Glossary

advection. Transport of a solute by the bulk motion of flowing groundwater.

aliphatic compounds. Acyclic or cyclic, saturated or unsaturated carbon compounds, excluding aromatic compounds.

amendment. Substrate introduced to stimulate the in situ microbial processes (vegetable oils, sugars, alcohols, etc.).

anisotropy. The property of being directionally dependent, as opposed to "isotropy," which means homogeneity in all directions.

bioaugmentation. The addition of beneficial microorganisms into groundwater to increase the rate and extent of anaerobic reductive dechlorination to ethene.

bioremediation. Use of microorganisms to biodegrade contaminants in soil and groundwater.

biostimulation. The addition of an organic substrate or nutrients into groundwater to stimulate anaerobic reductive dechlorination.

chlorinated ethene. Organic compounds containing two double-bonded carbons and possessing at least one chlorine substituent.

compliance monitoring. The collection of data which, when analyzed, can allow for the evaluation of the contaminated media against standards such as soil and or water quality regulatory standards, risk-based standards, or remedial action objectives.

chlorinated solvent. Organic compounds with chlorine substituents that commonly are used for industrial degreasing and cleaning, dry-cleaning, and other processes.

conceptual site model (CSM). A hypothesis about how contaminant releases occurred, the current state of the source zone, and current plume characteristics (plume stability).

control plane. The location of the control plane, or response boundary, is defined as a location within the source area, upgradient or immediately downgradient of the source area where changes in the plume configuration are anticipated due to the implementation of the DNAPL source zone treatment. The response boundary should not be confused with the term "point of compliance," which the Environmental Protection Agency defines as the point where media-specific standards (e.g., maximum contaminant levels, risk-based cleanup goals) must be achieved.

dense, nonaqueous-phase liquid (DNAPL). A water-immiscible organic liquid that is denser than water (e.g., tetrachloroethene).

DNAPL architecture. The spatial distribution of DNAPL mass and source zone hydraulic conductivity distribution, and the correlation between DNAPL mass and hydraulic conductivity in the subsurface.

desorption. The converse of "sorption."

diffusion. The process of net transport of solute molecules from a region of high concentration to a region of low concentration caused by their molecular motion in the absence of turbulent mixing.

dilution. A reduction in solute concentration caused by mixing with water at a lower solute concentration.

dispersion. The spreading of a solute from the expected groundwater flow path as a result of mixing of groundwater.

flux. Rate of flow of fluid, particles, or energy through a given surface.

hydraulic conductivity. The capability of a geologic medium to transmit water. A medium has a hydraulic conductivity of unit length per unit time if it will transmit in unit time a unit volume of groundwater at the prevailing viscosity through a cross section of unit area, measured at right angles to the direction of flow, under a hydraulic gradient of

unit change in head through unit length of flow.

hydraulic gradient. The change in hydraulic head per unit distance in a given direction, typically in the principal flow direction.

inorganic compound. A compound that is not based on covalent carbon bonds, including most minerals, nitrate, phosphate, sulfate, and carbon dioxide.

in situ bioremediation. The use of biostimulation and bioaugmentation to create anaerobic conditions in groundwater and promote contaminant biodegradation for the purposes of minimizing contaminant migration and/or accelerating contaminant mass removal.

integrated contaminant mass flux. See mass discharge, cumulative mass flux, total mass flux, integrated mass flux (ITRC 2008a). The total quantity of a migrating substance that moves through a planar transect within the system of interest and oriented perpendicular to the direction of *x* movement. If the transect is at the entry point to the system, the integrated mass flux is the loading. If the transect is at the exit point from the system, the integrated mass flux is the discharge. Note that these terms have units of mass per time (kg/year, g/d, or the like) and represent an extension of the traditional engineering definition of flux (e.g., kg/year/m^2) in which the transect area is accounted for to allow mass balance calculation of plume- or system-scale behavior.

mass balance. Quantitative estimation of the mass loading to the dissolved plume from various sources, as well as the mass transport, phase transfer, degradation, and the attenuation capacity for the dissolved plume.

mass discharge (M_d, mg/d). Contaminant load past a transect (mass per time) (also called “cumulative mass flux” and “mass discharge,” or confusingly, “mass flux” by some groups).

mass flux (J, mg•d^{-1}•m^{-2}). Contaminant load (per unit area per time), a general term where mass flux and/or mass discharge type calculations are performed.

mass loading. Contaminant released to the environment (in this case the aquifer or unsaturated zone) from the source material.

mass transfer. The irreversible transport of solute mass from the nonaqueous phase (i.e., DNAPL) into the aqueous phase, the rate of which is proportional to the difference in concentration.

monitored natural attenuation (MNA). The term “natural attenuation” refers to naturally occurring processes in soil and groundwater environments that act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in those media. These in situ processes include biodegradation, dispersion, dilution, adsorption, volatilization, and chemical or biological stabilization or destruction of contaminants. When scientists monitor or test these conditions to make sure natural attenuation is working, it is called “monitored natural attenuation” (USEPA 2001a).

natural attenuation. Naturally occurring processes in soil and groundwater environments that act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in those media.

process monitoring. The collection of information documenting the operation of a system’s engineered components.

performance monitoring. The collection of information which, when analyzed, allows for the evaluation of the performance of a system on environmental contamination.

plume. A zone of dissolved contaminants. A plume usually originates from a source and extends in the direction of groundwater flow.

pool. An accumulation of DNAPL above a capillary barrier.

response boundary. See “control plane.”

saturated zone. Subsurface environments in which the pore spaces are filled with water.

seepage velocity. The rate of movement of fluid particles through porous media along a line from one point to another.

sorption. The uptake of a solute by a solid.

source strength. Mass discharge at the source zone.

source zone. The subsurface zone containing a contaminant reservoir sustaining a plume in groundwater. The subsurface zone is or was in contact with DNAPL. Source zone mass can include sorbed and aqueous-phase contaminant mass as well as DNAPL.

specific discharge. An apparent velocity calculated from Darcy's law, represents the flow rate at which water could flow in an aquifer if the aquifer were an open conduit.

substrate. A molecule that can transfer an electron to another molecule and/or provide carbon to the microorganism. Organic compounds, such as lactate, ethanol, or glucose, are commonly used as substrates for bioremediation of chlorinated ethenes.

volatilization. The transfer of a chemical from its liquid phase to the gas phase.

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