

# Definition of Terms

## A

**Action level** The concentration established by the U.S. Environmental Protection Agency of copper or lead which, if exceeded, triggers treatment or other requirements that a water-supply system must follow.

**Acute criteria** An estimate of the maximum concentration of a constituent to which aquatic life can be exposed for short periods of time without detrimental effects.

**Algorithm** A systematic procedure (usually repetitive) for solving a problem.

**Alluvium** A general term for unconsolidated sedimentary accumulations deposited by rivers or streams. It includes sediment deposited in river beds and flood plains.

**Anhydrite** A calcium sulfate mineral ( $\text{CaSO}_4$ ) that alters readily to gypsum.

**Anticline** A fold in which the strata dip away from the axis. After erosion, the oldest rocks are exposed in the central core of the fold. See figure 17.

**Aquatic-life criteria** Water-quality standards designed to protect aquatic life.

**Aquifer** An underground body of porous materials, such as sand, gravel, or fractured rock, filled with water and capable of supplying useful quantities of water to a well or spring.

**Artesian aquifer** An aquifer that contains water that would rise above the top of the aquifer in a penetrating well; also confined aquifer.

**Artesian well** A well in which the water will rise above the top of the aquifer. When the water level is above land surface, water will flow from the well.

**Axial plane** With reference to folds, such as anticlines and synclines, an imaginary plane that intersects the crest or trough of a fold. See figure 17.

## B

**Basal** Located at the bottom of a geologic unit.

**Base flow** That part of streamflow that is sustained primarily by groundwater discharge. It is not attributable to direct runoff from precipitation or melting snow.

**Basin yield** The annual yield of a basin (expressed in inches), which is obtained by dividing annual flow by drainage area.

**Bedrock aquifer** An aquifer composed of consolidated material such as limestone, dolomite, sandstone, siltstone, shale, or fractured crystalline rock.

**Beneficial-use criteria** Water-quality standards established by the State to protect beneficial uses that are assigned to stream segments, lakes, and aquifers.

**Breccia** A rock composed of large, angular fragments cemented into a solid mass.

**Brine** Water having a dissolved solids concentration greater than that of sea water (35,000 milligrams per liter).

## C

**Capillary fringe** The lower subdivision of the unsaturated zone, immediately above the water table, in which the voids are filled with water under pressure less than that of the atmosphere and held by surface tension.

**Carbonate rocks** Rocks consisting mainly of carbonate minerals, which contain the carbonate radical ( $\text{CO}_3^{2-}$ ) combined with other elements. Examples are limestone and dolomite.

**Cenozoic** The most recent of the four eras into which geologic time is divided. It extends from the end of the Mesozoic Era to the present.

**Chronic criteria** An estimate of the maximum concentration of a constituent to which aquatic life can be exposed for extended periods of time without detrimental effects.

**Clay** An earthy, extremely fine-grained sediment or soft rock composed primarily of clay-sized or colloidal particles, having high plasticity and a considerable content of clay minerals.

**Colluvium** A general term applied to unconsolidated material deposited by rainwash or slow continuous downslope creep, usually collecting at the base of hillsides.

**Common ions** The group of constituents that includes calcium, magnesium, sodium, bicarbonate, sulfate, and chloride and collectively constitute more than 95 percent of the dissolved solids for most natural waters. (An ion is an electrically charged particle.)

**Concentration** The amount of a constituent present in a given volume of sample. Usually expressed as milligrams per liter or micrograms per liter for a water sample.

**Conceptual model** A working model or hypothesis describing a phenomenon or process that is difficult or impossible to observe directly.

**Confined** Said of ground water that is under pressure greater than that of the atmosphere. When an aquifer is completely filled with water (fully saturated) and is overlain by a confining unit, the water can be confined under pressure.

**Confined aquifer** An aquifer that contains water that would rise above the top of the aquifer in a penetrating well; also artesian aquifer. See figure 7B.

**Confining unit** A relatively low permeability geologic unit that impedes the vertical movement of water.

**Conglomerate** A coarse-grained sedimentary rock composed of rounded fragments of pebbles, cobbles, or boulders cemented into a solid mass.

**Constituent** A chemical substance in water that can be measured by analytical methods.

**Consumptive use** Permanent removal of water from a water body by diversions, evaporation, or transpiration. For nonconsumptive uses, water is eventually returned to the water body.

**Cross section** A diagram or drawing that shows features transected by a given vertical plane. See figure 20.

**Crystalline rock** Igneous or metamorphic rock.

**Cubic foot per second** The rate of water discharge representing a volume of 1 cubic foot passing a given point during 1 second; approximately equal to 7.48 gallons per second, 448.8 gallons per minute, or 0.02832 cubic meter per second.

## D

**Depression storage** Accumulation of water from precipitation in depressions in the land surface.

**Dip** The slope of a tilted layer of rock.

**Direct runoff** The runoff reaching stream channels immediately after rainfall or snowmelt.

**Discharge** Rate of fluid flow passing a given point at a given moment in time, expressed as volume per unit of time, such as cubic foot per second.

**Dissolution** Process by which minerals and rock materials are dissolved by a fluid.

**Dissolved solids** The total of all dissolved mineral constituents, usually expressed in milligrams per liter (mg/L). The dissolved solids concentration commonly is called the water's salinity and is classified as follows: fresh, 0-1,000 mg/L; slightly saline, 1,000-3,000 mg/L; moderately saline, 3,000-10,000 mg/L; very saline, 10,000-35,000 mg/L; and briny, more than 35,000 mg/L.

**Dolomite** A sedimentary rock composed primarily of calcium-magnesium carbonate,  $\text{CaMg}(\text{CO}_3)_2$ .

**Dome** An uplift that is circular or elliptical in map view, with beds dipping away in all directions from a central area. See figure 17.

**Drainage area** The total area of a watershed upstream of a given location, such as a streamflow-gaging station.

**Drainage basin** The area drained by (or contributing water to) a stream, lake, or other body of water; also watershed.

## E

**Effective porosity** The porosity consisting of interconnected voids.

**Erosional remnant** A topographic feature that remains or is left standing above the general land surface after erosion has lowered the surrounding area.

**Evaporation** The process of liquid water becoming water vapor, including vaporization from water surfaces, land surfaces, and snow fields, but not from leaf surfaces.

**Evaporite mineral** A mineral precipitated as a result of evaporation, such as halite.

**Evapotranspiration** Loss of water from a land area through evaporation from the soil and surface-water bodies and transpiration by plants.

## F

**Fault** A surface along which a rock body has broken and been displaced. See figure 17.

**Flowpath** The direction of movement of ground water, and any contaminants that may be contained therein, as controlled by the hydraulic gradient and other geologic factors.

**Fold** A bend or flexure in a rock. See figure 16.

**Formation** The fundamental unit in the local classification of rocks into geologic units based on similar characteristics in lithology, which is the description of rocks on the basis of such characteristics as color, mineralogic composition, and grain size. Formations may represent rocks deposited during short or long time intervals, may be composed of materials from several sources, and may include breaks in deposition. Formations typically are named after geographic localities where they were first studied or described.

**Fracture** A crack in a rock. Also includes joints and faults.

**Fresh water** Water that has a dissolved solids concentrations of less than 1,000 milligrams per liter.

## G

**Geographic information system (GIS)** A computer program (and associated databases) that permits geographic information to be displayed, manipulated, and analyzed.

**Geologic time scale** An arbitrary chronologic arrangement of geologic events, commonly presented in a chart form with the oldest event and time unit at the bottom and the youngest at the top.

**Ground water** Water beneath the land surface in the saturated zone.

**Ground-water level** The level of the water table in an unconfined aquifer or of the potentiometric surface in a confined aquifer.

**Group** A geologic classification consisting of two or more formations.

**Gypsum** The mineral form of hydrated calcium sulfate,  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ .

## H

**Halite** A mineral composed of sodium and chloride,  $\text{NaCl}$  (salt).

**Hogback** A steep, elongate ridge; commonly protected from erosion by a steeply dipping resistant stratum.

**Hydraulic connection** Exists when changes in hydraulic head in adjacent aquifers or surface-water bodies influence each other.

**Hydraulic gradient** The rate of change in total head per unit of distance of flow in a given direction. Water will flow from higher hydraulic head to lower hydraulic head.

**Hydraulic head** In an aquifer, the altitude to which water will rise in a properly constructed well. This is the altitude of the water table in an unconfined aquifer or of the potentiometric surface in a confined aquifer.

**Hydrogeology** Factors that deal with geologic influences on water.

**Hydrograph** A graph showing flow rates or water levels with respect to time. A stream hydrograph commonly shows rate of flow; a well hydrograph commonly shows water level.

**Hydrologic budget** An accounting of the inflow to, outflow from, and storage change in a hydrologic unit such as an aquifer or drainage basin.

**Hydrologic cycle** The constant circulation of water from the sea, through the atmosphere, to the land, and back to the sea.

## I

**Igneous rocks** Rocks that solidified from molten or partly molten material, such as magma. Granite is an example of an igneous rock.

**Infiltration** Movement of water from the land surface into the soil or porous rock.

**Interflow** The runoff infiltrating into the surface soil and moving toward streams as shallow, perched ground water above the main ground-water level.

**Intrusion** The process of emplacement of magma in pre-existing rock.

**Isotope** One of two or more species of the same chemical element that differ from one another by having a different number of neutrons in the nucleus. The isotopes of an element have slightly different physical and chemical properties due to their mass difference.

## K

**Karst** A type of topography that is formed over limestone, dolomite, or gypsum by dissolution. It is characterized by sinkholes, caves, and underground drainage.

## L

**Laminated** Said of a rock containing very thin layers; platy.

**Limestone** A sedimentary rock consisting mostly of calcium carbonate,  $\text{CaCO}_3$ , primarily in the form of the mineral calcite.

**Loss threshold** Maximum rate of water lost by streams to underlying geologic units. Until streamflow upstream from a loss zone exceeds the loss threshold, the entire flow of the stream is lost to underlying geologic units.

**Loss zone** A stream zone, or segment, where flow is lost to underlying geologic units.

## M

**Massive** Said of rocks that occur in very thick beds that are uniform in structure and composition throughout.

**Maximum Contaminant Level (MCL)** Maximum permissible level of a contaminant in water that is delivered to any user of a public water system. MCL's are enforceable standards established by the U.S. Environmental Protection Agency.

**Mean** The arithmetic average of a series of values.

**Median** The value of the middle number in a set of data arranged in rank order. The 50th percentile.

**Mesozoic** The era of geologic time from the end of the Paleozoic Era to the beginning of the Cenozoic Era.

**Metamorphic rock** Derived from pre-existing rocks in response to changes to temperature, pressure, or stress that result in changes in the mineralogy, chemistry, or structure of the rock. Examples of metamorphic rocks are slate and schist.

**Mineralized areas** Areas where the local geology is known to have relatively high concentrations of trace elements, such as arsenic, copper, gold, lead, silver, and zinc.

**Monocline** A step-like bend or fold in otherwise horizontal or gently dipping beds. See figure 17.

## N

**Nutrients** Nitrogen and phosphorus, which are essential to plant growth.

## O

**Observation well** A well constructed for collection of hydrologic data, such as water levels and water quality.

**Orogeny** The process of the formation of mountains.

**Orographic** Pertaining to mountains. Climatically, the lifting of air currents caused by passage up and over mountains.

**Outcrop** That part of a geologic formation that is exposed at the land surface.

**Overland flow** That part of runoff flowing over land surfaces toward stream channels.

## P

**Paleozoic** The era of geologic time from the end of the Precambrian Era to the beginning of the Mesozoic Era.

**Perched ground water** Unconfined ground water separated from an underlying main body of ground water by an unsaturated zone.

**Perched spring** A spring whose source of water is a body of perched ground water.

**Perennial** Refers to a stream that flows throughout the year.

**Permeability** The capacity of a porous rock, sediment, or soil for transmitting a fluid.

**Porosity** The percentage of the soil or rock volume that is occupied by pore space, void of material; defined by the ratio of voids to the total volume of a specimen.

**Potential evaporation** The maximum amount of water that would evaporate under natural conditions if unlimited moisture was available.

**Potentiometric surface** A surface representing the hydraulic head of ground water; represented by the water-table altitude in an unconfined aquifer or by the altitude to which water will rise in a properly constructed well in a confined aquifer.

**Precambrian** The oldest geologic time period, which occurred before the beginning of the Paleozoic Era. The Precambrian Era constitutes about 90 percent of all geologic time.

**Public water supply** Water supply provided to the public; defined in South Dakota as having at least 15 service connections or regularly serving at least 25 individuals daily for at least 60 days out of the year.

## R

**Radioactive decay** Spontaneous emission of particles (alpha or beta) and gamma rays from the nucleus of an unstable nuclide. The resulting product nucleus may be stable or unstable, in which case decay continues until a stable nuclide is formed.

**Radioactive decay series** A series or succession of nuclides, each of which becomes the next in the series by radioactive decay, until a stable nuclide is formed.

**Radioactivity** The emission of energetic particles and/or radiation during radioactive decay.

**Radionuclide** A radioactive nuclide. (A nuclide is a species of atoms characterized by the number of neutrons and protons in its nucleus.)

**Recharge** The process involved whereby infiltration reaches the saturated zone. Also the amount of water added.

**Residence time** In ground water, the length of time water remains underground before it is extracted or discharged.

**Return flows** In irrigation waters, the excess water returning to a stream channel.

**Runoff** That part of precipitation contributing to streamflow. Runoff can originate as direct runoff or base flow.

## S

**Saline water** Salty water. Classified by the dissolved solids concentration in water.

**Sandstone** A sedimentary rock composed of abundant rounded or angular fragments of sand set in a fine-grained matrix (silt or clay) and more or less firmly united by a cementing material.

**Saturated** The condition in which the pores of a material are filled with water.

**Secondary Maximum Contaminant Level (SMCL)** Maximum level established by the U.S. Environmental Protection Agency for contaminants that can adversely affect the odor or appearance of water and may result in discontinuation of use of the water. SMCL's are nonenforceable, generally non-health-based standards that are related to the aesthetics of water use.

**Secondary permeability** The permeability developed in a rock after its deposition, through such processes as weathering and fracturing.

**Secondary porosity** The porosity developed in a rock after its deposition, through such processes as dissolution or fracturing.

**Sedimentary rock** Rocks resulting from the consolidation of loose sediment that has accumulated in layers. Examples of sedimentary rocks are sandstone, siltstone, limestone, and shale.

**Semiconfining unit** Unit that may transmit some water to and from adjacent aquifers.

**Shale** A fine-grained sedimentary rock, formed by the consolidation of clay, silt, or mud.

**Signature** A characteristic or combination of characteristics by which a material or object may be identified.

**Sill** A tabular igneous intrusion that parallels the bedding of the surrounding sedimentary or metamorphic rock.

**Solution opening** An opening in a rock material resulting from the dissolution of calcium carbonate in limestone or chalk.

**Spring** Any natural discharge of water from rock or soil onto the land surface or into a surface-water body.

**Stable isotope** An isotope that does not undergo radioactive decay.

**Stratigraphic column** The vertical (or chronological) sequence of rock units portrayed in a column from oldest (bottom) to youngest (top). See figure 15.

**Streamflow** The flow of water in a stream channel. Derived from all contributing sources, including base flow, direct runoff, and other sources such as diversions or well discharges.

**Streamflow depletions** Loss of water from surface-water resources. In the Black Hills area, the primary streamflow depletions are streamflow losses to outcrops of the Madison and Minnelusa aquifers, consumptive withdrawals, and reservoir evaporation associated with irrigation operations.

**Streamflow-gaging station** A particular site on a stream, canal, lake, reservoir, or other body of water where systematic observations of stream discharge and other hydrologic data are obtained.

**Structural feature** A feature produced by deformation or displacement of the rocks, such as a fold or fault.

**Superfund** A program initiated by the U.S. Environmental Protection Agency to define, study, and aid in cleanup activities for locations that are environmental hazards.

**Surface water** Water on the Earth's surface.

**Syncline** A fold in which the strata dip toward the axis. After erosion, the youngest beds are exposed in the central core of the fold. See figure 17.

## T

**Trace element** An element found in only minor amounts in water, generally less than 1.0 milligram per liter. Includes arsenic, copper, iron, lead, mercury, manganese, selenium, and zinc.

**Tracer** A substance, such as dye, used in tracing flowpaths or determining traveltimes.

**Transpiration** Process by which water that is absorbed by plants, usually through the roots, is evaporated into the atmosphere from the plant surface, such as leaf pores.

**Tributary** A stream feeding, joining, or flowing into a larger stream or lake.

**Tritium** A radioactive isotope of hydrogen ( $^3\text{H}$ ) having two neutrons and one proton in the nucleus.

## U

**Unconfined** Said of ground water that has a water table; the water is not confined under pressure.

**Unconfined aquifer** An aquifer in which the water table is exposed to the atmosphere through openings in the overlying materials.

**Unconsolidated aquifer** An aquifer composed of material that is loosely arranged or whose particles are not cemented together, such as sands and gravels.

**Unsaturated** The condition in which the pores of a material contain at least some air.

## W

**Watershed** The area drained by (or contributing water to) a stream, lake, or other body of water; also drainage basin.

**Water table** The top of the water surface in the saturated zone of an unconfined aquifer.

**Water year** The 12-month period, October 1 through September 30, that is designated by the calendar year in which it ends.

## Y

**Yield efficiency** The ratio of basin yield to annual precipitation, which indicates the percentage of annual precipitation that is yielded as streamflow (or recharge).