

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 | Coarse |
| Soil Type | (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) |
| General and Inorganic Parameters | | | | | | | | | |
| pH | 6.5-8.5 | 6.5-8.5 | 6.5-8.5 | - | - | 6.5-9.0 | 6.5-9.0 | - | - |
| Ammonia | see note d | see note d | - | - | - | see note d | see note d | - | - |
| Bromate | 0.010 | 0.010 | 0.010 | - | - | - | - | - | - |
| Chloride | 120 | 120 | 250 | - | - | 120 | 120 | - | - |
| Cyanide (free) | 0.0050 | 0.0050 | 0.20 | - | - | 0.0050 | 0.0050 | - | - |
| Fluoride | 1.5 | 1.5 | 1.5 | - | - | - | - | - | - |
| Nitrate (as nitrogen) | 3.0 | 3.0 | 10 | - | - | 3.0 | 3.0 | - | - |
| 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 | 0.050 | - | - | 0.0019 | 0.0019 | - | - |
| Total Dissolved Solids (TDS) | 500 | 500 | 500 | - | - | - | - | - | - |
| Metals | | | | | | | | | |
| Aluminum | see note d | see note d | 2.9 | - | - | see note d | see note d | - | - |
| Antimony | 0.0060 | 0.0060 | 0.0060 | - | - | - | - | - | - |
| Arsenic | 0.0050 | 0.0050 | 0.010 | - | - | 0.005 | 0.005 | - | - |
| Barium | 2.0 | 2.0 | 2.0 | - | - | - | - | - | - |
| Boron | 1.5 | 1.5 | 5.0 | - | - | 1.5 | 1.5 | - | - |
| Cadmium | see note e | see note e | 0.0070 | - | - | see note d | see note d | - | - |
| Chromium (trivalent) | 0.0089 | 0.0089 | - | - | - | 0.0089 | 0.0089 | - | - |
| Chromium (hexavalent) | 0.0010 | 0.0010 | - | - | - | 0.0010 | 0.0010 | - | - |
| Chromium (total) ^j | 0.050 | 0.050 | 0.050 | - | - | - | - | - | - |

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| Water Use Soil Type | Lowest Guideline | | Potable GW | Eco Soil Contact | | Aquatic Life | | Wildlife Watering | |
|------------------------------|------------------|------------|------------|------------------|--------|--------------|------------|-------------------|--------|
| | 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) |
| Copper | 0.0070 | 0.0070 | 1.0 | - | - | 0.0070 | 0.0070 | - | - |
| Iron | 0.30 | 0.30 | 0.30 | - | - | 0.30 | 0.30 | - | - |
| Lead | See note e | See note e | 0.0050 | - | - | see note d | see note d | - | - |
| Manganese | 0.020 | 0.020 | 0.020 | - | - | - | - | - | - |
| Mercury (total) ¹ | 0.0000050 | 0.0000050 | 0.0010 | - | - | 0.0000050 | 0.0000050 | - | - |
| Nickel | see note d | see note d | - | - | - | see note d | see note d | - | - |
| Selenium | 0.0020 | 0.0020 | 0.050 | - | - | 0.0020 | 0.0020 | - | - |
| Silver | 0.00010 | 0.00010 | - | - | - | 0.00010 | 0.00010 | - | - |
| Uranium | 0.015 | 0.015 | 0.020 | - | - | 0.015 | 0.015 | - | - |
| Zinc | 0.030 | 0.030 | 5.0 | - | - | 0.030 | 0.030 | - | - |
| Hydrocarbons | | | | | | | | | |
| Benzene | 0.0050 | 0.0050 | 0.0050 | 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 | 0.020 | 0.020 | 0.020 | 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 | - | - | 0.0010 | 0.0010 | NGR | NGR |

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| Water Use Soil Type | Lowest Guideline | | Potable GW | Eco Soil Contact | | Aquatic Life | | Wildlife Watering | |
|---|------------------|----------|------------|------------------|--------|--------------|----------|-------------------|--------|
| | 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) |
| Phenanthrene | 0.00086 | 0.00040 | - | - | - | 0.00086 | 0.00040 | NGR | NGR |
| Pyrene | 0.71 | 0.000092 | 0.71 | - | - | NGR | 0.000092 | NGR | NGR |
| Carcinogenic PAHs (as B(a)P TPE) ^a | 0.000040 | 0.000040 | 0.000040 | - | - | - | - | - | - |
| 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 | 0.0020 | 0.0020 | 0.0020 | - | - | - | - | - | - |
| 1,1-Dichloroethene | 0.014 | 0.014 | 0.014 | - | - | - | - | - | - |
| Trichloroethene (Trichloroethylene, TCE) | 0.0050 | 0.0050 | 0.0050 | 4.4 | 5.0 | 0.27 | 0.029 | - | - |
| Tetrachloroethene (Tetrachloroethylene, Perchloroethylene, PCE) | 0.010 | 0.010 | 0.010 | - | - | 0.11 | 0.11 | - | - |
| 1,2-Dichloroethane | 0.0050 | 0.0050 | 0.0050 | - | - | 0.10 | 0.10 | - | - |
| Dichloromethane (Methylene chloride) | 0.050 | 0.050 | 0.050 | - | - | 0.098 | 0.098 | - | - |
| Trichloromethane (Chloroform) ⁱ | 0.080 | 0.018 | 0.080 | - | - | 0.10 | 0.018 | - | - |
| Tetrachloromethane (Carbon tetrachloride) | 0.0020 | 0.0020 | 0.0020 | - | - | 0.013 | 0.013 | - | - |
| Dibromochloromethane | 0.19 | 0.19 | 0.19 | - | - | - | - | - | - |
| Chlorinated Aromatics | | | | | | | | | |
| Chlorobenzene | 0.0013 | 0.0013 | 0.030 | - | - | 0.0013 | 0.0013 | - | - |

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| Water Use Soil Type | Lowest Guideline | | Potable GW | Eco Soil Contact | | Aquatic Life | | Wildlife Watering | |
|-------------------------------|------------------|------------|------------|------------------|--------|--------------|----------|-------------------|--------|
| | 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) |
| 1,2-Dichlorobenzene | 0.00070 | 0.00070 | 0.0030 | - | - | 0.00070 | 0.00070 | - | - |
| 1,4-Dichlorobenzene | 0.0010 | 0.0010 | 0.0010 | - | - | 0.026 | 0.026 | - | - |
| 1,2,3-Trichlorobenzene | 0.0080 | 0.0080 | 0.014 | - | - | 0.0080 | 0.0080 | - | - |
| 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 | 0.0020 | 0.0020 | 0.0020 | - | - | - | - | - | - |
| Pentachlorobenzene | 0.0094 | 0.0069 | 0.0094 | - | - | NGR | 0.0069 | - | - |
| Hexachlorobenzene | 0.00029 | 0.00029 | 0.00029 | - | - | - | - | - | - |
| 2,4-Dichlorophenol | 0.00020 | 0.00020 | 0.00030 | - | - | 0.00020 | 0.00020 | - | - |
| 2,4,6-Trichlorophenol | 0.0020 | 0.0020 | 0.0020 | - | - | 0.018 | 0.018 | - | - |
| 2,3,4,6-Tetrachlorophenol | 0.0010 | 0.0010 | 0.0010 | - | - | 0.0010 | 0.0010 | - | - |
| Pentachlorophenol | 0.00051 | 0.00050 | 0.03 | 0.87 | 0.88 | 0.00051 | 0.00050 | - | - |
| Dioxins & Furans ^c | 0.00000012 | 0.00000012 | 0.00000012 | - | - | - | - | - | - |
| PCBs | 0.000094 | 0.000094 | 0.000094 | - | - | - | - | - | - |
| Pesticides | | | | | | | | | |
| Aldicarb | 0.0010 | 0.0010 | 0.0090 | - | - | 0.0010 | 0.0010 | - | - |
| Aldrin | 0.000028 | 0.000028 | 0.000028 | - | - | - | - | - | - |
| Atrazine and metabolites | 0.0018 | 0.0018 | 0.0050 | - | - | 0.0018 | 0.0018 | - | - |
| Azniphos-methyl (Guthion) | 0.000010 | 0.000010 | 0.020 | - | - | 0.000010 | 0.000010 | - | - |
| Bromacil ^g | 0.0050 | 0.0050 | 0.95 | 0.44 | 0.30 | 0.0050 | 0.0050 | - | - |
| Bromoxynil | 0.0050 | 0.0050 | 0.0050 | - | - | 0.0050 | 0.0050 | - | - |

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| Water Use Soil Type | Lowest Guideline | | Potable GW | Eco Soil Contact | | Aquatic Life | | Wildlife Watering | |
|------------------------|------------------|-----------|------------|------------------|--------|--------------|-----------|-------------------|--------|
| | 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) |
| Carbaryl | 0.00020 | 0.00020 | 0.090 | - | - | 0.00020 | 0.00020 | - | - |
| Carbofuran | 0.0018 | 0.0018 | 0.090 | - | - | 0.0018 | 0.0018 | - | - |
| Chlorothalonil | 0.00018 | 0.00018 | 0.14 | - | - | 0.00018 | 0.00018 | - | - |
| Chlorpyrifos | 0.0000046 | 0.0000020 | 0.09 | - | - | 0.0000046 | 0.0000020 | - | - |
| 2,4-D | 0.0040 | 0.0040 | 0.10 | - | - | 0.0040 | 0.0040 | - | - |
| DDT | 0.0014 | 0.0014 | 0.0014 | - | - | - | - | - | - |
| Diazinon | 0.00017 | 0.00017 | 0.02 | - | - | 0.00017 | 0.00017 | - | - |
| Dicamba | 0.010 | 0.010 | 0.12 | - | - | 0.010 | 0.010 | - | - |
| Diclofop-methyl | 0.0090 | 0.0061 | 0.0090 | - | - | 0.56 | 0.0061 | - | - |
| Dieldrin | 0.000029 | 0.000029 | 0.000029 | - | - | - | - | - | - |
| Dimethoate | 0.0062 | 0.0062 | 0.020 | - | - | 0.0062 | 0.0062 | - | - |
| Dinoseb | 0.000055 | 0.000050 | 0.010 | - | - | 0.000055 | 0.000050 | - | - |
| Diquat | 0.070 | 0.070 | 0.070 | - | - | - | - | - | - |
| 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 | 0.000010 | 0.000010 | 0.0028 | - | - | 0.000010 | 0.000010 | - | - |
| Linuron | 0.0070 | 0.0070 | 0.019 | - | - | 0.0070 | 0.0070 | - | - |
| Malathion | 0.00010 | 0.00010 | 0.19 | - | - | 0.00010 | 0.00010 | - | - |
| MCPA | 0.0026 | 0.0026 | 0.10 | - | - | 0.0026 | 0.0026 | - | - |
| Methoxychlor | 0.90 | 0.00017 | 0.90 | - | - | NGR | 0.00017 | - | - |
| Metolachlor | 0.0078 | 0.0078 | 0.050 | - | - | 0.0078 | 0.0078 | - | - |

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| Water Use Soil Type | Lowest Guideline | | Potable GW | Eco Soil Contact | | Aquatic Life | | Wildlife Watering | |
|-------------------------------|------------------|---------|------------|------------------|--------|--------------|---------|-------------------|--------|
| | 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) |
| Metribuzin | 0.0010 | 0.0010 | 0.080 | - | - | 0.0010 | 0.0010 | - | - |
| Paraquat (as dichloride) | 0.010 | 0.010 | 0.010 | - | - | - | - | - | - |
| Phorate | 0.0020 | 0.0020 | 0.0020 | - | - | - | - | - | - |
| Picloram | 0.029 | 0.029 | 0.19 | - | - | 0.029 | 0.029 | - | - |
| Simazine | 0.010 | 0.010 | 0.010 | - | - | 0.010 | 0.010 | - | - |
| Tebuthiuron ^h | 0.0016 | 0.0016 | 0.66 | 0.20 | 0.25 | 0.0016 | 0.0016 | - | - |
| Terbufos | 0.0010 | 0.0010 | 0.0010 | - | - | - | - | - | - |
| Toxaphene | 0.00043 | 0.00043 | 0.00043 | - | - | - | - | - | - |
| Triallate | 0.00024 | 0.00024 | 0.12 | - | - | 0.00024 | 0.00024 | - | - |
| Trifluralin | 0.0012 | 0.00020 | 0.045 | - | - | 0.0012 | 0.00020 | - | - |
| Other Organics | | | | | | | | | |
| Aniline | 0.0022 | 0.0022 | 0.066 | - | - | 0.0022 | 0.0022 | - | - |
| Di- <i>n</i> -butyl phthalate | 0.019 | 0.019 | 0.59 | - | - | 0.019 | 0.019 | - | - |
| Dichlorobenzidine | 0.0010 | 0.0010 | 0.0010 | - | - | - | - | - | - |
| Diethanolamine | 0.060 | 0.060 | 0.060 | - | - | 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 | 0.0060 | - | - | 0.0013 | 0.0013 | - | - |
| Methanol | 19 | 19 | 19 | - | - | 630 | 32 | - | - |
| Methylmethacrylate | 13 | 13 | 13 | - | - | - | - | - | - |
| Monoethanolamine | 0.60 | 0.60 | 0.60 | - | - | 30,000 | 1.0 | - | - |
| MTBE | 0.015 | 0.015 | 0.015 | - | - | 10 | 10 | - | - |

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| Water Use Soil Type | Lowest Guideline | | Potable GW | Eco Soil Contact | | Aquatic Life | | Wildlife Watering | |
|---|------------------|---------|------------|------------------|--------|--------------|--------|-------------------|--------|
| | 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) |
| Nitritotriacetic acid | 0.40 | 0.40 | 0.40 | - | - | - | - | - | - |
| Nonylphenol + ethoxylates | 0.0081 | 0.0081 | - | 0.0081 | 0.0081 | NGR | 0.61 | - | - |
| Perfluorooctane sulfonate (PFOS) ^k | 0.00060 | 0.00060 | 0.00060 | 1.4 | 1.4 | 0.0068 | 0.0068 | 0.052 | 0.052 |
| Perfluorooctanoic acid (PFOA) ^k | 0.00020 | 0.00020 | 0.00020 | - | - | - | - | - | - |
| Phenol | 0.0040 | 0.0040 | 0.57 | 110 | 150 | 0.0040 | 0.0040 | - | - |
| Sulfolane | 0.090 | 0.090 | 0.090 | 1,700 | 2,800 | 50 | 50 | - | - |
| Triethylene glycol | 60 | 60 | 60 | - | - | 25,000 | 550 | - | - |
| Trihalomethanes - total (THMs) | 0.10 | 0.10 | 0.10 | - | - | - | - | - | - |

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 |
|---------------------------|------|
| Benzo[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 |

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- 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 and updates) 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).
- j. Total means all chemical species.
- k. As the toxicological effects of PFOA and perfluorooctanoyl sulfonate (PFOS) are considered to be additive, the sum of the ratios of the detected concentrations to the corresponding MACs for PFOS and PFOA should not exceed 1.

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

TABLE B-2. GROUNDWATER REMEDIATION GUIDELINE VALUES FOR AGRICULTURAL LAND - ALL WATER USES

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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 | All | 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) |
| General and Inorganic Parameters | | | | | | | | | | | | | |
| pH | 6.5-8.5 | 6.5-8.5 | 6.5-8.5 | - | - | - | - | 6.5-9.0 | 6.5-9.0 | - | - | - | - |
| Ammonia | see note d | see note d | - | - | - | - | - | see note d | see note d | - | - | - | - |
| Bromate | 0.010 | 0.010 | 0.010 | - | - | - | - | - | - | - | - | - | - |
| Chloride | 100 | 100 | 250 | - | - | - | - | 120 | 120 | 100 | - | - | - |
| Cyanide (free) | 0.0050 | 0.0050 | 0.20 | - | - | - | - | 0.0050 | 0.0050 | - | - | - | - |
| Electrical Conductivity (dS/m) | 1.0 | 1.0 | | | | | | | | 1.0 | | | |
| Fluoride | 1.0 | 1.0 | 1.5 | - | - | - | - | - | - | 1.0 | 1.0 | - | - |
| Nitrate (as nitrogen) | 3.0 | 3.0 | 10 | - | - | - | - | 3.0 | 3.0 | - | - | - | - |
| 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 | 5.0 | 5.0 | | | | | | | | 5.0 | | | |
| Sulphate | see note e | see note e | 500 | - | - | - | - | see note d | see note d | - | 1000 | - | - |
| Sulphide – Total (as S) ^f | 0.0019 | 0.0019 | 0.050 | - | - | - | - | 0.0019 | 0.0019 | - | - | - | - |
| Total Dissolved Solids (TDS) | 500 | 500 | 500 | - | - | - | - | - | - | - | 3000 | - | - |
| Metals | | | | | | | | | | | | | |
| Aluminum | see note d | see note d | 2.9 | - | - | - | - | see note d | see note d | 5.0 | 5.0 | - | - |
| Antimony | 0.0060 | 0.0060 | 0.0060 | - | - | - | - | - | - | - | - | - | - |
| Arsenic | 0.0050 | 0.0050 | 0.010 | - | - | - | - | 0.0050 | 0.0050 | 0.16 | 0.025 | - | - |
| Barium | 2.0 | 2.0 | 2.0 | - | - | - | - | - | - | - | - | - | - |
| Boron | 1.0 | 1.0 | 5.0 | - | - | - | - | 1.5 | 1.5 | 1.0 | 5.0 | - | - |
| Cadmium | see note e | see note e | 0.0070 | - | - | - | - | see note d | see note d | 0.0082 | 0.080 | - | - |

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 required due to land use considerations (see Sections 3.2 and 5.1.1). 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 | All | 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) |
| 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) |
| Chromium (trivalent) | 0.0049 | 0.0049 | - | - | - | - | - | 0.0089 | 0.0089 | 0.0049 | 0.050 | - | - |
| Chromium (hexavalent) | 0.0010 | 0.0010 | - | - | - | - | - | 0.0010 | 0.0010 | 0.0080 | 0.050 | - | - |
| Chromium (total) ^j | 0.050 | 0.050 | 0.050 | - | - | - | - | - | - | - | - | - | - |
| Copper | 0.0070 | 0.0070 | 1.0 | - | - | - | - | 0.007 | 0.007 | 0.20 | 0.50 | - | - |
| Iron | 0.30 | 0.30 | 0.30 | - | - | - | - | 0.30 | 0.30 | 5.0 | - | - | - |
| Lead | see note e | see note e | 0.0050 | - | - | - | - | see note d | see note d | 0.20 | 0.10 | - | - |
| Manganese | 0.020 | 0.020 | 0.020 | - | - | - | - | - | - | 0.20 | - | - | - |
| Mercury (total) ^j | 0.0000050 | 0.0000050 | 0.001 | - | - | - | - | 0.0000050 | 0.0000050 | - | 0.003 | - | - |
| Nickel | see note e | see note e | - | - | - | - | - | see note d | see note d | 0.20 | 1.0 | - | - |
| Selenium | 0.0020 | 0.0020 | 0.050 | - | - | - | - | 0.0020 | 0.0020 | 0.020 | 0.050 | - | - |
| Silver | 0.00010 | 0.00010 | - | - | - | - | - | 0.00010 | 0.00010 | 0.020 | 0.050 | - | - |
| Uranium | 0.010 | 0.010 | 0.020 | - | - | - | - | 0.015 | 0.015 | 0.010 | 0.20 | - | - |
| Zinc | 0.030 | 0.030 | 5.0 | - | - | - | - | 0.030 | 0.030 | 1.0 | 50 | - | - |
| Hydrocarbons | | | | | | | | | | | | | |
| Benzene | 0.0050 | 0.0050 | 0.0050 | 0.57 | 0.03 | 100 | 61 | 3.6 | 0.074 | - | 0.088 | 6.8 | 0.14 |
| Toluene | 0.024 | 0.021 | 0.024 | NGR | 45 | 82 | 59 | 12,000 | 0.021 | - | 4.9 | NGR | 180 |
| Ethylbenzene | 0.0016 | 0.0016 | 0.0016 | NGR | 31 | 42 | 20 | NGR | 41 | - | 3.2 | NGR | NGR |
| Xylenes | 0.020 | 0.020 | 0.020 | 44 | 2.2 | 21 | 31 | NGR | 2.9 | - | 13 | NGR | NGR |
| Styrene | 0.072 | 0.072 | 2.8 | NGR | 39 | - | - | 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 | 0.0030 | 0.94 | NGR | NGR | - | - | 0.0042 | 0.0030 | - | 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 required due to land use considerations (see Sections 3.2 and 5.1.1). 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 | All | 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) |
| Naphthalene | 0.0010 | 0.0010 | 0.47 | NGR | 2.7 | - | - | 0.0010 | 0.0010 | - | NGR | NGR | NGR |
| Phenanthrene | 0.00086 | 0.00040 | - | - | - | - | - | 0.00086 | 0.00040 | - | 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 | 0.000040 | 0.000040 | 0.000040 | - | - | - | - | - | - | - | - | - | - |
| Benz[a]anthracene | - | - | - | - | - | - | - | NGR | NGR | - | NGR | NGR | NGR |
| 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 | 0.0020 | 0.0011 | 0.0020 | 0.018 | 0.0011 | - | - | - | - | - | - | - | - |
| 1,1-Dichloroethene | 0.014 | 0.014 | 0.014 | 0.68 | 0.039 | - | - | - | - | - | - | - | - |
| Trichloroethene (Trichloroethylene, TCE) | 0.0050 | 0.00032 | 0.0050 | 0.0064 | 0.00032 | 4.4 | 5.0 | 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 | 0.0050 | 0.0050 | 0.0050 | 0.17 | 0.010 | - | - | 0.10 | 0.10 | - | 0.0050 | - | - |
| Dichloromethane (Methylene chloride) | 0.050 | 0.050 | 0.050 | 17 | 0.94 | - | - | 0.098 | 0.098 | - | 0.050 | - | - |
| Trichloromethane (Chloroform) ¹ | 0.080 | 0.018 | 0.080 | 7.1 | 0.41 | - | - | 0.10 | 0.018 | - | 0.10 | - | - |
| Tetrachloromethane (Carbon tetrachloride) | 0.0020 | 0.0015 | 0.0020 | 0.030 | 0.0015 | - | - | 0.013 | 0.013 | - | 0.0050 | - | - |

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 required due to land use considerations (see Sections 3.2 and 5.1.1). 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 | All | 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) |
| Dibromochloromethane | 0.10 | 0.10 | 0.19 | 26 | 1.1 | - | - | - | - | - | 0.10 | - | - |
| Chlorinated Aromatics | | | | | | | | | | | | | |
| Chlorobenzene | 0.0013 | 0.0013 | 0.030 | 0.30 | 0.014 | - | - | 0.0013 | 0.0013 | - | - | - | - |
| 1,2-Dichlorobenzene | 0.00070 | 0.00070 | 0.0030 | 120 | 5.4 | - | - | 0.00070 | 0.00070 | - | - | - | - |
| 1,4-Dichlorobenzene | 0.0010 | 0.0010 | 0.0010 | 2.8 | 0.13 | - | - | 0.026 | 0.026 | - | - | - | - |
| 1,2,3-Trichlorobenzene | 0.0080 | 0.0080 | 0.014 | 0.80 | 0.032 | - | - | 0.0080 | 0.0080 | - | - | - | - |
| 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 | 0.0020 | 0.0020 | 0.0020 | 0.21 | 0.0088 | - | - | - | - | - | - | - | - |
| Pentachlorobenzene | 0.0094 | 0.0069 | 0.0094 | NGR | 0.038 | - | - | NGR | 0.0069 | - | - | - | - |
| Hexachlorobenzene | 0.00029 | 0.00029 | 0.00029 | 0.012 | 0.00050 | - | - | - | - | - | 0.00052 | - | - |
| 2,4-Dichlorophenol | 0.00020 | 0.00020 | 0.00030 | NGR | 1500 | - | - | 0.00020 | 0.00020 | - | - | - | - |
| 2,4,6-Trichlorophenol | 0.0020 | 0.0020 | 0.0020 | NGR | 54 | - | - | 0.018 | 0.018 | - | - | - | - |
| 2,3,4,6-Tetrachlorophenol | 0.0010 | 0.0010 | 0.0010 | NGR | NGR | - | - | 0.0010 | 0.0010 | - | - | - | - |
| Pentachlorophenol | 0.00051 | 0.00050 | 0.030 | NGR | NGR | 0.87 | 0.88 | 0.00051 | 0.00050 | - | - | - | - |
| Dioxins & Furans ^c | 0.00000012 | 0.00000012 | 0.00000012 | - | - | - | - | - | - | - | - | - | - |
| PCBs | 0.000094 | 0.000094 | 0.000094 | - | - | - | - | - | - | - | - | - | - |
| Pesticides | | | | | | | | | | | | | |
| Aldicarb | 0.0010 | 0.0010 | 0.0090 | - | - | - | - | 0.0010 | 0.0010 | 0.073 | 0.011 | - | - |
| Aldrin | 0.000028 | 0.000028 | 0.000028 | 0.056 | 0.0026 | - | - | - | - | - | - | - | - |

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 required due to land use considerations (see Sections 3.2 and 5.1.1). 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 | All | 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) |
| Atrazine and metabolites | 0.0018 | 0.0018 | 0.0050 | - | - | - | - | 0.0018 | 0.0018 | 0.010 | 0.005 | - | - |
| Azniphos-methyl (Guthion) | 0.000010 | 0.000010 | 0.020 | - | - | - | - | 0.000010 | 0.000010 | - | - | - | - |
| Bromacil ⁹ | 0.00020 | 0.00020 | 0.95 | - | - | 0.44 | 0.30 | 0.0050 | 0.0050 | 0.00020 | 1.1 | - | - |
| Bromoxynil | 0.00044 | 0.00044 | 0.0050 | - | - | - | - | 0.0050 | 0.0050 | 0.00044 | 0.011 | - | - |
| Carbaryl | 0.00020 | 0.00020 | 0.090 | - | - | - | - | 0.00020 | 0.00020 | - | 1.1 | - | - |
| Carbofuran | 0.0018 | 0.0018 | 0.090 | - | - | - | - | 0.0018 | 0.0018 | - | 0.045 | - | - |
| Chlorothalonil | 0.00018 | 0.00018 | 0.14 | - | - | - | - | 0.00018 | 0.00018 | 0.0093 | 0.17 | - | - |
| Chlorpyrifos | 0.0000046 | 0.0000020 | 0.090 | - | - | - | - | 0.0000046 | 0.0000020 | - | 0.024 | - | - |
| 2,4-D | 0.0040 | 0.0040 | 0.10 | - | - | - | - | 0.0040 | 0.0040 | - | 0.10 | - | - |
| DDT | 0.0014 | 0.0014 | 0.0014 | 15 | 0.69 | - | - | - | - | - | 0.10 | - | - |
| Diazinon | 0.00017 | 0.00017 | 0.020 | - | - | - | - | 0.00017 | 0.00017 | - | - | - | - |
| Dicamba | 0.0000080 | 0.0000080 | 0.12 | - | - | - | - | 0.010 | 0.010 | 0.0000080 | 0.12 | - | - |
| Diclofop-methyl | 0.00024 | 0.00024 | 0.0090 | - | - | - | - | 0.56 | 0.0061 | 0.00024 | 0.0090 | - | - |
| Dieldrin | 0.000029 | 0.000029 | 0.000029 | 0.27 | 0.013 | - | - | - | - | - | - | - | - |
| Dimethoate | 0.0030 | 0.0030 | 0.020 | - | - | - | - | 0.0062 | 0.0062 | - | 0.0030 | - | - |
| Dinoseb | 0.000055 | 0.000050 | 0.010 | - | - | - | - | 0.000055 | 0.000050 | 0.021 | 0.15 | - | - |
| Diquat | 0.070 | 0.070 | 0.070 | - | - | - | - | - | - | - | - | - | - |
| 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 | 0.00021 | - | - | - | - | - | - | - | - |
| Lindane | 0.000010 | 0.000010 | 0.0028 | - | - | - | - | 0.000010 | 0.000010 | - | 0.0040 | - | - |
| Linuron | 0.00011 | 0.00011 | 0.019 | - | - | - | - | 0.0070 | 0.0070 | 0.00011 | - | - | - |
| Malathion | 0.00010 | 0.00010 | 0.19 | - | - | - | - | 0.00010 | 0.00010 | - | - | - | - |

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 required due to land use considerations (see Sections 3.2 and 5.1.1). 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 | All | 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) |
| MCPA | 0.000040 | 0.000040 | 0.10 | - | - | - | - | 0.0026 | 0.0026 | 0.00004 | 0.025 | - | - |
| Methoxychlor | 0.90 | 0.00017 | 0.90 | - | - | - | - | NGR | 0.00017 | - | - | - | - |
| Metolachlor | 0.0078 | 0.0078 | 0.050 | - | - | - | - | 0.0078 | 0.0078 | 0.028 | 0.050 | - | - |
| Metribuzin | 0.00050 | 0.00050 | 0.080 | - | - | - | - | 0.0010 | 0.0010 | 0.00050 | 0.080 | - | - |
| Paraquat (as dichloride) | 0.010 | 0.010 | 0.010 | - | - | - | - | - | - | - | - | - | - |
| Parathion | - | - | - | - | - | - | - | 0.000013 | 0.000013 | - | - | - | - |
| Phorate | 0.0020 | 0.0020 | 0.0020 | - | - | - | - | - | - | - | - | - | - |
| Picloram | 0.029 | 0.029 | 0.19 | - | - | - | - | 0.029 | 0.029 | - | 0.19 | - | - |
| Simazine | 0.00050 | 0.00050 | 0.010 | - | - | - | - | 0.010 | 0.010 | 0.00050 | 0.010 | - | - |
| Tebuthiuron ^h | 0.00043 | 0.00043 | 0.66 | - | - | 0.20 | 0.25 | 0.0016 | 0.0016 | 0.00043 | 0.13 | - | - |
| Terbufos | 0.0010 | 0.0010 | 0.0010 | - | - | - | - | - | - | - | - | - | - |
| Toxaphene | 0.00043 | 0.00043 | 0.00043 | 6.4 | 0.31 | - | - | - | - | - | - | - | - |
| 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 | 59 | 2.8 | - | - | 0.0022 | 0.0022 | - | - | - | - |
| Di- <i>n</i> -butyl phthalate | 0.019 | 0.019 | 0.59 | NGR | NGR | - | - | 0.019 | 0.019 | - | - | - | - |
| Dichlorobenzidine | 0.0010 | 0.0010 | 0.0010 | NGR | NGR | - | - | - | - | - | - | - | - |
| Diethanolamine | 0.060 | 0.060 | 0.060 | - | - | - | - | 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 | 13 | 11 | 13 | 230 | 11 | - | - | - | - | - | - | - | - |

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 required due to land use considerations (see Sections 3.2 and 5.1.1). 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 | All | 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) |
| Monoethanolamine | 0.60 | 0.60 | 0.60 | - | - | - | - | 30,000 | 1.0 | - | - | - | - |
| MTBE | 0.015 | 0.015 | 0.015 | 6.1 | 0.34 | - | - | 10 | 10 | - | - | - | - |
| Nitilotriacetic acid | 0.40 | 0.40 | 0.40 | - | - | - | - | - | - | - | - | - | - |
| Nonylphenol + ethoxylates | 0.0081 | 0.0081 | - | - | - | 0.0081 | 0.0081 | NGR | 0.61 | - | - | - | - |
| Perfluorooctane sulfonate (PFOS)* | 0.00060 | 0.00060 | 0.00060 | - | - | 1.4 | 1.4 | 0.0068 | 0.0068 | - | 0.060 | 0.052 | 0.052 |
| Perfluorooctanoic acid (PFOA)* | 0.00020 | 0.00020 | 0.00020 | - | - | - | - | - | - | - | - | - | - |
| Phenol | 0.0020 | 0.0020 | 0.57 | 73,000 | 3,700 | 110 | 150 | 0.0040 | 0.0040 | - | 0.0020 | - | - |
| Sulfolane | 0.090 | 0.090 | 0.090 | - | - | 1,700 | 2,800 | 50 | 50 | 0.80 | - | - | - |
| Triethylene glycol | 60 | 60 | 60 | - | - | - | - | 25,000 | 550 | - | - | - | - |
| Trihalomethanes - total (THMs) | 0.10 | 0.10 | 0.10 | - | - | - | - | - | - | - | - | - | - |

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 |

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 required due to land use considerations (see Sections 3.2 and 5.1.1). 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).

- 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 and updates) 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).
- j. Total means all chemical species.
- k. As the toxicological effects of PFOA and perfluorooctanoyl sulfonate (PFOS) are considered to be additive, the sum of the ratios of the detected concentrations to the corresponding MACs for PFOS and PFOA should not exceed 1.

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

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 required due to land use considerations (see Sections 3.2 and 5.1.1). 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 | Coarse |
| Soil Type | (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) |
| General and Inorganic Parameters | | | | | | | | | |
| pH | 6.5-8.5 | 6.5-8.5 | 6.5-8.5 | - | - | - | - | 6.5-9.0 | 6.5-9.0 |
| Ammonia | see note d | see note d | - | - | - | - | - | see note d | see note d |
| Bromate | 0.010 | 0.010 | 0.010 | - | - | - | - | - | - |
| Chloride | 120 | 120 | 250 | - | - | - | - | 120 | 120 |
| Cyanide (free) | 0.0050 | 0.0050 | 0.20 | - | - | - | - | 0.0050 | 0.0050 |
| Fluoride | 1.5 | 1.5 | 1.5 | - | - | - | - | - | - |
| Nitrate (as nitrogen) | 3.0 | 3.0 | 10 | - | - | - | - | 3.0 | 3.0 |
| 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 | 0.050 | - | - | - | - | 0.0019 | 0.0019 |
| Total Dissolved Solids (TDS) | 500 | 500 | 500 | - | - | - | - | - | - |
| Metals | | | | | | | | | |
| Aluminum | see note d | see note d | 2.9 | - | - | - | - | see note d | see note d |
| Antimony | 0.0060 | 0.0060 | 0.0060 | - | - | - | - | - | - |
| Arsenic | 0.0050 | 0.0050 | 0.010 | - | - | - | - | 0.0050 | 0.0050 |
| Barium | 2.0 | 2.0 | 2.0 | - | - | - | - | - | - |
| Boron | 1.5 | 1.5 | 5 | - | - | - | - | 1.5 | 1.5 |
| Cadmium | see note e | see note e | 0.0070 | - | - | - | - | see note d | see note d |
| Chromium (trivalent) | 0.0089 | 0.0089 | - | - | - | - | - | 0.0089 | 0.0089 |
| Chromium (hexavalent) | 0.0010 | 0.0010 | - | - | - | - | - | 0.0010 | 0.0010 |
| Chromium (total) ^j | 0.050 | 0.050 | 0.050 | - | - | - | - | - | - |

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 required due to land use considerations (see Sections 3.2 and 5.1.1). 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 | Coarse |
| Soil Type | (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) |
| Copper | 0.0070 | 0.0070 | 1.0 | - | - | - | - | 0.0070 | 0.0070 |
| Iron | 0.30 | 0.30 | 0.30 | - | - | - | - | 0.30 | 0.30 |
| Lead | see note e | see note e | 0.0050 | - | - | - | - | see note d | see note d |
| Manganese | 0.020 | 0.020 | 0.020 | - | - | - | - | - | - |
| 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 | 0.0020 | 0.0020 | 0.050 | - | - | - | - | 0.0020 | 0.0020 |
| Silver | 0.00010 | 0.00010 | - | - | - | - | - | 0.00010 | 0.00010 |
| Uranium | 0.015 | 0.015 | 0.020 | - | - | - | - | 0.015 | 0.015 |
| Zinc | 0.030 | 0.030 | 5.0 | - | - | - | - | 0.030 | 0.030 |
| Hydrocarbons | | | | | | | | | |
| Benzene | 0.0050 | 0.0050 | 0.0050 | 0.57 | 0.030 | 100 | 61 | 3.6 | 0.074 |
| Toluene | 0.024 | 0.021 | 0.024 | NGR | 45 | 82 | 59 | 12,000 | 0.021 |
| Ethylbenzene | 0.0016 | 0.0016 | 0.0016 | NGR | 31 | 42 | 20 | NGR | 41 |
| Xylenes | 0.020 | 0.020 | 0.020 | 44 | 2.2 | 21 | 31 | NGR | 2.9 |
| Styrene | 0.072 | 0.072 | 2.8 | NGR | 39 | - | - | 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 | 0.0030 | 0.94 | NGR | NGR | - | - | 0.0042 | 0.0030 |
| Naphthalene | 0.0010 | 0.0010 | 0.47 | NGR | 2.7 | - | - | 0.0010 | 0.0010 |
| Phenanthrene | 0.00086 | 0.00040 | - | - | - | - | - | 0.00086 | 0.00040 |

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 required due to land use considerations (see Sections 3.2 and 5.1.1). 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 Soil Type | Lowest Guideline | | Potable | Inhalation | | Eco Soil Contact | | Aquatic Life | |
|---|------------------|----------|----------|------------|---------|------------------|--------|--------------|----------|
| | 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) |
| Pyrene | 0.71 | 0.000092 | 0.71 | NGR | NGR | - | - | NGR | 0.000092 |
| Carcinogenic PAHs (as B(a)P TPE) ^a | 0.000040 | 0.000040 | 0.000040 | - | - | - | - | - | - |
| 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 | 0.0020 | 0.0011 | 0.0020 | 0.018 | 0.0011 | - | - | - | - |
| 1,1-Dichloroethene | 0.014 | 0.014 | 0.014 | 0.68 | 0.039 | - | - | - | - |
| Trichloroethene (Trichloroethylene, TCE) | 0.0050 | 0.00032 | 0.0050 | 0.0064 | 0.00032 | 4.4 | 5.0 | 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 | 0.0050 | 0.0050 | 0.0050 | 0.17 | 0.010 | - | - | 0.10 | 0.10 |
| Dichloromethane (Methylene chloride) | 0.050 | 0.050 | 0.050 | 17 | 0.94 | - | - | 0.098 | 0.098 |
| Trichloromethane (Chloroform) ⁱ | 0.080 | 0.018 | 0.080 | 7.1 | 0.41 | - | - | 0.10 | 0.018 |
| Tetrachloromethane (Carbon tetrachloride) | 0.0020 | 0.0015 | 0.0020 | 0.030 | 0.0015 | - | - | 0.013 | 0.013 |
| Dibromochloromethane | 0.19 | 0.19 | 0.19 | 26 | 1.1 | - | - | - | - |
| Chlorinated Aromatics | | | | | | | | | |
| Chlorobenzene | 0.0013 | 0.0013 | 0.03 | 0.30 | 0.014 | - | - | 0.0013 | 0.0013 |
| 1,2-Dichlorobenzene | 0.00070 | 0.00070 | 0.0030 | 116 | 5.4 | - | - | 0.00070 | 0.00070 |

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 required due to land use considerations (see Sections 3.2 and 5.1.1). 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 Soil Type | Lowest Guideline | | Potable | Inhalation | | Eco Soil Contact | | Aquatic Life | |
|-------------------------------|------------------|------------|------------|------------|---------|------------------|--------|--------------|----------|
| | 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) |
| 1,4-Dichlorobenzene | 0.0010 | 0.0010 | 0.0010 | 2.8 | 0.13 | - | - | 0.026 | 0.026 |
| 1,2,3-Trichlorobenzene | 0.0080 | 0.0080 | 0.014 | 0.80 | 0.032 | - | - | 0.0080 | 0.0080 |
| 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 | 0.0020 | 0.0020 | 0.0020 | 0.21 | 0.0088 | - | - | - | - |
| Pentachlorobenzene | 0.0094 | 0.0069 | 0.0094 | NGR | 0.038 | - | - | NGR | 0.0069 |
| Hexachlorobenzene | 0.00029 | 0.00029 | 0.00029 | 0.012 | 0.00050 | - | - | - | - |
| 2,4-Dichlorophenol | 0.00020 | 0.00020 | 0.00030 | NGR | 1500 | - | - | 0.00020 | 0.00020 |
| 2,4,6-Trichlorophenol | 0.0020 | 0.0020 | 0.0020 | NGR | 54 | - | - | 0.018 | 0.018 |
| 2,3,4,6-Tetrachlorophenol | 0.0010 | 0.0010 | 0.0010 | NGR | NGR | - | - | 0.0010 | 0.0010 |
| Pentachlorophenol | 0.00051 | 0.00050 | 0.030 | NGR | NGR | 0.87 | 0.88 | 0.00051 | 0.00050 |
| Dioxins & Furans ^c | 0.00000012 | 0.00000012 | 0.00000012 | - | - | - | - | - | - |
| PCBs | 0.000094 | 0.000094 | 0.000094 | - | - | - | - | - | - |
| Pesticides | | | | | | | | | |
| Aldicarb | 0.001 | 0.001 | 0.0090 | - | - | - | - | 0.0010 | 0.0010 |
| Aldrin | 0.000028 | 0.000028 | 0.000028 | 0.056 | 0.0026 | - | - | - | - |
| Atrazine and metabolites | 0.0018 | 0.0018 | 0.0050 | - | - | - | - | 0.0018 | 0.0018 |
| Azniphos-methyl (Guthion) | 0.000010 | 0.000010 | 0.020 | - | - | - | - | 0.000010 | 0.000010 |
| Bromacil ^g | 0.0050 | 0.0050 | 0.95 | - | - | 0.44 | 0.30 | 0.0050 | 0.0050 |
| Bromoxynil | 0.0050 | 0.0050 | 0.0050 | - | - | - | - | 0.0050 | 0.0050 |
| Carbaryl | 0.00020 | 0.00020 | 0.090 | - | - | - | - | 0.00020 | 0.00020 |
| Carbofuran | 0.0018 | 0.0018 | 0.090 | - | - | - | - | 0.0018 | 0.0018 |

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 required due to land use considerations (see Sections 3.2 and 5.1.1). 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 Soil Type | Lowest Guideline | | Potable | Inhalation | | Eco Soil Contact | | Aquatic Life | |
|--------------------------|------------------|-----------|----------|------------|---------|------------------|--------|--------------|-----------|
| | 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) |
| Chlorothalonil | 0.00018 | 0.00018 | 0.14 | - | - | - | - | 0.00018 | 0.00018 |
| Chlorpyrifos | 0.0000046 | 0.0000020 | 0.090 | - | - | - | - | 0.0000046 | 0.0000020 |
| 2,4-D | 0.0040 | 0.0040 | 0.10 | - | - | - | - | 0.0040 | 0.0040 |
| DDT | 0.0014 | 0.0014 | 0.0014 | 15 | 0.69 | - | - | - | - |
| Diazinon | 0.00017 | 0.00017 | 0.020 | - | - | - | - | 0.00017 | 0.00017 |
| Dicamba | 0.010 | 0.010 | 0.12 | - | - | - | - | 0.010 | 0.010 |
| Diclofop-methyl | 0.0090 | 0.0061 | 0.0090 | - | - | - | - | 0.56 | 0.0061 |
| Dieldrin | 0.000029 | 0.000029 | 0.000029 | 0.27 | 0.013 | - | - | - | - |
| Dimethoate | 0.0062 | 0.0062 | 0.02 | - | - | - | - | 0.0062 | 0.0062 |
| Dinoseb | 0.000055 | 0.000050 | 0.010 | - | - | - | - | 0.000055 | 0.000050 |
| Diquat | 0.070 | 0.070 | 0.070 | - | - | - | - | - | - |
| 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 | 0.00021 | - | - | - | - |
| Lindane | 0.000010 | 0.000010 | 0.0028 | - | - | - | - | 0.000010 | 0.000010 |
| Linuron | 0.0070 | 0.0070 | 0.019 | - | - | - | - | 0.0070 | 0.0070 |
| Malathion | 0.00010 | 0.00010 | 0.19 | - | - | - | - | 0.00010 | 0.00010 |
| MCPA | 0.0026 | 0.0026 | 0.10 | - | - | - | - | 0.0026 | 0.0026 |
| Methoxychlor | 0.90 | 0.00017 | 0.90 | - | - | - | - | NGR | 0.00017 |
| Metolachlor | 0.0078 | 0.0078 | 0.050 | - | - | - | - | 0.0078 | 0.0078 |
| Metribuzin | 0.0010 | 0.0010 | 0.080 | - | - | - | - | 0.0010 | 0.0010 |
| Paraquat (as dichloride) | 0.010 | 0.010 | 0.010 | - | - | - | - | - | - |

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 required due to land use considerations (see Sections 3.2 and 5.1.1). 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 Soil Type | Lowest Guideline | | Potable | Inhalation | | Eco Soil Contact | | Aquatic Life | |
|----------------------------------|------------------|---------|---------|------------|--------|------------------|--------|--------------|---------|
| | 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) |
| Phorate | 0.0020 | 0.0020 | 0.0020 | - | - | - | - | - | - |
| Picloram | 0.029 | 0.029 | 0.19 | - | - | - | - | 0.029 | 0.029 |
| Simazine | 0.010 | 0.010 | 0.010 | - | - | - | - | 0.010 | 0.010 |
| Tebuthiuron ^h | 0.0016 | 0.0016 | 0.66 | - | - | 0.20 | 0.25 | 0.0016 | 0.0016 |
| Terbufos | 0.0010 | 0.0010 | 0.0010 | - | - | - | - | - | - |
| 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 | 0.00020 | 0.045 | - | - | - | - | 0.0012 | 0.00020 |
| Other Organics | | | | | | | | | |
| Aniline | 0.0022 | 0.0022 | 0.066 | 59 | 2.8 | - | - | 0.0022 | 0.0022 |
| Di- <i>n</i> -butyl phthalate | 0.019 | 0.019 | 0.59 | NGR | NGR | - | - | 0.019 | 0.019 |
| Dichlorobenzidine | 0.0010 | 0.0010 | 0.0010 | NGR | NGR | - | - | - | - |
| Diethanolamine | 0.060 | 0.060 | 0.060 | - | - | - | - | 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 | 13 | 11 | 13 | 230 | 11 | - | - | - | - |
| Monoethanolamine | 0.60 | 0.60 | 0.60 | - | - | - | - | 30,000 | 1.0 |
| MTBE | 0.015 | 0.015 | 0.015 | 6.1 | 0.34 | - | - | 10 | 10 |
| Nitrilotriacetic acid | 0.40 | 0.40 | 0.40 | - | - | - | - | - | - |
| Nonylphenol + ethoxylates | 0.0081 | 0.0081 | - | - | - | 0.0081 | 0.0081 | NGR | 0.61 |
| Perfluorooctane sulfonate (PFOS) | 0.00060 | 0.00060 | 0.00060 | - | - | 1.4 | 1.4 | 0.0068 | 0.0068 |

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 required due to land use considerations (see Sections 3.2 and 5.1.1). 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 Soil Type | Lowest Guideline | | Potable | Inhalation | | Eco Soil Contact | | Aquatic Life | |
|--------------------------------|------------------|---------|---------|------------|--------|------------------|--------|--------------|--------|
| | 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) |
| Perfluorooctanoic acid (PFOA) | 0.00020 | 0.00020 | 0.00020 | - | - | - | - | - | - |
| Phenol | 0.0040 | 0.0040 | 0.57 | 73,000 | 3,700 | 110 | 150 | 0.0040 | 0.0040 |
| Sulfolane | 0.090 | 0.090 | 0.090 | - | - | 1,700 | 2,800 | 50 | 50 |
| Triethylene glycol | 60 | 60 | 60 | - | - | - | - | 25,000 | 550 |
| Trihalomethanes - total (THMs) | 0.10 | 0.10 | 0.10 | - | - | - | - | - | - |

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 and updates) 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)

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 required due to land use considerations (see Sections 3.2 and 5.1.1). 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).

- 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).
- j. Total means all chemical species.
- k. As the toxicological effects of PFOA and perfluorooctanoyl sulfonate (PFOS) are considered to be additive, the sum of the ratios of the detected concentrations to the corresponding MACs for PFOS and PFOA should not exceed 1.

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. 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 | | |
|---|------------------|------------|---------|------------|--------|------------------|--------|--------------|------------|--------|
| | 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) | (mg/L) |
| General and Inorganic Parameters | | | | | | | | | | |
| pH | 6.5-8.5 | 6.5-8.5 | 6.5-8.5 | - | - | - | - | 6.5-9.0 | 6.5-9.0 | |
| Ammonia | see note d | see note d | - | - | - | - | - | see note d | see note d | |
| Bromate | 0.010 | 0.010 | 0.010 | - | - | - | - | - | - | |
| Chloride | 120 | 120 | 250 | - | - | - | - | 120 | 120 | |
| Cyanide (free) | 0.0050 | 0.0050 | 0.20 | - | - | - | - | 0.0050 | 0.0050 | |
| Fluoride | 1.5 | 1.5 | 1.5 | - | - | - | - | - | - | |
| Nitrate (as nitrogen) | 3.0 | 3.0 | 10 | - | - | - | - | 3.0 | 3.0 | |
| 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 | 0.050 | - | - | - | - | 0.0019 | 0.0019 | |
| Total Dissolved Solids (TDS) | 500 | 500 | 500 | - | - | - | - | - | - | |
| Metals | | | | | | | | | | |
| Aluminum | see note d | see note d | 2.9 | - | - | - | - | see note d | see note d | |
| Antimony | 0.0060 | 0.0060 | 0.0060 | - | - | - | - | - | - | |
| Arsenic | 0.0050 | 0.0050 | 0.010 | - | - | - | - | 0.0050 | 0.0050 | |
| Barium | 2.0 | 2.0 | 2.0 | - | - | - | - | - | - | |
| Boron | 1.5 | 1.5 | 5 | - | - | - | - | 1.5 | 1.5 | |
| Cadmium | see note e | see note e | 0.0070 | - | - | - | - | see note d | see note d | |
| Chromium (trivalent) | 0.0089 | 0.0089 | - | - | - | - | - | 0.0089 | 0.0089 | |
| Chromium (hexavalent) | 0.0010 | 0.0010 | - | - | - | - | - | 0.0010 | 0.0010 | |
| Chromium (total) ^j | 0.050 | 0.050 | 0.050 | - | - | - | - | - | - | |
| Copper | 0.0070 | 0.0070 | 1.0 | - | - | - | - | 0.0070 | 0.0070 | |
| Iron | 0.30 | 0.30 | 0.30 | - | - | - | - | 0.30 | 0.30 | |

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. 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 | All | 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 | 0.0050 | - | - | - | - | see note d | see note d |
| Manganese | 0.020 | 0.020 | 0.020 | - | - | - | - | - | - |
| Mercury (total) | 0.0000050 | 0.0000050 | 0.0010 | - | - | - | - | 0.0000050 | 0.0000050 |
| Nickel | see note d | see note d | - | - | - | - | - | see note d | see note d |
| Selenium | 0.0020 | 0.00200 | 0.05 | - | - | - | - | 0.0020 | 0.0020 |
| Silver | 0.00010 | 0.00010 | - | - | - | - | - | 0.00010 | 0.00010 |
| Uranium | 0.015 | 0.015 | 0.020 | - | - | - | - | 0.015 | 0.015 |
| Zinc | 0.030 | 0.030 | 5.0 | - | - | - | - | 0.030 | 0.030 |
| Hydrocarbons | | | | | | | | | |
| Benzene | 0.0050 | 0.0050 | 0.0050 | 3.9 | 0.37 | 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 | 0.020 | 0.020 | 0.020 | NGR | 26 | 74 | 120 | NGR | 2.9 |
| Styrene | 0.072 | 0.072 | 2.8 | NGR | NGR | - | - | 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 | 0.0030 | 0.94 | NGR | NGR | - | - | 0.0042 | 0.0030 |
| Naphthalene | 0.0010 | 0.0010 | 0.47 | NGR | 31 | - | - | 0.0010 | 0.0010 |
| Phenanthrene | 0.00086 | 0.00040 | - | - | - | - | - | 0.00086 | 0.00040 |
| Pyrene | 0.71 | 0.000092 | 0.71 | NGR | NGR | - | - | NGR | 0.000092 |

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. 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 | | |
|---|------------------|----------|----------|------------|--------|------------------|--------|--------------|---------|--------|
| | 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) | (mg/L) |
| Carcinogenic PAHs (as B(a)P TPE) ^a | 0.000040 | 0.000040 | 0.000040 | - | - | - | - | - | - | - |
| Benz[a]anthracene | - | - | - | - | - | - | - | - | NGR | NGR |
| Benzo[b+j]fluoranthene | - | - | - | - | - | - | - | - | - | - |
| 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 | 0.0020 | 0.0020 | 0.0020 | 0.12 | 0.013 | - | - | - | - | - |
| 1,1-Dichloroethene | 0.014 | 0.014 | 0.014 | 4.5 | 0.49 | - | - | - | - | - |
| Trichloroethene (Trichloroethylene, TCE) | 0.0050 | 0.0038 | 0.0050 | 0.044 | 0.0038 | 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 | 0.0050 | 0.0050 | 0.0050 | 1.2 | 0.13 | - | - | 0.10 | 0.10 | |
| Dichloromethane (Methylene chloride) | 0.050 | 0.050 | 0.050 | 110 | 12 | - | - | 0.098 | 0.098 | |
| Trichloromethane (Chloroform) ⁱ | 0.080 | 0.018 | 0.080 | 47 | 5.1 | - | - | 0.10 | 0.018 | |
| Tetrachloromethane (Carbon tetrachloride) | 0.0020 | 0.0020 | 0.0020 | 0.21 | 0.018 | - | - | 0.013 | 0.013 | |
| Dibromochloromethane | 0.19 | 0.19 | 0.19 | 250 | 10 | - | - | - | - | |
| Chlorinated Aromatics | | | | | | | | | | |
| Chlorobenzene | 0.0013 | 0.0013 | 0.030 | 2.2 | 0.18 | - | - | 0.0013 | 0.0013 | |
| 1,2-Dichlorobenzene | 0.00070 | 0.00070 | 0.0030 | NGR | 64 | - | - | 0.00070 | 0.00070 | |
| 1,4-Dichlorobenzene | 0.0010 | 0.0010 | 0.0010 | 20 | 1.6 | - | - | 0.026 | 0.026 | |
| 1,2,3-Trichlorobenzene | 0.0080 | 0.0080 | 0.014 | 6.9 | 0.33 | - | - | 0.0080 | 0.0080 | |
| 1,2,4-Trichlorobenzene | 0.015 | 0.015 | 0.015 | 6.1 | 0.29 | - | - | 0.024 | 0.024 | |

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. 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 | | |
|----------------------------|------------------|------------|------------|------------|--------|------------------|--------|--------------|-----------|--------|
| | 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) | (mg/L) |
| 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 | - | - | - | - | - |
| 1,2,4,5-Tetrachlorobenzene | 0.0020 | 0.0020 | 0.0020 | NGR | 0.080 | - | - | - | - | - |
| Pentachlorobenzene | 0.0094 | 0.0069 | 0.0094 | NGR | 0.44 | - | - | NGR | 0.0069 | - |
| Hexachlorobenzene | 0.00029 | 0.00029 | 0.00029 | 0.086 | 0.0057 | - | - | - | - | - |
| 2,4-Dichlorophenol | 0.00020 | 0.00020 | 0.00030 | NGR | NGR | - | - | 0.00020 | 0.00020 | - |
| 2,4,6-Trichlorophenol | 0.0020 | 0.0020 | 0.0020 | NGR | 540 | - | - | 0.018 | 0.018 | - |
| 2,3,4,6-Tetrachlorophenol | 0.0010 | 0.0010 | 0.0010 | NGR | NGR | - | - | 0.0010 | 0.0010 | - |
| Pentachlorophenol | 0.00051 | 0.00050 | 0.030 | NGR | NGR | 2.2 | 2.2 | 0.00051 | 0.00050 | - |
| Dioxins & Furans ° | 0.00000012 | 0.00000012 | 0.00000012 | - | - | - | - | - | - | - |
| PCBs | 0.000094 | 0.000094 | 0.000094 | - | - | - | - | - | - | - |
| Pesticides | | | | | | | | | | |
| Aldicarb | 0.0010 | 0.0010 | 0.0090 | - | - | - | - | 0.0010 | 0.0010 | - |
| Aldrin | 0.000028 | 0.000028 | 0.000028 | 0.63 | 0.024 | - | - | - | - | - |
| Atrazine and metabolites | 0.0018 | 0.0018 | 0.0050 | - | - | - | - | 0.0018 | 0.0018 | - |
| Azniphos-methyl (Guthion) | 0.000010 | 0.000010 | 0.020 | - | - | - | - | 0.000010 | 0.000010 | - |
| Bromacil ° | 0.0050 | 0.0050 | 0.95 | - | - | 1.1 | 0.50 | 0.0050 | 0.0050 | - |
| Bromoxynil | 0.0050 | 0.0050 | 0.0050 | - | - | - | - | 0.0050 | 0.0050 | - |
| Carbaryl | 0.00020 | 0.00020 | 0.090 | - | - | - | - | 0.00020 | 0.00020 | - |
| Carbofuran | 0.0018 | 0.0018 | 0.090 | - | - | - | - | 0.0018 | 0.0018 | - |
| Chlorothalonil | 0.00018 | 0.00018 | 0.14 | - | - | - | - | 0.00018 | 0.00018 | - |
| Chlorpyrifos | 0.0000046 | 0.0000020 | 0.090 | - | - | - | - | 0.0000046 | 0.0000020 | - |
| 2,4-D | 0.0040 | 0.0040 | 0.10 | - | - | - | - | 0.0040 | 0.0040 | - |
| DDT | 0.0014 | 0.0014 | 0.0014 | 170 | 6.3 | - | - | - | - | - |

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. 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 | | |
|--------------------------|------------------|-----------|----------|------------|--------|------------------|--------|--------------|-----------|--------|
| | 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) | (mg/L) |
| Diazinon | 0.00017 | 0.00017 | 0.020 | - | - | - | - | 0.00017 | 0.00017 | |
| Dicamba | 0.010 | 0.010 | 0.12 | - | - | - | - | 0.010 | 0.010 | |
| Diclofop-methyl | 0.0090 | 0.0061 | 0.0090 | - | - | - | - | 0.56 | 0.0061 | |
| Dieldrin | 0.000029 | 0.000029 | 0.000029 | 3.0 | 1.2 | - | - | - | - | |
| Dimethoate | 0.0062 | 0.0062 | 0.020 | - | - | - | - | 0.0062 | 0.0062 | |
| Dinoseb | 0.000055 | 0.000050 | 0.010 | - | - | - | - | 0.000055 | 0.000050 | |
| Diquat | 0.070 | 0.070 | 0.070 | - | - | - | - | - | - | |
| 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 | 0.0020 | - | - | - | - | |
| Lindane | 0.000010 | 0.000010 | 0.0028 | - | - | - | - | 0.000010 | 0.000010 | |
| Linuron | 0.0070 | 0.0070 | 0.019 | - | - | - | - | 0.0070 | 0.0070 | |
| Malathion | 0.00010 | 0.00010 | 0.19 | - | - | - | - | 0.00010 | 0.00010 | |
| MCPA | 0.0026 | 0.0026 | 0.10 | - | - | - | - | 0.0026 | 0.0026 | |
| Methoxychlor | 0.90 | 0.00017 | 0.90 | - | - | - | - | NGR | 0.00017 | |
| Metolachlor | 0.0078 | 0.0078 | 0.050 | - | - | - | - | 0.0078 | 0.0078 | |
| Metribuzin | 0.0010 | 0.0010 | 0.080 | - | - | - | - | 0.0010 | 0.0010 | |
| Paraquat (as dichloride) | 0.010 | 0.010 | 0.010 | - | - | - | - | - | - | |
| Phorate | 0.0020 | 0.0020 | 0.0020 | - | - | - | - | - | - | |
| Picloram | 0.029 | 0.029 | 0.19 | - | - | - | - | 0.029 | 0.029 | |
| Simazine | 0.010 | 0.010 | 0.010 | - | - | - | - | 0.010 | 0.010 | |
| Tebuthiuron ^h | 0.0016 | 0.0016 | 0.66 | - | - | 2.6 | 3.2 | 0.0016 | 0.0016 | |
| Terbufos | 0.0010 | 0.0010 | 0.0010 | - | - | - | - | - | - | |
| Toxaphene | 0.00043 | 0.00043 | 0.00043 | 75 | 2.9 | - | - | - | - | |

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. 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 | All | 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) |
| Triallate | 0.00024 | 0.00024 | 0.12 | - | - | - | - | 0.00024 | 0.00024 |
| Trifluralin | 0.0012 | 0.00020 | 0.045 | - | - | - | - | 0.0012 | 0.00020 |
| Other Organics | | | | | | | | | |
| Aniline | 0.0022 | 0.0022 | 0.066 | 420 | 33 | - | - | 0.0022 | 0.0022 |
| Di- <i>n</i> -butyl phthalate | 0.019 | 0.019 | 0.59 | NGR | NGR | - | - | 0.019 | 0.019 |
| Dichlorobenzidine | 0.0010 | 0.0010 | 0.0010 | NGR | NGR | - | - | - | - |
| Diethanolamine | 0.060 | 0.060 | 0.060 | - | - | - | - | 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 | 0.0060 | 0.22 | 0.015 | - | - | 0.0013 | 0.0013 |
| Methylmethacrylate | 13 | 13 | 13 | 1,600 | 140 | - | - | - | - |
| Methanol | 19 | 19 | 19 | NGR | 250,000 | - | - | 630 | 32 |
| Monoethanolamine | 0.60 | 0.60 | 0.60 | - | - | - | - | 30,000 | 1.0 |
| MTBE | 0.015 | 0.015 | 0.015 | 40 | 4.3 | - | - | 10 | 10 |
| Nitrilotriacetic acid | 0.40 | 0.40 | 0.40 | - | - | - | - | - | - |
| Nonylphenol + ethoxylates | 0.020 | 0.020 | - | - | - | 0.020 | 0.020 | NGR | 0.61 |
| Perfluorooctane sulfonate (PFOS) ^k | 0.00060 | 0.00060 | 0.00060 | - | - | 8.2 | 8.2 | 0.0068 | 0.0068 |
| Perfluorooctanoic acid (PFOA) ^k | 0.00020 | 0.00020 | 0.00020 | - | - | - | - | - | - |
| Phenol | 0.0040 | 0.0040 | 0.57 | NGR | 45,000 | 730 | 1000 | 0.0040 | 0.0040 |
| Sulfolane | 0.090 | 0.090 | 0.090 | - | - | 3,400 | 5,700 | 50 | 50 |
| Triethylene glycol | 60 | 60 | 60 | - | - | - | - | 25,000 | 550 |
| Trihalomethanes - total (THMs) | 0.10 | 0.10 | 0.10 | - | - | - | - | - | - |

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. 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 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 and updates) 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).
- j. Total means all chemical species.
- k. As the toxicological effects of PFOA and perfluorooctanoyl sulfonate (PFOS) are considered to be additive, the sum of the ratios of the detected concentrations to the corresponding MACs for PFOS and PFOA should not exceed 1.

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