THE PENNSYLVANIA STATE UNIVERSITY
ENERGY AND MINERAL ENGINEERING
ENVSE 408 CONTAMINANT HYDROLOGY
ASSIGNMENT 8

The inferred extent of DNAPL and the upper aquifer isopleths are shown for TCE at the Smithville site. These data are for February/March 1989, approximately 10 years after the presumed leakage of the impoundment.

Recall that the parent DNAPL comprises 50% polychlorinated biphenyl (PCB), 10% trichlorobenzene (TCB), 2% trichloroethene (TCE), with the remainder as a mixture of mineral oils. For this mixture the effective solubility of TCE is 23 mg/L. Distribution coefficients may be estimated, for TCE, to be $k_d = 0.1\ L/kg$.

The data for the four units at the site are as follows.

Field Parameters

Aquifer	Hydraulic Gradient (m/m)	Hydraulic Conductivity (cm/s)	Effective Porosity (-)	Fracture Spacing (m)
Clay till	.005 (horiz)	5×10^{-3}	.05	$.1 - .2$
Upper Limestone Aquifer	.005 (horiz)	5×10^{-3}	.05	$.1 - .2$
Intermediate Aquiclude (shale)	.005 (horiz)	1×10^{-7}	.05	.05
Vinemount Aquifer	.005 (horiz)	4×10^{-2}	.05	$.3 - .5$

Assignment

1. Use the *Modflow* package to confirm plume extent after 10 years for TCE, in the upper aquifer.
2. Define the location of a pumping well (or a maximum of two wells) together with pumping rates, and durations, that will intercept the plume in the Upper Limestone Aquifer.