APPENDIX U

EXAMPLE CALCULATIONS

P $= Partial\ Pressure\ (atm)$

$X =$ Concentration of contaminant in groundwater $\left(\frac{mol}{L}\right)$

$K_H =$ Henry's Law constant $= \frac{P}{X}$

The following example calculation converts the measured concentration of TCE in groundwater to the expected equilibrium concentration in soil gas using the Henry's Law constant for TCE:

$K_H(TCE) = \left(11 \frac{atm \cdot L}{mol}\right)$

Molecular weight of TCE $= 131.4\ \frac{g}{mol}$

Measured concentration of TCE in groundwater $= 5.0 \frac{\mu g}{L}$

$$X_{TCE} = \mathbf{5.0\ \frac{\mu g}{L}} \times \frac{1\ g}{10^6\ \mu g} \times \frac{1\ mol}{131.4\ g} = 3.8 \times 10^{-8} \frac{mol}{L}$$

$$P_{TCE} = 11 \frac{atm \cdot L}{mol} \times 3.8 \times 10^{-8} \frac{mol}{L} = 4.2 \times 10^{-7} atm$$

$$\frac{4.2 \times 10^{-7} atm}{1\ atm} = 0.420\ ppmv = \mathbf{420\ ppbv}$$

The following example calculation converts the measured concentration of PCE in soil gas to the expected equilibrium concentration in groundwater using the Henry's Law constant for PCE:

$K_H(PCE) = \left(18 \frac{atm \cdot L}{mol}\right)$

Molecular weight of PCE $= 165.85\ \frac{g}{mol}$

Measured concentration of PCE in soil gas $= 64$ ppbv

$$\mathbf{64\ ppbv} = 0.064\ \text{ppmv} = \frac{6.4 \times 10^{-8} atm}{1\ atm}$$

$$X_{PCE} = 6.4 \times 10^{-8}\ atm \times \frac{1}{18 \frac{atm \cdot L}{mol}} = 3.6 \times 10^{-9} \frac{mol}{L}$$

$$3.6 \times 10^{-9} \frac{mol}{L} \times 165.85 \frac{g}{\text{mol}} \times 10^6 \frac{\mu g}{g} = 0.59 \frac{\mu g}{L}$$