

Table B-1. Groundwater Remediation Guideline Values for Natural Areas - All Water Uses

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Water Use	Lowest Guideline		Potable GW	Eco Soil Contact		Aquatic Life		Wildlife Watering	
	Fine	Coarse		All	Fine	Coarse	Fine	Coarse	Fine
Unit	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
General and Inorganic Parameters									
pH	6.5-8.5	6.5-8.5	6.5-8.5	-	-	6.5-9	6.5-9	-	-
Ammonia	see note d	see note d	-	-	-	see note d	see note d	-	-
Bromate	0.01	0.01	0.01	-	-	-	-	-	-
Chloride	120	120	250	-	-	120	120	-	-
Cyanide (free)	0.005	0.005	0.2	-	-	0.005	0.005	-	-
Fluoride	1.5	1.5	1.5	-	-	-	-	-	-
Nitrate (as nitrogen)	3	3	10	-	-	3	3	-	-
Nitrite (as nitrogen)	see note e	see note e	1.0	-	-	see note d	see note d	-	-
Sodium	200	200	200	-	-	-	-	-	-
Sulphate	see note e	see note e	500	-	-	see note d	see note d	-	-
Sulphide – Total (as S) ^f	0.0019	0.002	0.05	-	-	0.0019	0.0019	-	-
Total Dissolved Solids (TDS)	500	500	500	-	-	-	-	-	-
Metals									
Aluminum	see note d	see note d	-	-	-	see note d	see note d	-	-
Antimony	0.006	0.006	0.006	-	-	-	-	-	-
Arsenic	0.005	0.005	0.01	-	-	0.005	0.005	-	-
Barium	1	1	1	-	-	-	-	-	-
Boron	1.5	1.5	5	-	-	1.5	1.5	-	-
Cadmium	see note e	see note e	0.005	-	-	see note d	see note d	-	-
Chromium (trivalent)	0.0089	0.0089	-	-	-	0.0089	0.0089	-	-
Chromium (hexavalent)	0.001	0.001	-	-	-	0.001	0.001	-	-
Chromium (total)	0.05	0.05	0.05	-	-	-	-	-	-
Copper	0.007	0.007	1	-	-	0.007	0.007	-	-
Iron	0.3	0.3	0.3	-	-	0.3	0.3	-	-
Lead	See note e	See note e	0.01	-	-	see note d	see note d	-	-
Manganese	0.05	0.05	0.05	-	-	-	-	-	-
Mercury (total)	0.000005	0.000005	0.001	-	-	0.000005	0.000005	-	-
Nickel	see note d	see note d	-	-	-	see note d	see note d	-	-
Selenium	0.002	0.002	0.05	-	-	0.002	0.002	-	-
Silver	0.0001	0.0001	-	-	-	0.0001	0.0001	-	-

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Water Use	Lowest Guideline		Potable GW	Eco Soil Contact		Aquatic Life		Wildlife Watering	
	Fine	Coarse		All	Fine	Coarse	Fine	Coarse	Fine
Soil Type	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
Uranium	0.015	0.015	0.02	-	-	0.015	0.015	-	-
Zinc	0.03	0.03	5	-	-	0.03	0.03	-	-
Hydrocarbons									
Benzene	0.005	0.005	0.005	100	61	3.6	0.074	6.8	0.14
Toluene	0.024	0.021	0.024	82	59	12,000	0.021	NGR	180
Ethylbenzene	0.0016	0.0016	0.0016	42	20	NGR	41	NGR	NGR
Xylenes	0.02	0.02	0.02	21	31	NGR	2.9	NGR	NGR
Styrene	0.072	0.072	2.8	-	-	0.072	0.072	-	-
F1	2.2	2.2	2.2	6.5	7.1	NGR	9.8	NGR	NGR
F2	1.1	1.1	1.1	1.8	1.8	NGR	1.3	NGR	NGR
Acenaphthene	0.0060	0.0058	1.4	-	-	0.0060	0.0058	NGR	NGR
Anthracene	0.0034	0.000012	NGR	0.025	0.025	0.0034	0.000012	NGR	NGR
Fluoranthene	0.24	0.000057	NGR	0.24	0.24	NGR	0.000057	NGR	NGR
Fluorene	0.0042	0.0030	0.94	-	-	0.0042	0.0030	NGR	NGR
Naphthalene	0.0010	0.0010	0.47	-	-	0.001	0.0010	NGR	NGR
Phenanthrene	0.00086	0.0004	-	-	-	0.00086	0.0004	NGR	NGR
Pyrene	0.71	0.000092	0.71	-	-	NGR	0.000092	NGR	NGR
Carcinogenic PAHs (as B(a)P TPE) ^a	0.00004	0.00004	0.00004	-	-	-	-	-	-
Benz[a]anthracene	-	-	-	-	-	NGR	NGR	NGR	NGR
Benzo[b+j]fluoranthene	-	-	-	-	-	-	-	NGR	NGR
Benzo[k]fluoranthene	-	-	-	-	-	-	-	NGR	NGR
Benzo[g,h,i]perylene	-	-	-	-	-	-	-	-	-
Benzo[a]pyrene ^b	0.0018	0.0018	-	0.0018	0.0018	NGR	NGR	NGR	NGR
Chrysene	-	-	-	-	-	-	-	NGR	NGR
Dibenz[a,h]anthracene	-	-	-	-	-	-	-	NGR	NGR
Indeno[1,2,3-c,d]pyrene	-	-	-	-	-	-	-	-	-
Halogenated Aliphatics									
Vinyl chloride	0.002	0.002	0.002	-	-	-	-	-	-
1,1-Dichloroethene	0.014	0.014	0.014	-	-	-	-	-	-
Trichloroethene (Trichloroethylene, TCE)	0.005	0.005	0.005	4.4	5	0.27	0.029	-	-

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Water Use	Lowest Guideline		Potable GW	Eco Soil Contact		Aquatic Life		Wildlife Watering	
	Fine	Coarse		All	Fine	Coarse	Fine	Coarse	Fine
Soil Type	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
Tetrachloroethene (Tetrachloroethylene, Perchloroethylene, PCE)	0.010	0.010	0.010	-	-	0.11	0.11	-	-
1,2-Dichloroethane	0.005	0.005	0.005	-	-	0.1	0.1	-	-
Dichloromethane (Methylene chloride)	0.05	0.05	0.05	-	-	0.098	0.098	-	-
Trichloromethane (Chloroform) ⁱ	0.08	0.018	0.08	-	-	0.10	0.018	-	-
Tetrachloromethane (Carbon tetrachloride)	0.002	0.002	0.002	-	-	0.013	0.013	-	-
Dibromochloromethane	0.19	0.19	0.19	-	-	-	-	-	-
Chlorinated Aromatics									
Chlorobenzene	0.0013	0.0013	0.03	-	-	0.0013	0.0013	-	-
1,2-Dichlorobenzene	0.0007	0.0007	0.003	-	-	0.0007	0.0007	-	-
1,4-Dichlorobenzene	0.001	0.001	0.001	-	-	0.026	0.026	-	-
1,2,3-Trichlorobenzene	0.008	0.008	0.014	-	-	0.008	0.008	-	-
1,2,4-Trichlorobenzene	0.015	0.015	0.015	-	-	0.024	0.024	-	-
1,3,5-Trichlorobenzene	0.014	0.014	0.014	-	-	-	-	-	-
1,2,3,4-Tetrachlorobenzene	0.0018	0.0018	0.032	-	-	0.0018	0.0018	-	-
1,2,3,5-Tetrachlorobenzene	0.0038	0.0038	0.0038	-	-	-	-	-	-
1,2,4,5-Tetrachlorobenzene	0.002	0.002	0.002	-	-	-	-	-	-
Pentachlorobenzene	0.0094	0.0069	0.0094	-	-	NGR	0.0069	-	-
Hexachlorobenzene	0.00057	0.00057	0.00057	-	-	-	-	-	-
2,4-Dichlorophenol	0.0002	0.0002	0.0003	-	-	0.0002	0.0002	-	-
2,4,6-Trichlorophenol	0.002	0.002	0.002	-	-	0.018	0.018	-	-
2,3,4,6-Tetrachlorophenol	0.001	0.001	0.001	-	-	0.001	0.001	-	-
Pentachlorophenol	0.00051	0.0005	0.03	0.87	0.88	0.00051	0.0005	-	-
Dioxins & Furans ^c	0.00000012	0.00000012	0.00000012	-	-	-	-	-	-
PCBs	0.0094	0.0094	0.0094	-	-	-	-	-	-
Pesticides									
Aldicarb	0.001	0.001	0.009	-	-	0.001	0.001	-	-
Aldrin	0.0007	0.0007	0.0007	-	-	-	-	-	-
Atrazine and metabolites	0.0018	0.0018	0.005	-	-	0.0018	0.0018	-	-
Azinphos-methyl (Guthion)	0.00001	0.00001	0.02	-	-	0.00001	0.00001	-	-
Bendiocarb	0.04	0.04	0.04	-	-	-	-	-	-

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Water Use Soil Type	Lowest Guideline		Potable GW	Eco Soil Contact		Aquatic Life		Wildlife Watering	
	Fine (mg/L)	Coarse (mg/L)	All (mg/L)	Fine (mg/L)	Coarse (mg/L)	Fine (mg/L)	Coarse (mg/L)	Fine (mg/L)	Coarse (mg/L)
Unit									
Bromacil [§]	0.005	0.005	0.95	0.44	0.30	0.005	0.005	-	-
Bromoxynil	0.005	0.005	0.005	-	-	0.005	0.005	-	-
Carbaryl	0.0002	0.0002	0.09	-	-	0.0002	0.0002	-	-
Carbofuran	0.0018	0.0018	0.09	-	-	0.0018	0.0018	-	-
Chlorothalonil	0.00018	0.00018	0.14	-	-	0.00018	0.00018	-	-
Chlorpyrifos	0.0000046	0.000002	0.09	-	-	0.0000046	0.000002	-	-
Cyanazine	0.002	0.002	0.01	-	-	0.002	0.002	-	-
2,4-D	0.004	0.004	0.1	-	-	0.004	0.004	-	-
DDT	0.093	0.093	0.093	-	-	-	-	-	-
Diazinon	0.00017	0.00017	0.02	-	-	0.00017	0.00017	-	-
Dicamba	0.01	0.01	0.12	-	-	0.01	0.01	-	-
Diclofop-methyl	0.009	0.0061	0.009	-	-	0.56	0.0061	-	-
Dieldrin	0.0007	0.0007	0.0007	-	-	-	-	-	-
Dimethoate	0.0062	0.0062	0.02	-	-	0.0062	0.0062	-	-
Dinoseb	0.000055	0.00005	0.01	-	-	0.000055	0.00005	-	-
Diquat	0.07	0.07	0.07	-	-	-	-	-	-
Diuron	0.15	0.15	0.15	-	-	-	-	-	-
Endosulfan	0.0019	0.0000031	0.057	-	-	0.0019	0.0000031	-	-
Endrin	0.0028	0.0028	0.0028	-	-	-	-	-	-
Glyphosate	0.065	0.065	0.28	-	-	0.065	0.065	-	-
Heptachlor epoxide	0.000052	0.000052	0.000052	-	-	-	-	-	-
Lindane	0.00001	0.00001	0.0028	-	-	0.00001	0.00001	-	-
Linuron	0.007	0.007	0.019	-	-	0.007	0.007	-	-
Malathion	0.0001	0.0001	0.19	-	-	0.0001	0.0001	-	-
MCPA	0.0026	0.0026	0.1	-	-	0.0026	0.0026	-	-
Methoxychlor	0.9	0.00017	0.9	-	-	NGR	0.00017	-	-
Metolachlor	0.0078	0.0078	0.05	-	-	0.0078	0.0078	-	-
Metribuzin	0.001	0.001	0.08	-	-	0.001	0.001	-	-
Paraquat (as dichloride)	0.01	0.01	0.01	-	-	-	-	-	-
Parathion	0.000013	0.000013	0.05	-	-	0.000013	0.000013	-	-
Phorate	0.002	0.002	0.002	-	-	-	-	-	-

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Water Use	Lowest Guideline		Potable GW	Eco Soil Contact		Aquatic Life		Wildlife Watering	
	Fine	Coarse		Fine	Coarse	Fine	Coarse	Fine	Coarse
Soil Type	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
Unit									
Picloram	0.029	0.029	0.19	-	-	0.029	0.029	-	-
Simazine	0.01	0.01	0.01	-	-	0.01	0.01	-	-
Tebuthiuron ^h	0.0016	0.0016	0.66	0.20	0.25	0.0016	0.0016	-	-
Terbufos	0.001	0.001	0.001	-	-	-	-	-	-
Toxaphene	0.00043	0.00043	0.00043	-	-	-	-	-	-
Triallate	0.00024	0.00024	0.12	-	-	0.00024	0.00024	-	-
Trifluralin	0.0012	0.0002	0.045	-	-	0.0012	0.0002	-	-
<i>Other Organics</i>									
Aniline	0.0022	0.0022	0.066	-	-	0.0022	0.0022	-	-
Dibutyl phthalate	0.019	0.019	0.59	-	-	0.019	0.019	-	-
Dichlorobenzidine	0.007	0.007	0.007	-	-	-	-	-	-
Diethanolamine	0.06	0.06	0.06	-	-	65,000	5.0	-	-
Diethylene glycol	6.0	6.0	6.0	-	-	4,000	200	-	-
Diisopropanolamine	1.6	1.6	3.6	160	160	1.6	1.6	-	-
Ethylene glycol	31	31	31	9,200	16,000	190	190	-	-
Hexachlorobutadiene	0.0013	0.0013	0.006	-	-	0.0013	0.0013	-	-
Methanol	19	19	19	-	-	630	32	-	-
Methylmethacrylate	0.47	0.47	0.47	-	-	-	-	-	-
Monoethanolamine	0.6	0.6	0.6	-	-	30,000	1.0	-	-
MTBE	0.015	0.015	0.015	-	-	10	10	-	-
Nitrilotriacetic acid	0.4	0.4	0.4	-	-	-	-	-	-
Nonylphenol + ethoxylates	0.0081	0.0081	-	0.0081	0.0081	NGR	0.61	-	-
Phenol	0.004	0.004	0.57	110	150	0.004	0.004	-	-
Sulfolane	0.09	0.09	0.09	1,700	2,800	50	50	-	-
Triethylene glycol	60	60	60	-	-	25,000	550	-	-
Trihalomethanes - total (THMs)	0.1	0.1	0.1	-	-	-	-	-	-

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Notes:

- a. B[a]P TPE (Total Potency Equivalents) are calculated by multiplying the groundwater concentration of individual carcinogenic PAHs by a standardized Benzo[a]pyrene Potency Equivalence Factor (PEF) to produce a Benzo[a]pyrene relative potency concentration, and by subsequently summing the relative potency concentrations for the entire PAH mixture. B[a]P PEFs are order of magnitude estimates of carcinogenic potential and are based on the World Health Organization (1999) scheme, as follows:

Carcinogenic PAH Compound	PEF
Benz[a]anthracene	0.1
Benzo(b+j)fluoranthene	0.1
Benzo[k]fluoranthene	0.1
Benzo[ghi]perylene	0.01
Benzo[a]pyrene	1
Chrysene	0.01
Dibenz[a,h]anthracene	1
Indeno[1,2,3-c,d]pyrene	0.1

- b. For ecological receptors only.
- c. Expressed as toxic equivalents (TEQs) based on 2,3,7,8-PCDD (See CCME, 1999 and updates)
- d. See *Environmental Quality Guidelines for Alberta Surface Waters* (ESRD, 2014) for further guidance on aquatic life pathway.
- e. Tier 1 guideline = lowest of aquatic life guideline and potable GW guideline.
- f. As S, but can be applied to undissociated H₂S if concerns arise.
- g. Eco-contact guidelines from Stantec (2012)
- h. Eco-contact guidelines from Stantec (2008)
- i. Guideline for protection of aquatic life (fine soil) is set at the maximum concentration of trichloromethane that will support biological degradation (MEMS, 2016).

NGR - no guideline required, calculated value > solubility or >1,000,000 mg/L

Potable GW = protection of groundwater for potable drinking water

Eco Soil Contact = protection of terrestrial plants and soil invertebrates in areas with shallow groundwater

Aquatic Life = protection of groundwater discharging to a surface water body hosting aquatic life

Wildlife Watering = protection of groundwater discharging to a surface water body from which wildlife may drink

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Water Use	Lowest Guideline		Potable	Inhalation		Eco Soil Contact		Aquatic Life		Irrigation	Livestock	Wildlife Watering	
	Fine	Coarse		All	Fine	Coarse	Fine	Coarse	Fine			Coarse	All
Unit	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
<i>General and Inorganic Parameters</i>													
pH	6.5-8.5	6.5-8.5	6.5-8.5	-	-	-	-	6.5-9	6.5-9	-	-	-	-
Ammonia	see note d	see note d	-	-	-	-	-	see note d	see note d	-	-	-	-
Bromate	0.01	0.01	0.01	-	-	-	-	-	-	-	-	-	-
Chloride	100	100	250	-	-	-	-	120	120	100	-	-	-
Cyanide (free)	0.005	0.005	0.2	-	-	-	-	0.005	0.005	-	-	-	-
Electrical Conductivity (dS/m)	1	1								1			
Fluoride	1	1	1.5	-	-	-	-	-	-	1	1	-	-
Nitrate (as nitrogen)	3	3	10	-	-	-	-	3	3	-	-	-	-
Nitrate + Nitrite (as nitrogen)	100	100	-	-	-	-	-	-	-	-	100	-	-
Nitrite (as nitrogen)	see note e	see note e	1.0	-	-	-	-	see note d	see note d	-	10	-	-
Sodium	200	200	200	-	-	-	-	-	-	-	-	-	-
Sodium Adsorption Ratio	5	5								5			
Sulphate	see note e	see note e	500	-	-	-	-	see note d	see note d	-	1000	-	-
Sulphide – Total (as S) ^f	0.0019	0.0019	0.05	-	-	-	-	0.0019	0.0019	-	-	-	-
Total Dissolved Solids (TDS)	500	500	500	-	-	-	-	-	-	-	3000	-	-
<i>Metals</i>													
Aluminum	see note e	see note e	-	-	-	-	-	see note d	see note d	5	5	-	-
Antimony	0.006	0.006	0.006	-	-	-	-	-	-	-	-	-	-
Arsenic	0.005	0.005	0.01	-	-	-	-	0.005	0.005	0.16	0.025	-	-
Barium	1	1	1	-	-	-	-	-	-	-	-	-	-
Boron	1.0	1.0	5	-	-	-	-	1.5	1.5	1.0	5	-	-
Cadmium	see note e	see note e	0.005	-	-	-	-	see note d	see note d	0.0082	0.08	-	-
Chromium (trivalent)	0.0049	0.0049	-	-	-	-	-	0.0089	0.0089	0.0049	0.05	-	-
Chromium (hexavalent)	0.001	0.001	-	-	-	-	-	0.001	0.001	0.008	0.05	-	-
Chromium (total)	0.05	0.05	0.05	-	-	-	-	-	-	-	-	-	-
Copper	0.007	0.007	1	-	-	-	-	0.007	0.007	0.2	0.5	-	-

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Water Use	Lowest Guideline		Potable	Inhalation		Eco Soil Contact		Aquatic Life		Irrigation	Livestock	Wildlife Watering	
	Fine	Coarse		Fine	Coarse	Fine	Coarse	Fine	Coarse			Fine	Coarse
Soil Type	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
Iron	0.3	0.3	0.3	-	-	-	-	0.3	0.3	5	-	-	-
Lead	see note e	see note e	0.01	-	-	-	-	see note d	see note d	0.2	0.1	-	-
Manganese	0.05	0.05	0.05	-	-	-	-	-	-	0.2	-	-	-
Mercury (total)	0.000005	0.000005	0.001	-	-	-	-	0.000005	0.000005	-	0.003	-	-
Nickel	see note e	see note e	-	-	-	-	-	see note d	see note d	0.2	1	-	-
Selenium	0.002	0.002	0.05	-	-	-	-	0.002	0.002	0.02	0.05	-	-
Silver	0.0001	0.0001	-	-	-	-	-	0.0001	0.0001	0.02	0.05	-	-
Uranium	0.01	0.01	0.02	-	-	-	-	0.015	0.015	0.01	0.2	-	-
Zinc	0.03	0.03	5	-	-	-	-	0.03	0.03	1	50	-	-
Hydrocarbons													
Benzene	0.005	0.005	0.005	2.8	0.14	100	61	3.6	0.074	-	0.088	6.8	0.14
Toluene	0.024	0.021	0.024	NGR	74	82	59	12,000	0.021	-	4.9	NGR	180
Ethylbenzene	0.0016	0.0016	0.0016	NGR	16	42	20	NGR	41	-	3.2	NGR	NGR
Xylenes	0.02	0.02	0.02	80	3.9	21	31	NGR	2.9	-	13	NGR	NGR
Styrene	0.072	0.072	2.8	90	4.3	-	-	0.072	0.072	-	-	-	-
F1	2.2	0.81	2.2	19	0.81	6.5	7.1	NGR	9.8	-	53	NGR	NGR
F2	1.1	1.1	1.1	NGR	1.5	1.8	1.8	NGR	1.3	-	NGR	NGR	NGR
Acenaphthene	0.0060	0.0058	1.4	NGR	NGR	-	-	0.0060	0.0058	-	NGR	NGR	NGR
Anthracene	0.0034	0.000012	NGR	NGR	NGR	0.025	0.025	0.0034	0.000012	-	NGR	NGR	NGR
Fluoranthene	0.24	0.000057	NGR	NGR	NGR	0.24	0.24	NGR	0.000057	-	NGR	NGR	NGR
Fluorene	0.0042	0.003	0.94	NGR	NGR	-	-	0.0042	0.003	-	NGR	NGR	NGR
Naphthalene	0.001	0.001	0.47	14	0.6	-	-	0.001	0.001	-	NGR	NGR	NGR
Phenanthrene	0.00086	0.0004	-	-	-	-	-	0.00086	0.0004	-	NGR	NGR	NGR
Pyrene	0.71	0.000092	0.71	NGR	NGR	-	-	NGR	0.000092	-	NGR	NGR	NGR
Carcinogenic PAHs (as B(a)P TPE) ^a	0.00004	0.00004	0.00004	-	-	-	-	-	-	-	-	-	-
Benz[a]anthracene	-	-	-	-	-	-	-	NGR	NGR	-	NGR	NGR	NGR

Table B-2. Groundwater Remediation Guideline Values for Agricultural Land - All Water Uses

This table must not be used for Tier 1 assessment and remediation, unless directed by Section 2.4.3 or 5.1.2. Tier 1 groundwater guidelines are found in Table 2. This table is provided to assist Tier 2 guideline development, using the procedures outlined in the companion Tier 2 document (ESRD 2007 as amended).

Water Use	Lowest Guideline		Potable	Inhalation		Eco Soil Contact		Aquatic Life		Irrigation	Livestock	Wildlife Watering	
	Fine	Coarse		All	Fine	Coarse	Fine	Coarse	Fine			Coarse	All
Soil Type	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
Unit	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
Benzo[b+j]fluoranthene	-	-	-	-	-	-	-	-	-	-	NGR	NGR	NGR
Benzo[k]fluoranthene	-	-	-	-	-	-	-	-	-	-	NGR	NGR	NGR
Benzo[g,h,i]perylene	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo[a]pyrene ^b	0.0018	0.0018	-	-	-	0.0018	0.0018	NGR	NGR	-	NGR	NGR	NGR
Chrysene	-	-	-	-	-	-	-	-	-	-	NGR	NGR	NGR
Dibenz[a,h]anthracene	-	-	-	-	-	-	-	-	-	-	NGR	NGR	NGR
Indeno[1,2,3-c,d]pyrene	-	-	-	-	-	-	-	-	-	-	-	-	-
Halogenated Aliphatics													
Vinyl chloride	0.002	0.0011	0.002	0.018	0.0011	-	-	-	-	-	-	-	-
1,1-Dichloroethene	0.014	0.014	0.014	0.68	0.039	-	-	-	-	-	-	-	-
Trichloroethene (Trichloroethylene, TCE)	0.005	0.005	0.005	0.41	0.02	4.4	5	0.27	0.029	-	0.05	-	-
Tetrachloroethene (Tetrachloroethylene, Perchloroethylene, PCE)	0.010	0.010	0.010	0.25	0.012	-	-	0.11	0.11	-	-	-	-
1,2-Dichloroethane	0.005	0.005	0.005	0.17	0.01	-	-	0.1	0.1	-	0.005	-	-
Dichloromethane (Methylene chloride)	0.05	0.05	0.05	61	3.4	-	-	0.098	0.098	-	0.05	-	-
Trichloromethane (Chloroform) ⁱ	0.08	0.018	0.08	0.53	0.030	-	-	0.10	0.018	-	0.1	-	-
Tetrachloromethane (Carbon tetrachloride)	0.002	0.00057	0.002	0.012	0.00057	-	-	0.013	0.013	-	0.005	-	-
Dibromochloromethane	0.1	0.1	0.19	26	1.1	-	-	-	-	-	0.1	-	-
Chlorinated Aromatics													
Chlorobenzene	0.0013	0.0013	0.03	0.3	0.014	-	-	0.0013	0.0013	-	-	-	-
1,2-Dichlorobenzene	0.0007	0.0007	0.003	116	5.4	-	-	0.0007	0.0007	-	-	-	-
1,4-Dichlorobenzene	0.001	0.001	0.001	4.6	0.22	-	-	0.026	0.026	-	-	-	-
1,2,3-Trichlorobenzene	0.008	0.008	0.014	0.8	0.032	-	-	0.008	0.008	-	-	-	-
1,2,4-Trichlorobenzene	0.015	0.015	0.015	0.71	0.028	-	-	0.024	0.024	-	-	-	-

Table B-2. Groundwater Remediation Guideline Values for Agricultural Land - All Water Uses

This table must not be used for Tier 1 assessment and remediation, unless directed by Section 2.4.3 or 5.1.2. Tier 1 groundwater guidelines are found in Table 2. This table is provided to assist Tier 2 guideline development, using the procedures outlined in the companion Tier 2 document (ESRD 2007 as amended).

Water Use	Lowest Guideline		Potable	Inhalation		Eco Soil Contact		Aquatic Life		Irrigation	Livestock	Wildlife Watering	
	Fine	Coarse		Fine	Coarse	Fine	Coarse	Fine	Coarse			Fine	Coarse
Soil Type	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
1,3,5-Trichlorobenzene	0.014	0.014	0.014	0.38	0.015	-	-	-	-	-	-	-	-
1,2,3,4-Tetrachlorobenzene	0.0018	0.0018	0.032	NGR	0.14	-	-	0.0018	0.0018	-	-	-	-
1,2,3,5-Tetrachlorobenzene	0.0038	0.0038	0.0038	0.41	0.017	-	-	-	-	-	-	-	-
1,2,4,5-Tetrachlorobenzene	0.002	0.002	0.002	0.21	0.0088	-	-	-	-	-	-	-	-
Pentachlorobenzene	0.0094	0.0069	0.0094	NGR	0.038	-	-	NGR	0.0069	-	-	-	-
Hexachlorobenzene	0.00052	0.00052	0.00057	0.029	0.0012	-	-	-	-	-	0.00052	-	-
2,4-Dichlorophenol	0.0002	0.0002	0.0003	NGR	1500	-	-	0.0002	0.0002	-	-	-	-
2,4,6-Trichlorophenol	0.002	0.002	0.002	NGR	54	-	-	0.018	0.018	-	-	-	-
2,3,4,6-Tetrachlorophenol	0.001	0.001	0.001	NGR	NGR	-	-	0.001	0.001	-	-	-	-
Pentachlorophenol	0.00051	0.0005	0.03	NGR	NGR	0.87	0.88	0.00051	0.0005	-	-	-	-
Dioxins & Furans ^c	0.00000012	0.00000012	1.2E-07	-	-	-	-	-	-	-	-	-	-
PCBs	0.0094	0.0094	0.0094	-	-	-	-	-	-	-	-	-	-
Pesticides													
Aldicarb	0.001	0.001	0.009	-	-	-	-	0.001	0.001	0.073	0.011	-	-
Aldrin	0.0007	0.0007	0.0007	-	-	-	-	-	-	-	-	-	-
Atrazine and metabolites	0.0018	0.0018	0.005	-	-	-	-	0.0018	0.0018	0.01	0.005	-	-
Azniphos-methyl (Guthion)	0.00001	0.00001	0.02	-	-	-	-	0.00001	0.00001	-	-	-	-
Bendiocarb	0.04	0.04	0.04	-	-	-	-	-	-	-	-	-	-
Bromacil ^g	0.0002	0.0002	0.95	-	-	0.44	0.30	0.005	0.005	0.0002	1.1	-	-
Bromoxynil	0.00044	0.00044	0.005	-	-	-	-	0.005	0.005	0.00044	0.011	-	-
Carbaryl	0.0002	0.0002	0.09	-	-	-	-	0.0002	0.0002	-	1.1	-	-
Carbofuran	0.0018	0.0018	0.09	-	-	-	-	0.0018	0.0018	-	0.045	-	-
Chlorothalonil	0.00018	0.00018	0.14	-	-	-	-	0.00018	0.00018	0.0093	0.17	-	-
Chlorpyrifos	0.0000046	0.000002	0.09	-	-	-	-	0.0000046	0.000002	-	0.024	-	-
Cyanazine	0.0005	0.0005	0.01	-	-	-	-	0.002	0.002	0.0005	0.01	-	-
2,4-D	0.004	0.004	0.1	-	-	-	-	0.004	0.004	-	0.1	-	-
DDT	0.093	0.093	0.093	-	-	-	-	-	-	-	0.1	-	-

Table B-2. Groundwater Remediation Guideline Values for Agricultural Land - All Water Uses

This table must not be used for Tier 1 assessment and remediation, unless directed by Section 2.4.3 or 5.1.2. Tier 1 groundwater guidelines are found in Table 2. This table is provided to assist Tier 2 guideline development, using the procedures outlined in the companion Tier 2 document (ESRD 2007 as amended).

Water Use	Lowest Guideline		Potable	Inhalation		Eco Soil Contact		Aquatic Life		Irrigation	Livestock	Wildlife Watering	
	Fine	Coarse		Fine	Coarse	Fine	Coarse	Fine	Coarse			Fine	Coarse
Soil Type	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
Diazinon	0.00017	0.00017	0.02	-	-	-	-	0.00017	0.00017	-	-	-	-
Dicamba	0.000008	0.000008	0.12	-	-	-	-	0.01	0.01	0.000008	0.12	-	-
Diclofop-methyl	0.00024	0.00024	0.009	-	-	-	-	0.56	0.0061	0.00024	0.009	-	-
Dieldrin	0.0007	0.0007	0.0007	-	-	-	-	-	-	-	-	-	-
Dimethoate	0.003	0.003	0.02	-	-	-	-	0.0062	0.0062	-	0.003	-	-
Dinoseb	0.000055	0.00005	0.01	-	-	-	-	0.000055	0.00005	0.021	0.15	-	-
Diquat	0.07	0.07	0.07	-	-	-	-	-	-	-	-	-	-
Diuron	0.15	0.15	0.15	-	-	-	-	-	-	-	-	-	-
Endosulfan	0.0019	0.0000031	0.057	-	-	-	-	0.0019	0.0000031	-	-	-	-
Endrin	0.0028	0.0028	0.0028	-	-	-	-	-	-	-	-	-	-
Glyphosate	0.065	0.065	0.28	-	-	-	-	0.065	0.065	-	0.28	-	-
Heptachlor epoxide	0.000052	0.000052	0.000052	0.0043	0.00024	-	-	-	-	-	-	-	-
Lindane	0.00001	0.00001	0.0028	-	-	-	-	0.00001	0.00001	-	0.004	-	-
Linuron	0.00011	0.00011	0.019	-	-	-	-	0.007	0.007	0.00011	-	-	-
Malathion	0.0001	0.0001	0.19	-	-	-	-	0.0001	0.0001	-	-	-	-
MCPA	0.00004	0.00004	0.1	-	-	-	-	0.0026	0.0026	0.00004	0.025	-	-
Methoxychlor	0.9	0.00017	0.9	-	-	-	-	NGR	0.00017	-	-	-	-
Metolachlor	0.0078	0.0078	0.05	-	-	-	-	0.0078	0.0078	0.028	0.05	-	-
Metribuzin	0.0005	0.0005	0.08	-	-	-	-	0.001	0.001	0.0005	0.08	-	-
Paraquat (as dichloride)	0.01	0.01	0.01	-	-	-	-	-	-	-	-	-	-
Parathion	0.000013	0.000013	0.05	-	-	-	-	0.000013	0.000013	-	-	-	-
Phorate	0.002	0.002	0.002	-	-	-	-	-	-	-	-	-	-
Picloram	0.029	0.029	0.19	-	-	-	-	0.029	0.029	-	0.19	-	-
Simazine	0.0005	0.0005	0.01	-	-	-	-	0.01	0.01	0.0005	0.01	-	-
Tebuthiuron ^h	0.00043	0.00043	0.66	-	-	0.20	0.25	0.0016	0.0016	0.00043	0.13	-	-
Terbufos	0.001	0.001	0.001	-	-	-	-	-	-	-	-	-	-
Toxaphene	0.00043	0.00043	0.00043	6.4	0.31	-	-	-	-	-	-	-	-

Table B-2. Groundwater Remediation Guideline Values for Agricultural Land - All Water Uses

This table must not be used for Tier 1 assessment and remediation, unless directed by Section 2.4.3 or 5.1.2. Tier 1 groundwater guidelines are found in Table 2. This table is provided to assist Tier 2 guideline development, using the procedures outlined in the companion Tier 2 document (ESRD 2007 as amended).

Water Use	Lowest Guideline		Potable	Inhalation		Eco Soil Contact		Aquatic Life		Irrigation	Livestock	Wildlife Watering	
	Fine	Coarse		Fine	Coarse	Fine	Coarse	Fine	Coarse			Fine	Coarse
Soil Type	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
Triallate	0.00024	0.00024	0.12	-	-	-	-	0.00024	0.00024	-	0.23	-	-
Trifluralin	0.0012	0.0002	0.045	-	-	-	-	0.0012	0.0002	-	0.045	-	-
Other Organics													
Aniline	0.0022	0.0022	0.066	1,900	87	-	-	0.0022	0.0022	-	-	-	-
Dibutyl phthalate	0.019	0.019	0.59	NGR	NGR	-	-	0.019	0.019	-	-	-	-
Dichlorobenzidine	0.007	0.007	0.007	NGR	NGR	-	-	-	-	-	-	-	-
Diethanolamine	0.06	0.06	0.06	-	-	-	-	65,000	5.0	-	-	-	-
Diethylene glycol	6.0	6.0	6.0	-	-	-	-	4,000	200	-	-	-	-
Diisopropanolamine	1.6	1.6	3.6	-	-	160	160	1.6	1.6	3.2	-	-	-
Ethylene glycol	31	31	31	NGR	NGR	9,200	16,000	190	190	-	-	-	-
Hexachlorobutadiene	0.0013	0.0013	0.006	0.031	0.0013	-	-	0.0013	0.0013	-	-	-	-
Methanol	19	19	19	270,000	19,000	-	-	630	32	-	-	-	-
Methylmethacrylate	0.47	0.47	0.47	17	0.84	-	-	-	-	-	-	-	-
Monoethanolamine	0.6	0.6	0.6	-	-	-	-	30,000	1.0	-	-	-	-
MTBE	0.015	0.015	0.015	6.1	0.34	-	-	10	10	-	-	-	-
Nitrilotriacetic acid	0.4	0.4	0.4	-	-	-	-	-	-	-	-	-	-
Nonylphenol + ethoxylates	0.0081	0.0081	-	-	-	0.0081	0.0081	NGR	0.61	-	-	-	-
Phenol	0.002	0.002	0.57	73,000	3,700	110	150	0.004	0.004	-	0.002	-	-
Sulfolane	0.09	0.09	0.09	-	-	1,700	2,800	50	50	0.8	-	-	-
Triethylene glycol	60	60	60	-	-	-	-	25,000	550	-	-	-	-
Trihalomethanes - total (THMs)	0.1	0.1	0.1	-	-	-	-	-	-	-	-	-	-

Table B-2. Groundwater Remediation Guideline Values for Agricultural Land - All Water Uses

This table must not be used for Tier 1 assessment and remediation, unless directed by Section 2.4.3 or 5.1.2. Tier 1 groundwater guidelines are found in Table 2. This table is provided to assist Tier 2 guideline development, using the procedures outlined in the companion Tier 2 document (ESRD 2007 as amended).

Notes:

- a. *B[a]P TPE (Total Potency Equivalents) are calculated by multiplying the groundwater concentration of individual carcinogenic PAHs by a standardized Benzo[a]pyrene Potency Equivalence Factor (PEF) to produce a Benzo[a]pyrene relative potency concentration, and by subsequently summing the relative potency concentrations for the entire PAH mixture. B[a]P PEFs are order of magnitude estimates of carcinogenic potential and are based on the World Health Organization (1999) scheme, as follow:*

Carcinogenic PAH Compound	PEF
Benz[a]anthracene	0.1
Benzo(b+j)fluoranthene	0.1
Benzo[k]fluoranthene	0.1
Benzo[ghi]perylene	0.01
Benzo[a]pyrene	1
Chrysene	0.01
Dibenz[a,h]anthracene	1
Indeno[1,2,3-c,d]pyrene	0.1

- b. *For ecological receptors only.*
 c. *Expressed as toxic equivalents (TEQs) based on 2,3,7,8-PCDD (See CCME, 1999 and updates)*
 d. *See Environmental Quality Guidelines for Alberta Surface Waters (ESRD, 2014) for further guidance on aquatic life pathway.*
 e. *Tier 1 guideline = lowest of aquatic life guideline and all other guidelines.*
 f. *As S, but can be applied to undissociated H₂S if concerns arise.*
 g. *Eco-contact guidelines from Stantec (2012)*
 h. *Eco-contact guidelines from Stantec (2008)*
 i. *Guideline for protection of aquatic life (fine soil) is set at the maximum concentration of trichloromethane that will support biological degradation (MEMS, 2016).*

NGR - no guideline required, calculated value > solubility or >1,000,000 mg/L

Potable GW = protection of groundwater for potable drinking water

Inhalation = protection of volatilization from groundwater and migration into indoor air

Eco Soil Contact = protection of terrestrial plants and soil invertebrates in areas with shallow groundwater

Aquatic Life = protection of groundwater discharging to a surface water body hosting aquatic life

Irrigation = protection of a potential irrigation groundwater source

Table B-2. Groundwater Remediation Guideline Values for Agricultural Land - All Water Uses

This table must not be used for Tier 1 assessment and remediation, unless directed by Section 2.4.3 or 5.1.2. Tier 1 groundwater guidelines are found in Table 2. This table is provided to assist Tier 2 guideline development, using the procedures outlined in the companion Tier 2 document (ESRD 2007 as amended).

Livestock Watering = protection of a potential livestock watering groundwater resource

Wildlife Watering = protection of groundwater discharging to a surface water body from which wildlife may drink

Table B-3. Groundwater Remediation Guideline Values for Residential/Parkland - All Water Uses

This table must **not** be used for Tier 1 assessment and remediation, unless directed by Section 2.4.3 or 5.1.2. Tier 1 groundwater guidelines are found in Table 2. This table is provided to assist Tier 2 guideline development, using the procedures outlined in the companion Tier 2 document (ESRD 2007 as amended).

Water Use	Lowest Guideline		Potable	Inhalation		Eco Soil Contact		Aquatic Life	
	Fine	Coarse		All	Fine	Coarse	Fine	Coarse	Fine
Unit	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
<i>General and Inorganic Parameters</i>									
pH	6.5-8.5	6.5-8.5	6.5-8.5	-	-	-	-	6.5-9	6.5-9
Ammonia	see note d	see note d	-	-	-	-	-	see note d	see note d
Bromate	0.01	0.01	0.01	-	-	-	-	-	-
Chloride	120	120	250	-	-	-	-	120	120
Cyanide (free)	0.005	0.005	0.2	-	-	-	-	0.005	0.005
Fluoride	1.5	1.5	1.5	-	-	-	-	-	-
Nitrate (as nitrogen)	3	3	10	-	-	-	-	3	3
Nitrite (as nitrogen)	see note e	see note e	1.0	-	-	-	-	see note d	see note d
Sodium	200	200	200	-	-	-	-	-	-
Sulphate	see note e	see note e	500	-	-	-	-	see note d	see note d
Sulphide - Total (as S) ^f	0.0019	0.0019	0.05	-	-	-	-	0.0019	0.0019
Total Dissolved Solids (TDS)	500	500	500	-	-	-	-	-	-
<i>Metals</i>									
Aluminum	see note d	see note d	-	-	-	-	-	see note d	see note d
Antimony	0.006	0.006	0.006	-	-	-	-	-	-
Arsenic	0.005	0.005	0.01	-	-	-	-	0.005	0.005
Barium	1	1	1	-	-	-	-	-	-
Boron	1.5	1.5	5	-	-	-	-	1.5	1.5
Cadmium	see note e	see note e	0.005	-	-	-	-	see note d	see note d
Chromium (trivalent)	0.0089	0.0089	-	-	-	-	-	0.0089	0.0089
Chromium (hexavalent)	0.001	0.001	-	-	-	-	-	0.001	0.001
Chromium (total)	0.05	0.05	0.05	-	-	-	-	-	-
Copper	0.007	0.007	1	-	-	-	-	0.007	0.007

Table B-3. Groundwater Remediation Guideline Values for Residential/Parkland - All Water Uses

This table must **not** be used for Tier 1 assessment and remediation, unless directed by Section 2.4.3 or 5.1.2. Tier 1 groundwater guidelines are found in Table 2. This table is provided to assist Tier 2 guideline development, using the procedures outlined in the companion Tier 2 document (ESRD 2007 as amended).

Water Use	Lowest Guideline		Potable	Inhalation		Eco Soil Contact		Aquatic Life	
	Fine	Coarse		All	Fine	Coarse	Fine	Coarse	Fine
Soil Type	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
Iron	0.3	0.3	0.3	-	-	-	-	0.3	0.3
Lead	see note e	see note e	0.01	-	-	-	-	see note d	see note d
Manganese	0.05	0.05	0.05	-	-	-	-	-	-
Mercury (total)	0.000005	0.000005	0.001	-	-	-	-	0.000005	0.000005
Nickel	see note d	see note d	-	-	-	-	-	see note d	see note d
Selenium	0.002	0.002	0.05	-	-	-	-	0.002	0.002
Silver	0.0001	0.0001	-	-	-	-	-	0.0001	0.0001
Uranium	0.015	0.015	0.02	-	-	-	-	0.015	0.015
Zinc	0.03	0.03	5	-	-	-	-	0.03	0.03
Hydrocarbons									
Benzene	0.005	0.005	0.005	2.8	0.14	100	61	3.6	0.074
Toluene	0.024	0.021	0.024	NGR	74	82	59	12,000	0.021
Ethylbenzene	0.0016	0.0016	0.0016	NGR	16	42	20	NGR	41
Xylenes	0.02	0.02	0.02	80	3.9	21	31	NGR	2.9
Styrene	0.072	0.072	2.8	90	4.3	-	-	0.072	0.072
F1	2.2	0.81	2.2	19	0.81	6.5	7.1	NGR	9.8
F2	1.1	1.1	1.1	NGR	1.5	1.8	1.8	NGR	1.3
Acenaphthene	0.0060	0.0058	1.4	NGR	NGR	-	-	0.0060	0.0058
Anthracene	0.0034	0.000012	NGR	NGR	NGR	0.025	0.025	0.0034	0.000012
Fluoranthene	0.24	0.000057	NGR	NGR	NGR	0.24	0.24	NGR	0.000057
Fluorene	0.0042	0.003	0.94	NGR	NGR	-	-	0.0042	0.003
Naphthalene	0.001	0.001	0.47	14	0.6	-	-	0.001	0.001
Phenanthrene	0.00086	0.0004	-	-	-	-	-	0.00086	0.0004
Pyrene	0.71	0.000092	0.71	NGR	NGR	-	-	NGR	0.000092

Table B-3. Groundwater Remediation Guideline Values for Residential/Parkland - All Water Uses

This table must **not** be used for Tier 1 assessment and remediation, unless directed by Section 2.4.3 or 5.1.2. Tier 1 groundwater guidelines are found in Table 2. This table is provided to assist Tier 2 guideline development, using the procedures outlined in the companion Tier 2 document (ESRD 2007 as amended).

Water Use	Lowest Guideline		Potable	Inhalation		Eco Soil Contact		Aquatic Life	
	Fine	Coarse		All	Fine	Coarse	Fine	Coarse	Fine
Soil Type	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
Carcinogenic PAHs (as B(a)P TPE) ^a	0.00004	0.00004	0.00004	-	-	-	-	-	-
Benz[a]anthracene	-	-	-	-	-	-	-	NGR	NGR
Benzo[b+j]fluoranthene	-	-	-	-	-	-	-	-	-
Benzo[k]fluoranthene	-	-	-	-	-	-	-	-	-
Benzo[g,h,i]perylene	-	-	-	-	-	-	-	-	-
Benzo[a]pyrene ^b	0.0018	0.0018	-	-	-	0.0018	0.0018	NGR	NGR
Chrysene	-	-	-	-	-	-	-	-	-
Dibenz[a,h]anthracene	-	-	-	-	-	-	-	-	-
Indeno[1,2,3-c,d]pyrene	-	-	-	-	-	-	-	-	-
Halogenated Aliphatics									
Vinyl chloride	0.002	0.0011	0.002	0.018	0.0011	-	-	-	-
1,1-Dichloroethene	0.014	0.014	0.014	0.68	0.039	-	-	-	-
Trichloroethene (Trichloroethylene, TCE)	0.005	0.005	0.005	0.41	0.02	4.4	5	0.27	0.029
Tetrachloroethene (Tetrachloroethylene, Perchloroethylene, PCE)	0.010	0.010	0.010	0.25	0.012	-	-	0.11	0.11
1,2-Dichloroethane	0.005	0.005	0.005	0.17	0.01	-	-	0.1	0.1
Dichloromethane (Methylene chloride)	0.05	0.05	0.05	61	3.4	-	-	0.098	0.098
Trichloromethane (Chloroform) ⁱ	0.08	0.018	0.08	0.53	0.030	-	-	0.10	0.018
Tetrachloromethane (Carbon tetrachloride)	0.002	0.00057	0.002	0.012	0.00057	-	-	0.013	0.013
Dibromochloromethane	0.19	0.19	0.19	26	1.1	-	-	-	-
Chlorinated Aromatics									
Chlorobenzene	0.0013	0.0013	0.03	0.3	0.014	-	-	0.0013	0.0013
1,2-Dichlorobenzene	0.0007	0.0007	0.003	116	5.4	-	-	0.0007	0.0007
1,4-Dichlorobenzene	0.001	0.001	0.001	4.6	0.22	-	-	0.026	0.026
1,2,3-Trichlorobenzene	0.008	0.008	0.014	0.8	0.032	-	-	0.008	0.008

Table B-3. Groundwater Remediation Guideline Values for Residential/Parkland - All Water Uses

This table must **not** be used for Tier 1 assessment and remediation, unless directed by Section 2.4.3 or 5.1.2. Tier 1 groundwater guidelines are found in Table 2. This table is provided to assist Tier 2 guideline development, using the procedures outlined in the companion Tier 2 document (ESRD 2007 as amended).

Water Use	Lowest Guideline		Potable	Inhalation		Eco Soil Contact		Aquatic Life	
	Fine	Coarse		All	Fine	Coarse	Fine	Coarse	Fine
Soil Type	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
1,2,4-Trichlorobenzene	0.015	0.015	0.015	0.71	0.028	-	-	0.024	0.024
1,3,5-Trichlorobenzene	0.014	0.014	0.014	0.38	0.015	-	-	-	-
1,2,3,4-Tetrachlorobenzene	0.0018	0.0018	0.032	NGR	0.14	-	-	0.0018	0.0018
1,2,3,5-Tetrachlorobenzene	0.0038	0.0038	0.0038	0.41	0.017	-	-	-	-
1,2,4,5-Tetrachlorobenzene	0.002	0.002	0.002	0.21	0.0088	-	-	-	-
Pentachlorobenzene	0.0094	0.0069	0.0094	NGR	0.038	-	-	NGR	0.0069
Hexachlorobenzene	0.00057	0.00057	0.00057	0.029	0.0012	-	-	-	-
2,4-Dichlorophenol	0.0002	0.0002	0.0003	NGR	1500	-	-	0.0002	0.0002
2,4,6-Trichlorophenol	0.002	0.002	0.002	NGR	54	-	-	0.018	0.018
2,3,4,6-Tetrachlorophenol	0.001	0.001	0.001	NGR	NGR	-	-	0.001	0.001
Pentachlorophenol	0.00051	0.0005	0.03	NGR	NGR	0.87	0.88	0.00051	0.0005
Dioxins & Furans ^c	0.00000012	0.00000012	0.00000012	-	-	-	-	-	-
PCBs	0.0094	0.0094	0.0094	-	-	-	-	-	-
Pesticides									
Aldicarb	0.001	0.001	0.009	-	-	-	-	0.001	0.001
Aldrin	0.0007	0.0007	0.0007	-	-	-	-	-	-
Atrazine and metabolites	0.0018	0.0018	0.005	-	-	-	-	0.0018	0.0018
Azniphos-methyl (Guthion)	0.00001	0.00001	0.02	-	-	-	-	0.00001	0.00001
Bendiocarb	0.04	0.04	0.04	-	-	-	-	-	-
Bromacil ^g	0.005	0.005	0.95	-	-	0.44	0.30	0.005	0.005
Bromoxynil	0.005	0.005	0.005	-	-	-	-	0.005	0.005
Carbaryl	0.0002	0.0002	0.09	-	-	-	-	0.0002	0.0002
Carbofuran	0.0018	0.0018	0.09	-	-	-	-	0.0018	0.0018
Chlorothalonil	0.00018	0.00018	0.14	-	-	-	-	0.00018	0.00018

Table B-3. Groundwater Remediation Guideline Values for Residential/Parkland - All Water Uses

This table must **not** be used for Tier 1 assessment and remediation, unless directed by Section 2.4.3 or 5.1.2. Tier 1 groundwater guidelines are found in Table 2. This table is provided to assist Tier 2 guideline development, using the procedures outlined in the companion Tier 2 document (ESRD 2007 as amended).

Water Use	Lowest Guideline		Potable	Inhalation		Eco Soil Contact		Aquatic Life	
	Fine	Coarse		All	Fine	Coarse	Fine	Coarse	Fine
Soil Type	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
Chlorpyrifos	0.0000046	0.000002	0.09	-	-	-	-	0.0000046	0.000002
Cyanazine	0.002	0.002	0.01	-	-	-	-	0.002	0.002
2,4-D	0.004	0.004	0.1	-	-	-	-	0.004	0.004
DDT	0.093	0.093	0.093	-	-	-	-	-	-
Diazinon	0.00017	0.00017	0.02	-	-	-	-	0.00017	0.00017
Dicamba	0.01	0.01	0.12	-	-	-	-	0.01	0.01
Diclofop-methyl	0.009	0.0061	0.009	-	-	-	-	0.56	0.0061
Dieldrin	0.0007	0.0007	0.0007	-	-	-	-	-	-
Dimethoate	0.0062	0.0062	0.02	-	-	-	-	0.0062	0.0062
Dinoseb	0.000055	0.00005	0.01	-	-	-	-	0.000055	0.00005
Diquat	0.07	0.07	0.07	-	-	-	-	-	-
Diuron	0.15	0.15	0.15	-	-	-	-	-	-
Endosulfan	0.0019	0.0000031	0.057	-	-	-	-	0.0019	0.0000031
Endrin	0.0028	0.0028	0.0028	-	-	-	-	-	-
Glyphosate	0.065	0.065	0.28	-	-	-	-	0.065	0.065
Heptachlor epoxide	0.000052	0.000052	0.000052	0.0043	0.00024	-	-	-	-
Lindane	0.00001	0.00001	0.0028	-	-	-	-	0.00001	0.00001
Linuron	0.007	0.007	0.019	-	-	-	-	0.007	0.007
Malathion	0.0001	0.0001	0.19	-	-	-	-	0.0001	0.0001
MCPA	0.0026	0.0026	0.1	-	-	-	-	0.0026	0.0026
Methoxychlor	0.9	0.00017	0.9	-	-	-	-	NGR	0.00017
Metolachlor	0.0078	0.0078	0.05	-	-	-	-	0.0078	0.0078
Metribuzin	0.001	0.001	0.08	-	-	-	-	0.001	0.001
Paraquat (as dichloride)	0.01	0.01	0.01	-	-	-	-	-	-

Table B-3. Groundwater Remediation Guideline Values for Residential/Parkland - All Water Uses

This table must **not** be used for Tier 1 assessment and remediation, unless directed by Section 2.4.3 or 5.1.2. Tier 1 groundwater guidelines are found in Table 2. This table is provided to assist Tier 2 guideline development, using the procedures outlined in the companion Tier 2 document (ESRD 2007 as amended).

Water Use	Lowest Guideline		Potable	Inhalation		Eco Soil Contact		Aquatic Life	
	Fine	Coarse		All	Fine	Coarse	Fine	Coarse	Fine
Soil Type	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
Parathion	0.000013	0.000013	0.05	-	-	-	-	0.000013	0.000013
Phorate	0.002	0.002	0.002	-	-	-	-	-	-
Picloram	0.029	0.029	0.19	-	-	-	-	0.029	0.029
Simazine	0.01	0.01	0.01	-	-	-	-	0.01	0.01
Tebuthiuron ^h	0.0016	0.0016	0.66	-	-	0.20	0.25	0.0016	0.0016
Terbufos	0.001	0.001	0.001	-	-	-	-	-	-
Toxaphene	0.00043	0.00043	0.00043	6.4	0.31	-	-	-	-
Triallate	0.00024	0.00024	0.12	-	-	-	-	0.00024	0.00024
Trifluralin	0.0012	0.0002	0.045	-	-	-	-	0.0012	0.0002
Other Organics									
Aniline	0.0022	0.0022	0.066	1,900	87	-	-	0.0022	0.0022
Dibutyl phthalate	0.019	0.019	0.59	NGR	NGR	-	-	0.019	0.019
Dichlorobenzidine	0.007	0.007	0.007	NGR	NGR	-	-	-	-
Diethanolamine	0.06	0.06	0.06	-	-	-	-	65,000	5.0
Diethylene glycol	6.0	6.0	6.0	-	-	-	-	4,000	200
Diisopropanolamine	1.6	1.6	3.6	-	-	160	160	1.6	1.6
Ethylene glycol	31	31	31	NGR	NGR	9,200	16,000	190	190
Hexachlorobutadiene	0.0013	0.0013	0.006	0.031	0.0013	-	-	0.0013	0.0013
Methanol	19	19	19	270,000	19,000	-	-	630	32
Methylmethacrylate	0.47	0.47	0.47	17	0.84	-	-	-	-
Monoethanolamine	0.6	0.6	0.6	-	-	-	-	30,000	1.0
MTBE	0.015	0.015	0.015	6.1	0.34	-	-	10	10
Nitrilotriacetic acid	0.4	0.4	0.4	-	-	-	-	-	-
Nonylphenol + ethoxylates	0.0018	0.0018	-	-	-	0.0081	0.0081	NGR	0.61

Table B-3. Groundwater Remediation Guideline Values for Residential/Parkland - All Water Uses

This table must **not** be used for Tier 1 assessment and remediation, unless directed by Section 2.4.3 or 5.1.2. Tier 1 groundwater guidelines are found in Table 2. This table is provided to assist Tier 2 guideline development, using the procedures outlined in the companion Tier 2 document (ESRD 2007 as amended).

Water Use	Lowest Guideline		Potable	Inhalation		Eco Soil Contact		Aquatic Life	
	Fine	Coarse		All	Fine	Coarse	Fine	Coarse	Fine
Soil Type	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
Phenol	0.004	0.004	0.57	73,000	3,700	110	150	0.004	0.004
Sulfolane	0.09	0.09	0.09	-	-	1,700	2,800	50	50
Triethylene glycol	60	60	60	-	-	-	-	25,000	550
Trihalomethanes - total (THMs)	0.1	0.1	0.1	-	-	-	-	-	-

Notes:

a. *B[a]P TPE (Total Potency Equivalents) are calculated by multiplying the groundwater concentration of individual carcinogenic PAHs by a standardized Benzo[a]pyrene Potency Equivalence to produce a Benzo[a]pyrene relative potency concentration, and by subsequently summing the relative potency concentrations for the entire PAH mixture. B[a]P PEFs are order of magnitude estimates of carcinogenic potential and are based on the World Health Organization (1999) scheme, as follows:*

Carcinogenic PAH Compound	PEF
Benz[a]anthracene	0.1
Benzo(b+j)fluoranthene	0.1
Benzo[k]fluoranthene	0.1
Benzo[ghi]perylene	0.01
Benzo[a]pyrene	1
Chrysene	0.01
Dibenz[a,h]anthracene	1
Indeno[1,2,3-c,d]pyrene	0.1

b. *For ecological receptors only.*

c. *Expressed as toxic equivalents (TEQs) based on 2,3,7,8-PCDD (See CCME, 1999 and updates)*

d. *See Environmental Quality Guidelines for Alberta Surface Waters (ESRD, 2014) for further guidance on aquatic life pathway.*

e. *Tier 1 guideline = lowest of aquatic life guideline and potable GW guideline.*

Table B-3. Groundwater Remediation Guideline Values for Residential/Parkland - All Water Uses

This table must **not** be used for Tier 1 assessment and remediation, unless directed by Section 2.4.3 or 5.1.2. Tier 1 groundwater guidelines are found in Table 2. This table is provided to assist Tier 2 guideline development, using the procedures outlined in the companion Tier 2 document (ESRD 2007 as amended).

f. As S, but can be applied to undissociated H₂S if concerns arise.

g. Eco-contact guidelines from Stantec (2012)

h. Eco-contact guidelines from Stantec (2008)

i. Guideline for protection of aquatic life (fine soil) is set at the maximum concentration of trichloromethane that will support biological degradation (MEMS, 2016).

NGR - no guideline required, calculated value > solubility or >1,000,000 mg/L

Potable GW = protection of groundwater for potable drinking water

Inhalation = protection of volatilization from groundwater and migration into indoor air

Eco Soil Contact = protection of terrestrial plants and soil invertebrates in areas with shallow groundwater

Aquatic Life = protection of groundwater discharging to a surface water body hosting aquatic life

Table B-4. Groundwater Remediation Guideline Values for Commercial/Industrial - All Water Uses

This table must not be used for Tier 1 assessment and remediation, unless directed by Section 2.4.3 or 5.1.2. Tier 1 groundwater guidelines are found in Table 2. This table is provided to assist Tier 2 guideline development, using the procedures outlined in the companion Tier 2 document (ESRD 2007 as amended).

Pathway	Lowest Guideline		Potable	Inhalation		Eco Soil Contact		Aquatic Life	
	Fine	Coarse		Fine	Coarse	Fine	Coarse	Fine	Coarse
Soil Type	Fine	Coarse	All	Fine	Coarse	Fine	Coarse	Fine	Coarse
Unit	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
<i>General and Inorganic Parameters</i>									
pH	6.5-8.5	6.5-8.5	6.5-8.5	-	-	-	-	6.5-9	6.5-9
Ammonia	see note d	see note d	-	-	-	-	-	see note d	see note d
Bromate	0.01	0.01	0.01	-	-	-	-	-	-
Chloride	120	120	250	-	-	-	-	120	120
Cyanide (free)	0.005	0.005	0.2	-	-	-	-	0.005	0.005
Fluoride	1.5	1.5	1.5	-	-	-	-	-	-
Nitrate (as nitrogen)	3	3	10	-	-	-	-	3	3
Nitrite (as nitrogen)	see note e	see note e	1.0	-	-	-	-	see note d	see note d
Sodium	200	200	200	-	-	-	-	-	-
Sulphate	see note e	see note e	500	-	-	-	-	see note d	see note d
Sulphide - Total (as S) ^f	0.0019	0.0019	0.05	-	-	-	-	0.0019	0.0019
Total Dissolved Solids (TDS)	500	500	500	-	-	-	-	-	-
<i>Metals</i>									
Aluminum	see note d	see note d	-	-	-	-	-	see note d	see note d
Antimony	0.006	0.006	0.006	-	-	-	-	-	-
Arsenic	0.005	0.005	0.01	-	-	-	-	0.005	0.005
Barium	1	1	1	-	-	-	-	-	-
Boron	1.5	1.5	5	-	-	-	-	1.5	1.5
Cadmium	see note e	see note e	0.005	-	-	-	-	see note d	see note d
Chromium (trivalent)	0.0089	0.0089	-	-	-	-	-	0.0089	0.0089
Chromium (hexavalent)	0.001	0.001	-	-	-	-	-	0.001	0.001
Chromium (total)	0.05	0.05	0.05	-	-	-	-	-	-
Copper	0.007	0.007	1	-	-	-	-	0.007	0.007
Iron	0.3	0.3	0.3	-	-	-	-	0.3	0.3

Table B-4. Groundwater Remediation Guideline Values for Commercial/Industrial - All Water Uses

This table must **not** be used for Tier 1 assessment and remediation, unless directed by Section 2.4.3 or 5.1.2. Tier 1 groundwater guidelines are found in Table 2. This table is provided to assist Tier 2 guideline development, using the procedures outlined in the companion Tier 2 document (ESRD 2007 as amended).

Pathway	Lowest Guideline		Potable	Inhalation		Eco Soil Contact		Aquatic Life	
	Fine	Coarse		Fine	Coarse	Fine	Coarse	Fine	Coarse
Soil Type	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
Lead	see note e	see note e	0.01	-	-	-	-	see note d	see note d
Manganese	0.05	0.05	0.05	-	-	-	-	-	-
Mercury (total)	0.000005	0.000005	0.001	-	-	-	-	0.000005	0.000005
Nickel	see note d	see note d	-	-	-	-	-	see note d	see note d
Selenium	0.002	0.002	0.05	-	-	-	-	0.002	0.002
Silver	0.0001	0.0001	-	-	-	-	-	0.0001	0.0001
Uranium	0.015	0.015	0.02	-	-	-	-	0.015	0.015
Zinc	0.03	0.03	5	-	-	-	-	0.03	0.03
Hydrocarbons									
Benzene	0.005	0.005	0.005	19	1.8	540	350	3.6	0.074
Toluene	0.024	0.021	0.024	NGR	NGR	240	200	12,000	0.021
Ethylbenzene	0.0016	0.0016	0.0016	NGR	NGR	150	110	NGR	41
Xylenes	0.02	0.02	0.02	NGR	48	74	120	NGR	2.9
Styrene	0.072	0.072	2.8	NGR	51	-	-	0.072	0.072
F1	2.2	2.2	2.2	NGR	9.1	9.9	11	NGR	9.8
F2	1.1	1.1	1.1	NGR	17	3.1	3.1	NGR	1.3
Acenaphthene	0.0060	0.0058	1.4	NGR	NGR	-	-	0.0060	0.0058
Anthracene	0.0034	0.000012	NGR	NGR	NGR	0.32	0.32	0.0034	0.000012
Fluoranthene	0.86	0.000057	NGR	NGR	NGR	0.86	0.86	NGR	0.000057
Fluorene	0.0042	0.003	0.94	NGR	NGR	-	-	0.0042	0.003
Naphthalene	0.001	0.001	0.47	NGR	7	-	-	0.001	0.001
Phenanthrene	0.00086	0.0004	-	-	-	-	-	0.00086	0.0004
Pyrene	0.71	0.000092	0.71	NGR	NGR	-	-	NGR	0.000092
Carcinogenic PAHs (as B(a)P TPE) ^a	0.00004	0.00004	0.00004	-	-	-	-	-	-
Benz[a]anthracene	-	-	-	-	-	-	-	NGR	NGR
Benzo[b+j]fluoranthene	-	-	-	-	-	-	-	-	-

Table B-4. Groundwater Remediation Guideline Values for Commercial/Industrial - All Water Uses

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Pathway	Lowest Guideline		Potable	Inhalation		Eco Soil Contact		Aquatic Life	
	Fine	Coarse		All	Fine	Coarse	Fine	Coarse	Fine
Soil Type	Fine	Coarse	All	Fine	Coarse	Fine	Coarse	Fine	Coarse
Unit	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
Benzo[k]fluoranthene	-	-	-	-	-	-	-	-	-
Benzo[g,h,i]perylene	-	-	-	-	-	-	-	-	-
Benzo[a]pyrene ^b	0.0066	0.0066	-	-	-	0.0066	0.0066	NGR	NGR
Chrysene	-	-	-	-	-	-	-	-	-
Dibenz[a,h]anthracene	-	-	-	-	-	-	-	-	-
Indeno[1,2,3-c,d]pyrene	-	-	-	-	-	-	-	-	-
Halogenated Aliphatics									
Vinyl chloride	0.002	0.002	0.002	0.12	0.013	-	-	-	-
1,1-Dichloroethene	0.014	0.014	0.014	4.5	0.49	-	-	-	-
Trichloroethene (Trichloroethylene, TCE)	0.005	0.005	0.005	2.8	0.25	73	83	0.27	0.029
Tetrachloroethene (Tetrachloroethylene, Perchloroethylene, PCE)	0.010	0.010	0.010	1.8	0.14	-	-	0.11	0.11
1,2-Dichloroethane	0.005	0.005	0.005	1.2	0.13	-	-	0.1	0.1
Dichloromethane (Methylene chloride)	0.05	0.05	0.05	410	43	-	-	0.098	0.098
Trichloromethane (Chloroform) ⁱ	0.08	0.018	0.08	3.5	0.38	-	-	0.10	0.018
Tetrachloromethane (Carbon tetrachloride)	0.002	0.002	0.002	0.080	0.0069	-	-	0.013	0.013
Dibromochloromethane	0.19	0.19	0.19	250	10	-	-	-	-
Chlorinated Aromatics									
Chlorobenzene	0.0013	0.0013	0.03	2.2	0.18	-	-	0.0013	0.0013
1,2-Dichlorobenzene	0.0007	0.0007	0.003	NGR	64	-	-	0.0007	0.0007
1,4-Dichlorobenzene	0.001	0.001	0.001	32	2.6	-	-	0.026	0.026
1,2,3-Trichlorobenzene	0.008	0.008	0.014	6.9	0.33	-	-	0.008	0.008
1,2,4-Trichlorobenzene	0.015	0.015	0.015	6.1	0.29	-	-	0.024	0.024
1,3,5-Trichlorobenzene	0.014	0.014	0.014	3.3	0.15	-	-	-	-
1,2,3,4-Tetrachlorobenzene	0.0018	0.0018	0.032	NGR	NGR	-	-	0.0018	0.0018
1,2,3,5-Tetrachlorobenzene	0.0038	0.0038	0.0038	NGR	0.16	-	-	-	-

Table B-4. Groundwater Remediation Guideline Values for Commercial/Industrial - All Water Uses

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Pathway	Lowest Guideline		Potable	Inhalation		Eco Soil Contact		Aquatic Life	
	Fine	Coarse		All	Fine	Coarse	Fine	Coarse	Fine
Soil Type	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
1,2,4,5-Tetrachlorobenzene	0.002	0.002	0.002	NGR	0.08	-	-	-	-
Pentachlorobenzene	0.0094	0.0069	0.0094	NGR	0.44	-	-	NGR	0.0069
Hexachlorobenzene	0.00057	0.00057	0.00057	0.21	0.014	-	-	-	-
2,4-Dichlorophenol	0.0002	0.0002	0.0003	NGR	NGR	-	-	0.0002	0.0002
2,4,6-Trichlorophenol	0.002	0.002	0.002	NGR	540	-	-	0.018	0.018
2,3,4,6-Tetrachlorophenol	0.001	0.001	0.001	NGR	NGR	-	-	0.001	0.001
Pentachlorophenol	0.00051	0.0005	0.03	NGR	NGR	2.2	2.2	0.00051	0.0005
Dioxins & Furans ^c	0.00000012	0.00000012	0.00000012	-	-	-	-	-	-
PCBs	0.0094	0.0094	0.0094	-	-	-	-	-	-
Pesticides									
Aldicarb	0.001	0.001	0.009	-	-	-	-	0.001	0.001
Aldrin	0.0007	0.0007	0.0007	-	-	-	-	-	-
Atrazine and metabolites	0.0018	0.0018	0.005	-	-	-	-	0.0018	0.0018
Azinphos-methyl (Guthion)	0.00001	0.00001	0.02	-	-	-	-	0.00001	0.00001
Bendiocarb	0.04	0.04	0.04	-	-	-	-	-	-
Bromacil ^g	0.005	0.005	0.95	-	-	1.1	0.50	0.005	0.005
Bromoxynil	0.005	0.005	0.005	-	-	-	-	0.005	0.005
Carbaryl	0.0002	0.0002	0.09	-	-	-	-	0.0002	0.0002
Carbofuran	0.0018	0.0018	0.09	-	-	-	-	0.0018	0.0018
Chlorothalonil	0.00018	0.00018	0.14	-	-	-	-	0.00018	0.00018
Chlorpyrifos	0.0000046	0.000002	0.09	-	-	-	-	0.0000046	0.000002
Cyanazine	0.002	0.002	0.01	-	-	-	-	0.002	0.002
2,4-D	0.004	0.004	0.1	-	-	-	-	0.004	0.004
DDT	0.093	0.093	0.093	-	-	-	-	-	-
Diazinon	0.00017	0.00017	0.02	-	-	-	-	0.00017	0.00017
Dicamba	0.01	0.01	0.12	-	-	-	-	0.01	0.01

Table B-4. Groundwater Remediation Guideline Values for Commercial/Industrial - All Water Uses

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Pathway	Lowest Guideline		Potable	Inhalation		Eco Soil Contact		Aquatic Life	
	Fine	Coarse		All	Fine	Coarse	Fine	Coarse	Fine
Soil Type	Fine	Coarse	All	Fine	Coarse	Fine	Coarse	Fine	Coarse
Unit	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
Diclofop-methyl	0.009	0.0061	0.009	-	-	-	-	0.56	0.0061
Dieldrin	0.0007	0.0007	0.0007	-	-	-	-	-	-
Dimethoate	0.0062	0.0062	0.02	-	-	-	-	0.0062	0.0062
Dinoseb	0.000055	0.00005	0.01	-	-	-	-	0.000055	0.00005
Diquat	0.07	0.07	0.07	-	-	-	-	-	-
Diuron	0.15	0.15	0.15	-	-	-	-	-	-
Endosulfan	0.0019	0.0000031	0.057	-	-	-	-	0.0019	0.0000031
Endrin	0.0028	0.0028	0.0028	-	-	-	-	-	-
Glyphosate	0.065	0.065	0.28	-	-	-	-	0.065	0.065
Heptachlor epoxide	0.000052	0.000052	0.000052	0.051	0.002	-	-	-	-
Lindane	0.00001	0.00001	0.0028	-	-	-	-	0.00001	0.00001
Linuron	0.007	0.007	0.019	-	-	-	-	0.007	0.007
Malathion	0.0001	0.0001	0.19	-	-	-	-	0.0001	0.0001
MCPA	0.0026	0.0026	0.1	-	-	-	-	0.0026	0.0026
Methoxychlor	0.9	0.00017	0.9	-	-	-	-	NGR	0.00017
Metolachlor	0.0078	0.0078	0.05	-	-	-	-	0.0078	0.0078
Metribuzin	0.001	0.001	0.08	-	-	-	-	0.001	0.001
Paraquat (as dichloride)	0.01	0.01	0.01	-	-	-	-	-	-
Parathion	0.000013	0.000013	0.05	-	-	-	-	0.000013	0.000013
Phorate	0.002	0.002	0.002	-	-	-	-	-	-
Picloram	0.029	0.029	0.19	-	-	-	-	0.029	0.029
Simazine	0.01	0.01	0.01	-	-	-	-	0.01	0.01
Tebuthiuron ^h	0.0016	0.0016	0.66	-	-	2.6	3.2	0.0016	0.0016
Terbufos	0.001	0.001	0.001	-	-	-	-	-	-
Toxaphene	0.00043	0.00043	0.00043	75	2.9	-	-	-	-
Triallate	0.00024	0.00024	0.12	-	-	-	-	0.00024	0.00024

Table B-4. Groundwater Remediation Guideline Values for Commercial/Industrial - All Water Uses

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Pathway	Lowest Guideline		Potable	Inhalation		Eco Soil Contact		Aquatic Life	
	Fine	Coarse		Fine	Coarse	Fine	Coarse	Fine	Coarse
Soil Type	Fine	Coarse	All	Fine	Coarse	Fine	Coarse	Fine	Coarse
Unit	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
Trifluralin	0.0012	0.0002	0.045	-	-	-	-	0.0012	0.0002
<i>Other Organics</i>									
Aniline	0.0022	0.0022	0.066	13,000	1,000	-	-	0.0022	0.0022
Dibutyl phthalate	0.019	0.019	0.59	NGR	NGR	-	-	0.019	0.019
Dichlorobenzidine	0.007	0.007	0.007	NGR	NGR	-	-	-	-
Diethanolamine	0.06	0.06	0.06	-	-	-	-	65,000	5.0
Diethylene glycol	6.0	6.0	6.0	-	-	-	-	4,000	200
Diisopropanolamine	1.6	1.6	3.6	-	-	320	320	1.6	1.6
Ethylene glycol	31	31	31	NGR	NGR	15,000	26,000	190	190
Hexachlorobutadiene	0.0013	0.0013	0.006	0.22	0.015	-	-	0.0013	0.0013
Methylmethacrylate	0.47	0.47	0.47	120	10	-	-	-	-
Methanol	19	19	19	NGR	250,000	-	-	630	32
Monoethanolamine	0.6	0.6	0.6	-	-	-	-	30,000	1.0
MTBE	0.015	0.015	0.015	40	4.3	-	-	10	10
Nitrilotriacetic acid	0.4	0.4	0.4	-	-	-	-	-	-
Nonylphenol + ethoxylates	0.02	0.02	-	-	-	0.02	0.02	NGR	0.61
Phenol	0.004	0.004	0.57	NGR	45,000	730	1000	0.004	0.004
Sulfolane	0.09	0.09	0.09	-	-	3,400	5,700	50	50
Triethylene glycol	60	60	60	-	-	-	-	25,000	550
Trihalomethanes - total (THMs)	0.1	0.1	0.1	-	-	-	-	-	-

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Notes:

a. B[a]P TPE (Total Potency Equivalents) are calculated by multiplying the groundwater concentration of individual carcinogenic PAHs by a standardized Benzo[a]pyrene Potency Equivalence to produce a Benzo[a]pyrene relative potency concentration, and by subsequently summing the relative potency concentrations for the entire PAH mixture. B[a]P PEFs are order of magnitude estimates of carcinogenic potential and are based on the World Health Organization (1999) scheme, as follows:

Carcinogenic PAH Compound	PEF
Benz[a]anthracene	0.1
Benzo(b+j)fluoranthene	0.1
Benzo[k]fluoranthene	0.1
Benzo[ghi]perylene	0.01
Benzo[a]pyrene	1
Chrysene	0.01
Dibenz[a,h]anthracene	1
Indeno[1,2,3-c,d]pyrene	0.1

b. For ecological receptors only.

c. Expressed as toxic equivalents (TEQs) based on 2,3,7,8-PCDD (See CCME, 1999 and updates)

d. See Environmental Quality Guidelines for Alberta Surface Waters (ESRD, 2014) for further guidance on aquatic life pathway.

e. Tier 1 guideline = lowest of aquatic life guideline and potable GW guideline.

f. As S, but can be applied to undissociated H₂S if concerns arise.

g. Eco-contact guidelines from Stantec (2012)

h. Eco-contact guidelines from Stantec (2008)

i. Guideline for protection of aquatic life (fine soil) is set at the maximum concentration of trichloromethane that will support biological degradation (MEMS, 2016).

NGR - no guideline required, calculated value > solubility or >1,000,000 mg/L

Potable GW = protection of groundwater for potable drinking water

Inhalation = protection of volatilization from groundwater and migration into indoor air

Eco Soil Contact = protection of terrestrial plants and soil invertebrates in areas with shallow groundwater

Aquatic Life = protection of groundwater discharging to a surface water body hosting aquatic life