

# **Compilation and Review of Canadian Remediation Guidelines, Standards and Regulations**



***Science Applications International Corporation  
(SAIC Canada)  
Environmental Technologies Program  
Ottawa, Ontario, CANADA***

*Final report presented to:*

*Emergencies Engineering Technologies Office  
Environmental Technology Centre, Environment Canada*

*and*

*Contaminated Sites Division  
Environment Canada*

January 18, 2002

<b>SAIC Canada</b> <i>Quality Assurance Program</i>		
B187-413 Compilation and Review of Canadian Remediation Guidelines, Standards and Regulations		
<b>Co-Authors:</b> researched material in report, compiled final deliverable		
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## **ACKNOWLEDGEMENTS**

The funding for this work was provided by the Emergencies Engineering Technologies Office (EETO) of Environment Canada's Environmental Technology Centre. Dr. Carl Brown of EETO was the scientific authority for this work.

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**ABSTRACT**

This report summarizes information compiled on federal, provincial and territorial standards, guidelines and regulations used to establish remediation limits for key contaminants found at contaminated sites in Canada. For each province and territory, the mechanisms used and the generic remediation values implemented are compared with the Canadian Council of Ministers of the Environment (CCME) Environmental Quality Guidelines (EQGs) for water, soil and sediments.

Summary tables are included as part of this document, which outline the mechanisms, organizational structure and actual values adopted by each province and territory. A discussion is also provided on how the provinces and territories compare with respect to their authorities related to contaminated sites and the completeness and availability of contaminated site legislations/policies in each of the jurisdictions.

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## 1 INTRODUCTION

The information provided in this report was compiled as part of an initiative by Environment Canada's Emergencies Engineering Technology Office and Contaminated Sites Division to create a central reference source on federal, provincial and territorial legislation and policies related to the management of contaminated sites. The scope of the work covered by this report is the collection of information related to the specific remediation standards, guidelines and regulations used for the key contaminants generally found at contaminated sites in Canada. Specifically, the comparison was performed on contaminants identified within Canadian Council of Ministers of the Environment (CCME) Environmental Quality Guidelines (EQGs) for water, soil and sediments (i.e., the Canadian Soil Quality Guidelines (CSQGs), the Canadian Water Quality Guidelines (CWQGs) and the Canadian Sediment Quality Guidelines (CSedQGs).

The tasks performed as part of this project were as follows:

- 1) Information on contaminated site remediation related legislation and policies was obtained through searches of the Internet and literature and through discussions with provincial authorities. Specifically, information was collected on the values or limits established for each jurisdiction as their remediation criteria and on the scientific basis on which the values were developed.
- 2) A summary table was produced that includes the type of legislation or policy mechanism used by each province and territory and describes the approach used to present remediation values.
- 3) Comparison tables were produced containing the provincial and territorial remediation values and the current CCME EQGs.
- 4) The information obtained was also reviewed to determine:
  - a) How the provinces and territories compare with respect to their contaminated site remediation guidelines, standards and regulations;
  - b) The soundness of the science used to establish the remediation values; and,
  - c) The availability, completeness and level of detail of the provincial and territorial guidelines, standards and regulations.

The scope of this study was to cover contamination to soil, sediment and groundwater. However, because of the manner in which the jurisdictions present their water guidelines, the information compiled for this report goes beyond presenting only groundwater guidelines to include all water guidelines that have been established related to contaminated sites (e.g., included are surface and sub-surface guidelines for various uses including aquatic life, irrigation, livestock watering and potable water). In particular, drinking water guidelines (i.e., those intended for water treatment facilities) were not included as part of this study; however, where contaminated sites guidelines included potable water (i.e., potential drinking water sources) values, these were included.

Under a separate contract, the company LJM Environmental Consulting performed a review and analysis of the legal framework of the contaminated sites management in Canada.

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## 2 ESTABLISHMENT OF REMEDIATION OBJECTIVES

Typically there are two methods of establishing objectives for the remediation of contaminated sites – guideline-based and risk-based (CCME, 1997b). Guideline-based (also called criteria-based) objectives are single values set in a guidelines or regulation for generic contaminated site situations. These values are typically established using broad assumptions to encompass a wide range of contaminated sites and, therefore, could be considered conservative for some situations (e.g., in some cases background levels in areas surrounding the site are higher than the guideline values). As such, these values are normally used as a trigger to indicate that further investigation is required at a site (i.e., further site assessment, risk assessment or remedial planning). For soil contamination, guideline-based values are typically set based on the expected land-use for the site such as agriculture, residential, parkland, commercial or industrial. For water contamination, the values are typically based on the intended use of the water, such as aquatic life, drinking water, irrigation or livestock watering.

The guideline-based values are normally established by evaluating typical risks posed by the contaminants for the different land-use categories (CCME, 1997b). The risks are translated into numerical values by collecting information on human and ecological receptors, the expected exposure levels, toxicological data (for both humans, animals and plants) and the mechanisms by which the contaminants can reach the receptors (e.g., migration of contaminant from soil to groundwater, ingestion of water, breathing of vapour-phase, uptake in plants that are ingested). For residential, parkland, commercial and industrial land-uses exposure to the contaminants in soil by receptors is expected to be direct. However, agricultural values, which are typically the lowest, also take into account indirect exposures to the contaminants through animals and crops that are consumed by humans or animals. Once the acceptable limits are established for both human and ecological receptors, the lower value is generally adopted as the guideline-based value.

On the other hand, risk-based methods are used to determine limits for a specific contaminated site based on an assessment of the risks posed at that site by the contaminants in question. The risk-based values established for a site can be either slight modifications to the guideline-based values using some site specific information, or specific values based on extensive information and data collected for that site. The assessments performed to determine site-specific values typically evaluate both human and ecological risks through the evaluation of contaminant types, contaminant concentrations, contaminant toxicity and human and ecological exposure pathways.



### 3 JURISDICTIONAL COMPARISON

As part of this work, a review was performed of all the provincial and territorial authoritative mechanisms (regulations, policies, guidelines, standards, etc.) related to contaminated site remediation. In general, it was found that the provinces employed one of the following three approaches to organizing their contaminated sites remediation values:

- Adoption of CCME EQGs – Legislative or policy mechanisms indicate that the CCME EQGs values have been adopted directly;
- CCME EQGs Format/Differing Values – Use the CCME soil, water and sediment categories, but establish their own values for some or all of the contaminant/media combinations; or,
- Surface/Sub-surface Potable/Nonpotable Format – Categorization of soil and water guideline values based on whether the media is at the surface or subsurface and whether the water is for potable or non-potable uses, or the soil is above water that is for potable or non-potable uses.

Tables 1 and 2 summarize the mechanisms used by each of the provinces and territories and describes how their remediation values are organized as compared with the CCME EQG categories. Table 1 compares the soil and sediment values, whereas Table 2 compares the water values.

The guideline-based numerical values used by each jurisdiction to dictate the allowable limits for particular compounds in soil, water and sediments were compiled into tables. For comparison purposes, these tables include the CCME EQG values and are set up in the same format as the CCME presents the EQGs. The following tables are included in Appendix A:

- Table A-1: Soil Quality Guidelines – Agriculture
- Table A-2: Soil Quality Guidelines – Residential/Parkland
- Table A-3: Soil Quality Guidelines – Commercial
- Table A-4: Soil Quality Guidelines – Industrial
- Table A-5: Water Quality Guidelines
- Table A-6: Sediment Quality Guidelines – Freshwater and Marine

The following sections describe and compare the mechanisms used by the CCME and the provincial and territorial governments to provide remediation limits for contaminated sites. Each of the provincial contaminated site contacts were given the opportunity to review and comment on the information collected on their province. Their comments are reflected in the information presented below. A list of the provincial contacts is provided in Appendix B.

**Table 1: Comparison of Provincial Values for Soil and Sediment**

(X indicates categories in which the province has adopted specific values, for some or all contaminants, that differ from the CCME EQGs.)

PROVINCE OR TERRITORY	DOCUMENTS	SOIL				SEDIMENT	
		Agriculture	Residential / Parkland	Industrial	Commercial	Freshwater	Marine
BRITISH COLUMBIA	Contaminated Sites Regulation of the B.C Waste Management Act (1995)	X	X	X	X		
ALBERTA	Tier 1 Criteria for Contaminated Soil Assessment and Remediation (March 1994)	X (Values not land-use specific)					
SASKATCHEWAN	Upstream Petroleum Sites Remediation Guideline (Final Draft, March 1999)	X	X				
MANITOBA	Contaminated Sites Remediation Act (1997)						
	Guideline for the Designation of Contaminated Sites in Manitoba (1997)						
ONTARIO	Ontario Guideline for Use at Contaminated Sites in Ontario (June 1996)	X (surface/ subsurface potable/ nonpotable)	X (surface/ subsurface potable/ nonpotable)	X (surface/ subsurface potable/ nonpotable)	Refers to Industrial	X	Refers to freshwater
QUEBEC	Soil Protection and Contaminated Sites Rehabilitation Policy (June 1998)	X	X	X	Refers to Industrial		
YUKON	Contaminated Site Regulations (Nov. 1996)	X	X	X	X		
NORTHWEST TERRITORIES	Guideline for Contaminated Site Remediation (1998)	X	X	X	X		
NUNAVUT	Guideline for Contaminated Site Remediation (1998)	X	X	X	X		
NEW BRUNSWICK	Guideline for the Management of Contaminated Sites (June 1999)		X (surface/ subsurface potable/ nonpotable)		X (surface/ subsurface potable/ nonpotable)		
	Atlantic Risk-Based Screening Levels Look-Up Tables						
NFLD. & LABRADOR	Newfoundland Contaminated Sites Cleanup Criteria (March 1999)						
NOVA SCOTIA	Guidelines for the Management of Contaminated Sites in Nova Scotia (March 1996)		X (surface/ subsurface potable/ nonpotable)		X (surface/ subsurface potable/ nonpotable)		
	Atlantic Risk-Based Screening Levels Look-up Tables						
PEI	Petroleum Contaminated Sites Guidelines (1999)		X (surface/ subsurface potable/ nonpotable)		X (surface/ subsurface potable/ nonpotable)		
	Atlantic Risk-Based Screening Levels Look-Up Tables						

**Table 2: Comparison of Provincial Values for Water**

(X indicates categories in which the province has adopted specific values, for some or all contaminants, that differ from the CCME EQGs)

PROVINCE OR TERRITORY	DOCUMENTS	Freshwater	Marine	Livestock	Irrigation
BRITISH COLUMBIA	Contaminated Sites Regulation of the B.C Waste Management Act (1995)	X	X	X	X
ALBERTA	Surface Water Quality Guidelines for Use in Alberta (Nov. 1999)	X (surface water)			
SASKATCHEWAN	Upstream Petroleum Sites Remediation Guideline (Final Draft, March 1999)	X		X	X
MANITOBA	Contaminated Sites Remediation Act (1997)				
	Guideline for the Designation of Contaminated Sites in Manitoba (1997)				
	Manitoba Water Quality Standards, Objectives & Guidelines - Technical Draft (2001)				
ONTARIO	Ontario Guideline for Use at Contaminated Sites in Ontario (June 1996)	X (potable and non-potable groundwater)			
QUEBEC	Soil Protection and Contaminated Sites Rehabilitation Policy (June 1998)	X (surface water and sewer discharge)			
YUKON	Contaminated Site Regulations (Nov. 1996)	X	X	X	X
NORTHWEST TERRITORIES	Guideline for Contaminated Site Remediation (1998)				
NUNAVUT	Guideline for Contaminated Site Remediation (1998)				
NEW BRUNSWICK	Guideline for the Management of Contaminated Sites (June 1999)	X (potable and non-potable groundwater)			
	Atlantic Risk-Based Screening Levels Look-Up Tables				
NFLD. & LABRADOR	Newfoundland Contaminated Sites Cleanup Criteria (March 1999)				
NOVA SCOTIA	Guidelines for the Management of Contaminated Sites in Nova Scotia (March 1996)	X (potable and non-potable groundwater)			
	Atlantic Risk-Based Screening Levels Look-up Tables				
PEI	Petroleum Contaminated Sites Guidelines (1999)	X (potable and non-potable groundwater)			
	Atlantic Risk-Based Screening Levels Look-Up Tables				

### 3.1 Canadian Council of Ministers of the Environment

The Canadian Council of Ministers of the Environment (CCME) is comprised of environment ministers from the federal, provincial and territorial governments (14 ministers in total). The council's mandate is to promote cooperation on and coordination of interjurisdictional issues such as waste management, air pollution and toxic chemicals. One of the main objectives of the CCME is to propose nationally consistent environmental guidelines and standards. The CCME has no authority to implement or enforce legislation and, therefore, it is up to each province and territory to decide whether to adopt the CCME guidelines and standards.

In 1991, Interim Environmental Quality Criteria for soil and water were recommended by the CCME as a tool to assist in the management of contaminated site assessment and remediation (CCME, 1991a). These criteria were established so that values were available in the short-term while the CCME could develop a protocol for the development of scientifically defensible, risk-based environmental quality guidelines. The interim guidelines were based on existing guidelines in other jurisdictions and were not developed as a result of a systematic scientific evaluation related to specific Canadian environmental conditions.

Based on established guidance material on the development of soil quality objectives (CCME, 1996a,b), a variety of inorganic and organic substances were subjected to assessments to establish soil quality guidelines (CCME, 1997a), which in turn became the basis for the recommended **Canadian Soil Quality Guidelines** (CSQG) (CCME, 2001a). These guidelines were based on published literature on the effect of the substances on human and ecological receptors for four land uses: Agricultural, Residential/Parkland, Commercial and Industrial.

The **Canadian Water Quality Guidelines** (CWQG) (CCME, 1999a, CCME 2001b) have been divided into the following three sections based on the intended use of the water: aquatic life, irrigation water and livestock water. The aquatic life category is further divided into marine and freshwater. For each of the categories, the derivation of the guideline values was performed through the collection of information and toxicological data on each contaminant and its potential receptors for the specific water uses (CCME, 1991b). Typically, toxicity data for the most sensitive of the ecological receptors is used to calculate the guideline value.

The CCME has also established the **Canadian Sediment Quality Guidelines** (CSedQG) (CCME, 1999, CCME, 2001), which present values for both freshwater and marine (including estuarine) sediments. The guideline values are numerical limits or narrative statements that are recommended to support and maintain aquatic life and are based on the biological effects of sediment-associated chemicals. Two approaches are used to establish the sediment guidelines: the National Status and Trends Program (NSTP) and the Spiked-Sediment Toxicity Tests (SSTT). The NSTP approach relies on field data to demonstrate associations between chemicals and biological effects. The SSTT approach uses data from laboratory tests that evaluate the cause and effect relationship of various concentrations in sediments on aquatic life. A Threshold Effect Level (TEL) for a particular chemical (i.e., the value at which there is no toxicological effect) is established based on the NSTP approach unless SSTT information is available. A Probable Effect Level (PEL) is also determined, which is the value at which there is expected to be an adverse biological effect. The Sediment Quality Guideline lists both the TEL (indicated in the tables as Interim Sediment Quality Guidelines (ISQG)) and the PEL.

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## 3.2 Western Region

### 3.2.1 British Columbia

The management of contaminated sites in British Columbia is legislated by the “Contaminated Sites Regulation of the B.C. Waste Management Act” (British Columbia, 1995). The soil values in the regulation are listed either as generic numerical soil standards or as matrix numerical soil standards. The generic levels are a single value for each substance for each of the following land-use categories: urban park, residential, commercial, industrial and agricultural. Unlike the CSQG, B.C. has separate categories for parkland and residential values; however, the values are currently the same for each category.

The matrix numerical soil standards presented in the regulations give a range of values for some substances that vary not only by land-use but also with respect to different site conditions and the factors associated with the human and environmental receptors. For human health protection the matrices take into account the potential for human intake of contaminated soil and whether the groundwater associated with the site is used for drinking water. For environmental protection, the factors identified include toxicity to soil invertebrates and plants; potential for livestock to ingest soil and fodder; the potential for microbial function impairment; and groundwater flow to surface used by aquatic life, for livestock watering or for irrigation.

The Contaminated Sites Regulation also allows for the calculation of site-specific numerical soil standards, following protocols specified by the Director of waste management. This protocol was approved in February 1998.

The Contaminated Sites Regulation also includes generic numerical water standards. Currently, these water values are categorized according to the intended use of the impacted water (i.e., aquatic life, irrigation, livestock watering and drinking water). However, B.C. is in the process of updating the generic numerical water standards to reflect the current CCME water quality guidelines (British Columbia, 2001). For comparison purposes, the generic numerical water standards are presented in the tables provided in Appendix A.

In summary, B.C. has established its own standards for most soil and water contaminants. When compared with the CCME CSQGs, the B.C. soil values vary considerably, with some higher and some lower than the CCME values. The B.C. aquatic life values are generally higher than the CWQG aquatic life values with the benzene, ethylbenzene and toluene values being much higher than the CWQGs; however, as noted above, these values are being updated to bring them in line with the CCME values. For the most part the B.C. irrigation and livestock watering values are currently the same as the CCME CWQGs. For the control of contaminants in sediments, B.C. is currently drafting a criteria specifically for sediments.

### 3.2.2 Alberta

Alberta Environment is currently consolidating remediation criteria and guideline values into one document. The “Alberta Soil and Water Quality Guidelines for Hydrocarbons at Upstream Oil and Gas Facilities (Volumes 1 -3)” (Alberta, 2001) is used for hydrocarbon contamination at upstream oil and gas facilities and is based on the “Canada-Wide Standard for Petroleum Hydrocarbons in Soil” (CCME, 2001c). The Alberta guideline has been

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expanded from the CCME version to include a natural area land-use category, values for BTEX and an administrative section.

In general, Alberta uses the CCME EQGs for all types of sites and land uses. If the contaminant is not listed in CCME EQGs, two other guidelines can be used depending on land use. The draft “Alberta Tier 1 Criteria for Contaminated Soil Assessment and Remediation” (Alberta, 1994) is used for agricultural and residential/parkland land-uses, whereas the CSQGs are used for commercial and industrial land uses. However, risk-based criteria is diminishing the use of the CCME EQGs and Alberta Tier 1 Criteria.

The “Surface Water Quality Guidelines for use in Alberta” (Alberta, 1999) provides an extensive list of substances for which there are either CWQGs, U.S. Environmental Protection Agency guidelines and/or Alberta guidelines. The document outlines that in applying these guidelines, the Alberta guidelines developed after 1996 are given preference over CCME and USEPA guideline values. Also, in cases where more than one guideline value for a substance is included in the tables, the more stringent values are used to develop wastewater limits, unless scientific justification can be provided for doing otherwise.

The Surface Water Quality Guidelines indicate a few specific levels for contaminant concentrations for freshwater aquatic life including copper (which is higher than the CCME CWQG level) mercury (which is lower than the CWQG level) and dissolved oxygen (which is similar to the range presented in the CWQGs). Alberta lists its specific water values either for chronic toxicity situations (i.e., where a discharge is continuous such as leaching from contaminated soil) or acute toxicity situations (i.e., a maximum one-time discharge such as a spill directly to water). The “Protocol To Develop Alberta Water Quality Guideline For Protection of Freshwater Aquatic Life” (Alberta, 1996) outlines Alberta’s preference in developing guidelines for both “Acute” and “Chronic” values. Alberta adopts the CWQGs for livestock watering and irrigation.

There were no specific sediment quality guidelines found for Alberta.

### 3.2.3 Saskatchewan

Generally speaking, criteria for contaminated sites outlined in the CCME EQGs are used as a basis for development of remediation guidelines in the Saskatchewan. If no provincial guideline has been established then the CCME EQGs would be included as a starting point for development of remediation plans.

The “Saskatchewan Upstream Petroleum Sites Remediation Guidelines” (Saskatchewan, 1999) were established to provide a common set of remediation criteria for upstream petroleum sites such as wellsites, batteries, compressors, upstream waste processing facilities or other facilities impacted by primary exploration, production or transportation of unrefined petroleum resources. The guidelines provide recommended soil and water contamination limits for petroleum hydrocarbons, benzene, toluene, ethylbenzene and xylene (BTEX), ethylene glycol, polychlorinated biphenols (PCBs) and inorganics.

The soil values are separated into three land-uses – agricultural, residential and forest. There is a fourth category for “subsoil” values, which includes higher limits that can be applied in cases where contamination is at sufficient depth separated by or within a confining material (e.g., clay or a synthetic liner) that will block all migration pathways for the contaminants. For the agriculture land use values, two values are sometimes presented. In

this case, the higher value is allowable provided that crop growth and yield is monitored. For example, benzene, toluene, ethylbenzene and xylene are given two values. The higher value (by a factor of 10) is allowable provided that the crop growth and yield are monitored for a period of minimum three years. In the case of ethylene glycol, two agriculture values are listed – one for “pasture (grazing animals)” and a higher allowable value for “crop land (no grazing)”. In general, the Saskatchewan soil values are the same as the CSQGs, with the exception of ethylbenzene, toluene, PCBs, lead and nickel, which all have higher values.

Saskatchewan water values are also listed in the “Upstream Petroleum Sites Remediation Guidelines”. These values are divided into freshwater aquatic, irrigation, livestock watering and drinking water. Of the freshwater aquatic life water contaminant values specifically listed, some are the same as the CCME CWQGs for freshwater. However, the level for benzene is lower and those for ethylbenzene and toluene are higher than the CWQGs. As well, the range presented for cadmium is higher than the CWQGs value. The Saskatchewan irrigation and livestock values are all the same as the CWQGs except for cadmium and chromium (cadmium is lower for livestock watering and higher for irrigation and chromium is higher for both).

Decommissioning of storage facilities for gasoline, diesel, heating oil, aviation fuel and waste oil is carried out in accordance with the “Risk Based Corrective Actions for Petroleum Contaminated Sites” (Saskatchewan, 1995). Generic contaminated site criteria are based on the Guidelines for Canadian Drinking Water Quality (1993) and the CCME EQGs. The guideline also allows for the development of management options based on site specific conditions through site sensitivity and site specific risk assessment. It is anticipated that the RBCA guidelines will be updated to keep in step with Canada-Wide Standards where appropriate.

No information on the control of sediment contamination in Saskatchewan has been found.

#### 3.2.4 *Manitoba*

In 1997, the “Manitoba Contaminated Sites Remediation Act” was passed. As outlined in the “Guideline for the Designation of Contaminated Sites in Manitoba” (Manitoba, 1997), the province has adopted a three-tier approach to contaminated site remediation. Tier 1 is criteria based, adopting the CCME EQGs for soil, sediments and water. Tier 2 involves limited modification to the criteria-based values based on site-specific situations and Tier 3 involves a full risk assessment for cases where generic criteria and modified criteria do not apply.

In 1996, Manitoba established the “Treatment and Disposal of Petroleum Contaminated Soil Guideline” (Manitoba, 1996) to cover contaminants such as benzene, toluene, ethylbenzene and xylenes, semi-volatile organic compounds, volatile organic compounds, mineral oil and grease and lead. These guidelines are currently being modified to incorporate the CCME “Canada Wide Standard for Petroleum Hydrocarbons” (CCME, 2001c).

### 3.3 Central and Northern Regions

#### 3.3.1 Ontario

The “Guideline for Use at Contaminated Sites in Ontario” (Ontario, 1996) divides the applicable contaminant remediation levels for Ontario into categories and sub-categories as follows:

Soil values:

- surface versus subsurface soil
- whether contaminated soil is situated above potable or non-potable groundwater
- texture of the soil (for some contaminants separate values are given for medium and fine textured soils).
- land-use (agriculture for surface soils above potable groundwater, parkland/residential, industrial/commercial).

Water values:

- potable versus non-potable.

In general, the Ontario soil and water values are higher than the CCME CSQGs and CWQGs. However, the benzene and ethylbenzene potable freshwater values are lower than the CWQGs for freshwater. On the other hand, the non-potable freshwater values for benzene, ethylbenzene and toluene are much higher than the freshwater CWQGs.

Ontario is the only jurisdiction for which dedicated sediment contamination values were located. The “Guideline for Use at Contaminated Sites” lists the lowest effect levels (LEL) for a large number of contaminants in sediments for freshwater aquatic life. The LEL is determined using the 5<sup>th</sup> percentile of the screening level concentrations (i.e., the concentration that is toxic to less than 5% of the population). These values are different from the CCME Interim Sediment Quality Guidelines (ISQG), which are based on Threshold Effect Levels (i.e., the level at which there is no toxic effect). As such, a few of the Ontario values are greater than the CCME ISQGs. However, many are the similar or lower than the ISQGs.

#### 3.3.2 Quebec

The “Soil Protection and Contaminated Sites Rehabilitation Policy” (Quebec, 1998) has three categories of contaminant remediation levels: levels A, B and C. Level A values are established background levels for inorganic contaminants and analytical detection limits for organic compounds. For agricultural land-use, level A values are recommended unless it can be otherwise proven that the soil is suitable for agriculture use. Level B values are the maximum allowable concentrations for residential, recreational, institutional (i.e., schools, daycares, etc.) or commercial sites in residential districts. Level C values are the maximum allowable concentrations for commercial sites not located in a residential area or for industrial sites. When comparing the Quebec soil values to the CSQGs, there is a wide



range of variability between the two sets of values. For agricultural purposes (Level A), some values are higher and some are lower than the agriculture CSQGs. The industrial values (Level C) are also variable but typically the Quebec metal values are higher than the industrial CSQGs. Many of the residential values (Level B) are higher than the residential/parkland CSQGs.

Quebec divides groundwater contamination values into two categories based on the intended use of the water: drinking water or surface water and sewers. The Drinking water values are taken from Health Canada or, if no Health Canada values are available, from the U.S. Environmental Protection Agency (U.S. EPA) or the World Health Organization (WHO). In the case where groundwater flows to surface water or sewers, the Quebec Water Quality Criteria are used (Quebec MEF, 1998). The values presented for this category are typically a factor of 100 greater than the CWQGs freshwater values. The Quebec Policy states that if groundwater is used for irrigation or for watering cattle, the CWQGs should be used.

Quebec information pertaining to allowable sediment contamination levels was not found.

### 3.3.3 Northwest Territories

Under the authority stated in Section 2.2 of the 1988 “Northwest Territories Environmental Protection Act”, the “Guideline for Contaminated Site Remediation” (N.W.T., 1998) was established. In general, this Guideline adopts the CCME CSQGs and CWQGs. However, the guideline specifically indicates limits for benzene, toluene, ethylbenzene, xylenes, total petroleum hydrocarbons, lead and polychlorinated biphenyls. Of these values only the lead industrial value is different (i.e., lower) than the CSQGs. The PCB values refer to the CCME 1991 Interim Soil Quality Guidelines (CCME, 1991) but indicate that these values are being updated by the CCME.

No information was found with respect to the control of contamination in sediments in the Northwest Territories. However, where specific criteria are not indicated through legislation, regulations or guidelines, the Northwest Territories refers to CCME EQGs.

### 3.3.4 Nunavut

Nunavut has adopted the “Northwest Territories Guideline for Contaminated Site Remediation” (1998). In general, this Guideline adopts the CCME CSQGs and CWQGs. However, the guideline specifically indicates soil limits for benzene, toluene, ethylbenzene, xylenes, total petroleum hydrocarbons, lead and polychlorinated biphenyls. Of these values only the lead industrial value is different (i.e., lower) than the CSQGs. The PCB values refer to the CCME 1991 Interim Soil Quality Guidelines (CCME, 1991) but indicate that these values are being updated by the CCME.

### 3.3.5 Yukon

The Yukon’s “Contaminated Sites Regulations” (Yukon, 1996) uses “matrix” and “generic” numerical standards to regulate limits for contaminants in soil similar to those established in British Columbia. Currently matrix standards have only been established for 16 substances, and the Yukon will be adding more following an ongoing amendment to the regulation (Hall, 2001). For these contaminants the values vary not only by land-use but also with respect to different site conditions and the risk factors associated with the human and ecological receptors. For human health receptors, the matrices take into account the potential for

human intake of contaminated soil and whether the groundwater associated with the site is used for drinking water. For ecological receptors various information and data is taken into account such as: toxicity to soil invertebrates and plants; potential for livestock to ingest soil and fodder; the potential for microbial function impairment; groundwater flow to surface used by aquatic life, for livestock watering or for irrigation.

The water values are listed as generic numeric water standards and are categorized according to the intended use of the water: aquatic life, irrigation, livestock watering and drinking water. Unlike the CWQGs, the Yukon aquatic life values are not separated into freshwater or marine categories except for the pesticides aldicarb and dieldrin. Most of the livestock watering and irrigation values are similar to the CWQGs.

In general, the Yukon guideline is very similar to that of British Columbia with the exception of a few areas. The Yukon aldicarb marine value is slightly lower than the B.C. value. The Yukon indicates a range for aluminum that is dependent on pH, whereas B.C. lists no value for aluminum. However, the Yukon is intending to drop the aluminum aquatic life standard as part of the currently proposed amendments to the Contaminated Site Regulations (Hall, 2001). The dichloroethane and chlorinated phenol values also differ between the Yukon and B.C.

### 3.4 Eastern Region

For the management of contaminated sites, the Atlantic provinces have banded together to establish the Atlantic Risk-Based Corrective Action (RBCA or "Rebecca") process. RBCA, which was initially established in the U.S., was adapted for the Atlantic Canada situation in order to make dealing with contaminated sites more consistent and cost-effective. The process emphasizes a risk-based management approach rather than having contaminated site management based solely on generic remediation values. For the most part, the process is intended for dealing with petroleum impacted sites. The governments of each of the four Atlantic Provinces are promoting the RBCA approach, while maintaining their own regulations governing environmental protection.

The Atlantic RBCA takes a three tier approach. Tier I is the use of generic criteria values that have been established using conservative assumptions with respect to the effects of contaminants at typical Atlantic sites. Tier II involves modifying the Tier I values using information specific to the site in question. Tier III involves the development of criteria specific to a site based on detailed information and data collected about that site.

New Brunswick, Nova Scotia and Prince Edward Island have all adopted the Tier I Look Up Tables in the Atlantic RBCA guideline into their own remediation guidelines. The Tier I tables include values for petroleum hydrocarbons (Gasoline, diesel #2 and fuel oil #6), benzene, toluene, ethyl benzene and xylene. The Guidelines divide the values into categories and sub-categories as follows:

Soil values:

- surface versus subsurface soil;
- whether contaminated soil is situated above potable or non-potable groundwater;

- clayey versus sandy soil; and,
- whether land-use is residential or commercial.

Groundwater values:

- potable versus non-potable; and,
- clayey versus sandy soil.

In the Tier 1 Lookup Table, the ethylbenzene, xylene and toluene groundwater values are the same regardless of the receptor or the type of soil. However, the benzene values vary with respect to whether it is in a commercial site or a residential area and whether the ground water is located within clay or sandy soil.

When comparing the Atlantic Tier I Look Up Table values with the CCME EQGs, the residential and commercial soil values for potable water for benzene and ethylbenzene are lower than the corresponding CSQGs values. However, the surface soil for non-potable water values are much higher than the CSQGs. Similarly, the Atlantic RBCA potable groundwater values are lower than the CWQG freshwater aquatic values and the non-potable values are much higher. It should be noted, however, that the Atlantic provinces are presently revising the Atlantic RBCA model so that the soil values meet the minimum corresponding CSQG values (McInnis, 2001). It should also be noted that the Atlantic tables include petroleum hydrocarbons which are not included in the CCME EQGs as they are being addressed separately in the new Canada Wide Standard for Petroleum Hydrocarbons.

#### 3.4.1 *New Brunswick*

New Brunswick's "Clean Environment Act", the "Petroleum Products Storage and Handling Regulations" and the "Water Quality Regulations" all contain authorities to prohibit the release of contaminants into the environment. The "Guideline for the Management of Contaminated Sites" (New Brunswick, 1999) outlines the steps to be taken should contamination enter the environment and provides management procedures to be used in the remediation of contaminated sites. In keeping with the Atlantic Risk-Based Corrective Action (RBCA), this Guideline is also based on the desire to move the remediation of contaminated sites towards a risk-based management approach rather than the sole dependence on generic remediation values. The Atlantic RCBA Tier I Look Up Tables form a part of this Guideline.

No contaminated sediment criteria were found for New Brunswick.

#### 3.4.2 *Newfoundland and Labrador*

The "Newfoundland Contaminated Sites Cleanup Criteria" (Newfoundland and Labrador, 1999) is currently under review, with the intention of replacing it. Like the other Atlantic Provinces, Newfoundland generally implements the procedures outlined by the Atlantic RBCA; however, they have not currently adopted the RBCA Tier I Look Up Tables into their criteria. Two basic approaches to contaminated site remediation are considered acceptable under these criteria - a numerical-based criteria approach and a comprehensive, site-specific risk based approach. For the criteria based approach, the CCME EQGs for

contaminated soil, freshwater and drinking water are used. For the risk-based approach, the policy outlines site sensitivity determination procedures.

There do not appear to be any specific sediment quality criteria for Newfoundland and Labrador.

### 3.4.3 *Nova Scotia*

Nova Scotia is also a partner in the Atlantic RBCA, and has adopted the three-tier approach including the use of the Tier I Look Up Tables to establish values for particular contaminants related to petroleum-impacted sites. The “Renewed Interim Procedure for the Implementation of Risk Based Corrective Action” (November 1999) provides interim standards for Nova Scotia for petroleum hydrocarbon contamination in soil and groundwater, for one year effective November 1, 2000 (renewed from November 1, 1999). This Procedure replaced the 1990 "Soil Remediation Petroleum Products" guideline. Nova Scotia intends to re-evaluate this Procedure based on the new Canada-Wide Standard for Petroleum Hydrocarbon in Soil.

Specific sediment quality criteria were not located for Nova Scotia.

### 3.4.4 *Prince Edward Island*

In 1999, Prince Edward Island established “Petroleum Contaminated Site Guidelines” (P.E.I., 1999) using a “risk assessment tiered” approach as outlined by the Atlantic RBCA. The RBCA Tier I Look Up Tables have been included as part of this guideline. P.E.I. does not appear to have specific criteria for contaminated sediments.

## 4 SUMMARY AND CONCLUSIONS

Upon review of the information collected on the mechanisms used by the provinces and territories with respect to their contaminated sites legislation and policies, it was found that each jurisdiction takes a slightly different approach to the management of contaminated sites. However, in general, one of the following three approaches have been employed:

- adoption of the CCME EQGs (Manitoba and Newfoundland and Labrador);
- adoption of the CCME EQGs format for the soil, water and sediment categories but establishment of their own values or a combination of their own values and CCME EQG values (British Columbia, Alberta, Saskatchewan, Quebec, Northwest Territories, Nunavut, and Yukon); and,
- categorizing soil and water guideline values based on whether the media is at the surface or subsurface and whether the water is for potable or non-potable uses or the soil is above water that is for potable or non-potable uses (Ontario, New Brunswick, Nova Scotia and Prince Edward Island).

The provinces and territories that have adopted their own values but use the CCME EQG format have generally established water values that are higher (i.e., more lenient) than the

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CCME values. On the other hand, in the case of soil values there was no general trend found (i.e., some of the individual values adopted were higher and some were lower).

For the provinces that categorize their values as surface/subsurface potable/non-potable, generally the values associated with a potable water situation were lower than the CWQGs and the values associated with a non-potable water situation were much higher than the CWQGs.

In terms of the coverage of the contaminants by each of the provinces and territories, Ontario, Quebec and British Columbia, include guideline-based values for a wide range of contaminants and generally cover most of the contaminants that are covered by the EQGs. The Yukon covers most of the same water values as the CWQGs but has a more limited list of soil values than the CSQGs, where they concentrate on heavy metals and a few organics. The other provinces that have their own guideline-based values (i.e., Alberta, Saskatchewan, New Brunswick, Nova Scotia and Prince Edward Island, Northwest Territories, Nunavut, and Yukon, concentrate mainly on benzene, toluene, ethylbenzene and xylenes and a few heavy metals (e.g., lead).

The following unique methods used by the provinces and territories to present their guideline-based remediation values should also be noted:

- British Columbia and the Yukon have developed both “generic” numerical soil standards, which are single values for each contaminant/land-use combination) and “matrix” numerical soil standards, which include a range of values for some contaminants that vary not only by land-use but also with respect to different site conditions and the risk factors associated with the human and environmental receptors.
- For its water values, Alberta accounts for situations where there is a continuous discharge such as leaching from contaminated soil into water (“chronic toxicity” values) and situations where there is a maximum one-time discharge such as a spill into water (“acute toxicity” values).
- In addition to the three land-use categories (agricultural, residential and forest), Saskatchewan has a fourth category for “subsoil” values, which includes higher limits that can be applied in cases where contamination is at sufficient depth separated by or within a confining material (e.g., clay or a synthetic liner) that will block all migration pathways for the contaminants. For the agriculture values, Saskatchewan also presents two values for some contaminants whereby the higher value is allowable provided that crop growth and yield are monitored. For some contaminants they also distinguish between whether land is used for “pasture (grazing animals)” or for “crop land (no grazing)”.
- Quebec uses similar soil land-use categories to the CSQGs. However, instead of having a separate category for commercial land values, values for commercial sites located in residential districts are included in a category with residential, recreational and institutional land-uses and values for commercial sites not located in a residential area are combined with the industrial site values.

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**APPENDIX A: Contaminated Site Remediation Limits Comparison Tables**

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**Table A-1: Soil Quality Guidelines – Agriculture**

Values shown are not for regulatory use. Refer to provincial/territorial guidelines, standards and regulations to confirm values and their implications. (See Reference Section and Appendix B for provincial/territorial references and contact persons.)

Values shown are for provinces/territories that have adopted values that differ from CCME EQGs. Provinces/territories not listed generally adopt CCME EQGs. All concentrations are expressed in mg/kg (ppm).

CONTAMINANT	CCME <sup>1</sup>	BC <sup>5</sup>	Alberta <sup>6</sup>	Sask	Ont <sup>10,11</sup>	Que	Yukon <sup>5</sup>	NWT	Nunavut
Arsenic (inorganic)	12	15-100	10		(25) 20	6	15-100		
Barium	750	750	600	750	(1000) 750	200	750		
Benzene	0.05	0.04-1000	0.05	0.5-5 <sup>7</sup>	0.24	0.1	0.04-1000	0.05	0.05
Benzo (a) pyrene	0.1	0.1-5			1.2	0.1	0.1-5		
Cadmium	1.4	1.5-4500	1	1.4	(4.0) 3.0	1.5	1.5-4500		
Chromium (total)	64	9-750	100	64		85	9-750		
Chromium (VI)	0.4		5		(10) 8.0				
Copper (total)	63	40-350000	80	63	(200) 150	40	40-350000		
Cyanide (Free/Available)	0.9	0.5	0.5		100	2	0.5		
<i>Cyanide (Total)<sup>4</sup></i>		5				2	5		
DDT (total)	0.7		0.1		1.6				
Ethylbenzene	0.1	0.1-3500		5-50 <sup>7</sup>	0.28	0.2	0.1-3500	0.1	0.1
Ethylene glycol	960			97 <sup>8</sup> , 410 <sup>9</sup>					
Lead	70	100-100000	50	375	200	50	100-100000	70	70
Mercury (inorganic)	6.6	0.8	0.2	6.6	10		0.8		
Naphthalene	0.1	0.1	0.1		4.6	0.1	0.1		
Nickel	50		40	150	(200) 150	50			
Pentachlorophenol	7.6	0.1-750000	0.05		5.0	0.1	0.1-750000		
<i>chlorophenols (each)<sup>3,4</sup></i>		0.05	0.05				0.05		
Phenol	3.8		0.05		40	0.1			
<i>nonchlorinated (each)<sup>2,4</sup></i>		0.1	0.1				0.1		
Polychlorinated Biphenyls (PCBs)	0.5	0.5-5	0.5	0.5	0.5	0.05	0.5-5	0.5	0.5
Tetrachloroethylene	0.1	0.1-1000			0.45	0.2	0.1-1000		
Thallium	1	2	1		4.1		2		
Toluene	0.1	0.1-6500	1.0	3-30 <sup>7</sup>	2.1	0.2	0.1-6500	0.1	0.1
Trichloroethylene	0.1	0.1-200			(3.9) 1.1		0.1-200		
Vanadium (total)	130	200	100	130	(250) 200		200		
Xylene	0.1	0.1-65000	1.0	5-50 <sup>7</sup>	25	0.2	0.1-65000	0.1	0.1
Zinc	200	150-150000	120	200	(800) 600	110	150-150000		

- <sup>1</sup> Updated 2001 EC, CCME EQG web site [http://www2.ec.gc.ca/ceqg-rcqe/index\\_e.htm](http://www2.ec.gc.ca/ceqg-rcqe/index_e.htm)
- <sup>2</sup> Nonchlorinated phenolic substances include: 2,4-dimethylphenol, 2,4-dinitrophenol, 2-methyl 4,6-dinitrophenol, nitrophenol (2-,4-), phenol and cresol
- <sup>3</sup> Chlorophenols include: chlorophenol (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-,2,3,4-,2,3,4-, 3,4,5-), tetrochlorophenol (2,3,5,6-, 2,3,4,5-, 2,3,4,6-)
- <sup>4</sup> Indented and italicized compounds are broken down specifically in certain provinces, but are more general in the CCME
- <sup>5</sup> Single BC & Yukon values are Generic Numeric Soil Standards. Compounds with a range of values are the lows and highs indicated in the Matrix Numerical Soil Standards.
- <sup>6</sup> Alberta uses one generic value for all land uses.
- <sup>7</sup> If high value is used, crop growth and yield must be monitored for a minimum of 3 years.
- <sup>8</sup> The value represents pasture (grazing animals)
- <sup>9</sup> The value represents crop land (no grazing)
- <sup>10</sup> The Ontario values represent surface soil in a potable groundwater situation.
- <sup>11</sup> For Ontario, ( ) indicate value applies to medium and fine textured soils.

**Table A-2: Soil Quality Guidelines – Residential/Parkland**

Values shown are not for regulatory use. Refer to provincial/territorial guidelines, standards and regulations to confirm values and their implications. (See Reference Section and Appendix B for provincial/territorial references and contact persons.)

Values shown are for provinces/territories that have adopted values that differ from CCME EQGs. Provinces/territories not listed generally adopt CCME EQGs.

**i. Soil Quality Guidelines – Residential/Parkland (Western, Central and Northern Regions)**

All concentrations are expressed in mg/kg (ppm).

(see Table ii for Eastern Region, see end of Table ii for footnotes)

CONTAMINANT	CCME <sup>1</sup>	BC <sup>5</sup>	Alberta <sup>6</sup>	Sask	Ont <sup>7</sup>				Que	Yukon <sup>5</sup>	NWT	Nunavut
					Surface		Subsurface					
					Potable	Non-potable	Potable	Non-potable				
Arsenic (inorganic)	12	15-100	10		(25) 20	(25) 20	(50) 40	(50) 40	30	15-100		
Barium	500	500	600	500	(1000) 750	(1000) 750	2500	2500	500	500		
Benzene	0.5	0.04-1000	0.05	0.5	0.24	(25) 5.3	0.24	63	0.5	0.04-1000	0.5	0.5
Benzo (a) pyrene	0.7	1-5			1.2	1.2	1.9	1.9	1	1-5		
Cadmium	10	1.5-4000	1	10	12	12	41	41	5	1.5-4000		
Chromium (total)	64	60-250	100	64	(1000) 750	(1000) 750	2500	2500	250	60-250		
Chromium (VI)	0.4		5		(10) 8.0	(10) 8.0	600	600				
Copper (total)	63	90-35000	80	63	(300) 225	(300) 225	2500	2500	100	90-35000		
Cyanide (Free/Available)	0.9	10	0.5		100	100	100	100	10	10		
<i>Cyanide (Total)<sup>4</sup></i>		50							50	50		
DDT (total)	0.7		0.1		1.6	1.6	2.0	2.0				
Ethylbenzene	1.2	5-3500		5	0.28	(500) 290	0.28	1000	5	5-3500	1.2	1.2
Ethylene glycol	960			97					97			
Lead	140	100-100000	50	500	200	200	1000	1000	500	100-100000	140	140
Mercury (inorganic)	6.6	2	0.2	6.6	10	10	57	57		2		
Naphthalene	0.6	5	0.1		4.6	40	4.6	(1400) 1300	5	5		
Nickel	50		40	100	(200)150	(200) 150	710	710	100			
Pentachlorophenol	7.6	0.1-750000	0.05		5.0	5.0	12	12	0.5	0.1-750000		
<i>chlorophenols (each)<sup>3,4</sup></i>		0.5	0.05							0.5		

CONTAMINANT	CCME <sup>1</sup>	BC <sup>5</sup>	Alberta <sup>6</sup>	Sask	Ont <sup>7</sup>				Que	Yukon <sup>5</sup>	NWT	Nunavut
					Surface		Subsurface					
					Potable	Non-potable	Potable	Non-potable				
Phenol	3.8		0.05		40	40	64	390	1			
<i>nonchlorinated (each)</i> <sup>2,4</sup>		1	0.1							1		
Polychlorinated Biphenyls (PCBs)	1.3	5	0.5	5	5.0	5.0	25	25	1	5	5	5
Tetrachloroethylene	0.2	5-1000			0.45	0.45	0.45	0.45	5	5-1000		
Thallium	1	1	1		4.1	4.1	32	32		1		
Toluene	0.8	2.5-6500	1.0	3	2.1	(150) 34	2.1	(1000) 510	3	2.5-6500	0.8	0.8
Trichloroethylene	3	0.15-200			(3.9) 1.1	(3.9) 1.1	3.9	3.9		0.15-200		
Vanadium (total)	130	200	100	130	(250) 200	(250) 200	910	910		200		
Xylene	1	5-65000	1.0	5	25	(210) 34	25	(1000) 460	5	5-65000	1	1
Zinc	200	150-15000	120	200	(800) 600	(800) 600	2500	2500	500	150-15000		

See end of next table (Table ii) for footnotes.

**ii. Soil Quality Guidelines – Residential/Parkland (Eastern Region)**

All concentrations are expressed in mg/kg (ppm).

CONTAMINANT	CCME <sup>1</sup>	New Brunswick <sup>8</sup>				Nova Scotia <sup>8</sup>				P.E.I. <sup>8</sup>			
		Surface		Subsurface		Surface		Subsurface		Surface		Subsurface	
		Potable	Non-Potable	Potable	Non-Potable	potable	non-potable	potable	non-potable	potable	non-potable	potable	non-potable
Arsenic (inorganic)	12												
Barium	500												
Benzene	0.5	0.01 (0.005)	50 (50)	0.01 (0.005)	0.30 (0.80)	0.01 (0.005)	50 (50)	0.01 (0.005)	0.30 (0.80)	0.01 (0.005)	50 (50)	0.01 (0.005)	0.30 (0.80)
Benzo (a) pyrene	0.7												
Cadmium	10												
Chromium (total)	64												
Chromium (VI)	0.4												
Copper (total)	63												
Cyanide (Free/Available)	0.9												
<i>Cyanide (Total)<sup>4</sup></i>													
DDT (total)	0.7												
Ethylbenzene	1.2	0.02 (0.015)	980 (980)	0.02(0.01 5)	20(165)	0.02(0.01 5)	980(980)	0.02(0.0 15)	20(165)	0.02(0.01 5)	980(980)	0.02(0.0 15)	20(165)
Ethylene glycol	960												
Lead	140												
Mercury (inorganic)	6.6												
Naphthalene	0.6												
Nickel	50												
Pentachlorophenol	7.6												
<i>chlorophenols (each)<sup>3,4</sup></i>													
Phenol	3.8												
<i>nonchlorinated (each)<sup>2,4</sup></i>													
Polychlorinated Biphenyls (PCBs)	1.3												
Tetrachloroethylene	0.2												
Thallium	1												
Toluene	0.8	0.10 (0.06)	1960 (1960)	0.10 (0.06)	34 (260)	0.10 (0.06)	1960 (1960)	0.10 (0.06)	34 (260)	0.10 (0.06)	1960 (1960)	0.10 (0.06)	34 (260)

CONTAMINANT	CCME <sup>1</sup>	New Brunswick <sup>8</sup>				Nova Scotia <sup>8</sup>				P.E.I. <sup>8</sup>			
		Surface		Subsurface		Surface		Subsurface		Surface		Subsurface	
		Potable	Non-Potable	Potable	Non-Potable	potable	non-potable	potable	non-potable	potable	non-potable	potable	non-potable
Trichloroethylene	3												
Vanadium (total)	130												
Xylene	1	2.4 (1.8)	1380 (1380)	2.4 (1.8)	19 (165)	2.4 (1.8)	1380 (1380)	2.4 (1.8)	19 (165)	2.4 (1.8)	1380 (1380)	2.4 (1.8)	19 (165)
Zinc	200												

<sup>1</sup> Updated 2001 EC, CCME EQG web site [http://www2.ec.gc.ca/ceqg-rcqe/index\\_e.htm](http://www2.ec.gc.ca/ceqg-rcqe/index_e.htm)

<sup>2</sup> Nonchlorinated phenolic substances include: 2,4-dimethylphenol, 2,4-dinitrophenol, 2-methyl 4,6-dinitrophenol, nitrophenol (2-,4-) phenol, cresol

<sup>3</sup> Chlorophenols include: chlorophenol (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-,2,3,4-, 2,3,4-, 3,4,5-), tetrochlorophenol (2,3,5,6-, 2,3,4,5-, 2,3,4,6-),

<sup>4</sup> Indented and italicized compounds are broken down in certain provinces, but are more general in the CCME.

<sup>5</sup> Single BC & Yukon values are Generic Numeric Soil Standards. Compounds with a range of values are the lows and highs indicated in the Matrix Numerical Soil Standards.

<sup>6</sup> Alberta uses one generic value for all land uses.

<sup>7</sup> For Ontario, ( ) criterion values in brackets apply to medium fine textured soils.

<sup>8</sup> For N.B., N.S., and PEI, ( ) criterion figures in brackets refer to clay values.

**Table A-3: Soil Quality Guidelines – Commercial**

Values shown are not for regulatory use. Refer to provincial/territorial guidelines, standards and regulations to confirm values and their implications.

(See Reference Section and Appendix B for provincial/territorial references and contact persons.)

Values shown are for provinces/territories that have adopted values that differ from CCME EQGs. Provinces/territories not listed generally adopt CCME EQGs.

**i. Soil Quality Guidelines – Commercial (Western, Central and Northern Regions)**

All concentrations are expressed in mg/kg (ppm).

(see Table ii for Eastern Region, see end of Table ii for footnotes)

CONTAMINANT	CCME <sup>1</sup>	BC <sup>4</sup>	Alberta <sup>5</sup>	Ont <sup>6</sup>				Que <sup>7</sup>	Yukon <sup>4</sup>	NWT	Nunavut
				Surface		Subsurface					
				Potable	Non-potable	Potable	Non-potable				
Arsenic (inorganic)	12	15-300	10	(50) 40	(50) 40				15-300		
Barium	2000	2000	600	(2000) 1500	(2000) 1500	4100	4100		2000		
Benzene	5	0.04-4000	0.05	0.24	(25) 5.3	0.24	(230) 89		0.04-4000	5	5
Benzo (a) pyrene	0.7	10-15		1.9	1.9	7.2	7.2		10-15		
Cadmium	22	1.5-4000	1	12	12	41	41		1.5-4000		
Chromium (total)	87	60-800	100	(1000) 750	(1000) 750	5000	5000		60-800		
Chromium (VI)	1.4		5	(10) 8.0	(10) 8.0	1100	1100				
Copper (total)	91	90-350000	80	(300) 225	(300) 225	2500	2500		90-350000		
Cyanide (Free/Available)	8	100	0.5	100	100	390	390		100		
<i>Cyanide (Total)<sup>9</sup></i>		500							500		
DDT (total)	12		0.1	2	2	2	2				
Ethylbenzene	20	7-10000		0.28	(1000) 290	0.28	2500		7-10000	20	20
Ethylene glycol	960										
Lead	260	100-40000	50	1000	1000				100-40000	260	260
Mercury (inorganic)	24	10	0.2	10	10	57	57		10		
Naphthalene	22	50	0.1	4.6	40	4.6	(1400) 1300		50		
Nickel	50		40	(200) 1500	(200) 1500	710	710				
Pentachlorophenol	7.6	0.1-750000	0.05	5	5	43	43		0.1-750000		
<i>chlorophenols (each)<sup>3,9</sup></i>		5	0.05						5		



CONTAMINANT	CCME <sup>1</sup>	BC <sup>4</sup>	Alberta <sup>5</sup>	Ont <sup>6</sup>				Que <sup>7</sup>	Yukon <sup>4</sup>	NWT	Nunavut
				Surface		Subsurface					
				Potable	Non-potable	Potable	Non-potable				
Phenol	3.8		0.05	40	40	64	390				
<i>nonchlorinated (each)</i> <sup>2,9</sup>		10	0.1						10		
Polychlorinated Biphenyls (PCBs)	33	15-50	0.5	25	25				15-50	50	50
Tetrachloroethylene	0.5	5-3500		0.45	0.45	0.45	0.45		5-3500		
Thallium	1	1	1	32	32	150	150		1		
Toluene	0.8	2.5-20000	1.0	2.1	(150) 34	2.1	(2500) 510		2.5-20000	0.8	0.8
Trichloroethylene	31	0.15-600		(3.9) 1.1	(3.9) 1.1	3.9	3.9		0.15-600		
Vanadium (total)	130		100	(250) 200	(250) 200	910	910				
Xylene	17	20-200000	1.0	25	(210) 34	25	(2500) 460		20-200000	17	17
Zinc	360	150-15000	120	(800) 600	(800) 600	5000	5000		150-15000		

See end of next table (Table ii) for footnotes.

**ii. Soil Quality Guidelines – Commercial (Eastern Region)**

All concentrations are expressed in mg/kg (ppm).

CONTAMINANT	CCME <sup>1</sup>	New Brunswick <sup>8</sup>				Nova Scotia <sup>8</sup>				P.E.I. <sup>8</sup>			
		Surface		Sub-surface		Surface		Subsurface		Surface		Subsurface	
		potable	non-potable	potable	non-potable	potable	non-potable	potable	non-potable	potable	non-potable	potable	non-potable
Arsenic (inorganic)	12												
Barium	2000												
Benzene	5	0.01 (0.005)	120 (120)	0.01 (0.005)	1.4 (3.8)	0.01 (0.005)	120 (120)	0.01 (0.005)	1.4 (3.8)	0.01 (0.005)	120 (120)	0.01 (0.005)	1.4 (3.8)
Benzo (a) pyrene	0.7												
Cadmium	22												
Chromium (total)	87												
Chromium (VI)	1.4												
Copper (total)	91												
Cyanide (Free/Available)	8												
<i>Cyanide (Total)<sup>9</sup></i>													
DDT (total)	12												
Ethylbenzene	20	0.02 (0.015)	2400 (2400)	0.02 (0.015)	20 (165)	0.02 (0.015)	2400 (2400)	0.02 (0.015)	20 (165)	0.02 (0.015)	2400 (2400)	0.02 (0.015)	20 (165)
Ethylene glycol	960												
Lead	260												
Mercury (inorganic)	24												
Naphthalene	22												
Nickel	50												
Pentachlorophenol	7.6												
<i>chlorophenols (each)<sup>3,9</sup></i>													
Phenol	3.8												
<i>nonchlorinated (each)<sup>2,9</sup></i>													
Polychlorinated Biphenyls (PCBs)	33												
Tetrachloroethylene	0.5												
Thallium	1												
Toluene	0.8	0.10 (0.06)	4800 (4800)	0.10 (0.06)	34 (260)	0.10 (0.06)	4800 (4800)	0.10 (0.06)	34 (260)	0.10 (0.06)	4800 (4800)	0.10 (0.06)	34 (260)

CONTAMINANT	CCME <sup>1</sup>	New Brunswick <sup>8</sup>				Nova Scotia <sup>8</sup>				P.E.I. <sup>8</sup>			
		Surface		Sub-surface		Surface		Subsurface		Surface		Subsurface	
		potable	non-potable	potable	non-potable	potable	non-potable	potable	non-potable	potable	non-potable	potable	non-potable
Trichloroethylene	31												
Vanadium (total)	130												
Xylene	17	2.4 (1.8)	2400 (2400)	2.4 (1.8)	20 (165)	2.4 (1.8)	3200 (3400)	2.4 (1.8)	25 (260)	2.4 (1.8)	3200 (3400)	2.4 (1.8)	25 (260)
Zinc	360												

<sup>1</sup> Updated 2001 EC, CCME EQG web site [http://www2.ec.gc.ca/ceqg-rcqe/index\\_e.htm](http://www2.ec.gc.ca/ceqg-rcqe/index_e.htm)

<sup>2</sup> Nonchlorinated phenolic substances include: 2,4-dimethylphenol, 2,4-dinitrophenol, 2-methyl 4,6-dinitrophenol, nitrophenol (2-,4-), phenol, cresol

<sup>3</sup> Chlorophenols include: chlorophenol (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-,2,3,4-, 2,3,4-, 3,4,5-), tetrochlorophenol (2,3,5,6-, 2,3,4,5-, 2,3,4,6-)

<sup>4</sup> Single BC & Yukon values are Generic Numeric Soil Standards. Compounds with a range of values are the lows and highs indicated in the Matrix Numerical Soil Standards.

<sup>5</sup> Alberta uses one generic value for all land uses.

<sup>6</sup> For Ontario, ( ) criterion in brackets applies to medium fine textured soils.

<sup>7</sup> For Quebec guidelines, commercial sites in residential areas refer to residential/parkland guidelines; commercial sites in industrial area refer to industrial guidelines.

<sup>8</sup> For N.B., N.S., and P.E.I., ( ) criterion in brackets applies to clay values.

<sup>9</sup> Indented and italicized compounds are broken down in certain provinces, but are more general in the CCME.

**Table A-4: Soil Quality Guidelines – Industrial**

Values shown are not for regulatory use. Refer to provincial/territorial guidelines, standards and regulations to confirm values and their implications.

(See Reference Section and Appendix B for provincial/territorial references and contact persons.)

Values shown are for provinces/territories that have adopted values that differ from CCME EQGs. Provinces/territories not listed generally adopt CCME EQGs.

All concentrations are expressed in mg/kg (ppm).

CONTAMINANT	CCME <sup>1</sup>	BC <sup>5</sup>	Alberta <sup>6</sup>	Ont <sup>7</sup>				Que	Yukon	NWT	Nunavut
				Surface		Subsurface					
				Potable	Non-potable	Potable	Non-potable				
Arsenic (inorganic)	12	15-150	10	(50) 40	(50) 40			50	15-150		
Barium	2000	2000	600	(2000) 1500	(2000) 1500	4100	4100	2000	2000		
Benzene	5	0.04-150	0.05	0.24	(25) 5.3	0.24	(230) 89	5	0.04-150	5	5
Benzo (a) pyrene	0.7	10		1.9	1.9	7.2	7.2	10	10		
Cadmium	22	1.5-4000	1	12	12	41	41	20	1.5-4000		
Chromium (total)	87	60-800	100	(1000) 750	(1000) 750	5000	5000	800	60-800		
Chromium (VI)	1.4		5	(10) 8.0	(10) 8.0	1100	1100				
Copper (total)	91	90-350000	80	(300) 225	(300) 225	2500	2500	500	90-350000		
Cyanide (Free/Available)	8	100	0.5	100	100	390	390	100	100		
<i>Cyanide (Total)<sup>4</sup></i>		500						500	500		
DDT (total)	12		0.1	2	2	2	2				
Ethylbenzene	20	7-1000		0.28	(1000) 290	0.28	2500	50	7-1000	20	20
Ethylene glycol	960							411			
Lead	600	100-40000	50	1000	1000			1000	100-40000	400	400
Mercury (inorganic)	50	10	0.2	10	10	57	57		10		
Naphthalene	22	50	0.1	4.6	40	4.6	(1400) 1300	50	50		
Nickel	50		40	(200) 1500	(200) 1500	710	710	500			
Pentachlorophenol	7.6	0.1-750000	0.05	5	5	43	43	5	0.1-750000		
<i>chlorophenols (each)<sup>3,4</sup></i>		5	0.05						5		
Phenol	3.8		0.05	40	40	64	390	10			
<i>nonchlorinated (each)<sup>2,4</sup></i>		10	0.1						10		
Polychlorinated Biphenyls (PCBs)	33	50	0.5	25	25			10	50	50	50

CONTAMINANT	CCME <sup>1</sup>	BC <sup>5</sup>	Alberta <sup>6</sup>	Ont <sup>7</sup>				Que	Yukon	NWT	Nunavut
				Surface		Subsurface					
				Potable	Non-potable	Potable	Non-potable				
Tetrachloroethylene	0.6	5-50		0.45	0.45	0.45	0.45	50	5-50		
Thallium	1	1	1	32	32	150	150		1		
Toluene	0.8	2.5-300	1.0	2.1	(150) 34	2.1	(2500) 510	30	2.5-300	0.8	0.8
Trichloroethylene	31	0.15-50		(3.9) 1.1	(3.9) 1.1	3.9	3.9		0.15-50		
Vanadium (total)	130		100	(250) 200	(250) 200	910	910				
Xylene	20	20-50	1.0	25	(210) 34	25	(2500) 460	50	20-50	20	20
Zinc	360	150-15000	120	(800) 600	(800) 600	5000	5000	1500	150-15000		

1. Updated 2001 EC, CCME EQG web site [http://www2.ec.gc.ca/ceqg-rcqe/index\\_e.htm](http://www2.ec.gc.ca/ceqg-rcqe/index_e.htm)

2. Nonchlorinated phenolic substances include: 2,4-dimethylphenol, 2,4-dinitrophenol, 2-methyl 4,6-dinitrophenol, nitrophenol (2-,4-), phenol, cresol

3. Chlorophenols include: chlorophenol (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-, 2,3,4-, 2,3,4-, 3,4,5-), tetrochlorophenol (2,3,5,6-, 2,3,4,5-, 2,3,4,6-),

4. Indented and italicized compounds are broken down in certain provinces, but are more general in the CCME.

5. Single BC & Yukon values are Generic Numeric Soil Standards.

Compounds with a range of values are the lows and highs indicated in the Matrix Numerical Soil Standards.

6. Alberta uses one generic value for all land uses.

7. Ontario has a single value for commercial and industrial land uses.

**Table A-5: Water Quality Guidelines**

Values shown are not for regulatory use. Refer to provincial/territorial guidelines, standards and regulations to confirm values and their implications.

(See Reference Section and Appendix B for provincial/territorial references and contact persons.)

Values shown are for provinces/territories that have adopted values that differ from CCME EQGs. Provinces/territories not listed generally adopt CCME EQGs.

**i. Water Quality Guidelines (Aquatic Life, Irrigation and Livestock)**

All concentrations are expressed in µg/L (ppb) unless otherwise noted.

(see Table ii for provinces that use groundwater guidelines (i.e., Alberta, Ontario, New Brunswick, Nova Scotia and P.E.I.))

(see end of Table ii for footnotes)

COMPOUND	AQUATIC LIFE WATER QUALITY ( F = Freshwater guidelines, M = Marine guidelines)							IRRIGATION WATER QUALITY				LIVESTOCK WATER QUALITY			
	CCME <sup>2</sup>		BC	Alberta <sup>11</sup>	Sask	Yukon	Que <sup>17</sup>	CCME <sup>2</sup>	BC	Sask	Yukon	CCME <sup>2</sup>	BC	Sask	Yukon
	F	M	F (M)	F	F	F(M)	F								
Acenaphthene [See Polycyclic aromatic hydrocarbons (PAHs)]															
Acridine [See Polycyclic aromatic hydrocarbons (PAHs)]															
Aldicarb	1	0.15	10(1.5)			10 <sup>5</sup> (1.15)	100	54.9	54.9-67.5 <sup>22</sup>		54.9-67.5 <sup>22</sup>	11	11		11
Aldrin / Dieldrin	0.004 <sup>4</sup>		0.04			0.04	0.014 <sup>6</sup>		10		10		0.7		0.7
Algae, blue-green [See Blue-green algae]															
Aluminum	5-100					50-500 <sup>6</sup>	750	5000	5000		5000	5000	5000		5000
Ammonia (total)	see fact-sheet		1310-18500 <sup>6</sup>		1.37-2.2mg/L	1310-18500 <sup>6</sup>									
Ammonia (un-ionized)	19														
Aniline	2.2	id <sup>3</sup>						id <sup>3</sup>	100		100	id <sup>3</sup>			

COMPOUND	AQUATIC LIFE WATER QUALITY ( F = Freshwater guidelines, M = Marine guidelines)							IRRIGATION WATER QUALITY				LIVESTOCK WATER QUALITY			
	CCME <sup>2</sup>		BC	Alberta <sup>11</sup>	Sask	Yukon	Que <sup>17</sup>	CCME <sup>2</sup>	BC	Sask	Yukon	CCME <sup>2</sup>	BC	Sask	Yukon
	F	M	F (M)	F	F	F(M)	F								
Anthracene [See Polycyclic aromatic hydrocarbons (PAHs)]															
Arsenic	5	12.5	500			500	14					25	500		500
Atrazine	1.8		20(100)			20(100)	78	10				5	60		60
Benz(a)anthracene [See Polycyclic aromatic hydrocarbons (PAHs)]															
Benzene	370	110	3000		300	3000	590								
Benzo(a)pyrene [See Polycyclic aromatic hydrocarbons (PAHs)]															
Beryllium <sup>1</sup>			53			53		100	100		100	100	100		100
2,2-Bis(p-chlorophenyl)-1,1,1-trichloroethane [See DDT (total)]															
Blue-green algae (Cyanobacteria)												Avoid heavy growths			
Boron								500-6000 <sup>22</sup>	500-6000 <sup>22</sup>	500-6000	500-6000 <sup>22</sup>	5000	5000	5000	5000
Bromacil	5	id <sup>3</sup>						0.2				1100			
Bromoform [See Halogenated methanes, Tribromomethane]															
Bromoxynil	5	id <sup>3</sup>					500	0.33				11	5	20	5

COMPOUND	AQUATIC LIFE WATER QUALITY ( F = Freshwater guidelines, M = Marine guidelines)							IRRIGATION WATER QUALITY				LIVESTOCK WATER QUALITY			
	CCME <sup>2</sup>		BC	Alberta <sup>11</sup>	Sask	Yukon	Que <sup>17</sup>	CCME <sup>2</sup>	BC	Sask	Yukon	CCME <sup>2</sup>	BC	Sask	Yukon
	F	M	F (M)	F	F	F(M)	F								
Cadmium	0.017	0.12	2-18 <sup>7</sup>		0.2-1.8	2-18 <sup>7</sup>	1.8	5.1	10	10	10	80	20		20
Calcium												1million	1000mg/L		1000mg/L
Captan	1.3						130	id <sup>3</sup>				13			
Carbaryl	0.2	0.32					20	id <sup>3</sup>				1100	90		90
Carbofuran	1.8		17.5			17.5	180	id <sup>3</sup>				45	45		45
Carbon tetrachloride [See Halogenated methanes, Tetrachloromethane]															
Chlordane	0.006 <sup>4</sup>		0.06			0.06						7 <sup>4</sup>	7		7
Chloride								100000- 700000 <sup>2</sup>	100- 700mg/L <sup>2</sup>	100-700	100- 700mg/L <sup>2</sup>				
<b>Chlorinated benzenes</b>															
Monochlorobenzene	1.3	25	150			150		id <sup>3</sup>				id <sup>3</sup>			
1,2-Dichlorobenzene	0.7	42	25			25	70	id <sup>3</sup>				id <sup>3</sup>			
1,3-Dichlorobenzene	150	id <sup>3</sup>	25			25	15000	id <sup>3</sup>				id <sup>3</sup>			
1,4-Dichlorobenzene	26	id <sup>3</sup>	40			40	110	id <sup>3</sup>				id <sup>3</sup>			
1,2,3- Trichlorobenzene	8	id <sup>3</sup>	9			9	800	id <sup>3</sup>				id <sup>3</sup>			
1,2,4- Trichlorobenzene	24	5.4	5			5	2200	id <sup>3</sup>				id <sup>3</sup>			
1,3,5- Trichlorobenzene	id <sup>3</sup>	id <sup>3</sup>	6.5			6.5		id <sup>3</sup>				id <sup>3</sup>			
1,2,3,4- Tetrachlorobenzene	1.8	id <sup>3</sup>	1			1	180	id <sup>3</sup>				id <sup>3</sup>			



COMPOUND	AQUATIC LIFE WATER QUALITY ( F = Freshwater guidelines, M = Marine guidelines)							IRRIGATION WATER QUALITY				LIVESTOCK WATER QUALITY				
	CCME <sup>2</sup>		BC	Alberta <sup>11</sup>	Sask	Yukon	Que <sup>17</sup>	CCME <sup>2</sup>	BC	Sask	Yukon	CCME <sup>2</sup>	BC	Sask	Yukon	
	F	M	F (M)	F	F	F(M)	F									
1,2,3,5-Tetrachlorobenzene	id <sup>3</sup>	id <sup>3</sup>	1			1		id <sup>3</sup>				id <sup>3</sup>				
1,2,4,5-Tetrachlorobenzene	id <sup>3</sup>	id <sup>3</sup>	1.5			1.5	310	id <sup>3</sup>				id <sup>3</sup>				
Pentachlorobenzene	6	id <sup>3</sup>	0.3			0.3	25	id <sup>3</sup>				id <sup>3</sup>				
Hexachlorobenzene	id	id <sup>3</sup>	0.065			0.065	0.077	id <sup>3</sup>				0.52				
<b>Chlorinated ethanes</b>																
1,2-Dichloroethane	100	id <sup>3</sup>	1000			500	9900	id <sup>3</sup>				5	5		5	
1,1,1-Trichloroethane	id <sup>3</sup>	id <sup>3</sup>					2000	id <sup>3</sup>				id <sup>3</sup>				
1,1,2,2-Tetrachloroethane	id <sup>3</sup>	id <sup>3</sup>					470	id <sup>3</sup>				id <sup>3</sup>				
<b>Chlorinated ethenes</b>																
1,1,2-Trichloroethene (Trichloroethylene; TCE)	21	id <sup>3</sup>	200			200	590	id <sup>3</sup>				50	50		50	
1,1,2,2-Tetrachloroethene (Tetrachloroethylene; PCE)	111	id <sup>3</sup>	1100			1100	540	id <sup>3</sup>				id <sup>3</sup>				
Chlorinated methanes [See Halogenated methanes]																
<b>Chlorinated Phenols</b>																
Monochlorophenols	7		8.5-650 <sup>8</sup>				5-9 <sup>8</sup>								0.1	0.1
Dichlorophenols	0.2		2.5-340 <sup>8</sup>				1.2-9 <sup>8</sup>	100							0.3	0.3
Trichlorophenols	18		1-270 <sup>8</sup>				0.6-5 <sup>8</sup>	100							2	2
Trichlorophenol 2,4,5-								46								

COMPOUND	AQUATIC LIFE WATER QUALITY ( F = Freshwater guidelines, M = Marine guidelines)							IRRIGATION WATER QUALITY				LIVESTOCK WATER QUALITY			
	CCME <sup>2</sup>		BC	Alberta <sup>11</sup>	Sask	Yukon	Que <sup>17</sup>	CCME <sup>2</sup>	BC	Sask	Yukon	CCME <sup>2</sup>	BC	Sask	Yukon
	F	M	F (M)	F	F	F(M)	F								
Trichlorophenol 2,4,6-							36								
Tetrachlorophenols	1		1-180 <sup>8</sup>				0.2-3 <sup>7</sup>	100, 7 <sup>20</sup>					1		1
Pentachlorophenol (PCP)	0.5		1-27.5 <sup>8</sup>				0.2-3 <sup>8</sup>						30		30
Chlorine, reactive (See Reactive chlorine species)															
Chloroform [See Halogenated methanes, Trichloromethane]															
<i>Chlorine</i> <sup>1</sup>			20				20		1000		1000				
4-Chloro-2-methyl phenoxy acetic acid [See MCPA]															
Chlorothalonil	0.18	0.36					18	5.8				170			
Chlorpyrifos	0.0035	0.002					0.083	id <sup>3</sup>				24	90		90
<b>Chromium (total)</b>			20		2-20	20	200		100	100	100		1000	1000	1000
Trivalent chromium (Cr(III))	8.9	56						4.9				50			
Hexavalent chromium (Cr(VI))	1	1.5					16	8				50	10		10
Chrysene [See Polycyclic aromatic hydrocarbons (PAHs)]															
<i>Cobalt</i> <sup>1</sup>			500				500	50	50		50	1000	1000		1000
<i>Coliforms, fecal</i>								100 / 100							
<i>Coliforms, total</i>								1000 / 100							

COMPOUND	AQUATIC LIFE WATER QUALITY ( F = Freshwater guidelines, M = Marine guidelines)							IRRIGATION WATER QUALITY				LIVESTOCK WATER QUALITY			
	CCME <sup>2</sup>		BC	Alberta <sup>11</sup>	Sask	Yukon	Que <sup>17</sup>	CCME <sup>2</sup>	BC	Sask	Yukon	CCME <sup>2</sup>	BC	Sask	Yukon
	F	M	F (M)	F	F	F(M)	F								
Colour	Nar-rative	Nar-rative										Nar-rative			
Copper	2-4		20-90 <sup>7</sup>	1.2 <sup>10</sup> [7] <sup>12</sup>	2-4	20-90 <sup>7</sup>	9.2	200-1000 <sup>22</sup>	200 <sup>22</sup>	200-1000	200 <sup>22</sup>	500-5000	300	500-5000	300
Cyanazine	2		20			20	47	0.5	0.5		0.5	10	10		10
Cyanide (Free/WAD/Available)	5 (as free CN)		50			50	22								
Cyanide (SAD/Total)															
Cyanobacteria [See Blue-green algae]															
DDAC (Didecyl dimethyl ammonium chloride)	1.5														
DDT (total) (2,2-Bis(p-chlorophenyl)- 1,1,1-trichloroethane; Dichloro diphenyl trichloroethane)	0.001 <sup>4</sup>		0.01			0.01	0.0011					30 <sup>4</sup>	30		30
Debris (litter/settleable matter)		Nar-rative													
Deltamethrin	0.0004	id <sup>3</sup>					0.04	id <sup>3</sup>				2.5			
Deposited bedload sediment [See Total particulate matter]															
Dibromochloromethane [See Halogenated methanes]															
Dicamba	10						1000	0.006				122	120		120

COMPOUND	AQUATIC LIFE WATER QUALITY ( F = Freshwater guidelines, M = Marine guidelines)							IRRIGATION WATER QUALITY				LIVESTOCK WATER QUALITY			
	CCME <sup>2</sup>		BC	Alberta <sup>11</sup>	Sask	Yukon	Que <sup>17</sup>	CCME <sup>2</sup>	BC	Sask	Yukon	CCME <sup>2</sup>	BC	Sask	Yukon
	F	M	F (M)	F	F	F(M)	F								
Dichlorobenzene [See Chlorinated benzenes]															
Dichlorobromomethane [See Halogenated methanes]															
Dichloro diphenyl trichloroethane [See DDT (total)]															
Dichloroethane [See Chlorinated ethanes]															
Dichloroethylene [See Chlorinated ethanes]															
Dichloromethane [See Halogenated methanes]															
Dichlorophenols [See Chlorinated phenols]															
1,3-Dichlorophenoxyacetic acid [See Phenoxy hericides]															
Diclofop-methyl	6.1							0.18				9	9		9
Didecyl dimethyl ammonium chloride [See DDAC]															
Diethylene glycol [See Glycols]															
Di(2-ethylhexyl) phthalate [See phthalate esters]															

COMPOUND	AQUATIC LIFE WATER QUALITY ( F = Freshwater guidelines, M = Marine guidelines)							IRRIGATION WATER QUALITY				LIVESTOCK WATER QUALITY			
	CCME <sup>2</sup>		BC	Alberta <sup>11</sup>	Sask	Yukon	Que <sup>17</sup>	CCME <sup>2</sup>	BC	Sask	Yukon	CCME <sup>2</sup>	BC	Sask	Yukon
	F	M	F (M)	F	F	F(M)	F								
Dimethoate	6.2	id <sup>3</sup>	62			62	620	id <sup>3</sup>				3	3		3
Di- <i>n</i> -butyl phthalate [See Phthalate esters]															
Di- <i>n</i> -octyl phthalate [See Phthalate esters]															
Dinoseb	0.05		0.5			0.5		16	16 <sup>22</sup>		16 <sup>22</sup>	150	150		150
Dissolved gas supersaturation	Nar-rative	Nar-rative													
Dissolved oxygen	5500-9500	>8000 & nar-rative		[5.0 mg/L (1 day min) 6.5 mg/L (7-day mean)] <sup>12</sup>					5000		5000				
<i>Dissolved Solids, total</i> [See <i>Total dissolved solids (salinity)</i> ]															
Endosulfan	0.02		0.2			0.2	0.11 <sup>19</sup>								
Endrin	0.0023 <sup>4</sup>		0.023			0.023	0.086					0.2 <sup>4</sup>			
Ethylbenzene	90	25	7000		700	7000	420	id <sup>3</sup>				2.4			
Ethylene glycol [See Glycols]															
Fecal coliforms [See Coliforms, fecal]															

COMPOUND	AQUATIC LIFE WATER QUALITY ( F = Freshwater guidelines, M = Marine guidelines)							IRRIGATION WATER QUALITY				LIVESTOCK WATER QUALITY			
	CCME <sup>2</sup>		BC	Alberta <sup>11</sup>	Sask	Yukon	Que <sup>17</sup>	CCME <sup>2</sup>	BC	Sask	Yukon	CCME <sup>2</sup>	BC	Sask	Yukon
	F	M	F (M)	F	F	F(M)	F								
Fluroanthene [See Polycyclic aromatic hydrocarbons (PAHs)]															
Fluorene [See Polycyclic aromatic hydrocarbons (PAHs)]															
<i>Fluoride</i> <sup>1</sup>			2000-3000 <sup>7</sup>			2000-3000 <sup>7</sup>		1000	1000		1000	1000-2000	1000		1000
<b>Glycols</b>															
Ethylene glycol	192000	id <sup>3</sup>					19million	id <sup>3</sup>				id <sup>3</sup>			
Diethylene glycol	id <sup>3</sup>	id <sup>3</sup>						id <sup>3</sup>				id <sup>3</sup>			
Propylene glycol	id <sup>3</sup>	id <sup>3</sup>						id <sup>3</sup>				id <sup>3</sup>			
Glyphosate	65		650			650	6500					280	280		280
<b>Halogenated methanes</b>															
Monochloromethane (Methyl chloride)	id <sup>3</sup>	id <sup>3</sup>						id <sup>3</sup>				id <sup>3</sup>			
Dichloromethane (Methylene chloride)	98.1	id <sup>3</sup>					13000	id <sup>3</sup>				50			
Trichloromethane (Chloroform)	1.8	id <sup>3</sup>					1800	id <sup>3</sup>				100			
Tetrachloromethane (Carbon tetrachloride)	13.3	id <sup>3</sup>	130			130	440	id <sup>3</sup>				5	5		5
Monobromomethane (Methyl bromide)	id <sup>3</sup>	id <sup>3</sup>						id <sup>3</sup>				id <sup>3</sup>			

COMPOUND	AQUATIC LIFE WATER QUALITY ( F = Freshwater guidelines, M = Marine guidelines)							IRRIGATION WATER QUALITY				LIVESTOCK WATER QUALITY			
	CCME <sup>2</sup>		BC	Alberta <sup>11</sup>	Sask	Yukon	Que <sup>17</sup>	CCME <sup>2</sup>	BC	Sask	Yukon	CCME <sup>2</sup>	BC	Sask	Yukon
	F	M	F (M)	F	F	F(M)	F								
Tribromomethane (Bromoform)	id <sup>3</sup>	id <sup>3</sup>						id <sup>3</sup>				100			
Dibromochloromethane	id <sup>3</sup>	id <sup>3</sup>						id <sup>3</sup>				100			
Dichlorobromomethane	id <sup>3</sup>	id <sup>3</sup>						id <sup>3</sup>				1000			
HCBD [See Hexachlorobutadiene (HCBD)]															
Heptachlor (Heptachlor epoxide)	0.01 <sup>4</sup>		0.1			0.1	0.021 (0.011) <sub>21</sub>					3	3		3
Hexachlorobenzene [See Chlorinated benzenes]															
Hexachlorobutadiene (HCBD)	1.3		1			1									
Hexachlorocyclohexane (Lindane)	0.01		0.1			0.1	1					4			
Hypochlorous acid [See Reactive chlorine species]															
3-Iodo-2-propynyl butyl carbamate [See IPBC]															
IPBC (3-Iodo-2-propynyl butyl carbamate)	1.9														
Iron	300							5000	5000		5000				
Lead	1-7		40-160 <sup>7</sup>		1-7	40-160 <sup>7</sup>	34	200	200	200	200	100	100	100	100

COMPOUND	AQUATIC LIFE WATER QUALITY ( F = Freshwater guidelines, M = Marine guidelines)							IRRIGATION WATER QUALITY				LIVESTOCK WATER QUALITY			
	CCME <sup>2</sup>		BC	Alberta <sup>11</sup>	Sask	Yukon	Que <sup>17</sup>	CCME <sup>2</sup>	BC	Sask	Yukon	CCME <sup>2</sup>	BC	Sask	Yukon
	F	M	F (M)	F	F	F(M)	F								
Lindane [See Hexachlorocyclohexane]													4		4
Linuron	7	id <sup>3</sup>						0.071				id <sup>3</sup>			
Lithium								2500	2500		2500		5000		5000
Manganese								200	200		200				
MCPA (4-Chloro-2-methyl phenoxy acetic acid; 2-Methyl-4-chloro phenoxy acetic acid)	2.6	4.2					260	0.25				25			
Mercury	0.1		1	0.013 (0.005) <sup>12</sup>	0.1	1	0.13		1		1	3	2	3	2
Methyl bromide [See Halogenated methanes, Monobromomethane]															
Methyl chloride [See Halogenated methanes, Monochloromethane]							1								
2-Methyl-4-chloro phenoxy acetic acid [See MCPA]															
Methylene chloride [See Halogenated methanes, Dichloromethane]															
Metolachlor	7.8		80			80	800	28	28		28	50	50		50
Metribuzin	1		10			10	100	0.5	0.5		0.5	80	80		80
Molybdenum	73		10000			10000	2000	10-50	10-30		10-30	500	50		50



COMPOUND	AQUATIC LIFE WATER QUALITY ( F = Freshwater guidelines, M = Marine guidelines)							IRRIGATION WATER QUALITY				LIVESTOCK WATER QUALITY			
	CCME <sup>2</sup>		BC	Alberta <sup>11</sup>	Sask	Yukon	Que <sup>17</sup>	CCME <sup>2</sup>	BC	Sask	Yukon	CCME <sup>2</sup>	BC	Sask	Yukon
	F	M	F (M)	F	F	F(M)	F								
Monobromomethane [See Halogenated methanes]															
Monochloramine [See Reactive chlorine species]															
Monochlorobenzene [See Chlorinated benzenes]															
Monochloromethane [See Halogenated methanes]															
Monochlorophenols [See Chlorinated phenols]							2000								
Naphthalene [See Polycyclic aromatic hydrocarbons (PAHs)]															
Nickel	25-150		250- 1500 <sup>7</sup>			250- 1500 <sup>7</sup>	790	200	200		200	1000	1000		1000
Nitrate	See note <sup>5</sup>		400000			400000	20000 0						100000		100000
<i>Nitrate and nitrite</i> <sup>1</sup>			400000			400000						100000	100000	100mg/ L	100000
Nitrite	60		200- 2000 <sup>9</sup>		0.06m g/L	200- 2000 <sup>9</sup>	60					10000	10000	10mg/L	10000
<b>Organotins</b>															
Tributyltin	0.008	0.001						id <sup>3</sup>				250			
Tricyclohexyltin	id <sup>3</sup>	id <sup>3</sup>						id <sup>3</sup>				250			

COMPOUND	AQUATIC LIFE WATER QUALITY ( F = Freshwater guidelines, M = Marine guidelines)							IRRIGATION WATER QUALITY				LIVESTOCK WATER QUALITY			
	CCME <sup>2</sup>		BC	Alberta <sup>11</sup>	Sask	Yukon	Que <sup>17</sup>	CCME <sup>2</sup>	BC	Sask	Yukon	CCME <sup>2</sup>	BC	Sask	Yukon
	F	M	F (M)	F	F	F(M)	F								
Triphenyltin	0.022	id <sup>3</sup>						id <sup>3</sup>				820			
Oxygen, dissolved [See Dissolved oxygen]															
PAHs [See Polycyclic aromatic hydrocarbons (PAHs)]															
PCBs [See Polychlorinated biphenyls (PCBs)(total)]															
PCE [See Chlorinated ethenes, 1,1,2,2-Tetrachloroethene]															
PCP [See Chlorinated phenols, Pentachlorophenol]															
Pentachlorobenzene [See Chlorinated benzenes]															
Pentachlorophenol [See Chlorinated phenols]															
pH	6.5-9	7.0-8.7 & narrative													
Phenanthrene [See Polycyclic aromatic hydrocarbons (PAHs0)]															
Phenols (mono- & dihydric)	4		10			10	490					2			

COMPOUND	AQUATIC LIFE WATER QUALITY ( F = Freshwater guidelines, M = Marine guidelines)							IRRIGATION WATER QUALITY				LIVESTOCK WATER QUALITY			
	CCME <sup>2</sup>		BC	Alberta <sup>11</sup>	Sask	Yukon	Que <sup>17</sup>	CCME <sup>2</sup>	BC	Sask	Yukon	CCME <sup>2</sup>	BC	Sask	Yukon
	F	M	F (M)	F	F	F(M)	F								
Phenoxy herbicides	4											100			
<b>Phthalate esters</b>															
Di- <i>n</i> -butyl phthalate	19	id <sup>3</sup>	190			190	1900								
Di(2-ethylhexyl) phthalate	16	id <sup>3</sup>	160			160									
Di- <i>n</i> -octyl phthalate [See Phthalate esters]	id <sup>3</sup>	id <sup>3</sup>													
Picloram	29		290			290	2900	id <sup>3</sup>	0.5		0.5	190	190		190
Polychlorinated biphenyls (PCBs) (total)	0.001 <sup>4</sup>				1ng/L		0.0045								
<b>Polycyclic aromatic hydrocarbons (PAHs)</b>															
Acenaphthene	5.8	id <sup>3</sup>	60			60	67								
Acridine	4.4	id <sup>3</sup>	0.5			0.5									
Anthracene	0.012	id <sup>3</sup>	1			1	11million								
Benzo( <i>a</i> )anthracene	0.018	id <sup>3</sup>	1			1	3.1								
Benzo( <i>a</i> )pyrene	0.015	id <sup>3</sup>	0.1			0.1	3.1								
Chrysene	id <sup>3</sup>	id <sup>3</sup>					3.1								
Fluoroanthene	0.04	id <sup>3</sup>	2			2	2.3								
Fluorene	3	id <sup>3</sup>	120			120	14million								
Naphthalene	1.1	1.4	10			10	340								
Phenanthrene	0.4	id <sup>3</sup>	3			3	30								

COMPOUND	AQUATIC LIFE WATER QUALITY ( F = Freshwater guidelines, M = Marine guidelines)							IRRIGATION WATER QUALITY				LIVESTOCK WATER QUALITY			
	CCME <sup>2</sup>		BC	Alberta <sup>11</sup>	Sask	Yukon	Que <sup>17</sup>	CCME <sup>2</sup>	BC	Sask	Yukon	CCME <sup>2</sup>	BC	Sask	Yukon
	F	M	F (M)	F	F	F(M)	F								
Pyrene	0.025	id <sup>3</sup>	0.2			0.2	11000 00								
Quinoline	3.4	id <sup>3</sup>													
Propylene glycol [See Glycols]															
Pyrene [See Polycyclic aromatic hydrocarbons (PAHs)]															
Quinoline [See Polycyclic aromatic hydrocarbons (PAHs)]															
Reactive chlorine species (hydrochlorous acid and monochloramine)	0.5	0.5													
Salinity		<10% fluctuation													
Selenium	1		10			10	20	20-50 <sup>23</sup>	20,50 <sup>23</sup>		20,50 <sup>23</sup>	50	50		50
Silver	0.1		1			1	0.62								
Simazine	10		100			100	1000	0.5	0.5		0.5	10	10		10
Streambed substrate [See Total substrate [See Total particulate matter]															
Styrene	72						190								
<i>Sulphate</i> <sup>1</sup>			1000mg /L			1000mg/ L						1million	1000mg /L	1000mg /L	1000mg/L

COMPOUND	AQUATIC LIFE WATER QUALITY ( F = Freshwater guidelines, M = Marine guidelines)							IRRIGATION WATER QUALITY				LIVESTOCK WATER QUALITY			
	CCME <sup>2</sup>		BC	Alberta <sup>11</sup>	Sask	Yukon	Que <sup>17</sup>	CCME <sup>2</sup>	BC	Sask	Yukon	CCME <sup>2</sup>	BC	Sask	Yukon
	F	M	F (M)	F	F	F(M)	F								
Suspended sediments [See Total particulate matter]															
TCE [See Chlorinated ethenes, 1,1,2-Trichloroethene]															
Tebuthiuron	1.6	id <sup>3</sup>					160	0.27 (cereals)				130			
Temperature	Nar- rative	not to exceed +/-1C													
Tetrachlorobenzene [See Chlorinated benzenes]															
Tetrachloroethane [See Chlorinated ethanes]															
Tetrachloroethene [See Chlorinated ethenes]															
Tetrachloroethylene [See Chlorinated ethenes, 1,1,2,2-Tetrachloroethene]															
Tetrachloromethane [See Halogenated methanes]															
Tetrachlorophenols [See Chlorinated phenols]															
Thallium	0.8		3			3									
Toluene	2	215	3000		300	3000	200	id <sup>3</sup>				24			

COMPOUND	AQUATIC LIFE WATER QUALITY ( F = Freshwater guidelines, M = Marine guidelines)							IRRIGATION WATER QUALITY				LIVESTOCK WATER QUALITY				
	CCME <sup>2</sup>		BC	Alberta <sup>11</sup>	Sask	Yukon	Que <sup>17</sup>	CCME <sup>2</sup>	BC	Sask	Yukon	CCME <sup>2</sup>	BC	Sask	Yukon	
	F	M	F (M)	F	F	F(M)	F									
Total coliforms [See Coliforms, total]																
Total dissolved solids (salinity)								500000-3500000					3million			
<b>Total particulate matter</b>																
Deposited bedload sediment	id <sup>3</sup>	id <sup>3</sup>														
Streambed substrate	Nar-rative	Nar-rative														
Suspended sediments	Nar-rative	Nar-rative														
Turbidity	Nar-rative	Nar-rative														
Toxaphene	0.008 <sup>4</sup>												5 <sup>4</sup>			
Triallate	0.24		2.4			2.4		id <sup>3</sup>					230	230		230
Tribromomethane [See Halogenated methanes]																
Tributyltin [See Organotins]																
Trichlorobenzene [See Chlorinated benzenes]																
Trichloroethane [See Chlorinated ethanes]																
Trichloroethene [See Chlorinated ethenes]																

COMPOUND	AQUATIC LIFE WATER QUALITY ( F = Freshwater guidelines, M = Marine guidelines)							IRRIGATION WATER QUALITY				LIVESTOCK WATER QUALITY			
	CCME <sup>2</sup>		BC	Alberta <sup>11</sup>	Sask	Yukon	Que <sup>17</sup>	CCME <sup>2</sup>	BC	Sask	Yukon	CCME <sup>2</sup>	BC	Sask	Yukon
	F	M	F (M)	F	F	F(M)	F								
Trichloroethylene [See Chlorinated ethenes, 1,1,2-Trichloroethene]															
Trichloromethane [See Halogenated methanes]															
Trichlorophenols [See Chlorinated phenols]															
Tricyclohexyltin [See Organotins]															
Trifluralin	0.2		1			0.1	10	id <sup>3</sup>				45	45		45
Triphenyltin [See Organotins]															
Turbidity [See Total particulate matter]															
Uranium <sup>1</sup>			3000			3000		10	10		10	200	200		200
Vanadium								100	100		100	100	100		100
Zinc	30		300		30	300	65	1000-5000 <sup>22,24</sup> <sub>4</sub>	1000-5000 <sup>22,24</sup>	1000-5000	1000-5000 <sup>22,24</sup>	50000	50000	50000	50000

See end of next table (Table ii) for footnotes.

**ii. Water Quality Guidelines (Aquatic Life and Groundwater)**

All concentrations are expressed in µg/L (ppb) unless otherwise noted.

COMPOUND	AQUATIC LIFE WATER QUALITY ( F = Freshwater guidelines, M = Marine guidelines)							GROUNDWATER QUALITY							
	CCME <sup>2</sup> (µg/L)		BC	Alberta <sup>11</sup>	Sask	Yukon	Que <sup>17</sup>	Ontario <sup>25</sup>		New Brunswick		Nova Scotia		P.E.I.	
	F	M	F (M)		F	F(M)	F	Potable	Non-Potable	Potable	Non-Potable	Potable	Non-Potable	Potable	Non-Potable
Acenaphthene [See Polycyclic aromatic hydrocarbons (PAHs)]															
Acridine [See Polycyclic aromatic hydrocarbons (PAHs)]															
Aldicarb	1	0.15	10(1.5)			10 <sup>5</sup> (1.15)	100								
Aldrin / Dieldrin	0.004 <sup>4</sup>		0.04			0.04	0.014 <sup>6</sup>	0.01 / 0.02	0.2 / 0.02						
<i>Algae, blue-green [See Blue-green algae]</i>															
Aluminum	5-100					50-500 <sup>6</sup>	750								
Ammonia (total)	see fact-sheet		1310-18500 <sup>6</sup>		1.37-2.2mg/L	1310-18500 <sup>6</sup>									
Ammonia (un-ionized)	19														
Aniline	2.2	id <sup>3</sup>													
Anthracene [See Polycyclic aromatic hydrocarbons (PAHs)]															
Arsenic	5	12.5	500			500	14	25	480						
Atrazine	1.8		20(100)			20(100)	78								



COMPOUND	AQUATIC LIFE WATER QUALITY ( F = Freshwater guidelines, M = Marine guidelines)						GROUNDWATER QUALITY								
	CCME <sup>2</sup> (µg/L)		BC	Alberta <sup>11</sup>	Sask	Yukon	Que <sup>17</sup>	Ontario <sup>25</sup>		New Brunswick		Nova Scotia		P.E.I.	
	F	M	F (M)		F	F(M)	F	Potable	Non-Potable	Potable	Non-Potable	Potable	Non-Potable	Potable	Non-Potable
Benz(a)anthracene [See Polycyclic aromatic hydrocarbons (PAHs)]															
Benzene	370	110	3000		300	3000	590	5	1900	5	See Note <sup>22</sup>	5	See Note <sup>22</sup>	5	See Note <sup>22</sup>
Benzo(a)pyrene [See Polycyclic aromatic hydrocarbons (PAHs)]															
Beryllium <sup>1</sup>			53			53		4	53						
2,2-Bis(p-chlorophenyl)-1,1,1-trichloroethane [See DDT (total)]															
Blue-green algae (Cyanobacteria)															
Boron															
Bromacil	5	id <sup>3</sup>													
Bromoform [See Halogenated methanes, Tribromomethane]															
Bromoxynil	5	id <sup>3</sup>					500								
Cadmium	0.017	0.12	2-18 <sup>7</sup>		0.2-1.8	2-18 <sup>7</sup>	1.8	5	11						
Calcium															
Captan	1.3						130								
Carbaryl	0.2	0.32					20								

COMPOUND	AQUATIC LIFE WATER QUALITY ( F = Freshwater guidelines, M = Marine guidelines)							GROUNDWATER QUALITY							
	CCME <sup>2</sup> (µg/L)		BC	Alberta <sup>11</sup>	Sask	Yukon	Que <sup>17</sup>	Ontario <sup>25</sup>		New Brunswick		Nova Scotia		P.E.I.	
	F	M	F (M)		F	F(M)	F	Potable	Non-Potable	Potable	Non-Potable	Potable	Non-Potable	Potable	Non-Potable
Carbofuran	1.8		17.5			17.5	180								
Carbon tetrachloride [See Halogenated methanes, Tetrachloromethane]															
Chlordane	0.006 <sup>4</sup>		0.06			0.06		0.04	0.04						
<i>Chloride</i>															
<b>Chlorinated benzenes</b>															
Monochlorobenzene	1.3	25	150			150		30	500						
1,2-Dichlorobenzene	0.7	42	25			25	70	3	7600						
1,3-Dichlorobenzene	150	id <sup>3</sup>	25			25	15000	630	7600						
1,4-Dichlorobenzene	26	id <sup>3</sup>	40			40	110	1	7600						
1,2,3-Trichlorobenzene	8	id <sup>3</sup>	9			9	800								
1,2,4-Trichlorobenzene	24	5.4	5			5	2200	70	500						
1,3,5-Trichlorobenzene	id <sup>3</sup>	id <sup>3</sup>	6.5			6.5									
1,2,3,4-Tetrachlorobenzene	1.8	id <sup>3</sup>	1			1	180								
1,2,3,5-Tetrachlorobenzene	id <sup>3</sup>	id <sup>3</sup>	1			1									
1,2,4,5-Tetrachlorobenzene	id <sup>3</sup>	id <sup>3</sup>	1.5			1.5	310								
Pentachlorobenzene	6	id <sup>3</sup>	0.3			0.3	25								
Hexachlorobenzene	id	id <sup>3</sup>	0.065			0.065	0.077	0.62	0.62						
<b>Chlorinated ethanes</b>															

COMPOUND	AQUATIC LIFE WATER QUALITY ( F = Freshwater guidelines, M = Marine guidelines)						GROUNDWATER QUALITY								
	CCME <sup>2</sup> (µg/L)		BC	Alberta <sup>11</sup>	Sask	Yukon	Que <sup>17</sup>	Ontario <sup>25</sup>		New Brunswick		Nova Scotia		P.E.I.	
	F	M	F (M)		F	F(M)	F	Potable	Non-Potable	Potable	Non-Potable	Potable	Non-Potable	Potable	Non-Potable
1,2-Dichloroethane	100	id <sup>3</sup>	1000			500	9900	5	17						
1,1,1-Trichloroethane	id <sup>3</sup>	id <sup>3</sup>					2000	200	200						
1,1,2,2-Tetrachloroethane	id <sup>3</sup>	id <sup>3</sup>					470	1	22						
<b>Chlorinated ethenes</b>															
1,1,2-Trichloroethene (Trichloroethylene; TCE)	21	id <sup>3</sup>	200			200	590	50	50						
1,1,2,2-Tetrachloroethene (Tetrachloroethylene; PCE)	111	id <sup>3</sup>	1100			1100	540	5	5						
Chlorinated methanes [See Halogenated methanes]															
<b>Chlorinated Phenols</b>				[5] <sup>12</sup>											
Monochlorophenols	7		8.5- 650 <sup>8</sup>			5-9 <sup>8</sup>		0.3 <sup>13</sup>	44000 <sup>13</sup>						
Dichlorophenols	0.2		2.5- 340 <sup>8</sup>			1.2-9 <sup>8</sup>	100	0.3	3700 <sup>14</sup>						
Trichlorophenols	18		1-270 <sup>8</sup>			0.6-5 <sup>8</sup>	100								
Trichlorophenol 2,4,5-							46	200 <sup>15</sup>	630 <sup>15</sup>						
Trichlorophenol 2,4,6-							36	2 <sup>15</sup>	9700 <sup>15</sup>						
Tetrachlorophenols	1		1-180 <sup>8</sup>			0.2-3 <sup>7</sup>	100, 7 <sup>19</sup>								
Pentachlorophenol (PCP)	0.5		1-27.5 <sup>8</sup>			0.2-3 <sup>8</sup>		30	130						
Chlorine, reactive (See Reactive chlorine species)															

COMPOUND	AQUATIC LIFE WATER QUALITY ( F = Freshwater guidelines, M = Marine guidelines)						GROUNDWATER QUALITY								
	CCME <sup>2</sup> (µg/L)		BC	Alberta <sup>11</sup>	Sask	Yukon	Que <sup>17</sup>	Ontario <sup>25</sup>		New Brunswick		Nova Scotia		P.E.I.	
	F	M	F (M)		F	F(M)	F	Potable	Non-Potable	Potable	Non-Potable	Potable	Non-Potable	Potable	Non-Potable
Chloroform [See Halogenated methanes, Trichloromethane]															
<i>Chlorine</i> <sup>1</sup>			20			20									
4-Chloro-2-methyl phenoxy acetic acid [See MCPA]															
Chlorothalonil	0.18	0.36					18								
Chlorpyrifos	0.0035	0.002					0.083								
<b>Chromium (total)</b>			20		2-20	20	200	50	2000						
Trivalent chromium (Cr(III))	8.9	56													
Hexavalent chromium (Cr(VI))	1	1.5					16	50	110						
Chrysene [See Polycyclic aromatic hydrocarbons (PAHs)]															
<i>Cobalt</i> <sup>1</sup>			500			500		100	100						
<i>Coliforms, fecal</i>															
<i>Coliforms, total</i>															
Colour	Nar-rative	Nar-rative													
Copper	2-4		20-90 <sup>7</sup>	1.2 <sup>10</sup> [7] <sup>12</sup>	2-4	20-90 <sup>7</sup>	9.2	23	23						
Cyanazine	2		20			20	47								
Cyanide (Free/WAD/Available)	5 (as free)		50			50	22	52	52						

COMPOUND	AQUATIC LIFE WATER QUALITY ( F = Freshwater guidelines, M = Marine guidelines)							GROUNDWATER QUALITY							
	CCME <sup>2</sup> (µg/L)		BC	Alberta <sup>11</sup>	Sask	Yukon	Que <sup>17</sup>	Ontario <sup>25</sup>		New Brunswick		Nova Scotia		P.E.I.	
	F	M	F (M)		F	F(M)	F	Potable	Non-Potable	Potable	Non-Potable	Potable	Non-Potable	Potable	Non-Potable
	CN)														
Cyanide (SAD/Total)															
Cyanobacteria [See Blue-green algae]															
DDAC (Didecyl dimethyl ammonium chloride)	1.5														
DDT (total) (2,2-Bis(p-chlorophenyl)- 1,1,1-trichloroethane; Dichloro diphenyl trichloroethane)	0.001 <sup>4</sup>		0.01			0.01	0.0011	0.05	0.05						
Debris (litter/settleable matter)		Nar-rative													
Deltamethrin	0.0004	id <sup>3</sup>					0.04								
Deposited bedload sediment [See Total particulate matter]															
Dibromochloromethane [See Halogenated methanes]															
Dicamba	10						1000								
Dichlorobenzene [See Chlorinated benzenes]															
Dichlorobromomethane [See Halogenated methanes]															

COMPOUND	AQUATIC LIFE WATER QUALITY ( F = Freshwater guidelines, M = Marine guidelines)							GROUNDWATER QUALITY							
	CCME <sup>2</sup> (µg/L)		BC	Alberta <sup>11</sup>	Sask	Yukon	Que <sup>17</sup>	Ontario <sup>25</sup>		New Brunswick		Nova Scotia		P.E.I.	
	F	M	F (M)		F	F(M)	F	Potable	Non-Potable	Potable	Non-Potable	Potable	Non-Potable	Potable	Non-Potable
Dichloro diphenyl trichloroethane [See DDT (total)]															
Dichloroethane [See Chlorinated ethanes]															
Dichloroethylene [See Chlorinated ethanes]															
Dichloromethane [See Halogenated methanes]															
Dichlorophenols [See Chlorinated phenols]															
1,3-Dichlorophenoxyacetic acid [See Phenoxy herbicides]															
Diclofop-methyl	6.1														
Didecyl dimethyl ammonium chloride [See DDAC]															
Diethylene glycol [See Glycols]															
Di(2-ethylhexyl) phthalate [See phthalate esters]															
Dimethoate	6.2	id <sup>3</sup>	62			62	620								
Di- <i>n</i> -butyl phthalate [See Phthalate esters]															

COMPOUND	AQUATIC LIFE WATER QUALITY ( F = Freshwater guidelines, M = Marine guidelines)							GROUNDWATER QUALITY							
	CCME <sup>2</sup> (µg/L)		BC	Alberta <sup>11</sup>	Sask	Yukon	Que <sup>17</sup>	Ontario <sup>25</sup>		New Brunswick		Nova Scotia		P.E.I.	
	F	M	F (M)		F	F(M)	F	Potable	Non-Potable	Potable	Non-Potable	Potable	Non-Potable	Potable	Non-Potable
Di- <i>n</i> -octyl phthalate [See Phthalate esters]															
Dinoseb	0.05		0.5			0.5									
Dissolved gas supersaturation	Nar-rative	Nar-rative													
Dissolved oxygen	5500-9500	>8000 & nar-rative		[5.0 mg/L (1 day min) 6.5 mg/L (7-day mean)] <sup>12</sup>											
<i>Dissolved Solids, total</i> [See <i>Total dissolved solids (salinity)</i> ]															
Endosulfan	0.02		0.2			0.2	0.11 <sup>18</sup>	0.35	0.56						
Endrin	0.0023 <sup>4</sup>		0.023			0.023	0.086	0.05	0.05						
Ethylbenzene	90	25	7000		700	7000	420	2.4	28000	2.4	20,000			2.4	20,000
Ethylene glycol [See Glycols]															
Fecal coliforms [See Coliforms, fecal]															
Fluroanthene [See Polycyclic aromatic hydrocarbons (PAHs)]															

COMPOUND	AQUATIC LIFE WATER QUALITY ( F = Freshwater guidelines, M = Marine guidelines)						GROUNDWATER QUALITY								
	CCME <sup>2</sup> (µg/L)		BC	Alberta <sup>11</sup>	Sask	Yukon	Que <sup>17</sup>	Ontario <sup>25</sup>		New Brunswick		Nova Scotia		P.E.I.	
	F	M	F (M)		F	F(M)	F	Potable	Non-Potable	Potable	Non-Potable	Potable	Non-Potable	Potable	Non-Potable
Fluorene [See Polycyclic aromatic hydrocarbons (PAHs)]															
Fluoride <sup>1</sup>			2000-3000 <sup>7</sup>			2000-3000 <sup>7</sup>									
<b>Glycols</b>															
Ethylene glycol	192000	id <sup>3</sup>					19million								
Diethylene glycol	id <sup>3</sup>	id <sup>3</sup>													
Propylene glycol	id <sup>3</sup>	id <sup>3</sup>													
Glyphosate	65		650			650	6500								
<b>Halogenated methanes</b>															
Monochloromethane (Methyl chloride)	id <sup>3</sup>	id <sup>3</sup>													
Dichloromethane (Methylene chloride)	98.1	id <sup>3</sup>					13000	50	50000						
Trichloromethane (Chloroform)	1.8	id <sup>3</sup>					1800	5	430						
Tetrachloromethane (Carbon tetrachloride)	13.3	id <sup>3</sup>	130			130	440	5	17						
Monobromomethane (Methyl bromide)	id <sup>3</sup>	id <sup>3</sup>						3.7	3.7						
Tribromomethane (Bromoform)	id <sup>3</sup>	id <sup>3</sup>						5	840						
Dibromochloromethane	id <sup>3</sup>	id <sup>3</sup>						5	50000						



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	CCME <sup>2</sup> (µg/L)		BC	Alberta <sup>11</sup>	Sask	Yukon	Que <sup>17</sup>	Ontario <sup>25</sup>		New Brunswick		Nova Scotia		P.E.I.	
	F	M	F (M)		F	F(M)	F	Potable	Non-Potable	Potable	Non-Potable	Potable	Non-Potable	Potable	Non-Potable
Dichlorobromomethane	id <sup>3</sup>	id <sup>3</sup>													
HCBD [See Hexachlorobutadiene (HCBD)]															
Heptachlor (Heptachlor epoxide)	0.01 <sup>4</sup>		0.1			0.1	0.021 (0.011) <sup>20</sup>	0.04 (3.0) <sup>20</sup>	0.04 (6) <sup>20</sup>						
Hexachlorobenzene [See Chlorinated benzenes]															
Hexachlorobutadiene (HCBD)	1.3		1			1	0.45	0.87							
Hexachlorocyclohexane (Lindane)	0.01		0.1			0.1	1	0.8	0.8						
Hypochlorous acid [See Reactive chlorine species]															
3-Iodo-2-propynyl butyl carbamate [See IPBC]															
IPBC (3-Iodo-2-propynyl butyl carbamate)	1.9														
Iron	300														
Lead	1-7		40-160 <sup>7</sup>		1-7	40-160 <sup>7</sup>	34	10	32						
Lindane [See Hexachlorocyclohexane]															
Linuron	7	id <sup>3</sup>													
<i>Lithium</i>															
<i>Manganese</i>															

COMPOUND	AQUATIC LIFE WATER QUALITY ( F = Freshwater guidelines, M = Marine guidelines)							GROUNDWATER QUALITY							
	CCME <sup>2</sup> (µg/L)		BC	Alberta <sup>11</sup>	Sask	Yukon	Que <sup>17</sup>	Ontario <sup>25</sup>		New Brunswick		Nova Scotia		P.E.I.	
	F	M	F (M)		F	F(M)	F	Potable	Non-Potable	Potable	Non-Potable	Potable	Non-Potable	Potable	Non-Potable
MCPA (4-Chloro-2-methyl phenoxy acetic acid; 2-Methyl-4-chloro phenoxy acetic acid)	2.6	4.2					260								
Mercury	0.1		1	0.013 (0.005) <sup>12</sup>	0.1	1	0.13	0.12	0.12						
Methyl bromide [See Halogenated methanes, Monobromomethane]															
Methyl chloride [See Halogenated methanes, Monochloromethane]							1								
2-Methyl-4-chloro phenoxy acetic acid [See MCPA]															
Methylene chloride [See Halogenated methanes, Dichloromethane]															
Metolachlor	7.8		80			80	800								
Metribuzin	1		10			10	100								
Molybdenum	73		10000			10000	2000	7300	7300						
Monobromomethane [See Halogenated methanes]															
Monochloramine [See Reactive chlorine species]															
Monochlorobenzene [See Chlorinated benzenes]															

COMPOUND	AQUATIC LIFE WATER QUALITY ( F = Freshwater guidelines, M = Marine guidelines)						GROUNDWATER QUALITY								
	CCME <sup>2</sup> (µg/L)		BC	Alberta <sup>11</sup>	Sask	Yukon	Que <sup>17</sup>	Ontario <sup>25</sup>		New Brunswick		Nova Scotia		P.E.I.	
	F	M	F (M)		F	F(M)	F	Potable	Non-Potable	Potable	Non-Potable	Potable	Non-Potable	Potable	Non-Potable
Monochloromethane [See Halogenated methanes]															
Monochlorophenols [See Chlorinated phenols]						2000									
Naphthalene [See Polycyclic aromatic hydrocarbons (PAHs)]															
Nickel	25-150		250-1500 <sup>7</sup>			250-1500 <sup>7</sup>	790	100	1600						
Nitrate	See note <sup>5</sup>		400000			400000	200000	10000							
<i>Nitrate and nitrite<sup>1</sup></i>			400000			400000									
Nitrite	60		200-2000 <sup>9</sup>		0.06mg/L	200-2000 <sup>9</sup>	60	1000	2000						
<b>Organotins</b>															
Tributyltin	0.008	0.001													
Tricyclohexyltin	id <sup>3</sup>	id <sup>3</sup>													
Triphenyltin	0.022	id <sup>3</sup>													
Oxygen, dissolved [See Dissolved oxygen]															
PAHs [See Polycyclic aromatic hydrocarbons (PAHs)]															
PCBs [See Polychlorinated biphenyls]															

COMPOUND	AQUATIC LIFE WATER QUALITY ( F = Freshwater guidelines, M = Marine guidelines)							GROUNDWATER QUALITY							
	CCME <sup>2</sup> (µg/L)		BC	Alberta <sup>11</sup>	Sask	Yukon	Que <sup>17</sup>	Ontario <sup>25</sup>		New Brunswick		Nova Scotia		P.E.I.	
	F	M	F (M)		F	F(M)	F	Potable	Non-Potable	Potable	Non-Potable	Potable	Non-Potable	Potable	Non-Potable
(PCBs)(total)]															
PCE [See Chlorinated ethenes, 1,1,2,2-Tetrachloroethene]															
PCP [See Chlorinated phenols, Pentachlorophenol]															
Pentachlorobenzene [See Chlorinated benzenes]															
Pentachlorophenol [See Chlorinated phenols]															
pH	6.5-9	7.0-8.7 & narrative													
Phenanthrene [See Polycyclic aromatic hydrocarbons (PAHs0)]															
Phenols (mono- & dihydric)	4		10			10	490	4200 <sup>16</sup>	26000 <sup>16</sup>						
Phenoxy herbicides	4														
<b>Phthalate esters</b>															
Di- <i>n</i> -butyl phthalate	19	id <sup>3</sup>	190			190	1900								
Di(2-ethylhexyl) phthalate	16	id <sup>3</sup>	160			160									
Di- <i>n</i> -octyl phthalate [See Phthalate esters]	id <sup>3</sup>	id <sup>3</sup>													

COMPOUND	AQUATIC LIFE WATER QUALITY ( F = Freshwater guidelines, M = Marine guidelines)							GROUNDWATER QUALITY							
	CCME <sup>2</sup> (µg/L)		BC	Alberta <sup>11</sup>	Sask	Yukon	Que <sup>17</sup>	Ontario <sup>25</sup>		New Brunswick		Nova Scotia		P.E.I.	
	F	M	F (M)		F	F(M)	F	Potable	Non-Potable	Potable	Non-Potable	Potable	Non-Potable	Potable	Non-Potable
Picloram	29		290			290	2900								
Polychlorinated biphenyls (PCBs) (total)	0.001 <sup>4</sup>				1ng/L		0.0045	0.2	0.2						
<b>Polycyclic aromatic hydrocarbons (PAHs)</b>															
Acenaphthene	5.8	id <sup>3</sup>	60			60	67	20	1700						
Acridine	4.4	id <sup>3</sup>	0.5			0.5									
Anthracene	0.012	id <sup>3</sup>	1			1	11million	12	12						
Benzo(a)anthracene	0.018	id <sup>3</sup>	1			1	3.1	0.2	5						
Benzo(a)pyrene	0.015	id <sup>3</sup>	0.1			0.1	3.1	0.01	1.9						
Chrysene	id <sup>3</sup>	id <sup>3</sup>					3.1	0.5	3						
Fluroanthene	0.04	id <sup>3</sup>	2			2	2.3	130	130						
Fluorene	3	id <sup>3</sup>	120			120	14million	280	290						
Naphthalene	1.1	1.4	10			10	340	21	5900						
Phenanthrene	0.4	id <sup>3</sup>	3			3	30	63	63						
Pyrene	0.025	id <sup>3</sup>	0.2			0.2	1100000	40	40						
Quinoline	3.4	id <sup>3</sup>													
Propylene glycol [See Glycols]															
Pyrene [See Polycyclic aromatic hydrocarbons (PAHs)]															

COMPOUND	AQUATIC LIFE WATER QUALITY ( F = Freshwater guidelines, M = Marine guidelines)							GROUNDWATER QUALITY							
	CCME <sup>2</sup> (µg/L)		BC	Alberta <sup>11</sup>	Sask	Yukon	Que <sup>17</sup>	Ontario <sup>25</sup>		New Brunswick		Nova Scotia		P.E.I.	
	F	M	F (M)		F	F(M)	F	Potable	Non-Potable	Potable	Non-Potable	Potable	Non-Potable	Potable	Non-Potable
Quinoline [See Polycyclic aromatic hydrocarbons (PAHs)]															
Reactive chlorine species (hydrochlorous acid and monochloramine)	0.5	0.5													
Salinity		<10% fluctuation													
Selenium	1		10			10	20	10	50						
Silver	0.1		1			1	0.62	1.2	1.2						
Simazine	10		100			100	1000								
Streambed substrate [See Total substrate [See Total particulate matter]															
Styrene	72						190	100	940						
Sulphate <sup>1</sup>			1000mg/L			1000mg/L									
Suspended sediments [See Total particulate matter]															
TCE [See Chlorinated ethenes, 1,1,2-Trichloroethene]															
Tebuthiuron	1.6	id <sup>3</sup>					160								

COMPOUND	AQUATIC LIFE WATER QUALITY ( F = Freshwater guidelines, M = Marine guidelines)							GROUNDWATER QUALITY							
	CCME <sup>2</sup> (µg/L)		BC	Alberta <sup>11</sup>	Sask	Yukon	Que <sup>17</sup>	Ontario <sup>25</sup>		New Brunswick		Nova Scotia		P.E.I.	
	F	M	F (M)		F	F(M)	F	Potable	Non-Potable	Potable	Non-Potable	Potable	Non-Potable	Potable	Non-Potable
Temperature	Nar-rative	not to excee-d +/- 1C													
Tetrachlorobenzene [See Chlorinated benzenes]															
Tetrachloroethane [See Chlorinated ethanes]															
Tetrachloroethene [See Chlorinated ethenes]															
Tetrachloroethylene [See Chlorinated ethenes, 1,1,2,2-Tetrachloroethene]															
Tetrachloromethane [See Halogenated methanes]															
Tetrachlorophenols [See Chlorinated phenols]															
Thallium	0.8		3			3	2.0	400							
Toluene	2	215	3000		300	3000	200	24	5900	24	20,000	24	20,000	24	20,000
<i>Total coliforms [See Coliforms, total]</i>															
<i>Total dissolved solids (salinity)</i>															
<b>Total particulate matter</b>															
Deposited bedload sediment	id <sup>3</sup>	id <sup>3</sup>													

COMPOUND	AQUATIC LIFE WATER QUALITY ( F = Freshwater guidelines, M = Marine guidelines)							GROUNDWATER QUALITY							
	CCME <sup>2</sup> (µg/L)		BC	Alberta <sup>11</sup>	Sask	Yukon	Que <sup>17</sup>	Ontario <sup>25</sup>		New Brunswick		Nova Scotia		P.E.I.	
	F	M	F (M)		F	F(M)	F	Potable	Non-Potable	Potable	Non-Potable	Potable	Non-Potable	Potable	Non-Potable
Streambed substrate	Nar-rative	Nar-rative													
Suspended sediments	Nar-rative	Nar-rative													
Turbidity	Nar-rative	Nar-rative													
Toxaphene	0.008 <sup>4</sup>														
Triallate	0.24		2.4			2.4									
Tribromomethane [See Halogenated methanes]															
Tributyltin [See Organotins]															
Trichlorobenzene [See Chlorinated benzenes]															
Trichloroethane [See Chlorinated ethanes]															
Trichloroethene [See Chlorinated ethenes]															
Trichloroethylene [See Chlorinated ethenes, 1,1,2-Trichloroethene]															
Trichloromethane [See Halogenated methanes]															
Trichlorophenols [See Chlorinated phenols]															



COMPOUND	AQUATIC LIFE WATER QUALITY ( F = Freshwater guidelines, M = Marine guidelines)							GROUNDWATER QUALITY							
	CCME <sup>2</sup> (µg/L)		BC	Alberta <sup>11</sup>	Sask	Yukon	Que <sup>17</sup>	Ontario <sup>25</sup>		New Brunswick		Nova Scotia		P.E.I.	
	F	M	F (M)		F	F(M)	F	Potable	Non-Potable	Potable	Non-Potable	Potable	Non-Potable	Potable	Non-Potable
Tricyclohexyltin [See Organotins]															
Trifluralin	0.2		1			0.1	10								
Triphenyltin [See Organotins]															
Turbidity [See Total particulate matter]															
<i>Uranium</i> <sup>1</sup>			3000			3000									
<i>Vanadium</i>															
Zinc	30		300		30	300	65	1100	1100						

<sup>1</sup> Italicized component indicates that compound has a CCME limit for one of the four intended uses for water (ie. Freshwater, marine, irrigation, livestock), but not necessarily in the CCME for each intended use.

<sup>2</sup> Updated 2001 EC, CCME EQG web site [http://www2.ec.gc.ca/ceqg-rcqe/index\\_e.htm](http://www2.ec.gc.ca/ceqg-rcqe/index_e.htm)

<sup>3</sup> id- Insufficient data

<sup>4</sup> guideline no longer recommended / value withdrawn

<sup>5</sup> Concentration that stimulates weed growth should be avoided.

<sup>6</sup> B.C. & Yukon value varies with pH.

<sup>7</sup> BC & Yukon value varies with water hardness.

<sup>8</sup> B.C. & Yukon value varies with ph, temperature and substance isomer - refer to B.C. authorities for guidance.

<sup>9</sup> BC & Yukon value varies with sample chloride concentration.

<sup>10</sup> Refer to Alberta Water Quality Guidelines original document.

<sup>11</sup> Alberta adopts CCME guidelines for all compounds expect those for which a value is noted.

<sup>12</sup> [ ] Alberta guideline represents the chronic toxicity (for continuous discharges) value, without [ ] represents acute toxicity (a maximum for single discharges) value.

<sup>13</sup> Indicates 2-chlorophenol (ONT)

<sup>14</sup> Indicates 2,4-dichlorophenol (ONT)

<sup>15</sup> Ontario guidelines specify the two trichlorophenols listed; the CCME does not.

<sup>16</sup> Ontario guidelines indicate values for phenol only.

<sup>17</sup> Quebec guidelines refer to “Surface Water and Sewers”

<sup>18</sup> Quebec guideline for Endosulfan I & II

<sup>19</sup> Quebec guideline for 2,3,4,6-tetrachlorophenol

<sup>20</sup> Ontario & Quebec - ( ) value refers to Heptachlor Epoxide; no ( ) refers to Heptachlor.

<sup>21</sup> NB, PEI, and NS standard for Benzene is listed as Residential Non-Potable Sand=1000 ug/L, Residential Non-Potable Clay=1500 ug/L, Commercial Non-potable Sand=4700 ug/L, and Commercial Non-Potable Clay=7000 ug/L

<sup>22</sup> Guideline is crop specific - check w/ authorities.

<sup>23</sup> Lower value is for continuous crop application, higher value is for intermittent application.

<sup>24</sup> Standard varies with pH - check with authorities.

<sup>25</sup> For Ontario, see guidelines for medium, fine textured soils for Hexachlorobenzene, Benzene, Ethylbenzene, Toluene, and Xylenes.

**Table A-6: Sediment Quality Guidelines – Freshwater and Marine**

Values shown are not for regulatory use. Refer to provincial/territorial guidelines, standards and regulations to confirm values and their implications. (See Reference Section and Appendix B for provincial/territorial references and contact persons.)

Values shown are for provinces/territories that have adopted values that differ from CCME EQGs. Provinces/territories not listed generally adopt CCME EQGs. Concentrations are in µg/g (ppm) unless otherwise stated.

CONTAMINANT	CCME <sup>1,2</sup>		CCME <sup>1,2</sup>		Ont <sup>6</sup>
	Freshwater		Marine		
	ISQD <sup>3</sup>	PEL <sup>4</sup>	ISQD <sup>3</sup>	PEL <sup>4</sup>	
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	17.0	7.24	41.6	6
Benz(a)anthracene [See Polycyclic aromatic hydrocarbons (PAHs)]					
Benzo (a) pyrene [See Polycyclic aromatic hydrocarbons (PAHs)]					
Cadmium	0.6	3.5	0.7	4.2	0.6
Chlordane	4.5 µg/kg	8.87µg/kg	2.26µg/kg	4.79µg/kg	0.007
Chromium	37.3	90.0	52.3	160	26
Chrysene [See Polycyclic aromatic hydrocarbons]					
Copper	35.7	197	18.7	108	16
DDTs					
DDD (2,2-Bis( <i>p</i> -chlorophenyl)-1,1-dichloroethane; Dichloro diphenyl dichloroethane)	3.54µg/kg	8.51µg/kg	1.22µg/kg	7.81µg/kg	0.008
DDE (1,1-Dichloro-2,2,bis ( <i>p</i> -chlorophenyl)-ethene: Diphenyl dichloro ethylene)	1.42µg/kg	6.75µg/kg	2.07µg/kg	374µg/kg	0.005
DDT (2,2-Bis( <i>p</i> -chlorophenyl)-1,1,1-trichloroethane; Dichloro diphenyl trichloroethane)	1.19µg/kg	4.77µg/kg	1.19µg/kg	4.77µg/kg	0.007
Dibenz ( <i>a,h</i> ) anthracene [See Polycyclic aromatic hydrocarbons (PAHs)]					
Dieldrin	2.85µg/kg	6.67µg/kg	0.71µg/kg	4.3µg/kg	0.002

CONTAMINANT	CCME <sup>1,2</sup>		CCME <sup>1,2</sup>		Ont <sup>6</sup>
	Freshwater		Marine		
	ISQD <sup>3</sup>	PEL <sup>4</sup>	ISQD <sup>3</sup>	PEL <sup>4</sup>	
Endrin	2.67µg/kg	62.4µg/kg	2.67µg/kg	62.4µg/kg	0.003
Fluoroanthene [See Polycyclic aromatic hydrocarbons (PAHs)]					
Fluorene [See Polycyclic aromatic hydrocarbons (PAHs)]					
Heptachlor epoxide	0.6µg/kg	2.74µg/kg	0.6µg/kg	2.74µg/kg	0.005
Hexachlorocyclohexane [See Lindane]					
Lead	35.0	91.3	30.2	112	31
Lindane (Hexachlorocyclohexane)	0.94µg/kg	1.38µg/kg	0.32µg/kg	0.99µg/kg	
Mercury	0.17	0.486	0.13µg/kg	0.7µg/kg	0.2
2-Methylnaphthalene [See Polycyclic aromatic hydrocarbons (PAHs)]					
Naphthalene [See Polycyclic aromatic hydrocarbons (PAHs)]					
PAHs [See Polycyclic aromatic hydrocarbons (PAHs)]					
PCBs [See Polychlorinated biphenyls (PCBs)]					
PCDD/Fs [See Polychlorinated dibenz-p-dioxins and polychlorinated dibenzofurans]					
Phenanthrene [See Polycyclic aromatic hydrocarbons (PAHs)]					
Polychlorinated Biphenyls					
Aroclor 1254	60µg/kg	340µg/kg	63.3µg/kg	709µg/kg	
Total PCBs	34.1µg/kg	277µg/kg	21.5µg/kg	189µg/kg	0.07
Polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans	0.85ng-TEQ/kg dw	21.5ng-TEQ/kg dw	0.85 ng TEQ/kg dw	21.5 ng TEQ/kg dw	
Polycyclic aromatic hydrocarbons					
Acenaphthene	6.71µg/kg	88.9µg/kg	6.71µg/kg	88.9µg/kg	
Acenaphthylene	5.87µg/kg	128µg/kg	5.87µg/kg	128µg/kg	
Anthracene	46.9µg/kg	245µg/kg	46.9µg/kg	245µg/kg	0.22
Benz(a)anthracene	31.7µg/kg	385µg/kg	74.8µg/kg	693µg/kg	0.32
Benzo(a) pyrene	31.9µg/kg	782µg/kg	88.8µg/kg	763µg/kg	0.37
Chrysene	57.1µg/kg	862µg/kg	108µg/kg	846µg/kg	0.34
Dibenz (a,h) anthracene	6.22µg/kg	135µg/kg	6.22µg/kg	135µg/kg	0.06
Fluoroanthene	111µg/kg	2355µg/kg	113µg/kg	1494µg/kg	0.75

CONTAMINANT	CCME <sup>1,2</sup>		CCME <sup>1,2</sup>		Ont <sup>6</sup>
	Freshwater		Marine		
	ISQD <sup>3</sup>	PEL <sup>4</sup>	ISQD <sup>3</sup>	PEL <sup>4</sup>	
Fluorene	21.2µg/kg	144µg/kg	21.2µg/kg	144µg/kg	0.19
2-Methylnaphthalene	20.2µg/kg	201µg/kg	20.2µg/kg	201µg/kg	
Naphthalene	34.6µg/kg	391µg/kg	34.6µg/kg	391µg/kg	
Phenanthrene	41.9µg/kg	515µg/kg	86.7µg/kg	544µg/kg	0.56
Pyrene	53µg/kg	875µg/kg	153µg/kg	1398µg/kg	0.49
Pyrene [See Polycyclic aromatic hydrocarbons]					
Toxaphene	0.1µg/kg	~ <sup>5</sup>	0.1µg/kg	~ <sup>5</sup>	
Zinc	123	315	124	271	120

<sup>1</sup> µg/kg unless otherwise stated.

<sup>2</sup> Updated 2001 EC, CCME EQG web site [http://www2.ec.gc.ca/ceqg-rcqe/index\\_e.htm](http://www2.ec.gc.ca/ceqg-rcqe/index_e.htm)

<sup>3</sup> ISQG=Interim Sediment Quality Guideline

<sup>4</sup> PEL= probable effect level

<sup>5</sup> No PEL derived

<sup>6</sup> Ontario guidelines list the lowest effect level (LEL µg/g dry wt.).

## **APPENDIX B: Provincial Contaminated Site Contacts**

### **Western Region**

#### **British Columbia**

John Ward  
Manager, Contaminated Sites  
Pollution Prevention and Remediation Branch  
British Columbia Ministry of Water, Land, and Air Protection

#### **Alberta**

Darlene Howat  
Land Branch  
Science and Standards Division  
Alberta Environment

#### **Saskatchewan**

Edgar (Ed) Gee  
Client Services Section  
Environmental Protection Branch  
Saskatchewan Environment and Resources Management

#### **Manitoba**

Joan La Rue-van Es  
Headquarters Operations  
Environment Programs  
Contaminated Sites  
Manitoba Conservation

### **Central and Northern Regions**

#### **Ontario**

Mr. Larry Wilcox  
Ontario Ministry of Environment and Energy

#### **Quebec**

Michel Beaulieu  
Contaminated Soil Unit  
Contaminated Sites Service  
Quebec Ministry of the Environment

#### **Yukon**

Ruth Hall  
Contaminated Sites Coordinator  
Environmental Protection and Assessment  
Government of Yukon

**Northwest Territories**

Lisette Self  
Government of Northwest Territories

**Nunavut**

Robert Eno  
Manager, Pollution Control  
Environmental Protection Service  
Dept. of Sustainable Development  
Government of Nunavut

**Eastern Region**

**New Brunswick**

Michael Sprague  
Director, Remediation Branch  
Department of the Environment and Local Government

**Nova Scotia**

Gerard Chisholm  
Environmental Monitoring and Compliance  
Department of Environment and Labour

**Prince Edward Island**

Danny McInnis  
Field Supervisor  
Pollution Prevention  
Fisheries, Aquaculture and Environment

**Newfoundland and Labrador**

Mr. Derek Maddocks  
Director  
Pollution Prevention  
Department of Environment