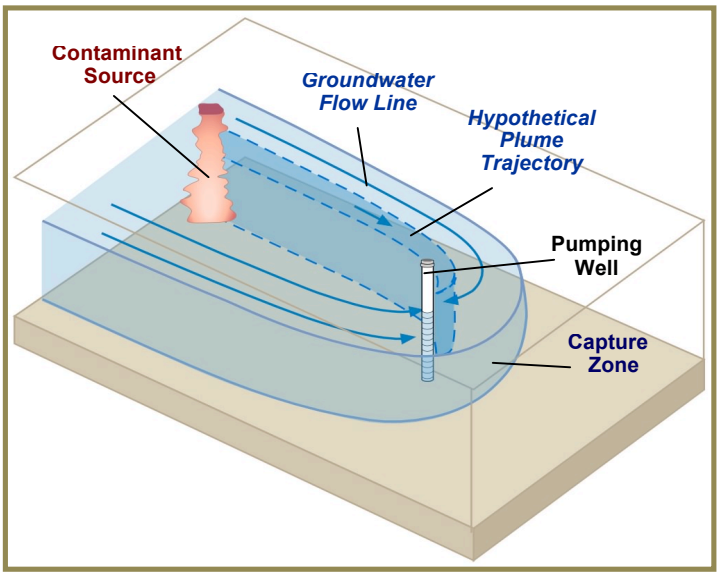
HOMEWORK EXERCISE # 2

MASS DISCHARGE TO A WELL

PROBLEM

A chlorinated solvent source area with a mass discharge rate of 0.2 grams per day of TCE is in the capture zone of a water supply well.

Is it possible this could cause an unacceptable risk to the users of the pumped groundwater?



DATA

Mass discharge (sometimes called mass flux) of the TCE source: **0.2 gram per day**

(This is equivalent to a "Mag 4 Plume" using the plume magnitude classification system (Newell, Farhat, Adamson, and Looney, Ground Water, 49: no. doi: 10.1111/j.1745-6584.2010.00793.x, 2012)).

Pumping Rate of well: **1,000,000 Liters per day.**

The Maximum Contaminant Level (MCL) for TCE **is 5 ug/L.**

KEY EQUATION

Calculate the concentration in the well if there were no attenuation and the plume reached the well:

(mass discharge in grams per day)	÷	(pumping rate of well in liters per day)	=	TCE concentration in pumped groundwater (in grams per liter)

Multiple by $1x10^6$ to convert final answer to units of micrograms per liter:

Calculated TCE concentration in pumped groundwater if no attenuation (in micrograms per liter)

DISCUSSION

What is the calculated concentration in the well if there were no attenuation and the plume reached the well? (This is the final answer in the box)

What is the uncertainty in this calculated value?

How could this value be used in managing this site?

KEY REFERENCE

ITRC "Use and Measurement of Mass Flux and Mass Discharge" August 2010
< http://www.itrcweb.org/guidancedocument.asp?TID=82

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ANSWERS

Calculate the concentration in the well if there were no attenuation and the plume reached the well:

(mass discharge in grams per day)	÷	(pumping rate of well in liters per day)	=	TCE concentration in pumped groundwater (in grams per liter)
0.2 g/d		**1 X 10^6 L/d**		**2 X 10^{-7} g/L**

Multiple by $1x10^6$ to convert final answer to units of micrograms per liter:

TCE concentration in pumped groundwater (in milligrams per liter)
0.2 ug/L