**Section 259.350 Equations for Calculating Site-Specific Soil Cleanup Objectives**

a) Site-specific soil cleanup objectives for pesticides are determined by the following equation:



Where:

|  |  |  |
| --- | --- | --- |
| SCO | = | soil cleanup objective (mg/kg) |
| Cw | = | target soil leachate concentration (mg/L) |
| Koc | = | organic carbon partition coefficient (L/kg) |
| foc | = | organic carbon content of soil (kg/kg) |
| Θw | = | water-filled soil porosity (Lwater/Lsoil) |
| Θa | = | air-filled soil porosity (Lair/Lsoil) |
| H' | = | Henry's law constant (dimensionless) |
| Ρb | = | dry soil bulk density (kg/L) |

References:

"Soil Screening Guidance: User's Guide", p. 29, eq. 10.

"Soil Screening Guidance: Technical Background Document", p. 37, eq. 24.

1) The target soil leachate concentration can be determined by the following equation:



Where:

|  |  |  |
| --- | --- | --- |
| Cw | = | target soil leachate concentration (mg/L) |
| DF | = | groundwater dilution factor (dimensionless) |
| GWobj | = | groundwater cleanup objective (mg/L) |

2) The dilution factor can be determined by the following equation:



Where:

|  |  |  |
| --- | --- | --- |
| DF | = | groundwater dilution factor (unitless) |
| K | = | aquifer hydraulic conductivity (m/yr) |
| i | = | hydraulic gradient (m/m) |
| d | = | mixing zone depth (m) |
| R | = | groundwater recharge rate (m/yr) |
| L | = | length of contaminated soil parallel to groundwater flow (m) |
| W | = | width of contaminated soil perpendicular to groundwater flow (m) |

b) Site-specific soil cleanup objectives for nitrate as nitrogen can be determined by the following equation:



Where:

|  |  |  |
| --- | --- | --- |
| L | = | Liter |
| Cw | = | Target soil leachate concentration (mg/L) |

c) Site-specific soil cleanup objectives for ammonium can be determined by the following empirical equation:



Where:

|  |  |  |
| --- | --- | --- |
| CEC | = | cation exchange capacity (meq/100g) |

Reference:

Potential Soil Cleanup Objectives for Nitrogen-Containing Fertilizers at Agrichemical Facilities, Soil and Sediment Contamination.

d) The default values for the equations in subsections (a) and (b) of this Section are:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter |  | Description |  | Default Value |
| DF |  | Groundwater dilution factor |  | 30 (dimensionless) |
| foc |  | Organic carbon content of soil |  | 0.008 kg/kg (0.8%) surface or 0.002 kg/kg (0.2%) subsurface |
| Θa |  | Air-filled soil porosity |  | 0.2 (20%) Lair/Lsoil |
| Θw |  | Water-filled soil porosity |  | 0.2 (20%) Lwater/Lsoil |
| Ρb |  | Dry soil bulk density |  | 1.6 kg/L |
| H' |  | Henry's law constant |  | see Appendix E |
| Koc |  | Organic carbon partition coefficient |  | see Appendix E |
| GWobj |  | Groundwater cleanup objective |  | see Appendix D |
|  |  |  |  |  |
| CEC |  | Cation exchange capacity |  | see Appendix F |

(Source: Amended at 32 Ill. Reg. 1308, effective January 21, 2008)