

Appendix B Glossary

ADVECTION. The process by which solutes are transported by the motion of flowing groundwater.

ALLUVIUM. Sediments deposited by flowing water. Deposits can be made by streams on river beds, flood plains, and alluvial fans.

ANISOTROPY. The condition under which one or more of the hydraulic properties of an aquifer vary according to the direction of flow.

AQUICLUDE. A low-permeability unit that forms either the upper or lower boundary of a groundwater flow system.

AQUIFER. Rock or sediment in a formation, group of formations, or part of a formation that is saturated and sufficiently permeable to transmit significant quantities of water to wells and springs.

AQUIFER, CONFINED. An aquifer that is overlain by a confining bed. The hydraulic conductivity of the confining bed is significantly lower than that of the aquifer.

AQUIFER, PERCHED. A region in the unsaturated zone where the soil may be locally saturated because it overlies a low-permeability unit.

AQUIFER, SEMICONFINED. An aquifer confined by a low-permeability layer that permits water to slowly flow through it. During pumping of the aquifer, recharge to the aquifer can occur across the confining layer. Also known as a leaky artesian or leaky confined aquifer.

AQUIFER, UNCONFINED. Also known as water-table and phreatic aquifer. An aquifer in which there are no confining beds between the zone of saturation and the surface. The water table is the upper boundary of unconfined aquifers.

AQUIFUGE. An absolutely impermeable unit that will neither store nor transmit water.

AQUITARD. A low-permeability unit that can store groundwater and also transmit it slowly from one aquifer to another.

BASEFLOW. The part of stream discharge that originates from groundwater seeping into the stream.

BASEFLOW RECESSION. The declining rate of discharge of a stream fed only by baseflow for an extended period. Typically, a baseflow recession will be exponential.

BOREHOLE GEOCHEMICAL PROBE. A device for monitoring water quality that is lowered into a well on a cable and can take direct readings of such parameters as pH, Eh, temperature, SP, and specific conductivity.

BOREHOLE GEOPHYSICS. The general field of geophysics developed around the lowering of various probes into wells.

BORING. A hole advanced into the ground by means of a drilling rig.

CALIBRATION. The process of refining the model representation of the hydrogeologic framework, hydraulic properties, and boundary conditions to achieve a desired degree of correspondence between the model simulations and observations of the groundwater flow system.

CALIPER LOG. A borehole log of the diameter of an uncased well.

CAPILLARY FORCES. The forces which act on soil moisture in the unsaturated zone, caused by the molecular attraction between soil particles and water.

CONCEPTUAL MODEL. A simplified representation of the physical hydrogeologic setting. This includes the identification and description of the geologic and hydrologic framework, media type, hydraulic properties, and sources and sinks of flow.

CONFINING LAYER. A body of relatively impermeable material that is stratigraphically adjacent to one or more aquifers. It may lie above or below the aquifer.

DARCY'S LAW. An empirical equation developed to compute the quantity of water flowing through an aquifer.

DENSITY. The mass or quantity of a substance per unit volume. Units are kilograms per cubic meter or grams per cubic centimeter.

DIRICHLET CONDITION. Also known as a constant head boundary. A boundary condition for a groundwater computer model where the head is known at the boundary of the flow field.

DIFFUSIVITY. The ratio of transmissivity to storage coefficient in an aquifer.

DISCHARGE. The volume of water flowing in a stream or through an aquifer past a specific point in a given period of time.

DISCHARGE AREA. An area in which there are upward components of hydraulic head in the aquifer.

DISPERSION. The phenomenon by which a solute in flowing groundwater is mixed with uncontaminated water and becomes reduced in concentration. Dispersion is caused by differences in the velocity that the water travels at the pore level and differences in the rate at which water travels through different strata in the flow path.

DRAWDOWN. A lowering of the water table of an unconfined aquifer, or of the potentiometric surface of a confined aquifer. Drawdown is the result of pumping of groundwater from wells.

DUPUIT ASSUMPTIONS. The following assumptions for flow in an unconfined aquifer: (a) hydraulic gradient is equal to the slope of the water table, (b) streamlines are horizontal, and (c) equipotential lines are vertical.

EFFECTIVE GRAIN SIZE. The grain size corresponding to the one that is 10 percent finer by weight line on the grain-size distribution curve.

EQUIPOTENTIAL LINE. A line in a two-dimensional groundwater flow field such that the total hydraulic head is the same for all points along the line.

EQUIPOTENTIAL SURFACE. A surface in a three-dimensional groundwater flow field such that the total hydraulic head is the same everywhere on the surface.

EVAPOTRANSPIRATION. The sum of evaporation and transpiration.

FIELD CAPACITY. The maximum amount of water that the unsaturated zone of a soil can hold against the downward pull of gravity.

FINITE-DIFFERENCE MODEL. A particular kind of digital computer model based upon a rectangular grid that sets the boundaries of the model and the nodes where the model will be solved.

FINITE-ELEMENT MODEL. A digital groundwater-flow model where the aquifer is divided into a mesh formed of a number of polygonal cells.

FLOW NET. The set of intersecting equipotential lines and flowlines representing two-dimensional steady flow through porous media.

FLOW, STEADY. The flow that occurs when, at any point in the flow field, the magnitude and direction of flow are constant in time.

FLOW, UNSTEADY. Also called transient flow. The flow that occurs when, at any point in the flow field, the magnitude or direction of flow changes with time.

GAMMA-GAMMA RADIATION LOG. A borehole log in which a source of gamma radiation as well as a detector are lowered into the borehole. This log measures bulk density of the formation and fluids.

GHYBEN-HERXBERG PRINCIPLE. An equation that relates the depth of a saltwater interface in a coastal aquifer to the height of the freshwater table above sea level.

GLACIAL OUTWASH. Well-sorted sand, or sand and gravel, deposited by the meltwater from a glacier.

GLACIAL TILL. Unsorted and unstratified deposits by melting ice without reworking by meltwater. Till may consist of a mixture of clay, silt, sand, gravel, and boulders.

GRAVITY POTENTIAL. A potential due to the position of groundwater or soil moisture above a datum.

GROUND-PENETRATING RADAR. A surface geophysical technique based upon the transmission of repetitive pulses of electromagnetic waves into the ground. Some of the radiated energy that is reflected back to the surface is captured and processed.

GROUNDWATER. The water contained in interconnected pores located below the water table.

GROUNDWATER DIVIDE. The boundary between two adjacent groundwater basins. The divide is represented by a high in the water table.

GROUNDWATER FLOW MODEL. An application of a mathematical model to represent a site-specific groundwater flow system.

HATTUSH-JACOB FORMULA. An equation to describe the change in hydraulic head with time during pumping of a leaky confined aquifer.

HEAD, TOTAL HYDRAULIC. The sum of the elevation head, the pressure head, and the velocity head at a given point in an aquifer.

HETEROGENEOUS. A medium which consists of different (nonuniform) characteristics in different locations.

HOMOGENEOUS. A medium with identical (uniform) characteristics regardless of location.

HYDRAULIC CONDUCTANCE. A term which incorporates model geometry and hydraulic conductivity into a single value for simplification purposes. Controls rate of flow to or from a given model cell, river reach, etc.

HYDRAULIC CONDUCTIVITY. The rate at which water of a specified density and kinematic viscosity can move through a permeable medium.

HYDRAULIC DIFFUSIVITY. A property of an aquifer or confining bed defined as the ratio of the transmissivity to the storativity.

HYDRAULIC GRADIENT. The change in total head with a change in distance in a given direction which yields a maximum rate of decrease in head.

HYDROGRAPH. A graph that shows some property of groundwater or surface water as a function of time.

HYDROLOGIC CYCLE. The circulation of water from the oceans through the atmosphere to the land and ultimately back to the ocean.

HYDROLOGIC EQUATION. An expression of the law of mass conservation for purposes of water budgets. It may be stated as inflow equals outflow plus or minus changes in storage.

INFILTRATION. The flow of water downward from the land surface into and through the upper soil layers.

INFILTRATION CAPACITY. The maximum rate at which infiltration can occur under specific conditions of soil moisture. For a given soil, the infiltration capacity is a function of the water content.

INTERFLOW. The lateral movement of water in the unsaturated zone during and immediately after a precipitation event. The water moving as interflow discharges directly into a stream or lake.

ISOTROPY. The condition in which hydraulic properties of the aquifer are equal in all directions.

JACOB STRAIGHT-LINE METHOD. A graphical method using semilogarithmic paper and the Theis equation for evaluating the results of a pump test.

KARST. The type of geologic terrain underlain by carbonate rocks where significant solution of the rock has occurred due to the flowing groundwater. Karst topography is frequently characterized by sinkholes, caves, and underground drainage.

LAMINAR FLOW. That type of flow in which the fluid particles follow paths that are smooth, straight, and parallel to the channel walls. In laminar flow, the viscosity of the fluid damps out turbulent motion.

LAPLACE EQUATION. The partial differential equation governing steady-state flow in a homogeneous, isotropic aquifer.

LEAKANCE. Controls vertical flow in a model between cells in adjacent layers. Equivalent to effective vertical hydraulic conductivity divided by the vertical distance between layer midpoints.

LEAKY CONFINING LAYER. A low-permeability layer that can transmit water at sufficient rates to furnish some recharge to a well pumping from an underlying aquifer. Also known as an aquitard.

LINEAMENT. A regional topographic feature of regional extent that is believed to reflect crustal structure.

LYSIMETER. A field device containing a soil column and vegetation; used for measuring evapotranspiration.

MANNING EQUATION. An equation that can be used to compute the average velocity of flow in an open channel.

MODEL CALIBRATION. The process by which the independent variables of a numerical model are adjusted to produce the best match between simulated and observed data, usually water-level values.

NATURAL GAMMA RADIATION LOG. A borehole log that measures the natural gamma radiation emitted by the formation rocks. It can be used to delineate subsurface rock types.

NEUMANN CONDITION. Also called a constant flux boundary. The boundary condition for a groundwater-flow model where a flux across the boundary of the flow region is known.

NEUTRON LOG. A borehole log obtained by lowering a radioactive element, which is a source of neutrons, and a neutron detector into the well. The neutron log measures the amount of water present; hence, the porosity of the formation.

NUMERICAL MODEL. A model of groundwater flow in which the aquifer is described by numerical equations, with specified values for boundary conditions, that are usually solved on a digital computer.

OBSERVATION WELL. A nonpumping well used to observe the elevation of the water table or the potentiometric surface. An observation well is generally of larger diameter than a piezometer and typically is screened or slotted throughout the thickness of the aquifer.

PACKER TEST. An aquifer test performed in an open borehole; the segment of the borehole to be tested is sealed off from the rest of the borehole by inflating seals, called packers, both above and below the segment.

PERMAFROST. Perennially frozen ground, occurring wherever the temperature remains at or below freezing for two or more years in a row.

PIEZOMETER. A nonpumping well, generally of small diameter, that is used to measure the elevation of the water table or potentiometric surface. A piezometer generally has a short well screen through which water can enter.

POROSITY. The ratio of the volume of void spaces in a rock or sediment to the total volume of the rock or sediment.

POROSITY, EFFECTIVE. The volume of the interconnected void spaces through which water or other fluids can travel in a rock or sediment divided by the total volume of the rock or sediment.

POROSITY, PRIMARY. The porosity that represents the original pore openings when a rock or sediment formed.

POROSITY, SECONDARY. The porosity that has been caused by fractures or weathering in a rock or sediment after it has been formed.

POTENTIOMETRIC SURFACE. A surface that represents the level to which water will rise in tightly cased wells. The water table is a particular potentiometric surface of an unconfined aquifer.

PUMPING TEST. Also known as an aquifer test. A test made by pumping a well for a period of time and observing the change in hydraulic head in the aquifer. A pumping test may be used to determine the capacity of the well and the hydraulic characteristics of the aquifer.

RECHARGE BOUNDARY. An aquifer system boundary that adds water to the aquifer. Streams and lakes are typically recharge boundaries.

REGOLITH. The fragmented and unconsolidated rock material that forms the surface of the land and overlies the bedrock.

RESIDUAL. The difference between the computed and observed value of a variable at a specific time and location.

RESISTIVITY LOG. A borehole log made by lowering two current electrodes into the borehole and measuring the resistivity between two additional electrodes. It measures the electrical resistivity of the formation and contained fluids near the probe.

ROCK, IGNEOUS. A rock formed by the cooling and crystallization of a molten rock mass called magma.

ROCK, METAMORPHIC. A rock formed by the application of heat and pressure to preexisting rocks.

ROCK, SEDIMENTARY. A layered rock formed from the consolidation of sediment. Includes clastic rocks (such as sandstone), rocks formed by chemical precipitation in water (such as limestone), or rocks formed from organic material (such as coal).

ROCK, VOLCANIC. An igneous rock formed when molten rock called lava cools on the earth's surface.

SAFE YIELD. The amount of naturally occurring groundwater that can be economically and legally withdrawn from an aquifer on a sustained basis without impairing the native groundwater quality or creating an undesirable effect such as environmental damage. It cannot exceed the increase in recharge or leakage from adjacent strata plus the reduction in discharge, which is due to the decline in head caused by pumping.

SATURATED ZONE. The zone in which the voids in the rock or soil are filled with water at a pressure greater than atmospheric. The water table is the top of the saturated zone in an unconfined aquifer.

SEEPAGE VELOCITY. Also known as pore water velocity. The rate of movement of fluid particles through porous media along a line from one point to another.

SEISMIC REFRACTION. A method of determining subsurface geophysical properties by measuring the length of time it takes for artificially generated seismic waves to pass through the ground.

SENSITIVITY ANALYSIS. The measurement of the uncertainty in a calibrated model as a function of uncertainty in estimates of aquifer parameters and boundary conditions.

SIMULATION. One complete execution of a groundwater modeling computer program, including input and output.

SLUG TEST. An aquifer test made either by pouring a small instantaneous charge of water into a well or by withdrawing a slug of water from the well.

SPECIFIC CAPACITY. The ratio of the rate of discharge of water from the well to the drawdown of the water level in the well. Specific capacity should be described on the basis of the number of hours of pumping prior to the time the drawdown measurement is made. It will generally decrease with time as the drawdown increases.

SPECIFIC DISCHARGE. Also known as Darcian flow velocity. An apparent velocity calculated from Darcy's law; represents the flow rate at which water would flow in an aquifer if the aquifer were an open conduit.

SPECIFIC RETENTION. The ratio of the volume of water the rock or sediment will retain against the pull of gravity to the total volume of the rock or sediment.

SPECIFIC STORAGE. The amount of water per unit volume of a saturated formation that is expelled from storage due to compression of the mineral skeleton and the pore water.

SPECIFIC YIELD. The ratio of the volume of water that a given mass of saturated soil or rock will yield by gravity to the volume of that mass.

STORAGE COEFFICIENT (STORATIVITY). The volume of water that a conductive unit will expel from storage per unit surface area per unit change in head. In a confined aquifer, it is computed as the product of specific storage and aquifer thickness. In an unconfined aquifer, it is equal to specific yield.

THEIS EQUATION. An equation for the unsteady flow of groundwater in a fully confined aquifer to a pumping well.

TOPOGRAPHIC DIVIDE. The boundary between adjacent surface water boundaries. It is represented by a topographically high area.

TORTUOSITY. The actual length of a groundwater flow path, which is sinuous in form, divided by the straight-line distance between the ends of the flow path.

TRANSMISSIVITY. The rate at which water is transmitted through a unit width of aquifer or confining bed under a unit hydraulic gradient. The product of saturated thickness and hydraulic conductivity.

UNSATURATED ZONE. Also known as the zone of aeration and the vadose zone. The zone between the land surface and the water table. It includes the root zone, intermediate zone, and capillary fringe. The pore spaces contain water at less than atmospheric pressure, as well as air and other gases. Saturated bodies, such as perched groundwater, may exist in the unsaturated zone.

VADOSE ZONE. See unsaturated zone.

VISCOSITY. The property of fluid describing its resistance to flow. Units of viscosity are newton-seconds per meter squared or pascal-seconds. Viscosity is also known as dynamic viscosity.

WATER BUDGET. An evaluation of all the sources of supply and the corresponding discharges with respect to an aquifer or a drainage basin.

WATER TABLE. The surface in an unconfined aquifer or confining bed at which the pore water pressure is atmospheric. It can be measured by installing shallow wells extending just into the zone of saturation and then measuring the water level in those wells.

WELL DEVELOPMENT. The process whereby a well is pumped or surged to remove any fine material that may be blocking the well screen or the aquifer outside the well screen.

WELL EFFICIENCY. The ratio of idealized draw-down in the well, where there are no losses resulting from well design and construction factors, to actual measured drawdown in the well.

WELL, FULLY PENETRATING. A well drilled to the bottom of an aquifer, constructed in such a way that it withdraws water from the entire thickness of the aquifer.

WELL, PARTIALLY PENETRATING. A well constructed in such a way that it draws water directly from a fractional part of the total thickness of the aquifer. The fractional part may be located at the top or bottom or anywhere in between in the aquifer.

WELL SCREEN. A tubular device with either slots, holes, gauze, or continuous-wire wrap; used at the end of a well casing to complete a well. The water enters the well through the well screen.