**Section 742.810 RBCA Calculations to Predict Impacts from Remaining Groundwater Contamination**

a) Equation R26 predicts the contaminant concentration along the centerline of a groundwater plume emanating from a vertical planar source in the aquifer (dimensions Sw wide and Sd deep). This model accounts for both three-dimensional dispersion (x is the direction of groundwater flow, y is the other horizontal direction, and z is the vertical direction) and biodegradation.

1) The parameters in this equation are:

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| X | = | distance from the planar source to the location of concern, along the centerline of the groundwater plume (i.e., y = 0, z = 0) |
| Cx | = | the concentration of the contaminant at a distance X from the source, along the centerline of the plume |
| Csource | = | the greatest potential concentration of the contaminant of concern in the groundwater at the source of the contamination, based on the concentrations of contaminants in groundwater due to the release and the projected concentration of the contaminant migrating from the soil to the groundwater. As indicated above, the model assumes a planar source discharging groundwater at a concentration equal to Csource. |
| αx | = | dispersivity in the x direction (i.e., Equation R16) |
| αy | = | dispersivity in the y direction (i.e., Equation R17) |
| αz | = | dispersivity in the z direction (i.e., Equation R18) |
| U | = | specific discharge (i.e., actual groundwater flow velocity through a porous medium; takes into account the fact that the groundwater actually flows only through the pores of the subsurface materials) where the aquifer hydraulic conductivity (K), the hydraulic gradient (I) and the total soil porosity θT must be known (i.e., Equation R19) |
| λ | = | first order degradation constant obtained from Appendix C, Table E or from measured groundwater data |
| Sw | = | width of planar groundwater source in the y direction |
| Sd | = | depth of planar groundwater source in the z direction |

2) The following parameters are determined through field measurements: U, K, I, θT, Sw, Sd.

A) The determination of values for U, K, I and θT can be obtained through the appropriate laboratory and field techniques;

B) From the immediate down-gradient edge of the source of the groundwater contamination values for Sw and Sd shall be determined. Sw is defined as the width of groundwater at the source which exceeds the Tier 1 groundwater remediation objective. Sd is defined as the depth of groundwater at the source which exceeds the Tier 1 groundwater remediation objective; and

C) Total soil porosity can also be calculated using Equation R23.

b) Once values are obtained for all the input parameters identified in subsection (a) of this Section, the contaminant concentration Cx along the centerline of the plume at a distance X from the source shall be calculated so that X is the distance from the down-gradient edge of the source of the contamination at the site to the point where the contaminant concentration is equal to the Tier 1 groundwater remediation objective or concentration determined according to the procedures specified in 35 Ill. Adm. Code 620, Subpart F.

1) If there are any potable water supply wells located within the calculated distance X, then the Tier 1 groundwater remediation objective or concentration shall be met at the edge of the minimum or designated maximum setback zone of the nearest potable water supply down-gradient of the source. To demonstrate that a minimum or maximum setback zone of a potable water supply well will not be impacted above the applicable Tier 1 groundwater remediation objective or concentration determined according to the procedures specified in 35 Ill. Adm. Code 620, Subpart F, X shall be the distance from the Csourcelocation to the edge of the setback zone.

2) To demonstrate that no surface water is adversely impacted, X shall be the distance from the down-gradient edge of the source of the contamination site to the nearest surface water body. This calculation must show that the contaminant in the groundwater at this location (Cx) does not exceed the applicable water quality standard.

(Source: Amended at 37 Ill. Reg. 7506, effective May 15, 2013)