

Additional Problems

1. Rerun the example problem several times varying the dispersion coefficient from 1 to 100 while keeping all other parameter values constant. Based on your observations what effect does the dispersion coefficient have on groundwater contaminant transport? (Hint: Carefully observe the shape of the curve, the time at which the contaminant first arrives at a given distance, the time at which the contaminant is washed past a given distance, and the location and value of the maximum contaminant concentration).
2. Rerun the example problem several times varying the velocity value from 0.5 to 50 while keeping all other parameter values constant. Based on your observations what effect does velocity have on groundwater contaminant transport? (Hint: Carefully observe the shape of the curve, the time at which the contaminant first arrives at a given distance, the time at which the contaminant is washed past a given distance, and the location and value of the maximum contaminant concentration).
3. Assume the tanker truck described in the example problem contained lead rather than TCE. For illustration purposes let's assume that the distribution coefficient for lead with this aquifer material is the same as that for TCE. Unlike TCE, metals, such as lead, do not biodegrade. So $k = 0$ for lead. Because the lead is spilled onto the same aquifer as was the TCE all other parameter values are the same. Based on a comparison of your results for lead with those you obtained for TCE, describe the effect of degradation on groundwater contaminant transport.
4. Assume the tanker truck described in the example problem contained endrin rather than TCE. For illustration purposes let's assume that TCE and endrin biodegrade at the same rate. However, endrin sorbs much more strongly to solid surfaces than does TCE. The retardation for endrin on this aquifer material is 150. Because the endrin leaches into the same aquifer as did the benzene, all other parameter values are the same. Based on a comparison of your results for endrin with those you obtained for TCE, describe the effect of adsorption on groundwater contaminant transport.