicity to soil invertebrates and plants specified in this matrix apply at all sites.
3. Intake pathway of exposure modeled is inadvertent ingestion of soil.
4. Standard is equivalent to the reference analytical detection limit of 0.04 µg/g. The toxicologically-based value equals the reference analytical detection limit for the substance.
5. NS - no standard. Insufficient acceptable scientific data exists, so no standard is calculated.
6. NS - no standard. No appropriate standard, guideline or criterion exists to use to develop a soil quality standard.

MATRIX NUMERICAL SOIL STANDARDS¹

CADMIUM

COLUMN I	COLUMN II	COLUMN III	COLUMN IV	COLUMN V	COLUMN VI	Note
Site-specific Factor	SOIL STANDARD FOR PROTECTION OF SITE-SPECIFIC FACTOR					2
	Agricultural (AL)	Urban Park (PL)	Residential (RL)	Commercial (CL)	Industrial (IL)	
HUMAN HEALTH PROTECTION						
Intake of contaminated soil	3 or 35	3 or 35	3 or 35	100		3,4,5
Groundwater used for drinking water						
pH < 6.5	1.5	1.5	1.5	1.5	1.5	6,7
pH 6.5 - < 7.0	3	3	3	3	3	6,7
pH 7.0 - < 7.5	15	15	15	15	15	6,7
pH 7.5 - < 8.0	200	200	200	200	200	6,7
pH ≥ 8.0	1 000	1 000	1 000	1 000	1 000	6,7
ENVIRONMENTAL PROTECTION						
Toxicity to soil invertebrates and plants	70	70	70	500	500	
Livestock ingesting soil and fodder	9					
Major microbial functional impairment	NS					8
Groundwater flow to surface water used by aquatic life						
Freshwater						
pH < 7.0	2	2	2	2	2	6,7
pH 7.0 - < 7.5	2.5	2.5	2.5	2.5	2.5	6,7
pH 7.5 - < 8.0	25	25	25	25	25	6,7
pH ≥ 8.0	150	150	150	150	150	6,7
Marine						
pH < 7.0	2	2	2	2	2	6,7
pH 7.0 - < 7.5	3.5	3.5	3.5	3.5	3.5	6,7
pH 7.5 - < 8.0	35	35	35	35	35	6,7
pH ≥ 8.0	200	200	200	200	200	6,7

MATRIX NUMERICAL SOIL STANDARDS¹

CADMIUM (CONTINUED)

COLUMN I	COLUMN II	COLUMN III	COLUMN IV	COLUMN V	COLUMN VI	Note
Site-specific Factor	SOIL STANDARD FOR PROTECTION OF SITE-SPECIFIC FACTOR					2
	Agricultural (AL)	Urban Park (PL)	Residential (RL)	Commercial (CL)	Industrial (IL)	
Groundwater used for livestock watering						
pH < 6.0	2.5					6,7
pH 6.0 - < 6.5	6					6,7
pH 6.5 - < 7.0	30					6,7
pH 7.0 - < 7.5	200					6,7
pH 7.5 - < 8.0	3 000					6,7
pH ≥ 8.0	20 000					6,7
Groundwater used for irrigation watering						
pH < 6.5	2	2	2			6,7
pH 6.5 - < 7.0	3	3	3			6,7
pH 7.0 - < 7.5	15	15	15			6,7
pH 7.5 - < 8.0	200	200	200			6,7
pH ≥ 8.0	1 000	1 000	1 000			6,7

Notes

1. All values in µg/g unless otherwise stated. Substances must be analyzed using methods specified in protocols approved under section 53 or alternate methods acceptable to the director.
2. The site-specific factors of human intake of contaminated soil and toxicity to soil invertebrates and plants specified in this matrix apply at all sites.
3. If land is used to grow produce for human consumption, the standard is 3 µg/g; if not, the standard is 35 µg/g.
4. The 3 µg/g standard has been derived based on results of clinical studies at sites. It represents the rounded remainder of the toxicologically-based value, 35 µg/g, minus the soil ingestion clinical study factor, 32 µg/g.
5. Intake pathway of exposure modeled is inadvertent ingestion of soil.
6. The pH is the pH of the soil at a site.
7. Standard has been adjusted based on a reference provincial background soil concentration. Standard represents the rounded sum of the toxicologically-based value plus the reference provincial background soil concentration. For all land uses, the reference provincial background soil concentration is 1.3 µg/g.
8. NS – no standard. Insufficient acceptable scientific data exists, so no standard is calculated.

MATRIX NUMERICAL SOIL STANDARDS¹

CHROMIUM

COLUMN I	COLUMN II	COLUMN III	COLUMN IV	COLUMN V	COLUMN VI	Note
Site-specific Factor	SOIL STANDARD FOR PROTECTION OF SITE-SPECIFIC FACTOR					2
	Agricultural (AL)	Urban Park (PL)	Residential (RL)	Commercial (CL)	Industrial (IL)	
HUMAN HEALTH PROTECTION						
Intake of contaminated soil	100	100	100	300		3,4
Groundwater used for drinking water	60	60	60	60	60	5,6
ENVIRONMENTAL PROTECTION						
Toxicity to soil invertebrates and plants	300	300	300	700	700	5
Livestock ingesting soil and fodder	150					4
	50					7
Major microbial functional impairment	50					5,8
Groundwater flow to surface water used by aquatic life						
Freshwater	60	60	60	60	60	4,6
	65	65	65	65	65	6,7
Marine	60	60	60	60	60	4,6
	95	95	95	95	95	6,7
Groundwater used for livestock watering	60					9
Groundwater used for irrigation watering	60	60	60			9

Notes

1. All values in µg/g unless otherwise stated. Substances must be analyzed using methods specified in protocols approved under section 53 or alternate methods acceptable to the director.
2. The site-specific factors of human intake of contaminated soil and toxicity to soil invertebrates and plants specified in this matrix apply at all sites.
3. Intake pathway of exposure modeled is inadvertent ingestion of soil.
4. Standard is for chromium (+6).
5. Standard is for chromium (total).
6. Standard has been adjusted based on a reference provincial background soil concentration. Standard represents the rounded sum of the toxicologically-based value plus the reference provincial background soil concentration. For all land uses and chromium species, the reference provincial background soil concentration is 58.9 µg/g.

7. Standard is for chromium (+3).
8. Standard is set equal to the Canadian Council of Ministers of the Environment, 1999 – Nutrient and energy cycling check value.
9. Standard is applicable to both chromium (+3) and chromium (+6).

MATRIX NUMERICAL SOIL STANDARDS¹

ETHYLBENZENE

COLUMN I	COLUMN II	COLUMN III	COLUMN IV	COLUMN V	COLUMN VI	Note
Site-specific Factor	SOIL STANDARD FOR PROTECTION OF SITE-SPECIFIC FACTOR					2
	Agricultural (AL)	Urban Park (PL)	Residential (RL)	Commercial (CL)	Industrial (IL)	
HUMAN HEALTH PROTECTION						
Intake of contaminated soil	3 500	3 500	3 500	10 000		3
Groundwater used for drinking water	7	7	7	7	7	
ENVIRONMENTAL PROTECTION						
Toxicity to soil invertebrates and plants	1	1	1	20	20	4
Livestock ingesting soil and fodder	NS					5
Major microbial functional impairment	NS					5
Groundwater flow to surface water used by aquatic life						
Freshwater	6 000	6 000	6 000	6 000	6 000	6
Marine	7 000	7 000	7 000	7 000	7 000	6
Groundwater used for livestock watering	NS					7
Groundwater used for irrigation watering	NS	NS	NS			7

Notes

1. All values in µg/g unless otherwise stated. Substances must be analyzed using methods specified in protocols approved under section 53 or alternate methods acceptable to the director.
2. The site-specific factors of human intake of contaminated soil and toxicity to soil invertebrates and plants specified in this matrix apply at all sites.
3. Intake pathway of exposure modeled is inadvertent ingestion of soil.
4. Insufficient acceptable data exists, so standards are set equal to the Canadian Council of Ministers of the Environment 1999 provisional soil quality criteria.
5. NS - no standard. Insufficient acceptable scientific data exists, so no standard is calculated.
6. Standard would generate leachate concentrations at source in excess of solubility limit for substance. Substance would be present as NAPL in groundwater at soil concentrations greater than 1000 µg/g.
7. NS - no standard. No appropriate standard, guideline or criterion exists to use to develop a soil quality standard.

MATRIX NUMERICAL SOIL STANDARDS¹

TOLUENE

COLUMN I	COLUMN II	COLUMN III	COLUMN IV	COLUMN V	COLUMN VI	Note
Site-specific Factor	SOIL STANDARD FOR PROTECTION OF SITE-SPECIFIC FACTOR					2
	Agricultural (AL)	Urban Park (PL)	Residential (RL)	Commercial (CL)	Industrial (IL)	
HUMAN HEALTH PROTECTION						
Intake of contaminated soil	40 000	40 000	40 000	100 000		3
Groundwater used for drinking water	2.5	2.5	2.5	2.5	2.5	
ENVIRONMENTAL PROTECTION						
Toxicity to soil invertebrates and plants	1.5	1.5	1.5	25	25	4
Livestock ingesting soil and fodder	NS					5
Major microbial functional impairment	NS					5
Groundwater flow to surface water used by aquatic life						
Freshwater	40	40	40	40	40	6
Marine	350	350	350	350	350	6
Groundwater used for livestock watering	NS					7
Groundwater used for irrigation watering	NS	NS	NS			7

Notes

1. All values in µg/g unless otherwise stated. Substances must be analyzed using methods specified in protocols approved under section 53 or alternate methods acceptable to the director.
2. The site-specific factors of human intake of contaminated soil and toxicity to soil invertebrates and plants specified in this matrix apply at all sites.
3. Intake pathway of exposure modeled is inadvertent ingestion of soil.
4. Insufficient acceptable environmental data exists, so standards are set equal to the Canadian Council of Ministers of the Environment 1999 provisional soil quality criteria.
5. NS - no standard. Insufficient acceptable scientific data exists, so no standard is calculated.
6. Standard comes into effect January 1, 2002. Until that date, applicable standard is 300 µg/g.
7. NS - no standard. No appropriate standard, guideline or criterion exists to use to develop a soil quality standard.

MATRIX NUMERICAL SOIL STANDARDS¹

ZINC

COLUMN I	COLUMN II	COLUMN III	COLUMN IV	COLUMN V	COLUMN VI	Note
Site-specific Factor	SOIL STANDARD FOR PROTECTION OF SITE-SPECIFIC FACTOR					2
	Agricultural (AL)	Urban Park (PL)	Residential (RL)	Commercial (CL)	Industrial (IL)	
HUMAN HEALTH PROTECTION						
Intake of contaminated soil	10 000	10 000	10 000	30 000		3
Groundwater used for drinking water						
pH < 5.0	150	150	150	150	150	4,5
pH 5.0 - < 5.5	200	200	200	200	200	4,5
pH 5.5 - < 6.0	300	300	300	300	300	4,5
pH 6.0 - < 6.5	1 000	1 000	1 000	1 000	1 000	4,5
pH 6.5 - < 7.0	7 500	7 500	7 500	7 500	7 500	4,5
pH ≥ 7.0	15 000	15 000	15 000	15 000	15 000	4,5
ENVIRONMENTAL PROTECTION						
Toxicity to soil invertebrates and plants	450	450	450	600	600	
Livestock ingesting soil and fodder	200					
Major microbial functional impairment	320					6
Groundwater flow to surface water used by aquatic life						
Freshwater						
pH < 6.0	150	150	150	150	150	4,5,7
pH 6.0 - < 6.5	300	300	300	300	300	4,5,7
pH 6.5 - < 7.0	1 500	1 500	1 500	1 500	1 500	4,5,7
pH ≥ 7.0	3 000	3 000	3 000	3 000	3 000	4,5,7
Marine						
pH < 6.5	150	150	150	150	150	4,5,7
pH 6.5 - < 7.0	300	300	300	300	300	4,5,7
pH 7.0 - < 7.5	2 000	2 000	2 000	2 000	2 000	4,5,7
pH ≥ 7.5	35 000	35 000	35 000	35 000	35 000	4,5,7

MATRIX NUMERICAL SOIL STANDARDS¹

ZINC (CONTINUED)

COLUMN I	COLUMN II	COLUMN III	COLUMN IV	COLUMN V	COLUMN VI	Note
Site-specific Factor	SOIL STANDARD FOR PROTECTION OF SITE-SPECIFIC FACTOR					2
	Agricultural (AL)	Urban Park (PL)	Residential (RL)	Commercial (CL)	Industrial (IL)	
Groundwater used for livestock watering						
pH < 5.5	150					4,5
pH 5.5 - < 6.0	200					4,5
pH 6.0 - < 6.5	500					4,5
pH 6.5 - < 7.0	3 000					4,5
pH ≥ 7.0	7 000					4,5
Groundwater used for irrigation						
pH < 6.0	150	150	150			4,5
pH 6.0 - < 6.5	500	500	500			4,5
pH 6.5 - < 7.0	3 000	3 000	3 000			4,5
pH ≥ 7.0	15 000	15 000	15 000			4,5

Notes

1. All values in µg/g unless otherwise stated. Substances must be analyzed using methods specified in protocols approved under section 53 or alternate methods acceptable to the director.
2. The site-specific factors of human intake of contaminated soil and toxicity to soil invertebrates and plants specified in this matrix apply at all sites.
3. Intake pathway of exposure modeled is inadvertent ingestion of soil.
4. The pH is the pH of the soil at a site.
5. Standard has been adjusted based on a reference provincial background soil concentration. Standard represents the rounded sum of the toxicologically-based value plus the reference provincial background soil concentration. For all land uses, the reference provincial background soil concentration is 138.1 µg/g.
6. Standard is set equal to the Canadian Council of Ministers of the Environment, 1999 - Nutrient and energy cycling check value.
7. Standard varies with receiving water hardness (H). H = 100 - < 200 mg/L as CaCO₃ is assumed. Consult director for further advice.

MATRIX NUMERICAL SOIL STANDARDS¹
DICHLORO-DIPHENYL-TRICHLOROETHANE (DDT)²

COLUMN I	COLUMN II	COLUMN III	COLUMN IV	COLUMN V	COLUMN VI	Note
Site-specific Factor	SOIL STANDARD FOR PROTECTION OF SITE-SPECIFIC FACTOR					2
	Agricultural (AL)	Urban Park (PL)	Residential (RL)	Commercial (CL)	Industrial (IL)	
HUMAN HEALTH PROTECTION						
Intake of contaminated soil	15	15	15	50		4
Groundwater used for drinking water	NS	NS	NS	NS	NS	5
ENVIRONMENTAL PROTECTION						
Toxicity to soil invertebrates and plants	10	10	10	15	15	
Livestock ingesting soil and fodder	NS					6
Major microbial functional impairment	550					7
Groundwater flow to surface water used by aquatic life	NS	NS	NS	NS	NS	5
Groundwater used for livestock watering	NS					5
Groundwater used for irrigation watering	NS	NS	NS			5,8

Notes

1. All values in µg/g unless otherwise stated. Substances must be analyzed using methods specified in protocols approved under section 53 or alternate methods acceptable to the director.
2. Includes DDT metabolites.
3. The site-specific factors of human intake of contaminated soil and toxicity to soil invertebrates and plants specified in this matrix apply at all sites.
4. Intake pathway of exposure modeled is inadvertent ingestion of soil.
5. NS – no standard. Substance is sufficiently hydrophobic to render it essentially insoluble and therefore immobile in aqueous media.
6. NS - no standard. Insufficient acceptable scientific data exists, so no standard is calculated.
7. Standard is set equal to the Canadian Council of Ministers of the Environment, 1999 - Nutrient and energy cycling check value.
8. NS – no standard. No appropriate standard, guideline or criterion exists to use to develop a soil quality standard.

MATRIX NUMERICAL SOIL STANDARDS¹

ETHYLENE GLYCOL

COLUMN I	COLUMN II	COLUMN III	COLUMN IV	COLUMN V	COLUMN VI	Note
Site-specific Factor	SOIL STANDARD FOR PROTECTION OF SITE-SPECIFIC FACTOR					2
	Agricultural (AL)	Urban Park (PL)	Residential (RL)	Commercial (CL)	Industrial (IL)	
HUMAN HEALTH PROTECTION						
Intake of contaminated soil	65 000	65 000	65 000	200 000		3
Groundwater used for drinking water	NS	NS	NS	NS	NS	4
ENVIRONMENTAL PROTECTION						
Toxicity to soil invertebrates and plants	5 500	5 500	5 500	20 000	20 000	
Livestock ingesting soil and fodder	NS					4
Major microbial functional impairment	NS					5
Groundwater flow to surface water used by aquatic life	1 500	1 500	1 500	1 500	1 500	
Groundwater used for livestock watering	NS					4
Groundwater used for irrigation watering	NS	NS	NS			4

Notes

1. All values in µg/g unless otherwise stated. Substances must be analyzed using methods specified in protocols approved under section 53 or alternate methods acceptable to the director.
2. The site-specific factors of human intake of contaminated soil and toxicity to soil invertebrates and plants specified in this matrix apply at all sites.
3. Intake pathway of exposure modeled is inadvertent ingestion of soil.
4. NS - no standard. No appropriate standard, guideline or criterion exists to use to develop a soil quality standard.
5. NS - no standard. Insufficient acceptable scientific data exists, so no standard is calculated.

MATRIX NUMERICAL SOIL STANDARDS¹

MERCURY (Inorganic)

COLUMN I	COLUMN II	COLUMN III	COLUMN IV	COLUMN V	COLUMN VI	Note
Site-specific Factor	SOIL STANDARD FOR PROTECTION OF SITE-SPECIFIC FACTOR					2
	Agricultural (AL)	Urban Park (PL)	Residential (RL)	Commercial (CL)	Industrial (IL)	
HUMAN HEALTH PROTECTION						
Intake of contaminated soil	15	15	15	40		3
Groundwater used for drinking water	NS	NS	NS	NS	NS	4
ENVIRONMENTAL PROTECTION						
Toxicity to soil invertebrates and plants	100	100	100	150	150	
Livestock ingesting soil and fodder	0.6					
Major microbial functional impairment	20					5
Groundwater flow to surface water used by aquatic life Freshwater or Marine	NS	NS	NS	NS	NS	4
Groundwater used for livestock watering	NS	NS	NS	NS	NS	4
Groundwater used for irrigation watering	NS	NS	NS	NS	NS	4

Notes

1. All values in µg/g unless otherwise stated. Substances must be analyzed using methods specified in protocols approved under section 53 or alternate methods acceptable to the director.
2. The site-specific factors of human intake of contaminated soil and toxicity to soil invertebrates and plants specified in this matrix apply at all sites.
3. Intake pathway of exposure modeled is inadvertent ingestion of soil.
4. NS - no standard. Insufficient acceptable scientific data exists, so no standard is calculated.
6. Standard is set equal to the Canadian Council of Ministers of the Environment, 1999 – Nutrient and energy cycling check value.