Guide for HW 7

Wednesday, March 15, 2017 10:42 AM

① Use empirical equation :

$$\log K_{oc} = 3.64 - 0.55 \log S$$

Solubility (mg/L)

$$K_d = f_{oc} K_{oc}$$

$$R = \left(1 + \frac{\rho_d}{\theta} K_d\right)$$

2000kg/m³ (2 kg/L)

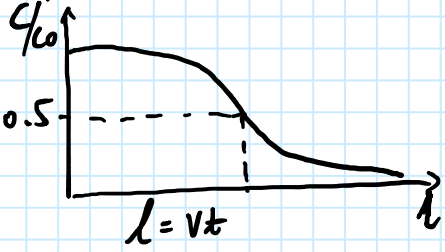
Tabulate your calculations

② Determine relative solubility of $\begin{cases} \text{TCE} \\ \text{TCB} \\ \text{PCB} \end{cases}$

	% by wt.	Formula wt	Moles per 100g	Mole percentage	Relative Solubility
TCE	2	131.4	?	?	? mg/L
TCB	10	181.5	?	?	? ppm
PCB	50	220	?	?	?
Mineral Oil	38	100	?	?	

convert to ppb

Evaluate R and Kd



Use your ruler to measure the distance between the centroid of the smeared zone to the $C/C_0 = 0.5$ contour, C_0 equals to the maximum concentration you can read from the contour map.

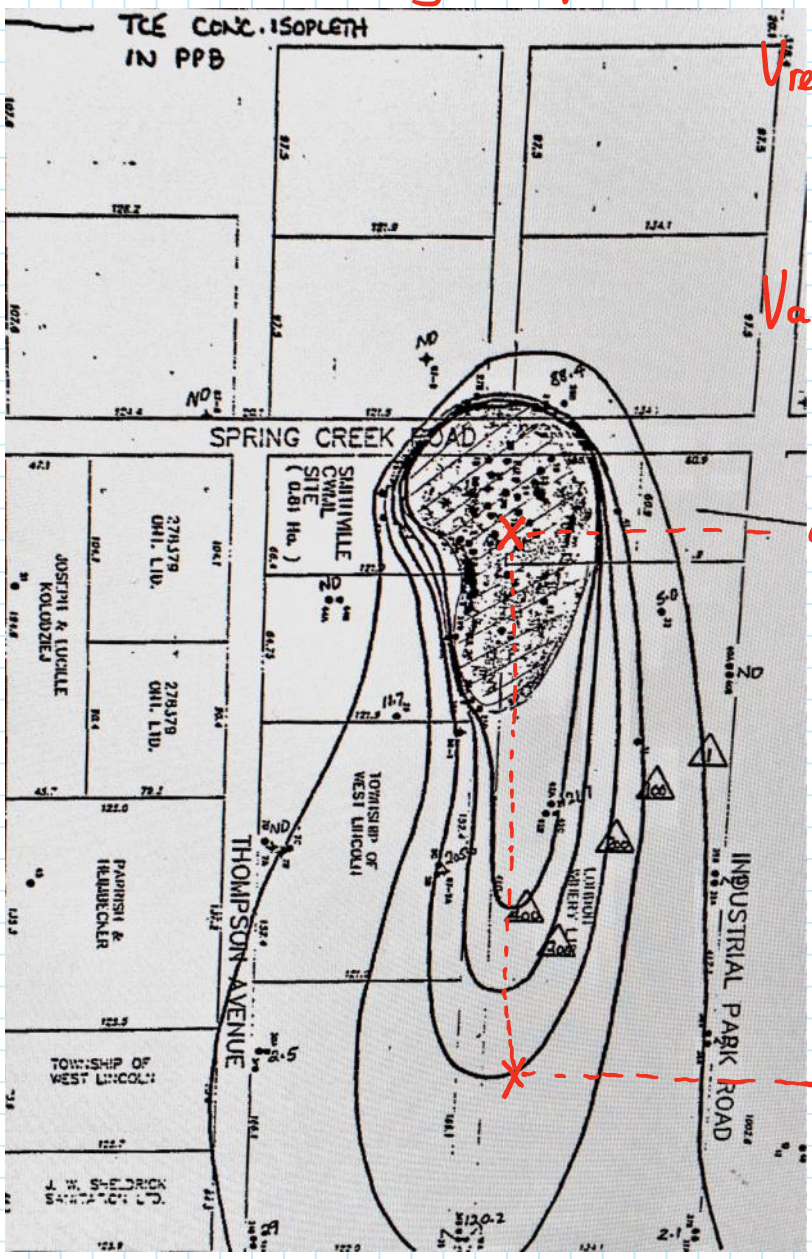
e.g. Notice the map shows year 1989. Which is 10 years from the spill. So now

$$V_{retarded} = \frac{\ell}{t}$$

ℓ ← measured

t ↑ 10 years

$$V_a = \frac{k}{n}\frac{dh}{dx}$$



centroid
$C_0 = 400$ ppb

200 ppb
$\parallel$
$C/C_0 = 0.5$

⇓

if no $C/C_0 = 0.5$ contour, make an educated assumption.

$$\frac{V_a}{V_{retarded}} = R \qquad K_d = (R-1)\frac{\theta}{\rho}$$

Do this for shallow TCE TCB

assumption.

Do this for $\begin{cases} \text{shallow TCE TCB} \\ \text{Deep TCE TCB} \end{cases}$

Tabulate your calculation results

③ Discussion.

④ $M_T = C\, n\, V_T\, R$

C: Concentration
Use $C/C_0 = 0.5$
Which means
Avg. C
e.g. 200 ppb
for shallow TCE

n: porosity

V_T: Estimate smeared zone area by ruler
$V_T = A_T \cdot \text{thickness}$

R: Retardation factor calculated from ②