Vapor Intrusion Risk Pathway: Practical & Cost Effective Assessment Strategies

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This presentation is a condensed version of the vapor intrusion training that Dr. Hartman has been presenting to Federal & State regulatory agencies, DOD facilities, consulting groups, and stakeholders around the country. As of July 2006, Dr. Hartman has given vapor intrusion or soil gas training to over 20 State Regulatory agencies, to regulators from all 50 states at the ASTSWMO national meeting, at the National UST conference in 2006, at the British Brownfields conference in May 2006, and to many RPs and stakeholders such as Exxon/Mobil, BP/ARCO, Dept. of Navy, & the Electrical Power Research Institute (EPRI).

Lecture notes are at the bottom of each slide so that if played out as a hard-copy, the presentation can be a useful reference document.

Contaminant Partitioning

Groundwater to Soil Gas (Henry's Constant):

$$H = Csg/Cw, \text{ so, } Csg = Cw * H$$

Example: $H_{benzene} = 0.25$ (dimensionless)
For GW Conc = 10 ug/L
Csg = 10 * 0.25 = 2.5 ug/L

Assumes Equilibrium. Very Rarely Achieved (no mixers or blenders in the subsurface)

Partitioning refers to the distribution of molecules between different phases. Partition coefficients are determined empirically by laboratory measurement. The partition coefficient for water to air partitioning (e.g., groundwater to soil gas) is called the Henry's Constant or Henry's Law. It simply is a ratio of the concentration in the air to the concentration in the water. It is simple to calculate the soil gas concentration from groundwater data or the reverse from the dimensionless Henry's constant.

Henry's constants are based upon equilibrium being reached. The container was vigorously mixed. Mixers do not exist in the subsurface so equilibrium not reached and actual soil gas concentrations are far below calculated ones.