

1) Clarification on wording in sentences in quotations (bullet 2 and bullet 3 from IHA email)

The BC Approved Water Quality Guidelines (available at

http://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-quality/water-qualityguidelines/approved-water-quality-guidelines) provide water quality guidelines(agricultural and aquatic life protection) for 14 metals (aluminum, arsenic, boron, cadmium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, selenium, sliver and zinc) and drinking water guidelines for only 9 metals (aluminum, arsenic, boron, copper, lead, mercury, molybdenum, selenium and zinc). The BC generic guidelines (available at http://www.bclaws.ca/civix/document/LOC/complete/statreg/--%20E%20--

/Environmental%20Management%20Act%20[SBC%202003]%20c.%2053/05_Regulations/19_375_96%2 O-%20Contaminated%20Sites%20Regulation/375_96_08.xml#Schedule6) provides aquatic life, agricultural land use (livestock and irrigation values) and drinking water guidelines for 25 metals (aluminum, antimony, arsenic, barium, beryllium, boron, cadmium, chromium, copper, iron, lead, lithium, magnesium, manganese, mercury, molybdenum, nickel, selenium, silver, thallium, titanium, uranium, vanadium and zinc). In all cases, the Generic Guideline concentrations for a given metal are lower than or equal to the BC Approved Water Quality Guideline concentrations. Because the Generic Guidelines provide acceptable water concentrations for more metals (25 versus 14 or 9) the BC Generic Guidelines provide a more comprehensive (larger) list of metals that the BC Approved Water Quality Guidelines. In addition, because the BC Generic Guideline acceptable concentrations for individual metals are equal to or lower than the acceptable concentrations listed in the BC Approved Water Quality Guidelines, the BC Generic Guidelines are more conservative (more protective) of human and ecological receptors) than the BC Approved water quality guidelines. This means that by using the BC Generic Water Quality Guidelines in the COPC screening process it is possible to consider a much wider range of metals than would be possible if the BC Approved Water Quality Guidelines had been used.

2) <u>Request to provide the actual guideline values (concentrations) for Aquatic Life Protection,</u> <u>Agricultural Land Use (irrigation and livestock watering) and Drinking Water.</u>

The specific numerical guideline values for aquatic life protection, agricultural use and drinking water used for each metal were provided in Appendix D (Selection of COPCs) of Appendix 10.A. Appendix D outlines the entire COPC screening process. Specifically the BC Generic Guideline values used to identify COPCs in surface water are provided on page 856 of the Appendix 10.4A pdf document. A simplified version of the information provided in Appendix D is provided below. This presents the numerical values for the Aquatic Life Protection, Agricultural and Drinking Water guidelines used in the COPC screening Process:

		Aquatic Life Screening			Drinking Water Screening			Agricultural Screening - Groundwater			Agricultural Screening - Surface Water			Einal List of
Parameter	Units	FWAL Guideline	EPC	Is the EPC Greater than the Guidelin e?	Drinking Water Guideline	EPC	Is the EPC Greater than the Guideline?	Agricultural Guideline	EPC	Is the EPC Greater than the Guideline?	Agricultural Guideline	EPC	Is the EPC Greater than the Guideline ?	COPCs from COPC Screening of Water Quality Data
Aluminum	mg/L	5.00E-02	1.64E-03		2.00E-01	6.80E-03		5.00E+00	2.39E+00		5.00E+00	1.64E-03		
Antimony	mg/L	9.00E-03	1.40E-04		6.00E-03	3.05E-04			1.29E-03			1.40E-04		
Arsenic	mg/L	5.00E-03	2.17E-03		2.50E-02	3.89E-03		2.50E-02	8.24E-03		2.50E-02	2.17E-03		
Barium	mg/L	1.00E+00	5.67E-02		1.00E+00	2.85E-02			1.18E-01			5.67E-02		
Beryllium	mg/L	1.30E-04	1.00E-04		4.00E-03	1.83E-04		1.00E-01	2.32E-03		1.00E-01	1.00E-04		
Cadmium	mg/L	9.00E-05	1.22E-05		5.00E-03	6.66E-05		5.10E-03	1.85E-04		5.10E-03	1.22E-05		
Chromium	mg/L	8.90E-03	8.61E-04		5.00E-02	8.74E-04		4.90E-03	1.60E-02	Yes (X)	4.90E-03	8.61E-04		Yes (X)
Cobalt	mg/L	4.00E-03	3.87E-04		3.80E-03	2.73E-04		5.00E-02	4.93E-03		5.00E-02	3.87E-04		
Copper	mg/L	2.45E-02	3.98E-03		5.00E-01	2.25E-02		2.00E-01	6.83E-02		2.00E-01	3.98E-03		
Lead	mg/L	3.53E-02	1.30E-04		5.00E-02	1.75E-03		1.00E-01	1.44E-03		1.00E-01	1.30E-04		
Manganese	mg/L	3.30E+00	1.25E-01		5.00E-02	7.12E-02	Yes (X)	2.00E-01	1.17E+00	Yes (X)	2.00E-01	1.25E-01		Yes (X)
Mercury	mg/L	2.60E-05	1.00E-05		1.00E-03	5.75E-05		2.00E-03	3.86E-05		2.00E-03	1.00E-05		
Molybdenu m	mg/L	1.00E+00	1.98E-02		2.50E-01	1.66E-02		5.00E-02	1.21E-01	Yes (X)	5.00E-02	1.98E-02		Yes (X)
Nickel	mg/L	1.50E-01	4.57E-03		1.00E-01	7.75E-03		2.00E-01	3.61E-02		2.00E-01	4.57E-03		
Selenium	mg/L	2.00E-03	6.90E-04		1.00E-02	9.18E-03		1.00E-02	8.94E-03		1.00E-02	6.90E-04		
Silver	mg/L	1.50E-03	1.14E-05		1.00E-01	1.83E-05			7.93E-05			1.14E-05		
Strontium	mg/L		9.32E-01			3.00E+00			2.87E+00			9.32E-01		
Thallium	mg/L	8.00E-04	1.07E-05		2.00E-03	1.83E-05			4.61E-04			1.07E-05		
Tin	mg/L		1.00E-04			2.20E-04			1.36E-03			1.00E-04		
Titanium	mg/L	2.00E+00	1.60E-02			1.83E-02			1.49E-01			1.60E-02		
Uranium	mg/L	8.50E-03	2.29E-03		2.00E-02	6.18E-03		1.00E-02	3.24E-03		1.00E-02	2.29E-03		
Vanadium	mg/L		3.64E-03		1.80E-01	3.73E-03		1.00E-01	1.24E-02		1.00E-01	3.64E-03		
Zinc	mg/L	3.99E-01	4.48E-03		5.00E+00	1.24E-01		2.00E+00	3.96E-02		2.00E+00	4.48E-03		

Notes

Water Quality Guidelines = BC Generic Water Quality Guidelines

FWAL BC gudeline for the proteciton of freshwater aquatic life

EPC Exposure Point Concentration - represents the baseline data concentration used in the screening process for each of the water categories. The derivation of the EPC values is explained in

YES (x) indicates that the EPC from the baseline data exceeds the indicated guideline

--- - indicates no guidelines are available



3) Clarification on how exceedances are addressed in the HHERA

The screening process outlined in Section 3.3.2.4, is used to identify COPCs (metals) that are present in water at concentrations that exceed the one or more of the generic water quality guidelines. Any metal that is present in the water at a concentration that is higher than any one of the generic water quality guidelines (aquatic life protection, agricultural or drinking water) is identified as a COPC and is evaluated in both the human health and ecological risk assessments. For each metal the 95% UCLM concentration in surface water is compared to the BC Generic guidelines for aquatic life protection, agriculture and drinking water and if the 95% UCLM is above any one of the generic guideline values, the metal is identified as a COPC and the potential human health risks and the ecological risks are assessed for that metal. In both the human health risk assessment and the ecological risk assessment, potential risks are calculated using the 95% UCLM concentration and not the Guideline concentrations, This means that for any metal, the presence of a single "X" in any one of the columns shown in Table 3.3-1 means that the metal is identified as a COPC and potential risks are assessed for human and ecological receptors. Thus, the HHERA provides the independent assessments of human health and ecological risks requested by IHA.