Appendix 3. Summary of Available Surface Water Quality Guidelines

Appendix 4 Input Parameters for Derivation of Water Quality Criteria

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Table 1. Summary of Available Surface Quality Guidelines

Parameter Name	Method Speciation	Units	Most stringent guideline value	Most stringent guideline source	AEP Water PAL chronic	AEP Livestock Water	CCME Water PAL Chronic	FEQG Water PAL	CCME Water Ag Livestock	USEPA Water Chronic	USEPA WQC HH DW+Org	USEPA DW HH Org	USEPA National DWR MCLG	USEPA National DWR MCL ot TT	USEPA WQC AO	Health Can MAC	WHO
Nutrients																	
Ammonia	as N	mg/L	0.794	AEP Water PAL chronic	0.794	-	-	-	-	-	-	-	-	-	-	-	35
Ammonia, unionized	as N	mg/L	0.016	AEP Water PAL chronic	0.016	-	0.019	-	-	-	-	-	-	-	-	-	-
Nitrate	as N	mg/L	3	AEP Water PAL chronic	3	-	3	-	-	-	10	-	10	10	-	10	11.3
Nitrite	as N	mg/L	0.06	CCME Water PAL Chronic	0.2	10	0.06	-	100	-	-	-	-	-	-	1	0.912
Ions	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	-	mg/L	1000	AEP Livestock Water	-	1000	-	-	1000	-	-	-	-	-	-	-	-
Chloride	-	mg/L	120	AEP Water PAL chronic	120	-	120	-	-	230	-	-	-	-	-	250	250
Fluoride	-	mg/L	0.12	CCME Water PAL Chronic	-	1	0.12	-	1	-	-	-	4000	4000	-	1.5	1.5
Sulfate	as SO4	mg/L	309	AEP Water PAL chronic	309	1000	-	-	1000	-	-	-	-	-	-	-	250000
Sulfide	-	mg/L	0.0019	AEP Water PAL chronic	0.0019	-	-	-	-	-	-	-	-	-	-	-	-
Cyanide	-	µg/L	4	USEPA WQC HH DW+Org	5.2	-	-	-	-	5.2	4	400	200	200	-	200	-

Parameter Name	Method Speciation	Units	Most stringent guideline value	Most stringent guideline source	AEP Water PAL chronic	AEP Livestock Water	CCME Water PAL Chronic	FEQG Water PAL	CCME Water Ag Livestock	USEPA Water Chronic	USEPA WQC HH DW+Org	USEPA DW HH Org	USEPA National DWR MCLG	USEPA National DWR MCL or TT	USEPA WQC AO	Health Can MAC	WHO
General Organics																	
Acrylamide	-	µg/L	0.5	WHO	-	-	-	-	-	-	-	-	zero	0.05% dosed at 1 mg/L	-	-	0.5
Petroleum hydrocarbons - F1	-	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Petroleum hydrocarbons - F2	-	µg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenol	-	µg/L	2	AEP Livestock Water	4	2	4	-	2	-	4000	300000	-	-	300	-	-
Naphthenic acids (total)	-	µg/L	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzene	-	µg/L	5	USEPA National DWR MCL or TT	40	-	370	-	-	-	5.8	160	zero	5	-	5	10
Ethylbenzene	-	µg/L	2.4	AEP Livestock Water	90	2.4	90	-	2.4	-	68	130	700	700	-	140	300
Toluene	-	µg/L	0.5	AEP Water PAL chronic	0.5	24	2	-	24	-	57	520	1000	1000	-	60	700
Xylene	-	µg/L	30	AEP Water PAL chronic	30	-	-	-	-	-	-	-	-	-	-	-	500

Parameter Name	Method Speciation	Unit	Most stringent guideline value	Most stringent guideline source	AEP Water PAL chronic	AEP Livestock Water	CCME Water PAL Chronic	FEQG Water PAL	CCME Water Ag Livestock	USEPA Water Chronic	USEPA WQC HH DW+Org	USEPA DW HH Org	USEPA National DWR MCLG	USEPA National DWR MCL or TT	USEPA WQC AO	Health Can MAC	WHO
Metals and Metalloids																	
Aluminum		µg/L	5000	CCME Water Ag Livestock					5000							Not required	
Aluminum - dissolved		µg/L	100	AEP Water PAL chronic	100												
Aluminum - total		µg/L	100	CCME Water PAL Chronic		5000	100										
Antimony		µg/L	5.6	USEPA WQC HH DW+Org							5.6	640	6	6		6	20
Arsenic		µg/L	0.18	USEPA WQC HH DW+Org		25			25		0.18	1.4	10	10		10	10
Arsenic - dissolved		µg/L	150	USEPA Water Chronic						150							
Arsenic - total		µg/L	5	AEP Water PAL chronic	5		5										
Barium		µg/L	1000	USEPA WQC HH DW+Org							1000	—	2000	2000		1000	1300
Beryllium		µg/L	4	USEPA National DWR MCLG					100		—	—	4	4			
Beryllium - total		µg/L	100	AEP Livestock Water		100											
Boron		µg/L	1500	CCME Water PAL Chronic			1500		5000							5000	2400
Boron - total		µg/L	1500	AEP Water PAL chronic	1500	5000											
Cadmium		µg/L	0.72	USEPA WQC					80		—	—	5	5	0.72		3

Parameter Name	Method Speciation	Unit	Most stringent guideline value	Most stringent guideline source	AEP Water PAL chronic	AEP Livestock Water	CCME Water PAL Chronic	FEQG Water PAL	CCME Water Ag Livestock	USEPA Water Chronic	USEPA WQC HH DW+Org	USEPA DW HH Org	USEPA National DWR MCLG	USEPA National DWR MCL or TT	USEPA WQC AO	Health Can MAC	WHO
Cadmium - dissolved		µg/L	0.823778	USEPA Water Chronic						0.823778							
Cadmium - total		µg/L	0.184383	AEP Water PAL chronic	0.184383	80	0.184383										
Chromium		µg/L	50	Health Can MAC												50	50
Chromium (VI)		µg/L	50	CCME Water Ag Livestock					50								
Chromium (III)		µg/L	50	CCME Water Ag Livestock					50								
Chromium - total		µg/L	100	USEPA National DWR MCLG									100	100			
Chromium (VI)		µg/L	1	AEP Water PAL chronic	1	50	1				Adopt MCL (total)	Adopt MCL (total)					
Chromium (III)		µg/L	8.9	AEP Water PAL chronic	8.9	50	8.9				Adopt MCL (total)	Adopt MCL (total)					
Chromium (III)		µg/L	100.9186	USEPA Water Chronic						100.9186	Adopt MCL (total)	Adopt MCL (total)					
Chromium (VI)		µg/L	1	CCME Water PAL			1	5		11	Adopt MCL (total)	Adopt MCL (total)					
Cobalt - total		µg/L	1.099683	AEP Water PAL chronic	1.099683	1000		1.099683									
Copper		µg/L	1.3	USEPA National DWR MCL ot TT					500		13000	—	1300	1.3	1000		2000

Parameter Name	Method Speciation	Unit	Most stringent guideline value	Most stringent guideline source	AEP Water PAL chronic	AEP Livestock Water	CCME Water PAL Chronic	FEQG Water PAL	CCME Water Ag Livestock	USEPA Water Chronic	USEPA WQC HH DW+Org	USEPA DW HH Org	USEPA National DWR MCLG	USEPA National DWR MCL or TT	USEPA WQC AO	Health Can MAC	WHO
Copper - total		µg/L	2.763433	CCME Water PAL Chronic	7	500	2.763433									2000	
Copper - dissolved		µg/L	0.53	FEQG Water PAL				0.53									
Iron		µg/L	300	USEPA WQC AO					-						300		
Iron - dissolved		µg/L	300	AEP Water PAL chronic	300					1000							
Iron - total		µg/L	300	CCME Water PAL Chronic		-	300	4624.725									
Lead		µg/L	15	USEPA National DWR MCL ot TT					100				zero	15		5	10
Lead - dissolved		µg/L	2.5	USEPA Water Chronic						2.5							
Lead - total		µg/L	4.012751	AEP Water PAL chronic	4.012751	100	4.012751										
Lithium		µg/L	-	-					-								
Lithium - total		µg/L	-	-		-											
Manganese		µg/L	50	USEPA WQC HH DW+Org			470				50	100				120	
Manganese - total		µg/L	-	-		-											
Mercury		µg/L	0.026	CCME Water PAL Chronic			0.026		3				2	2		1	6
Mercury - total		µg/L	0.005	AEP Water PAL chronic	0.005	3											

Parameter Name	Method Speciation	Unit	Most stringent guideline value	Most stringent guideline source	AEP Water PAL chronic	AEP Livestock Water	CCME Water PAL Chronic	FEQG Water PAL	CCME Water Ag Livestock	USEPA Water Chronic	USEPA WQC HH DW+Org	USEPA DW HH Org	USEPA National DWR MCLG	USEPA National DWR MCL or TT	USEPA WQC AO	Health Can MAC	WHO
Mercury - total (methyl)		µg/L	0.001	AEP Water PAL chronic	0.001						—	0.3 mg/kg					
Mercury - dissolved		µg/L	0.77	USEPA Water Chronic						0.77							
Mercury - dissolved (methyl)		µg/L	0.004	CCME Water PAL Chronic			0.004										
Molybdenum		µg/L	73	CCME Water PAL Chronic			73		500								
Molybdenum - total		µg/L	73	AEP Water PAL chronic	73	500											
Nickel		µg/L	70	WHO					1000		610	4600					70
Nickel - dissolved		µg/L	60.67996	USEPA Water Chronic						60.67996							
Nickel - total		µg/L	60.86255	AEP Water PAL chronic	60.86255	1000	109.7817										
Selenium		µg/L	1	CCME Water PAL Chronic			1		50		170	4200	50	50		50	40
Selenium - total		µg/L	2	AEP Water PAL chronic	2	50											
Silver		µg/L	-	-						-							
Silver - total		µg/L	0.25	AEP Water PAL chronic	0.25		0.25										
Strontium		µg/L	7000	Health Can MAC												7000	
Thallium			0.24	USEPA WQC HH DW+Org			0.8				0.24	0.47	0.5	2			

Parameter Name	Method Speciation	Unit	Most stringent guideline value	Most stringent guideline source	AEP Water PAL chronic	AEP Livestock Water	CCME Water PAL Chronic	FEQG Water PAL	CCME Water Ag Livestock	USEPA Water Chronic	USEPA WQC HH DW+Org	USEPA DW HH Org	USEPA National DWR MCLG	USEPA National DWR MCL or TT	USEPA WQC AO	Health Can MAC	WHO
Uranium		µg/L	20	Health Can MAC					200				zero	30		20	30
Uranium - total		µg/L	15	AEP Water PAL chronic	15	200	15										
Vanadium		µg/L	100	CCME Water Ag Livestock					100								
Vanadium - total		µg/L	100	AEP Livestock Water		100		120									
Zinc		µg/L	137.8744	USEPA Water Chronic					50000	137.8744	7400	26000			5000		
Zinc - dissolved		µg/L	33.16012	CCME Water PAL Chronic			33.16012										
Zinc - total		µg/L	30	AEP Water PAL chronic	30	50											

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Appendix 4 Input Parameters for Derivation of Water Quality Criteria

US EPA (2015) Input Parameters						
BW (kg)	DI (L/d)	Total FishIR (kg/d)	TL2 (kg/d)	TL3 (kg/d)	TL4 (kg/d)	Conversion factor (ug/mg)
80	2.4	0.022	0.0076	0.00868	0.00518	1000

Community Consumption Survey Input Parameters						
BW (kg)	DI (L/d)	Total FishIR (kg/d)	TL2 (kg/d)	TL3 (kg/d)	TL4 (kg/d)	Conversion factor (ug/mg)
80	2.4	0.388	0.100547148	0.114835427	0.068530819	1000

Fish source inputs for US EPA 2000 modification.

	US EPA IRIS				
Parameter	Reference Dose, RfD (mg/kg-d)	Oral Slope Factor (CSF)	Bioaccumulation Factor (BAF)	Cancer risk level (10^{-5})	Relative Source Contribution (RSC)
Acenaphthene	0.06		510		0.2
Antimony	0.0004		1		0.4
Arsenic	0.0003	1.5	44		0.2
Benzene*	0.0005	0.015	3.6	0.00001	0.2
	0.0005	0.055	3.6	0.00001	0.2
Benzo(a)anthracene*		0.73	3900	0.00001	0.2
Benzo(a)pyrene*	0.0003	7.3	3900	0.00001	0.2
Benzo(b)fluoranthene*		0.73	3900	0.00001	0.2
Benzo(k)fluoranthene*		0.073	3900	0.00001	0.2
Beryllium	0.002		19		0.2
Cadmium	0.0005		12400		0.2
Chromium (III)	1.5				0.2
Chromium (VI)	0.003		3		0.2
Chrysene*		0.0073	3900	0.00001	0.2
Cyanide	0.00063		1		0.2
Dibenzo(a,h)anthracene*		7.3	3900	0.00001	0.2
Ethylbenzene	0.022		100		0.2
Fluoranthene	0.04		1500		0.2
Fluorene	0.04		230		0.2
Indeno(1,2,3-cd)pyrene*		0.73	3900	0.00001	0.2
Methylmercury	0.0001				0.2
Nickel	0.02		106		0.2
Pyrene	0.03		860		0.2
Selenium	0.005		4.8		0.2
Thallium	0.000068		116		0.2
Zinc	0.3		966		0.2

Medicinal Plant source inputs for US EPA 2000 modification to estimate WQC – traditional medicine.

Parameter	US EPA IRIS				Plant	
	Cancer risk level (10-5)	Cancer Slope Factor, CSF (per mg/kg-d)	Reference Dose, RfD (mg/kg-d)	Relative Source Contribution, RSC (-)	Plant (TL1) IR heavy	BCF sed-plant
	0.00001	0.04	0.0003	0.2	0.007	
Antimony			0.0004	0.4		0.2
Arsenic*	0.00001	1.5				0.036
Barium			0.2	0.2		0.15
Benzo(a)anthracene	0.00001	0.73				0.0202
Benzo(b)fluoranthene	0.00001	0.73				0.0101
Benzo(k)fluoranthene	0.00001	0.073				0.0101
Cadmium			0.0005	0.2		0.364
Chrysene	0.00001	0.0073				0.0187
Chromium IV			0.003	0.2		0.0075
Dibenzo(a,h)anthracene	0.00001	7.3				0.0064
Indeno(1,2,3-cd)pyrene	0.00001	0.73				0.0039
Lead			0.14	0.2		0.045
Mercury (total)			0.0003	0.2		0.0375
Nickel			0.02	0.2		0.032
Selenium			0.005	0.2		0.016
Thallium			0.000068	0.2		0.04
Zinc			0.3	0.2		1.20E-12

Furbearer fish tissue inputs parameters for deriving tissue residues

Parameter	Mammalian TRV	Muskrat Body weight (kg)	Muskrat FIR
Aluminum (dissolved)	1.93	1	0.687
Antimony	0.27		
Arsenic (total)	1.04		
Barium	2.1		
Beryllium	21		
Low MW PAHs	100		
High MW PAHs	1.1		
Cadmium (total)	1.86		
Chromium (hexavalent)	9.24		
Chromium (trivalent)	2.4		
Cobalt	230		
Copper (total)	5.6		
Cyanide	24		
Lead (total)	4.7		
Manganese	4000		
Mercury (methyl)	0.032		
Nickel (total)	1.7		
Selenium (total)	0.143		
Silver (total)	6.02		
Thallium (total)	0.0131		
Zinc (total)	75.4		