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GLOSSARY OF SELECTED
HYDROLOGIC AND WATER QUALITY TERMS

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FOREWORD

This glossary has been prepared so that persons involved in multidisciplinary water resources may have a common source for the definition of terms frequently used in hydrologic matters. This revision includes a separate section of water quality terms (the blue pages), since those persons even indirectly involved with water quality find that the technical language is strewn with terminology from many of the traditional fields of study, e.g., chemistry, microbiology, and sanitary engineering. By placing these terms in a single document it is hoped a useful reference will be provided to those with an interest in water quality and/or hydrology.

Special appreciation is extended by the authors to JoAnn Abe and Paula Johnson, who enabled the compilation of this volume on computer storage. This will greatly simplify future updating of the Glossary.

Users who would like to suggest additions or corrections to the Glossary are encouraged to contact the Institute.

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GLOSSARY OF SELECTED HYDROLOGIC TERMS

- ABIOTA - Those non-living factors which are present in and affect the characteristics of a given ecosystem.
- ABLATION - The process by which ice and snow waste away as a result of melting and/or evaporation.
- ABSOLUTE HUMIDITY - The actual weight of water vapor contained in a unit volume of the atmosphere.
- ABSORPTION - The entrance of water into the soil or rocks by all natural processes, including the infiltration of precipitation or snowmelt, gravity flow of streams into the valley alluvium into sinkholes or other large openings, and the movement of atmospheric moisture.
- ACRE-FOOT -A unit of volume of water equal to the volume of a prism 1 foot high with a base 1 acre in area; 43,560 cubic feet or 325,851 gallons. Commonly used in measuring volumes of water used or stored. (See the SI Conversion Table.)
- ACTIVE STORAGE CAPACITY - See STORAGE CAPACITY, ACTIVE.
- ADIABATIC - Occurring without loss or gain in heat.
- AERATION ZONE - This term is now obsolete. See ZONE, UNSATURATED.
- AFTERBAY - The tail race of a hydroelectric power plant at the outlet of the turbines; may refer to a short stretch of stream or conduit, or to a pond or reservoir.
- ALBEDO - The portion of incoming radiation reflected by a surface.
- ALKALINE - An adjective referring to water or soils which contain enough alkali substances to raise the pH-value above 7.0, or to harm the growth of crops.
- ALLUVIAL - An adjective referring to soil or earth material which has been deposited by running water.
- ALLUVIAL VALLEY FLOOR (Legal) - "The unconsolidated stream laid deposits holding streams where water availability is sufficient for subirrigation or flood irrigation agricultural activities but does not include upland areas which are generally overlain by a thin veneer of colluvial deposits composed chiefly of debris from sheet erosion, deposits by unconcentrated runoff or slopewash, together with talus, other

mass movement accumulation and wind-blown deposits" (P.L. 95-87, Sec. 701).

- ANABRANCH - A diverging branch of a river which reenters the main stream.
- ANCHOR ICE - Frazil ice that has collected on rocks on the stream bed.
- ANEMOMETER - An instrument used to measure wind velocity.
- ANNUAL - Occurring once during, or accumulated over, a consecutive 12-month period for which the beginning date is identified.
- ANNUAL FLOOD - The highest peak discharge in a water year.
- ANTECEDENT PRECIPITATION - Precipitation that occurred prior to the particular event, condition, or time under consideration; usually applies to that prior precipitation which is still effective in modifying infiltration or runoff.
- ANTECEDENT PRECIPITATION INDEX - A weighted summation of past daily precipitation amounts used as an index of soil moisture.
- ANTICYCLONE - An area of relatively high pressure in which, in the northern hemisphere, the winds tend to blow spirally outward in a clockwise direction.
- APPROPRIATION - The capture, impoundment, or diversion of water from its natural course or channel for some beneficial use.
- APPROPRIATIVE WATER RIGHT - The legal right to take or divert water for beneficial use.
- AQUICLUDE - This term is now obsolete. See CONFINING BED.
- AQUIFER - A formation, group of formations, or part of a formation that contains enough saturated permeable material to yield significant quantities of water to wells and springs.
- AQUIFER, ARTESIAN - See ARTESIAN AQUIFER.
- AQUIFER, CONFINED - See ARTESIAN AQUIFER. "Confined" is now considered synonymous with "artesian."
- AQUIFER, WATER-TABLE - See WATER-TABLE AQUIFER.
- AQUITARD - This term is now falling into disuse. See CONFINING BED.
- AREA-CAPACITY CURVE - A graph showing the relationship among the surface area of the water in a reservoir, the corresponding volume, and the elevation.

AREA OF INFLUENCE - The area covered by the drawdown curves of a given pumping well or combination of wells at a particular time.

ARID - An adjective applied to regions where the amount and/or timing of precipitation is such that agriculture is impracticable without irrigation.

ARROYO - A water-carved channel or gully in an arid country which is usually rather small with steep banks and is dry much of the time due to infrequent rainfall and the shallowness of the cut, which does not penetrate below the level of permanent ground water.

ARTESIAN AQUIFER - (1) An aquifer which is bounded above and below by formations of impermeable or relatively impermeable material. (2) An aquifer containing water under sufficient pressure such that when tapped the water level will rise above the confining layer.

ARTESIAN GROUND WATER - See GROUND WATER, CONFINED.

ARTIFICIAL CONTROL - A weir or other man-made structure which serves as the control for a stream-gaging station.

ARTIFICIAL RECHARGE - The addition of water to the ground water reservoir by activities of man, such as irrigation or induced infiltration from streams, wells, or spreading basins.

ASPECT - The compass direction toward which a sloping land area faces. The direction is measured downslope and normal to the contours of elevation.

ATMOMETER - An instrument used to measure the rate of evaporation.

AVERAGE ANNUAL FLOOD - See MEAN ANNUAL FLOOD.

AVERAGE ANNUAL PRECIPITATION - See MEAN ANNUAL PRECIPITATION.

AVERAGE ANNUAL YIELD - See YIELD, AVERAGE ANNUAL.

* * *

BACKFLOW - The backing up of water through a conduit or channel in the direction opposite to normal flow.

BACKWATER - Water backed up or retarded in its course. In stream gaging, a rise in stage produced by a temporary obstruction such as ice or weeds, or by the flooding of the stream below. The difference between the observed stage and that indicated by the stage-discharge relation is reported as backwater.

BACKWATER CURVE - The longitudinal profile of the water surface in an open channel where the water surface is raised above its normal level by a natural or artificial obstruction. The term is sometimes used in a generic sense to denote all water surface profiles, or profiles where the water is flowing at depths greater than critical.

BACKWATER EFFECT - The effect which results when a dam or other obstruction raises the surface of the water upstream from it.

BANK - The margins of a channel. Banks are either right or left as viewed facing in the direction of the flow.

BANKFULL STAGE - The stage at which a stream first overflows its natural banks.

BANK STORAGE - The change in storage in an aquifer resulting from a change in stage of an adjacent surface-water body.

BAROTHERMOGRAPH - An instrument which records simultaneous barometric pressure and temperature on the same chart.

BASE DISCHARGE (For Peak Discharge) - The discharge above which peak discharge data are published in the Geological Survey's annual reports on surface-water supply. The base discharge at each station is selected to enable presentation of an average of three peaks a year.

BASE FLOW - That portion of the stream discharge derived from ground water outflow or other sources outside the net rainfall which created the surface runoff.

BASE PERIOD - A period of time specified for the selection of data for analysis. The base period should be sufficiently long to contain data representative of the averages and deviations from the averages that must be expected in other periods of similar and greater length. For example, the U.S. Weather Bureau computes values of average, heavy, and light monthly precipitation from data observed during the base period 1931-1960. For ground-water studies, the base period should both begin and end at the conclusion of a dry trend so that the difference between the amount of water in transit in the soil at the ends of the base period is minimal.

BASE WIDTH - (1) The time interval between the beginning and end of the direct runoff produced by a storm. (2) The time period covered by a unit hydrograph.

BASIN LAG - (1) The time from the centroid of rainfall to the hydrograph peak. (2) The time from the centroid of rainfall to the centroid of the unit hydrograph.

BED LOAD - Sand, silt, gravel, or soil and rock detritus carried by a stream on or immediately above its bed.

BENEFICIAL USE OF WATER - The use of water for any purpose from which benefits are derived, such as for irrigation, hydroelectric power, industrial and domestic use. Benefits vary with locality and custom, and what constitutes beneficial use is often defined by statute or by court decision.

BENTHOS - Those organisms (usually referring to aquatic macroinvertebrates) which occupy the substrate (or bottom layer) of a body of water (either lotic or limnetic).

BIOTA - Those living organisms present in a given ecosystem.

BRACKISH WATER - Water containing dissolved minerals in excess of the normal acceptable amount of municipal, domestic, and irrigation standards but less than the amount found in sea water.

BRAIDED STREAM - A stream composed of anabranches and characterized by successive division and rejoining of streamflow with accompanying islands.

BUOYANCY - The loss in weight of a body wholly or partly immersed in a fluid due to the resultant upward pressure exerted by the fluid.

* * *

CANOPY - The overhanging cover formed by leaves, needles, and branches of vegetation.

CAPILLARITY - The phenomenon in which water or other liquids are held in interstices above the normal hydrostatic level due to attraction of the molecules in the walls of an interstice for the molecules of the liquid and the attraction of the molecules of liquid for each other.

CAPILLARY FRINGE - The belt of subsurface water held above the saturated zone by capillary action. Materials having only subcapillary interstices are impermeable and do not have a capillary fringe. In materials whose interstices are supercapillary the capillary fringe is practically absent.

CAPILLARY POTENTIAL - The work required to move a unit mass of water from the reference plane to any point in the soil column.

CAPTURE - (1) The decrease in discharge from an aquifer plus the increase in recharge. Capture may occur in the form of decreases in the ground-water discharge into streams, lakes, and the ocean, or from decreases in that component of

evapotranspiration derived from the saturated zone. (2)
Diversion of the flow of water in the upper part of a stream
by the headward growth of another stream.

CATCHMENT AREA - (1) The intake area of an aquifer and all areas that
contribute surface water to the intake area. (2) The area
tributary to a lake, stream, sewer, or drain. See also
DRAINAGE AREA; WATERSHED.

CFS - Abbreviation for cubic feet per second. (See the SI Conversion
Table.)

CFS-DAY - The volume of water represented by a flow of 1 cubic foot per
second for 24 hours; 86,400 cubic feet, 1.983471 acre-feet, or
646,317 gallons. May be abbreviated SFD. (See the SI
Conversion Table.)

CHANNEL (WATERCOURSE) - A natural or artificial open conduit which
periodically or continuously contains moving water, or which
forms a connecting link between two bodies of water. River,
creek, run, branch, anabranch, and tributary are some of the
terms used to describe natural channels, which may be single
or braided. Canal and floodway are some of the terms used to
describe artificial channels.

CHANNEL CONTROL - The condition under which the stage-discharge
relation of a station is governed by the slope, size, and
roughness of the channel.

CHANNEL INFLOW - Water which at any instant is flowing into the channel
system from surface flow, subsurface flow, base flow, and
rainfall directly on the channel.

CHANNEL STORAGE - The volume of water stored in a channel or over the
flood plain of the streams in a drainage basin or river reach.

CHINOOK - A downslope wind in which the air is warmed by adiabatic
heating.

CLIMATE - The sum total of the meteorological elements that
characterize the average and extreme condition of the
atmosphere over a long period of time at any one place or
region of the earth's surface. The collective state of the
atmosphere at a given place or over a given area within a
specified period of time.

CLOSED BASIN - A basin draining to some depression or pond within its
area from which water is lost only by evaporation or
percolation. A basin without a surface outlet for
precipitation falling thereon.

CLOUDBURST - A rainstorm of extraordinary intensity and relatively short duration.

COMPOSITE HYDROGRAPH - A stream discharge hydrograph which includes base flow or which corresponds to a net rainstorm lasting longer than one unit period.

CONCENTRATION TIME - (1) The period of time required for storm runoff to flow from the most remote point of a catchment or drainage area to the outlet or point under consideration. Concentration time varies with depth of flow and channel condition. (2) The time during which the rate of runoff equals the rate of rainfall of a storm of uniform intensity.

CONDENSATION - The process by which water changes from the vapor state into the liquid or solid state. Condensation is the reverse of evaporation.

CONE OF INFLUENCE - The depression, roughly conical in shape, produced in a water table or other potentiometric surface by the extraction of water from a well at a given rate. The volume of the cone will vary with the rate of withdrawal of water. Also called "cone of depression."

CONFINED AQUIFER - See ARTESIAN AQUIFER. "Confined" is now considered synonymous with "artesian."

CONFINED GROUND WATER - See GROUND WATER, CONFINED.

CONFINING BED - A body of "impermeable" material stratigraphically adjacent to one or more aquifers. In nature its hydraulic conductivity may actually range from nearly zero to some value distinctly lower than that of the aquifer.

CONNATE WATER - Water, frequently saline, present in rock at its formation.

CONSERVATION STORAGE - Storage of water for later release for beneficial uses, such as municipal water supply, power, or irrigation, in contrast to storage for flood control.

CONSUMPTION, DOMESTIC - The quantity or quantity per capita of water consumed in a municipality or district for domestic uses during a given period, usually one day. Domestic consumption is generally considered to include all uses included in "municipal use of water," in addition to the quantity of water wasted, lost, or otherwise unaccounted for. See also CONSUMPTION, MUNICIPAL; MUNICIPAL USE OF WATER.

CONSUMPTION, INDUSTRIAL - The quantity of water consumed in a municipality or district for mechanical, trade, and manufacturing uses during a given period, usually one day.

- CONSUMPTION, MUNICIPAL - The quantity of water consumed through use in developed urban areas. See also CONSUMPTION, DOMESTIC; CONSUMPTIVE USE.
- CONSUMPTIVE USE - (1) The quantity of water absorbed by crops and transpired or used directly in the building of plant tissue, together with that evaporated from the cropped area. (2) The quantity of water transpired and evaporated from a cropped area, or the normal loss of water from the soil by evaporation and plant transpiration. (3) All activities where the use of water results in a loss in the original water supplied, such as industrial or municipal consumption.
- CONSUMPTIVE USE, NET - The consumptive use decreased by the estimated contribution of rainfall toward the production of irrigated crops. Net consumptive use is sometimes called "crop irrigation requirement."
- CONTAMINATION (WATER) - Introduction into water of any undesirable substance not normally present, e.g., micro-organisms, chemicals, waste, or sewage, which renders the water unfit for its intended use.
- CONTENTS (STORAGE) - The volume of water in a reservoir. Unless otherwise indicated, reservoir content is computed on the basis of a level pool and does not include bank storage.
- CONVECTION - The meteorological phenomenon occurring where large masses of warm air, heated by contact with a warm land surface and usually containing appreciable amounts of moisture, rise upward from the surface of the earth.
- CONVECTIVE PRECIPITATION - Precipitation resulting from vertical movement of moisture-laden air, which upon rising, cools and precipitates its moisture.
- CONVEYANCE LOSS - The loss of water from a conduit due to leakage, seepage, evaporation, or evapotranspiration.
- CORRELATION - The process of establishing a relation between a variable and one or more related variables. Correlation is simple if there is only one independent variable, multiple if there is more than one. For gaging station records, the usual variables are the short-term gaging station record and one or more long-term gaging station records.
- CREEK - A natural stream of water, normally smaller than, and often tributary to, a river.
- CREST - (1) The top of a dam, dike, spillway, or weir to which water must rise before passing over the structure. (2) The highest point of a wave. (3) The highest elevation reached by flood waters flowing in a channel.

CREST GAGE - An instrument used to obtain a record of flood crests at sites where recording gages are not installed.

CRITICAL AREA - An area where the use of underground water approaches or exceeds the current recharge rate.

CRITICAL DEPTH - The depth of water flowing in an open channel or conduit under conditions of critical flow.

CRITICAL FLOW - (1) The flow conditions at which the discharge is a maximum for a given specific energy, or at which the specific energy is a minimum for a given discharge. (2) In reference to Reynolds' critical velocities, the point at which the flow changes from streamline or nonturbulent to turbulent.

CRITICAL PERIOD - The period when the limitations of water supply are most severe with respect to a beneficial use.

CROP IRRIGATION REQUIREMENT - See CONSUMPTIVE USE, NET.

CRYOLOGY - The science of the physical aspects of snow, ice, hail, sleet, and other forms of water produced by temperatures below 0°C .

CSM (CUBIC FEET PER SECOND PER SQUARE MILE) - The average number of cubic feet of water per second flowing from each square mile of area drained by a stream, assuming that the runoff is distributed uniformly in time and area. Sometimes abbreviated as CFSM. (See the SI Conversion Table.)

CUBIC FEET PER SECOND - A unit expressing rates of discharge. One cubic foot per second is equal to the discharge through a rectangular cross section, 1 foot wide and 1 foot deep, flowing at an average velocity of 1 foot per second. Abbreviated as CFS. (See the SI Conversion Table.)

CURRENT - That portion of a stream of water which is moving with a velocity much greater than the average or in which the progress of the water is principally concentrated.

CURRENT METER - An instrument for measuring the velocity of water flowing in a stream, open channel, or conduit by ascertaining the speed at which elements of the flowing water rotate a vane or series of cups.

CUSEC - An abbreviation for cubic feet per second often used in the British Commonwealth countries. (See the SI Conversion Table.)

CYCLONE - A more or less circular area of low atmospheric pressure in which in the northern hemisphere the winds blow counter-clockwise.

CYCLONIC PRECIPITATION - Precipitation which results from the lifting of air converging into a low-pressure area, or cyclone.

* * *

DAILY FLOOD PEAK - The maximum mean daily discharge occurring in a stream during a given flood event.

DAILY TEMPERATURE RANGE - The difference between the highest and lowest temperature recorded on a particular day.

DAY SECOND FEET - See CFS-DAY.

DEAD STORAGE - The volume in a reservoir which lies below the lowest controllable level and is not susceptible to gravity release.

DEBRIS - Any material, including floating or submerged trash, suspended sediment, or bed load, moved by a flowing stream.

DEEP PERCOLATION LOSS - Water that percolates downward through the soil beyond the reach of plant roots.

DEEP SEEPAGE - Infiltration that reaches the water table.

DEEP WELL - A well whose pumping head is too great to permit use of a suction pump.

DEGRADATION - The geologic process in which parts of the earth's surface, such as cliffs, rocks, and streambeds, disintegrate due to atmospheric and aqueous action. See also DEGRADATION, STREAM-CHANNEL.

DEGRADATION, STREAM-CHANNEL - The removal of channel bed materials and downcutting of natural stream channels. Such erosion may initiate degradation of tributary channels, causing damage similar to that due to gully erosion and valley trenching. See also DEGRADATION.

DEGREE DAY - The difference, expressed in degrees, between the mean temperature for a given day and a reference temperature (usually 0°C).

DELTA - An alluvial deposit, often in the shape of the Greek letter "delta," which is formed where a stream drops its debris load on entering a body of quieter water.

DENDRITIC - The tree-like shape of the drainage pattern of a stream and its tributaries, with the main trunk, branches, and twigs corresponding, respectively, to the main stream, tributaries, and subtributaries of the stream.

DENSITY CURRENT - A flow of water maintained by gravity through a large body of water, such as a reservoir or lake, which retains its identity because of a difference in density.

DENSITY OF SNOW - See SNOW DENSITY.

DEPENDABLE SUPPLY - That water which can be expected to be available at a time and place with the quality demanded; sometimes the amount of water available is at a stated percentage of time.

DEPENDABLE YIELD - See FIRM YIELD.

DEPLETION - (1) Water which has been consumptively used and is no longer available as a water source. See STREAMFLOW DEPLETION. (2) The withdrawal of water from a ground-water source at a rate greater than the rate of replenishment, usually over a period of several years.

DEPLETION CURVE - That part of the hydrograph extending from the point of termination of the recession curve to the subsequent rise or alternation of inflow due to additional water becoming available for streamflow.

DEPRESSION STORAGE - The volume of water contained in natural depressions in the land surface, such as puddles.

DEPTH OF RUNOFF - The total runoff from a drainage basin divided by its area. For convenience in comparing runoff with precipitation, depth of runoff is usually expressed in inches during a given period of time over the drainage area expressed in acre-feet per square mile.

DESIGN FLOOD - The flood magnitude selected for use as a criterion in designing flood control works.

DETENTION DAM - A dam constructed for the temporary storage of flood flows where the opening for release is of fixed capacity and is not manually operated.

DETENTION STORAGE - The volume of water, other than depression storage, existing on the land surface as flowing water which has not yet reached the channel.

DETRITUS - (1) The heavier mineral debris moved by natural water courses, usually in bed-load form. (2) The sand, grit, and other coarse material removed by differential sedimentation in a relatively short period of detention.

DEW - Drops of water deposited mainly on horizontal surfaces cooled by natural radiation by direct condensation of water vapor from adjacent clear air.

DEW POINT - The temperature to which air containing a given quantity of water vapor must be cooled to cause condensation of the vapor.

DIRECT FLOOD DAMAGE - See FLOOD DAMAGE, DIRECT.

DIRECT RUNOFF - See RUNOFF, DIRECT.

DISCHARGE - The simplest meaning of discharge is outflow; the use of the term is not restricted as to course or location, and it can describe the flow of water from a pipe, as well as from a drainage basin. If the discharge occurs in some course or channel, it is correct to speak of the discharge of a canal or of a river. It is also correct to speak of the discharge of a canal or stream into a lake, stream, or ocean.

The data on surface water in the reports of the Geological Survey represent the total fluids measured. Thus, the terms discharge, streamflow, and runoff apply to water containing dissolved solids and sediment. Of these terms, discharge is the most comprehensive.

The discharge of drainage basins is distinguished as follows:

Runoff - That part of water yield that appears in streams. See WATER YIELD.

Streamflow - The water flowing in a stream channel.

Yield - Total water runoff or crop; consists of runoff plus underflow.

Each of these terms can be reported in total volume (such as acre-feet) or time rates (such as cubic feet per second or acre-feet per year). The differentiation between runoff as a volume and streamflow as a rate is not accepted.

DISCHARGE CURVE - A curve that expresses the relation between the discharge of a stream or open conduit at a given location and the stage or elevation of the liquid surface at or near that location. Also called "rating curve" and "discharge rating curve."

DISSOLVED OXYGEN - The amount of free (not chemically combined) oxygen in water, usually expressed in milligrams per liter.

DISSOLVED SOLIDS - Solids which are present in solution.

DISTRIBUTION GRAPH (DISTRIBUTION HYDROGRAPH) - A unit hydrograph of direct runoff modified to show the portion of the volume of runoff that occurs during successive equal units of time.

DIVERSION - (1) The act of taking water from a stream or other body of water into a canal, pipe, or other conduit. (2) A man-made

structure for taking water from a stream or other body of water.

DOMESTIC CONSUMPTION - See CONSUMPTION, DOMESTIC.

DOMESTIC USE OF WATER - The use of water primarily for household purposes, the watering of livestock, and the irrigation of gardens, lawns, and shrubbery surrounding a domicile.

DOUBLE-MASS CURVE - A plot on arithmetic cross-section paper of the accumulated values of one variable against the accumulated values of another or against the computed values of the same variable for a concurrent period of time.

DRAINAGE AREA - For a stream at a specified location, that area, measured in a horizontal plane, which is enclosed by a drainage divide. It may be expressed in acres, square miles, or other units of area. See also CATCHMENT AREA; WATERSHED.

DRAINAGE BASIN - A part of the surface of the earth that is occupied by a drainage system, which consists of a surface stream or a body of impounded surface water, together with all tributary surface streams and bodies of impounded surface water.

DRAINAGE DENSITY - The relative density of natural drainage channels in a given area, obtained by dividing the total length of the stream channels by the area.

DRAINAGE DIVIDE - The boundary line along a topographic ridge or subsurface formation which separates two adjacent drainage basins.

DRAINAGE WATER - Water which has been collected by a drainage system. It may derive from surface water or from water passing through soil and may or may not be suitable for reuse.

DRAWDOWN - The lowering of the surface elevation of a body of water, the water surface of a well, the water table, or the potentiometric surface adjacent to a well, resulting from the extraction of water.

DRIZZLE - Rather uniform precipitation consisting exclusively of minute and very numerous drops of water less than 0.02 inches in diameter, which seem to float in and follow even the slightest motion of the air. Poor visibility during drizzle, which frequently occurs simultaneously with fog, distinguishes it from light rain.

DROUGHT - Although there is no universally accepted quantitative definition of drought, it may be defined as a period of abnormally dry weather sufficiently prolonged to cause a serious hydrological imbalance.

DRY-ADIABATIC LAPSE RATE - The lapse rate in the unsaturated lower layers of the air. It may reach 5.4°F per 1,000 feet.

DURATION CURVE - A cumulative frequency curve that shows the percentage of time during which a given parameter (e.g., discharge, head, power) was equaled or exceeded over a specified period. It is the integral of the frequency diagram.

DUTY OF WATER - In irrigation, the quantity of water required to satisfy the irrigation water requirements of land. It is expressed either as the rate of flow required per unit area of land, the area which can be served by a unit rate of flow, or the total volumetric quantity of water in terms of water depth required during the irrigation season or a given portion thereof. In stating the duty, the crop, and usually the location of the land in question, as well as the type of soil, should be specified (use of this term is becoming obsolete).

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EFFECTIVE POROSITY - See POROSITY, EFFECTIVE.

EFFECTIVE PRECIPITATION (RAINFALL) - (1) That part of the precipitation that produces runoff. (2) A weighted average of current and antecedent precipitation that is "effective" in correlating with runoff. (3) That part of the precipitation falling on an irrigated area that is effective in meeting the consumptive use requirements.

EFFLUENT SEEPAGE - Diffuse discharge of ground water to the ground surface.

EFFLUENT STREAM - This term is now obsolete. See STREAM, GAINING.

ELECTRICAL LOG - A record of electrical-resistivity tests made at various depths in a well.

ENERGY GRADE LINE - Total head line.

EPHEMERAL STREAM - A stream that flows only in direct response to precipitation and thus discontinues its flow during dry seasons. Its channel is above the level of the water table.

EPILIMNION - The upper layer of a body of water with thermal stratification, which extends down from the surface to the thermocline and has a nearly uniform temperature. See THERMOCLINE.

EQUILIBRIUM DRAWDOWN - The ultimate, constant drawdown for a steady rate of pumped discharge.

EQUILIBRIUM SURFACE DISCHARGE - The steady rate of surface discharge which results from a steady rate of net rainfall over a long period, with discharge rate equal to net rainfall rate.

EQUILIBRIUM TIME - The point in time when flow conditions become substantially equal to those corresponding to equilibrium discharge or equilibrium drawdown.

EQUIPOTENTIAL LINE - A line in a field of flow such that the total head is the same for all points on the line; therefore, the direction of flow is perpendicular to the line at all points.

EROSION - The wearing away of the soil by running water, glaciers, winds, and waves. Erosion can be subdivided into three processes: corrasion, corrosion, and transportation. Weathering, although sometimes included as a type of erosion, is a distinct process which does not imply removal of any material.

EUTROPHICATION - The process of overfertilization of a body of water by nutrients which produce more organic matter than the self-purification processes can overcome.

EVAPORATION - The process by which water is transformed from the liquid or solid state into the vapor state. In hydrology, evaporation is vaporization that takes place at a temperature below the boiling point.

EVAPORATION, LAND - Evaporation from land surfaces, in contrast to evaporation from free water surfaces. See also EVAPORATION.

EVAPORATION, NET RESERVOIR - The difference between the total evaporation from the reservoir water surface and the evapotranspiration from the reservoir area prior to the existence of the reservoir, with identical precipitation.

EVAPORATION PAN - A pan, usually round or square, used to hold water during the determination of the amount of evaporation at a given location.

EVAPORATION RATE - The quantity of water which evaporates from a given surface per unit of time, usually expressed in inches or depth per day, month, or year.

EVAPOTRANSPIRATION - The volume of water evaporated and transpired from soil and plant surfaces per unit land area (essentially the same as "consumptive use" except that it does not include the water retained within the plant tissue).

EXCEEDENCE INTERVAL - The average number of years between the occurrence of an event of a given magnitude and one that is more extreme.

EXCESS RAIN - Effective rainfall in excess of infiltration capacity.

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FETCH - (1) The distance traveled by waves in open water, from their point of origin to the point where they break. (2) The distance the wind blows over water or another homogeneous surface without appreciable change in direction.

FIELD-MOISTURE CAPACITY - The quantity of water that can be permanently retained in the soil in opposition to the downward pull of gravity.

FIELD-MOISTURE DEFICIENCY - The quantity of water which would be required to restore the soil moisture to field-moisture capacity.

FIELD PERMEABILITY - Permeability corresponding to the temperature which occurs under field conditions.

FIRM YIELD - See YIELD, FIRM.

FIRM (FIRM SNOW) - Old snow that has become granular and compact through temperature changes, forming the transition stage to glacial ice. Also called "neve."

FIRM LINE - The highest level to which the fresh snow on a glacier's surface retreats during the melting season; the line separating the accumulation area from the ablation area.

FLASHBOARD - A temporary barrier, relatively low in height and usually constructed of wood, placed along the crest of the spillway of a dam to allow the water surface in the reservoir to be raised above spillway level in order to increase the storage capacity. It is designed to be readily removed, lowered or carried away by high flow or floods.

FLOE ICE - Ice usually several feet thick, which has formed on the surface of a body of water and then has broken into pieces and is floating on the water's surface.

FLOOD - An overflow on lands that are used or usable by man and are not normally covered by water. Floods have two essential characteristics: (a) The inundation of land is temporary, and (b) the land is inundated by overflow from a river or other body of water.

Normally, a "flood" is considered as any temporary rise in streamflow or stage, but not the ponding of surface water, that results in significant adverse effects in the vicinity. Adverse effects may include damages from overflow of land areas, temporary backwater effects in sewers and local

drainage channels, creation of unsanitary conditions or other unfavorable situations by deposition of materials in stream channels during flood recessions, rise of ground water coincident with increased streamflow, and other problems.

FLOOD-CONTROL CAPACITY - That part of the gross reservoir capacity which, at the time under consideration, is reserved for the temporary storage of flood waters. It can vary from zero to the entire capacity (exclusive of dead storage) according to a predetermined schedule based on such parameters as antecedent precipitation, reservoir inflow, potential snowmelt, or downstream channel capacities.

FLOOD-CONTROL STORAGE - Storage of water in reservoirs to abate flood damage.

FLOOD CREST - The maximum stage or elevation reached by the waters of a flood at a given location.

FLOOD DAMAGE, DIRECT - The damage done by a flood to property, structures, goods, and so on, as measured by the cost of replacement and repairs.

FLOOD DAMAGE, INDIRECT - Expenditures (other than for repairs) made as a result of a flood, such as for relief and rescue work, or for moving silt and debris.

FLOOD FREQUENCY - The average interval of time between floods equal to or greater than a specified discharge or stage, generally expressed in years. See also EXCEEDENCE INTERVAL.

FLOOD-FREQUENCY CURVE - (1) A graph showing the average number of times per year, plotted as the abscissa, that floods of a magnitude, indicated by the ordinate, are equaled or exceeded. (2) A similar graph, but with recurrence intervals of floods plotted as the abscissa.

FLOOD, HISTORIC - Any flood for which the stage or flow can be estimated, or has been recorded. See FLOOD; FLOOD, RECORDED.

FLOOD, INTERMEDIATE REGIONAL - A flood having a one percent probability, or an average frequency of occurrence on the order of once in 100 years, although the flood may occur in any year. The intermediate regional flood is based on statistical analyses of streamflow records available for the watershed and analyses of rainfall and runoff characteristics in the "general region of the watershed."

FLOOD, MAXIMUM PROBABLE - The largest flood for which there is any reasonable expectancy in a particular climatic era.

FLOOD PEAK - The highest value of the stage or discharge attained by a flood; thus, "peak stage" or "peak discharge." "Flood crest" has nearly the same meaning, but since it connotes the top of the flood wave, it is properly used only in referring to stage; thus, "crest stage," but not "crest discharge."

FLOOD PLAIN - (1) A strip of relatively flat land bordering a stream, built of sediment carried by the stream and dropped in the slack water beyond the influence of the swiftest current. A water flood plain is overflowed during times of high water; a fossil flood plain is beyond the reach of the highest flood. (2) That land outside a stream channel described by the perimeter of the maximum probable flood. (3) The relatively flat area or lowlands adjoining an ocean, lake, or other body of standing water which has been or might be covered by floodwater.

FLOOD PROFILE - A graph showing the relationship of water surface elevation to location, the latter generally expressed as distance above mouth for a stream of water flowing in an open channel. A flood profile is generally drawn to show surface elevation for the crest of a specific flood but may be prepared for conditions at a given time or stage.

FLOOD, RECORDED - A flood for which reliable data are available, permitting a reasonably accurate determination of flows or stages. See FLOOD; FLOOD, HISTORIC.

FLOOD ROUTING - The process of determining progressively the timing and shape of a flood wave at successive points along a river.

FLOOD STAGE - (1) The gage height of the lowest bank of the reach in which the gage is situated. The term "lowest bank" is, however, not to be taken to mean an unusually low place or break in the natural bank through which the water inundates an unimportant and small area. (2) The stage at which overflow of the natural banks of a stream begins to cause damage in the reach in which the elevation is measured.

FLOOD, STANDARD PROJECT - The flood that could be expected from the most severe combination of meteorological and hydrological conditions considered reasonably characteristic of the geographical area in which a drainage basin is located, excluding extremely rare combinations. Peak discharges for these floods are generally about 40 to 60 percent of the maximum probable flood for the same basin.

FLOOD WAVE - A distinct rise in stage, culminating in a crest and followed by recession to lower stages.

FLOODWAY - (1) A part of the flood plain, otherwise leveed, reserved for emergency diversion of water during floods. (2) The

channel of a river or stream and those parts of the flood plains adjoining the channel, which are reasonably required to carry and discharge the floodwater or floodflow of any river or stream.

FLOOD ZONE - The land bordering a stream which is subject to floods of about equal frequency; for example, a strip of the flood plain subject to flooding more often than once, but not as frequently as twice in a century.

FLOW-DURATION CURVE - A cumulative frequency curve which shows the percentage of time that specified discharges are equaled or exceeded.

FLOW, HISTORIC - A flow which has occurred and has been recorded at a gaging station.

FLOWING RESOURCE - A resource which is replaced.

FLOWING WELL - A well from an artesian aquifer in which the water is under sufficient pressure to rise above the ground surface.

FLOW, MODIFIED - That streamflow which would have existed had the works of man in or on the stream channels and in the drainage basin been consistent throughout the period of record. Usually used with an adjective such as "present" or a specific year to mean that the flow record was modified to represent the record that would have been obtained had the "present" conditions prevailed throughout the period of record. Modified flow is equal to virgin flow (see FLOW, VIRGIN) minus the amount of STREAMFLOW DEPLETION occurring at the specified time.

FLOW, NATURAL - The rate of water movement past a specified point on a natural stream from a drainage area which has not been affected by stream diversion, storage, import, export, return flow or change in consumptive use resulting from man's modifications of land use. Natural flow rarely occurs in a developed country.

FLOW, OVERLAND - The flow of rainwater or snowmelt over the land surface toward stream channels. Upon entering a stream, it becomes runoff.

FLOW, STEADY - A flow in which the magnitude and direction of the specific discharge are constant in time.

FLOW, TURBULENT - A flow in which successive flow particles follow independent path lines, and head loss varies approximately with the square of the velocity.

FLOW, VIRGIN - That streamflow which would exist had man not modified conditions on or along the stream or in the drainage basin. Same as RUNOFF.

FLUID POTENTIAL - The mechanical energy per unit mass of a fluid at any given point in space and time with respect to an arbitrary state and datum. Loss of fluid potential incurred as the fluid moves from a region of high potential to one of low potential represents loss of mechanical energy which is converted to heat by friction.

FOREBAY RESERVOIR - A reservoir used to regulate the flow of water to a hydroelectric plant; it may also serve other purposes such as recreation. Sometimes called "forebay."

FOUNTAINHEAD - The upper end of a confined-aquifer conduit, where it intersects the land surface.

FRAZIL (FRAZIL ICE) - Fine spicular ice, resembling cinders, which is suspended in water. When formed in salt water, it is known as lolly ice. When first formed, frazil is colloidal and is not visible in the water.

FREEBOARD - The vertical distance between the normal maximum level of the surface of the liquid in a conduit, reservoir, tank, canal, etc., and the top of the sides of an open conduit, the top of a dam or levee, etc., which is provided so that waves and other movements of the liquid will not overtop the confining structure.

FREE GROUND WATER - See GROUND WATER, FREE.

FRENCH DRAIN - An underground passageway for water through the interstices among stones placed loosely in a trench.

FREQUENCY CURVE - A curve relating the possible values of a random variable to the frequency of occurrence of associated specific events. The theoretical frequency curve is a derivative of the probability curve. See also EXCEEDENCE INTERVAL; FLOOD FREQUENCY.

FRICITION HEAD - The decrease in total head as a result of friction.

FROST - Thin ice crystals in the shape of scales, needles, feathers or fans which are deposited by sublimation at temperatures of 32°F or lower.

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GAGE - (1) An instrument used to measure magnitude or position; gages may be used to measure the elevation of a water surface, the velocity of flowing water, the pressure of water, the amount of intensity of precipitation, the depth of snowfall, etc. (2) The act or operation of registering or measuring magnitude or position. (3) The operation, including both field and office work, of measuring the discharge of a stream of water in a waterway.

- GAGE HEIGHT** - The height of the water surface above the gage datum. Gage height is often used interchangeably with the more general term, "stage," although gage height is more appropriate when used with a gage reading.
- GAGING STATION** - A particular site on a stream, canal, lake or reservoir where systematic observations of gage height or discharge are made.
- GEOHYDROLOGY** - The branch of hydrology relating to subsurface or subterranean waters.
- GEOLOGIC EROSION** - The normal or natural erosion caused by geological processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of flood plains, coastal plains, etc. See also EROSION.
- GEOPHYSICS** - The study of the physical characteristics and properties of the earth, including geodesy, seismology, meteorology, oceanography, atmospheric electricity, terrestrial magnetism, and tidal phenomena.
- GLACIAL DRIFT** - Material which has been deposited by a glacier or in connection with glacial processes. It consists of rock flour, sand, pebbles, cobbles, and boulders, and may occur in a heterogeneous mass or be reasonably well sorted, depending on the manner of deposition.
- GLACIER** - A body of land ice that consists of recrystallized snow accumulated on the surface of the ground and that moves slowly downslope.
- GLAZE** - Homogeneous, transparent ice layers which are built up, either from supercooled rain or drizzle, or from rain or drizzle, when the surfaces on which it forms are at temperatures of 32°F or lower. Glaze often forms a matrix for sleet pellets that fall at the same time.
- GRAVEL ENVELOPE** - In well construction, a several-inch thickness of uniform gravel poured into the annular space between the well casing and the drilled hole.
- GROSS RESERVOIR CAPACITY** - The total amount of storage capacity available in a reservoir for all purposes, from the streambed to the normal maximum operating level. It does not include surcharge but does include dead storage.
- GROUND WATER** - Subsurface water in the saturated zone, from which wells, springs, and ground water runoff are supplied.
- GROUND-WATER BASIN** - A physiographic or geologic unit containing at least one aquifer of significant areal extent.

GROUND WATER, CONFINED - Ground water under pressure significantly greater than atmospheric, with its upper limit the bottom of a bed with hydraulic conductivity distinctly lower than that of the material in which the confined water occurs.

GROUND-WATER DIVIDE - A line on a water table on either side of which the water table slopes downward. It is analogous to a drainage divide between two drainage basins on a land surface.

GROUND WATER, FREE - Unconfined ground water whose upper boundary is a free water table.

GROUND-WATER HYDROLOGY - The branch of hydrology that treats ground water, its occurrence and movements, its replenishment and depletion, the properties of rocks that control ground-water movement and storage, and the methods of investigation and utilization of ground water.

GROUND-WATER MINING - The pumping of ground water from a basin where the safe yield is very small, thereby extracting ground water which had accumulated over a long period of time. It occurs when withdrawals exceed replenishment or when replenishment is negligible. See DEPLETION (2).

GROUND-WATER OUTFLOW - The part of the discharge from a drainage basin that occurs through the ground water. The term "underflow" is often used to describe the ground-water outflow that takes place in valley alluvium (instead of the surface channel) and thus is not measured at a gaging station.

GROUND-WATER OVERDRAFT - Pumpage of ground water in excess of safe yield.

GROUND WATER, PERCHED - Ground water that is separated from the main body of ground water by unsaturated material.

GROUND-WATER RECHARGE - Inflow to a ground-water reservoir.

GROUND-WATER RESERVOIR - An aquifer or aquifer system in which ground water is stored. The water may be placed in the aquifer by either artificial or natural means.

GROUND-WATER RUNOFF - See RUNOFF, GROUND-WATER.

GROUND-WATER STORAGE CAPACITY - The reservoir space contained in a given volume of deposits, or under optimum conditions of use, the usable ground-water storage capacity volume of water that can be alternately extracted and replaced in the deposit, within specified economic limitations.

GROUND WATER, UNCONFINED - Water in an aquifer that has a water table.

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- HAIL - Precipitation in the form of balls or lumps of ice over 0.2 inches in diameter which are formed by alternate freezing and melting as they are carried up and down in very turbulent air currents.
- HAIR HYGROMETER - An instrument for measuring humidity which makes use of the fact that length of hair varies with relative humidity.
- HARDPAN - A shallow layer of earth material which has become relatively hard and impermeable, usually through deposition of minerals.
- HEAD LOSS - (1) The decrease in total head caused by friction. (2) The effect of obstructions, such as narrow bridge openings or buildings, that limit the area through which water must flow, raising the surface of the water upstream from the obstruction.
- HEAD RACE - A channel that carries water to a water wheel; a forebay.
- HEADWARD EROSION - Erosion which occurs in the upstream end of the valley of a stream, causing it to lengthen its course in that direction.
- HEAT BUDGET, ANNUAL (of a lake) - The amount of heat necessary to raise the water from the minimum winter temperature to the maximum summer temperature.
- HEAVY RAIN - See RAIN, HEAVY.
- HISTOGRAM - A table of computations which provides the data for plotting a histogram.
- HISTORIC FLOOD - See FLOOD, HISTORIC.
- HISTORIC FLOW - See FLOW, HISTORIC.
- HOMOGENEITY - Uniformity. A material is homogeneous if its hydrologic properties are everywhere identical. Although no known aquifer is homogeneous in detail, models based on the assumption of homogeneity have proven to be valuable tools for predicting the approximate relationship in aquifers between discharge and potential.
- HOOK GAGE - A pointed, U-shaped hook attached to a staff or vernier scale, used in the accurate measurement of the elevation of a water surface. The hook is submerged, and then raised, usually by means of a screw, until the point just makes a pimple on the water surface.

HUMIDITY - The water-vapor content of the atmosphere.

HYDRAULIC CONDUCTIVITY - With an isotropic porous medium and a homogeneous fluid, the volume of water at the existing kinematic viscosity that will move in unit time under a unit hydraulic gradient through a unit area measured at right angles to the direction of flow.

HYDRAULIC GRADE LINE (HGL) - A line whose plotted ordinate position represents the sum of pressure head plus elevation head for the various positions along a given fluid flow path, such as a pipeline or ground-water streamline.

HYDRAULIC GRADIENT - Change in static head per unit of distance in a given direction. If not specified, the direction is generally understood to be that of the maximum rate of decrease in head.

HYDRAULIC HEAD - (1) The height of the free surface of a body of water above a given point beneath the surface. (2) The height of the water level at the headworks or an upstream point of a waterway, and the water surface at a given point downstream. (3) The height of a hydraulic grade line above the center line of a pressure pipe, at a given point.

HYDRAULIC PERMEABILITY - The flow of water through a unit cross-sectional area of soil normal to the direction of flow when the hydraulic gradient is unity.

HYDRAULIC RADIUS - The right cross-sectional area of a stream of water divided by the length of that part of its periphery in contact with its containing conduit; the ratio of area to wetted perimeter. Also called "hydraulic mean depth."

HYDROGEN ION CONCENTRATION - See pH.

HYDROGRAPH - A graph showing, for a given point on a stream or conduit, the stage, velocity of flow, available power, or other function of the discharge with respect to time.

HYDROGRAPHIC SURVEY - An instrumental survey to measure and determine characteristics of streams and other bodies of water within an area, including such things as location, areal extent, and depth of water in lakes or the ocean; the width, depth, and course of streams; position and elevation of high water marks; location and depth of wells.

HYDROLOGIC BENCHMARK - A hydrologic unit, such as a basin or a ground-water body, that because of its expected freedom from the effects of man, has been designated as a benchmark. Data from such basins may provide a standard with which data from less independent basins can be compared so that changes wrought by man's interference can be distinguished from changes caused by variations in the natural regimen.

HYDROLOGIC BUDGET - An accounting of the inflow to, outflow from, and storage in a hydrologic unit, such as a drainage basin, aquifer, soil zone, lake, reservoir, or irrigation project.

HYDROLOGIC CYCLE - The complete cycle of phenomena through which water passes, commencing as atmospheric water vapor, passing into liquid and solid form as precipitation, thence along or into the ground surface, and finally again returning to the form of atmospheric water vapor by means of evaporation and transpiration. Also called "water cycle."

HYDROLOGIC EQUATION - The water inventory equation:

$$\text{Inflow} = \text{Outflow} + \Delta \text{ Storage},$$

which expresses the basic principle that during a given time interval the total inflow to an area must equal the total outflow plus the net change in storage.

HYDROLOGY - The science concerned with the waters of the earth, their occurrence, distribution, and circulation; their physical and chemical properties; and their reaction with the environment, including living beings.

HYDROPHYTE - A plant which grows naturally in water, or in saturated soils. See MESOPHYTE; PHREATOPHYTE; XEROPHYTE.

HYETOGRAPH - A graphic representation of rainfall intensity plotted against time.

HYGROTHERMOGRAPH - An instrument which combines the features of the hair hygograph and the thermograph, recording both relative humidity and temperature on one chart.

HYPOLIMNION - The lower level of a body of water having thermal stratification, which extends from the thermocline to the bottom and which is essentially removed from surface influence. See THERMOCLINE.

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IMPERVIOUS - An adjective describing a material through which water either cannot pass or through which it passes with great difficulty. See CONFINING BED.

IMPORT - Water piped or channeled into an area.

INACTIVE STORAGE CAPACITY - See STORAGE CAPACITY, INACTIVE.

INCH-DEGREES - The product of inches of rainfall times temperature in degrees above freezing (Fahrenheit), used as a measure of the snowmelting capacity of rainfall.

INCISED RIVER - A river which cuts its channel through the bed of the valley floor, as opposed to one flowing on a floodplain; its channel formed by the process of degradation.

INCLINED STAFF GAGE - A gage which is placed on the slope of a stream bank and graduated so that the scale reads directly in a vertical depth.

INCIDENTAL RECHARGE - That ground-water recharge which takes place as an unintentional by-product of man's use of water (irrigation, for example) and which would not have occurred naturally.

INDEX OF WETNESS - The precipitation for a given year expressed as a ratio to the mean annual precipitation.

INDICATOR GAGE - A gage that shows by means of an index, pointer, dial, etc. the instantaneous value of such characteristics as depth, pressure, velocity, stage, discharge, or the movements or positions of water-controlling devices.

INDIRECT FLOOD DAMAGE - See FLOOD DAMAGE, INDIRECT.

INDUSTRIAL CONSUMPTION - See CONSUMPTION, INDUSTRIAL.

INFILTRATION - The flow of a fluid into a substance through pores or small openings.

INFILTRATION CAPACITY - The maximum rate at which the soil, when in a given condition, can absorb falling rain or melting snow.

INFILTRATION CAPACITY CURVE - A graph showing the time variation of infiltration capacity. A standard infiltration capacity curve shows the time variation of the infiltration rate which would occur if the supply were continually in excess of infiltration capacity.

INFILTRATION CAPACITY, ULTIMATE - The relatively steady, slow, infiltration capacity which exists after a sufficiently long period of infiltration at capacity rate.

INFILTRATION INDEX - The average rate of infiltration, in inches per hour, derived from a time intensity graph of rainfall, so that the volume of rainfall in excess of this rate equals the total direct runoff. Also ϕ or W index.

INFILTRATION RATE - (1) The rate at which infiltration takes place, expressed in depth of water per unit time, usually in inches per hour. (2) The rate, usually expressed in cubic feet per second, or million gallons per day per mile of waterway, at which ground water enters an infiltration ditch or gallery, drain, sewer, or other underground conduit.

- INFILTRMETER** - An instrument which determines the rate and amount of water percolating into the soil by measuring the difference between the amount of water applied and that which runs off. Essentially, the infiltrometer consists of a sprinkling mechanism (rain simulator) which provides a rather uniform sprinkling of water to a prescribed area at prescribed rates and size drops (impact), a rain gage (either total or intensity), and a catchment basin or receptacles in which either the rate or total flow of surface runoff is measured. Infiltration or amount absorbed by the soil is usually expressed in inches (of water) per standard interval of time.
- INFLUENT SEEPAGE** - Movement of gravity water in the unsaturated zone from the ground surface toward the water table.
- INFLUENT STREAM** - This term is now obsolete. See **STREAM**, Losing.
- INITIAL DETENTION** - The volume of water on the ground, either in depressions or in transit, at the time active runoff begins.
- INITIAL LOSS** - Rainfall which precedes the beginning of surface runoff. It includes interception, surface wetting, and infiltration, unless otherwise specified.
- INITIAL WATER DEFICIENCY** - The quantity, usually expressed in depth of water in inches on a unit area, by which the actual water content of a given soil zone (usually the root zone) is exceeded by the field capacity of that zone at the beginning of the rainy season. Also called "initial moisture deficiency."
- INSTREAM FLOW NEEDS** - Those habitat requirements within the running water ecosystem related to current velocity and depth which present the optimum conditions of density (or diversity) or physiological stability to the aquatic organism being examined.
- INTANGIBLE FLOOD DAMAGE** - Estimated damage done by disruption of business, danger to health, shock, loss of life, and other factors not directly measurable.
- INTERCEPTING DRAIN** - A drain constructed at the upper end of an area to intercept and carry away surface or ground water flowing toward the area from higher ground. Also called "curtain drain."
- INTERCEPTION** - The process by which precipitation is caught and held by foliage, twigs, and branches of trees, shrubs, and other vegetation, and lost by evaporation, never reaching the surface of the ground. Interception equals the precipitation on the vegetation minus stemflow and throughfall.

INTERFERENCE (WELLS) - A change in the water level of one well caused by the pumping at another well.

INTERFLOW - (1) That movement of water of a given density in a reservoir or lake between layers of water of different density, usually caused by the inflow of water either at a different temperature, or with different silt or salt contents. (2) Runoff due to that part of the precipitation which infiltrates the surface soil and moves laterally through the upper soil horizons toward the stream channels.

INTERMEDIATE ZONE - The subsurface water zone below the root zone and above the capillary fringe.

INTERMITTENT STREAM - See STREAM, Intermittent or Seasonal.

IRRIGATED AREA - The gross farm area upon which water is artificially applied for the production of crops, with no reduction for access roads, canals, or farm buildings.

IRRIGATION - The controlled application of water to arable lands in order to supply water requirements not satisfied by rainfall.

IRRIGATION DEPLETION - See STREAMFLOW DEPLETION.

IRRIGATION EFFICIENCY - The percentage of water applied that can be accounted for in soil-moisture increase for consumptive use.

IRRIGATION REQUIREMENT - The quantity of water, exclusive of precipitation, that is required for crop production. It includes surface-evaporation and other unavoidable waste.

IRRIGATION RETURN FLOW - Applied water which is not consumptively used and returns to a surface or ground-water supply. In water-right litigation the definition may be restricted to measurable water returning to the stream from which it was derived. See also RETURN FLOW.

IRRIGATION, SUPPLEMENTAL - An additional irrigation water supply which supplements the initial, or primary, supply.

ISOBATH - An imaginary line on the earth's surface or a line on a map connecting all points which are the same vertical distance above the upper or lower surface of a water-bearing formation or aquifer.

ISOHYET - A line on the surface of the earth, as represented on a map, connecting all points of equal precipitation. Also called "isohyetal line" and "isopluvial line."

ISOTROPY - That condition in which a medium has the same properties in all directions.

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JETTY - A structure extending into the body of water on estuaries or open seacoasts, which is designed to prevent shoaling of a channel by littoral materials and to direct or confine the flow.

JOINT USE CAPACITY - That reservoir capacity which has been assigned to flood control purposes during certain periods of the year and to other purposes during other periods of the year.

JUVENILE WATER - Water formed chemically within the earth and brought to the surface in intrusive rock.

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KARST - Limestone and dolomite areas with a topography peculiar to and dependent on underground solution and the diversion of surface waters to underground routes.

KARST HYDROLOGY - The branch of hydrology that deals with the hydrology of geological formations having large underground passages or fractures which enable underground movement of large quantities of water.

KARSTIC RIVER - A river which originates from a karstic spring or flows in a karstic region.

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LAG TIME - The time from the center of a unit storm to the peak discharge or center of volume of the corresponding unit hydrograph.

LAMINAR FLOW - Streamline flow in which successive flow particles follow similar path lines and head loss varies with velocity to the first power.

LAND EVAPORATION. See EVAPORATION, LAND.

LAND PAN - An evaporation pan located on land. See also EVAPORATION PAN.

LAPSE RATE - The rate of change of temperature with height in the free atmosphere.

LATENT HEAT OF CONDENSATION - The amount of heat released by a unit mass of substance, without change in temperature, while passing from the vapor to the liquid state.

LATENT HEAT OF VAPORIZATION - The amount of heat absorbed by a unit mass of substance, without change in temperature, while passing from the liquid to the vapor state.

LEACHING - The removal of soluble constituents from soils or other material by infiltrating or percolating water.

LEFT BANK - See BANK.

LIGHT RAIN - See RAIN, LIGHT.

LIMNETIC - Referring to a standing water ecosystem (ponds and lakes).

LIMNOLOGY - That branch of hydrology pertaining to the study of lakes.

LIQUID WATER DEFICIENCY - See SNOW, LIQUID WATER DEFICIENCY OF.

LIQUID WATER-HOLDING CAPACITY - See SNOW, LIQUID WATER-HOLDING CAPACITY OF.

LITHOSPHERE - That part of the earth which is composed predominantly of rocks (either coherent or incoherent, and including the disintegrated rock materials known as soils and subsoils), together with everything contained in this rocky crust.

LITTORAL TRANSPORT - The movement of material along the shore by waves and currents.

LOTIC - Referring to a running water ecosystem (streams and rivers).

LYSIMETER - An instrument used to measure the quantity or rate of downward water movement through a block of soil usually undisturbed, or to collect such percolated water for analysis of its quality.

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MACROCLIMATE - The general large-scale climate of a large area or country, as distinguished from mesoclimate and microclimate. See MESOCLIMATE; MICROCLIMATE.

MANOMETER - An instrument for measuring pressure which usually consists of a U-shaped tube containing a liquid, the surface of which in one end of the tube moves proportionally with changes in pressure on the liquid in the other end. The term is also applied to a tube-type differential pressure gage.

MASS CURVE - A graph of the cumulative values of a hydrologic quantity (such as precipitation or runoff), generally as the ordinate, plotted against time or date as the abscissa.

MAXIMUM THERMOMETER - An instrument used to measure the highest temperature since its last setting. A constriction near the bulb prevents the mercury from returning to the bulb as the temperature falls.

MEAN - The sum of the magnitudes of all items of a set, divided by the number of items.

MEAN ANNUAL FLOOD - The average of all the annual flood stages or discharges of record. It may be estimated by regionalization, correlation, or any other process that can furnish a better estimate of the long-term average than can the observed data. Some investigators arbitrarily define the mean annual flood as the stage or discharge having an exceedence interval of 2.33 years.

MEAN ANNUAL PRECIPITATION - The average over a period of years of annual amounts of precipitation.

MEAN ANNUAL RUNOFF - The average value of all annual runoff amounts, usually estimated from the period of record or during a specified base period from a specified area. See BASE PERIOD; RUNOFF.

MEAN ANNUAL TEMPERATURE - The average of the monthly mean temperatures for the year.

MEAN DAILY TEMPERATURE - The average of the daily maximum and minimum temperatures.

MEAN DEPTH - The average depth of water in a stream channel or conduit. It is equal to the cross-sectional area divided by the surface width.

MEANDER - The winding of a stream channel.

MEANDER BELT - The area between lines drawn tangential to the extreme limits of fully developed meanders.

MEAN MONTHLY TEMPERATURE - The average of the mean monthly maximum and minimum temperatures.

MEDIAN - An item in a series chosen so that half of the total number of items are larger and half are smaller.

MENISCUS - The curved surface of the liquid at the open end of a capillary column.

MEROMICTIC LAKE - A lake in which some water remains partly or wholly unmixed with the main water mass at circulation periods. The process leading to a meromictic state is called meromixis. The perennially stagnant deep layer of a meromictic lake is the monimolimnion. The part of the meromictic lake in which free circulation can occur is the mixolimnion. The boundary between the monimolimnion and the mixolimnion is the chemocline.

MESOCLIMATE - The climate of small areas of the earth's surface, it may not be representative of the general climate of the district. It is intermediate in scale between macroclimate and microclimate. Places considered in mesoclimatology include small valleys, "frost hollows," forest clearings and open spaces in towns. See MACROCLIMATE; MICROCLIMATE.

MESOPHYTE - A plant that grows under medium or usual conditions of atmospheric moisture supply, as distinguished from one which grows under dry or desert conditions (xerophyte) or very wet conditions (hydrophyte). See HYDROPHYTE; PHREATOPHYTE; XEROPHYTE.

METEORIC WATER - Water derived from precipitation.

METEOROLOGY - The science of the atmosphere; the study of atmospheric phenomena.

MICROCLIMATE - The local climatic conditions, brought about by the modification of general climatic conditions by local differences in elevation and exposure. The detailed climate of a very small area of the earth's surface. See MACROCLIMATE; MESOCLIMATE.

MILLIGRAMS PER LITER - The weight in milligrams of any substance contained in one liter of liquid; nearly the same as parts per million.

MINER'S INCH - The rate of discharge through an orifice one inch square under a specific head. (See the SI Conversion Table.)

MINIMUM THERMOMETER - An instrument with an index which remains at the lowest temperature occurring since its last setting.

MINING, GROUND-WATER - See GROUND-WATER MINING.

MODERATE RAIN - See RAIN, MODERATE.

MODIFIED FLOW - See FLOW, MODIFIED.

MOISTURE - Water diffused in the ground or atmosphere.

MOISTURE EQUIVALENT - The ratio of (1) the weight of water which the soil, after saturation, will retain against a centrifugal force 1,000 times the force of gravity, to (2) the weight of the soil when dry. The ratio is stated as a percentage.

MOVABLE BED - A stream bed made up of materials readily transportable by the streamflow.

MUNICIPAL CONSUMPTION - See CONSUMPTION, MUNICIPAL.

MUNICIPAL USE OF WATER - The various ways in which water is used in developed urban areas, including domestic use, industrial use, street sprinkling, fire protection, etc.

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NATURAL CONTROL - A stream-gaging control which is natural to the stream channel, in contrast to an artificial control constructed by man.

NATURAL FLOW - See FLOW, NATURAL.

NET CONSUMPTIVE USE - See CONSUMPTIVE USE, NET.

NET RAIN - See RAIN, NET.

NET RESERVOIR EVAPORATION - See EVAPORATION, NET RESERVOIR.

NONCONSUMPTIVE USE - A use of water that does not reduce the supply, such as for hunting, fishing, boating, water-skiing, and swimming.

NORMAL - A central value (such as an arithmetic average or median) of annual quantities for a 30-year period ending with the first year of a decade, e.g., 1921-50, 1931-60.

NORMAL DAILY TEMPERATURE - The average daily mean temperature for a given date, computed for a specific 30-year period.

NORMAL YEAR - A year during which the precipitation or streamflow approximates the average for a long period of record.

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OBSERVATION WELL - A nonpumping well used for observing the elevation of the water table or the potentiometric surface.

OGEE - A reverse curve shaped like an elongated letter S. The downstream faces of overflow dams are often made in this shape. (From French ogive)

ORIFICE - (1) A regular, usually sharp-edged, opening with closed perimeter in a plate, wall, or partition for measuring or controlling the water which flows through it. (2) The end of a small tube, such as a Pitot tube, piezometer, etc.

OROGRAPHIC PRECIPITATION - Precipitation which results from the lifting of moist air over a topographic barrier such as a mountain range. The precipitation may occur some distance upwind and a short distance downwind, as well as on the barrier feature.

OVERDRAFT - That quantity of water pumped in excess of the safe yield.

OVERLAND FLOW - See FLOW, OVERLAND.

OXYGEN SATURATION CAPACITY - The maximum quantity of dissolved oxygen that a liquid exposed to the atmosphere can contain at a given temperature and pressure.

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PARTIAL-DURATION FLOOD SERIES - A list of all flood peaks that exceed a chosen base stage or discharge, without regard for the number occurring in a year.

PARTIAL PRESSURE - In a mixture of gases, the pressure exerted by each gas independently of the other gases.

PERCHED GROUND WATER - See GROUND WATER, PERCHED.

PERCHED WATER TABLE - The water table of a relatively small ground-water body supported above the general ground-water body.

PERCOLATING WATERS - Those waters not supplied by a definite flowing stream which pass through the ground beneath the earth's surface without a definite channel. Ground waters are assumed to be percolating.

PERCOLATION - The movement, under hydrostatic pressure, of water through the interstices of a rock or soil, excluding movement through large openings such as caves.

PERCOLATION, DEEP - In irrigation or farming practice, the amount of water that passes below the root zone of the crop or vegetation.

PERCOLATION PATH - The course followed by water moving or percolating through any permeable material or under a dam which rests on a permeable foundation.

PERCOLATION RATE - The rate, usually expressed as a velocity, at which water moves through saturated granular material. Also applies to quantity per unit of time of such movement and has been used erroneously to designate "infiltration rate" or "infiltration capacity."

PERENNIAL STREAM - A stream which flows at all times. See also STREAM, Perennial.

PERENNIAL YIELD - See YIELD, PERENNIAL.

PERMANENT CONTROL - A stream-gaging control which is substantially unchanging and is not appreciably affected by scour, fill, or backwater.

PERMEABILITY - The ability of a material to transmit fluid through its pores when subjected to a difference in head.

PERMEABILITY COEFFICIENT - This term is now obsolete. See **HYDRAULIC CONDUCTIVITY**.

PERMEAMETER - A laboratory instrument used to determine permeability by measuring the discharge through a sample of material when a known hydraulic head is applied.

pH (HYDROGEN ION CONCENTRATION) - A measure of acidity or alkalinity. Distilled water, which is neutral, has a pH value of 7; a value above 7 indicates the presence of alkalies, while one below 7 indicates acids.

PHREATOPHYTE - A plant that habitually obtains its water supply from the saturated zone, either directly or through the capillary fringe. See also **HYDROPHYTE**; **MESOPHYTE**; and **XEROPHYTE**.

PIEZOMETER - An instrument used to measure pressure head in a conduit, tank, soil, etc. It usually consists of a small pipe or tube tapped into the side of the container, so that the inside end is flush with, and normal to, the water face of the container and is connected with a manometer pressure gage, mercury or water column, or other device for indicating pressure head.

PIEZOMETRIC SURFACE - This term is now obsolete. See **POTENTIOMETRIC SURFACE**.

PITOT TUBE - An instrument used to measure the velocity of flowing water, with the velocity head of the stream an index of velocity. It consists essentially of an orifice held to a point upstream in the water, connected with a tube in which the rise of water due to velocity head may be observed and measured. It also may be constructed with an upstream and downstream orifice, with two water columns, in which case the difference in height of water column in the tubes is the index of velocity.

POINT DISCHARGE - The instantaneous rate of discharge, in contrast to the mean rate for an interval of time.

POINT PRECIPITATION - Precipitation at a particular site, in contrast to the mean precipitation over an area.

POLLUTION - The alteration of the physical, chemical, or biological properties of water, or a discharge of any substance into water, which adversely affects any beneficial water use.

PONDAGE - (1) The holding back of water for later release for power development above the dam of a hydroelectric plant to: (a) equalize daily or weekly fluctuations of streamflow, or (b) to permit irregular hourly use of water by the wheels to take care of fluctuations in the load demand. (2) The water so held back and later released. (3) The storage capacity available for the use of such water.

POROSITY - The ratio, expressed as a percentage or decimal fraction, of the volume of the interstices or pores in a material, such as rock or soil, to the total volume of the material.

POROSITY, EFFECTIVE - The amount of interconnected pore space in a material available for fluid transmission; expressed as a percentage of the total volume occupied by the interconnecting interstices.

POTENTIAL EVAPOTRANSPIRATION - The maximum quantity of water capable of being evaporated in a given climate from a continuous stretch of vegetation which covers the whole ground and has a plentiful water supply.

POTENTIAL NATURAL WATER LOSS - The water loss during years when the annual precipitation greatly exceeds the average water loss. It represents the approximate upper limit of water loss from the type and density of vegetation native to a basin, under conditions of actual moisture supply and other basin characteristics, in contrast to potential evapotranspiration which represents a hypothetical condition where there is no deficiency of water in the soil for use by the type and density of vegetation that would develop.

POTENTIOMETRIC SURFACE - A surface which represents the static head. In relation to an aquifer, the potentiometric surface is defined by the levels to which water will rise in tightly cased wells.

PRECIPITABLE WATER - The total water vapor contained in an atmospheric column of unit cross-sectional area; expressed in terms of water of the same cross-sectional area.

PRECIPITATION - As used in hydrology, precipitation is the discharge of water, in liquid or solid state, from the atmosphere, generally onto a land or water surface. It is the common process by which atmospheric water becomes surface or subsurface water. The term "precipitation" is also commonly used to designate the quantity of water that is precipitated. Forms of precipitation include drizzle, rainfall, glaze, sleet, snow, graupel, small hail, and hail.

PRESSURE GAGE - An instrument, graduated in any units desired, for registering the pressure of solids, liquids, or gases.

PRESSURE HEAD - The relative pressure (excess over atmospheric pressure) divided by the unit weight of water, expressed in units of height.

PRICE CURRENT METER - A current meter with a series of conical cups fastened to a flat framework through which a pin extends. Flowing water rotates the cups around the pin in a horizontal plane, and accoustical or electrical devices register the number of revolutions, from which the velocity of the water can be computed.

PROBABLE MAXIMUM PRECIPITATION - The maximum amount of precipitation for a given period that can reasonably be expected to occur in a specific drainage basin.

PROFILE - A graph showing variation of elevation with distance along a traverse.

PSYCHROMETER - A hygrometer used to determine relative humidity of the atmosphere. It usually consists of two thermometers, one wet and one dry bulb, with the wet bulb wrapped in cloth wick saturated with water which, due to evaporation, causes the temperature to fall below that of the air. From this difference in temperature and the use of specially prepared tables, the relative humidity can be determined.

PUDDLE - (1) The act of compacting earth, soil, clay, etc. by mixing them with water and rolling or tamping the mixture. (2) A compact mass of earth, soil, clay, or mixture of one or more, which has been compacted through the addition of water and rolling and tamping, and has been made more or less impervious. (3) A small pool of water usually a few inches deep and from several inches to several feet across. (4) An accumulation of meltwater on ice due to melting snow or ice.

PUMPING HEAD - Energy given to a fluid by a pump; usually expressed in feet of fluid (foot-pounds per pound).

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QUALITY OF SNOW - See SNOW QUALITY.

QUALITY OF WATER - See WATER QUALITY.

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RAIN - Drops of liquid water in the air, generally larger than 0.02 inches in diameter, which in still air fall to the earth at velocities usually greater than 10 feet per second.

RAINFALL - The quantity of water that falls as rain only. Not synonymous with precipitation.

RAINFALL EXCESS - That part of the rain in a given storm which falls at intensities exceeding the infiltration capacity.

RAINFALL-INTENSITY CURVE - A curve which expresses the relation between rate and duration of rainfall. Each curve generally covers a period of years during which the intensities shown will not, on the average, be exceeded more than once.

RAINFALL RATE - The amount of precipitation occurring in a unit of time; generally expressed in inches per hour.

RAIN GAGE - An instrument for catching and measuring the depth of rainfall. There are various kinds and sizes of rain gages, most of which catch the rainfall in a collector or cross-sectional area larger than that of the measuring compartment, so that a given depth of water in the latter represents a considerably smaller depth of rainfall catch.

RAIN, HEAVY - Rain which, at the time of observation, is falling with an intensity in excess of 0.30 inches per hour (over 0.03 inches in 6 minutes). See also PRECIPITATION.

RAIN, LIGHT - Rain which, at the time of observation, is falling with an intensity of between a trace and 0.10 inches per hour (0.01 inches in 6 minutes). See also PRECIPITATION.

RAIN, MODERATE - Rain which, at the time of observation, is falling with an intensity of between 0.11 inches per hour (0.01+ inches in 6 minutes) and 0.30 inches per hour (0.03 inches in 6 minutes). See also PRECIPITATION.

RAIN, NET - The portion of rainfall which reaches a stream channel or concentration point as direct surface flow.

RATING CURVE - (1) A graphic representation of a rating table. (2) A curve showing the relation between gage height and discharge of a stream or conduit at a given gaging station. (3) A curve showing the relation between the discharge of a gage, meter, or other hydraulic structure or instrument and the pertinent hydraulic conditions affecting the discharge, such as pressure, hydrostatic head, and velocity of approach. If more than one condition affects discharge, a family of curves is needed to represent the rating.

RATING TABLE - (1) A table showing the relation between two mutually dependent quantities or variables over a given range of magnitude. (2) A table showing the relation between the gage height and the discharge of a stream or conduit at a given gaging station. Also called a "discharge table."

REACH - (1) A length of channel which is uniform in discharge depth, area, and slope. (2) A length of channel for which a single

gage affords a satisfactory measure of the stage and discharge. (3) The length of a river between two gaging stations. (4) More generally, any length of a river.

RECESSION CURVE - A hydrograph which shows the decreasing rate of runoff following a period of rain or snowmelt. Since direct runoff and base runoff recede at different rates, separate curves, called direct runoff recession curves, are generally drawn. Use of the term "depletion curve" in the sense of base runoff recession is not recommended.

RECHARGE - See **GROUND-WATER RECHARGE**.

RECORDED FLOOD - See **FLOOD, RECORDED**.

RECURRENCE INTERVAL - The average number of years during which an event of magnitude equal to, greater, or smaller than a given value is expected to occur once. See also **EXCEEDENCE INTERVAL**.

REGIME - "Regime theory" is a theory of the formation of channels in material carried by the stream. Used in this sense, the word "regime" applies only to streams that take at least part of their boundaries from their transported load and part of their transported load from their boundaries, carrying out the process at different places and times in any one stream in a balanced or alternating manner that prevents unlimited growth or removal of boundaries. A stream, river, or canal of this type is called a "regime stream, river or canal." A regime channel is said to be "in regime" when it has achieved average equilibrium; that is, the average values of the quantities that constitute regime do not show a definite trend over a considerable period, generally, approximately a decade. In unspecialized use "regime" and "regimen" are synonymous.

REGIMEN OF A STREAM - The system or order characteristic of a stream, i.e., its habits with respect to velocity and volume, form of and changes in channel, capacity to transport sediment, and amount of material supplied for transportation. The term is also applied to a stream which has reached an equilibrium between corrosion and deposition or, in other words, to a graded stream.

REGULATION - The artificial manipulation of the flow of a stream.

RELATIVE HUMIDITY - The ratio of the actual quantity of water vapor present in a small volume to the quantity of water vapor required for saturation at the same temperature; the percentage of saturation.

RE-REGULATING RESERVOIR - A reservoir used to reduce diurnal fluctuations resulting from the operation of an upstream reservoir for power production. See also **AFTERBAY**.

RESERVOIR - A pond, lake, or basin, either natural or artificial, used for the storage, regulation, and control of water.

RESIDUAL DEPRESSION STORAGE - Depression storage existing at the end of a period of excess rain.

RESIDUAL DETENTION STORAGE - Detention storage existing at the end of a period of excess rain.

RESIDUAL DISCHARGE - Direct surface discharge at the end of a period of excess rain.

RESIDUAL MASS DIAGRAM - A diagram or graph plotted with rectangular coordinates, with each ordinate equal to (a) the sum of all preceding quantities in the series up to a given point, minus (b) the arithmetic mean of the series times the number of quantities in the series up to a given point, and the corresponding abscissa representing time, number of the item in the series, etc. A general upward slope of a section of such a graph indicates that the terms in the series within the section are, in general, in excess of the average for the series, and vice versa. The diagram is used in determining cyclic variation of quantities such as precipitation.

RETARDING RESERVOIR - An ungated reservoir for temporary storage of flood water; sometimes called "detention reservoir."

RETENTION - The part of the gross storm rainfall which is intercepted, stored, or delayed, and thus fails to reach the concentration point by either surface or subsurface routes during the time period under consideration.

RETURN FLOW - That part of a diverted flow which is not consumptively used and returns to its source or another body of water.

RETURN PERIOD - In statistical analysis of hydrologic data, based on the assumption that observations are equally spaced in time with the interval between two successive observations as a unit of time, the return period is the reciprocal of 1 minus the probability of a value equal to or less than a certain value; it is the mean number of such time units necessary to obtain a value equal to or greater than a certain value one time. For example, with a one-year interval between observations, a return period of 100 years means that, on the average, an event of this magnitude, or greater, is not expected to occur more often than once in 100 years. See also EXCEEDENCE INTERVAL; RECURRENCE INTERVAL; FLOOD FREQUENCY; FREQUENCY CURVE.

RETURN SEEPAGE - Water which percolates from canals and irrigated areas to underlying strata, raising the ground-water level, and eventually returning to natural channels.

REYNOLDS NUMBER - A dimensionless number used as an index of fluid flow characteristics, equal to V (velocity) times d (diameter of depth) times ρ (mass density), divided by μ (dynamic viscosity).

RIFFLE - A shallow rapids in an open stream, where the water surface is broken into waves by obstructions wholly or partly submerged

RIGHT BANK - See BANK.

RIPARIAN - Pertaining to the banks of a stream, lake, or body of water.

RIPARIAN LAND - Land which abuts upon the banks of a stream or other natural body of water.

RIPARIAN VEGETATION - Vegetation growing on the banks of a stream or other body of surface water.

RIPARIAN WATER RIGHT - The legal right of the owner of land that is contiguous to a natural stream or lake to take water from that source for use on that contiguous land.

RIVER BASIN - The area drained by a river and its tributaries.

RIVER STAGE - The elevation of the water surface at a specified station above some arbitrary zero datum.

ROOT ZONE - The subsurface zone from the land surface to the depth interwoven by plant roots.

ROUTING (Hydraulics) - (1) The derivation of an outflow hydrograph of a stream from known values of upstream inflow, using the wave velocity and/or the storage equation. (2) A technique used to compute the effect of channel storage and translation on the shape and movement of a flood wave through a river reach.

RUNOFF - (1) That part of the precipitation that appears in uncontrolled surface streams, drains or sewers. It is the same as streamflow unaffected by artificial diversions, imports, storage, or other works of man in or on the stream channels. Runoff may be classified according to speed of appearance after rainfall or melting snow as direct runoff or base runoff, and according to source as surface runoff, storm interflow, or ground-water runoff. (2) Total discharge of (1) during a specified time.

RUNOFF BASE - See RUNOFF, GROUND WATER; or BASE FLOW.

RUNOFF CYCLE - That portion of the hydrologic cycle between incident precipitation over land areas and its subsequent discharge through stream channels or evapotranspiration.

RUNOFF, DIRECT - The runoff entering stream channels most immediately after rainfall or snowmelt. It consists of surface runoff plus interflow and forms the bulk of the hydrograph of a flood. Direct runoff plus base runoff compose the entire flood hydrograph.

RUNOFF, GROUND-WATER - That part of the runoff which has passed into the ground, has become ground water, and has been discharged into a stream channel as spring or seepage water. Also called BASE RUNOFF or BASE FLOW.

RUNOFF PERCENTAGE - Runoff expressed as a percentage of the precipitation.

RUNOFF RATE - Volume of water running off in a unit of time from a surface, expressed as inches of rainfall per hour, cubic feet per second, or other units.

RUNOFF, SURFACE - (1) That part of the runoff which travels over the soil surface to the nearest stream channel. (2) That part of the runoff of a drainage basin that has not passed beneath the surface since precipitation. Surface runoff is not the same as direct runoff. See RUNOFF, DIRECT.

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SAFE YIELD - See YIELD, SAFE.

SALINITY - The relative concentration of salts, usually sodium chloride, in a given water; commonly expressed as parts per million.

SALT BALANCE - A condition in which the specific or total dissolved solids removed from a specified field, stratigraphic zone, political area, or drainage basin equal the comparable dissolved solids added to that location from all outside sources during a specific period of time.

SALT-WATER BARRIER - A physical facility or method of operation designed to prevent the intrusion of salt water into a body of fresh water.

SALT-WATER INTRUSION - The invasion of a body of fresh water by a body of salt water, due to its greater density. It can occur either in surface or ground-water bodies.

SALVAGED WATER - The part of a particular stream or other water supply that is saved from loss, in respect to quantity or quality, and is retained and made available for use.

SATURATED-ADIABATIC LAPSE RATE - The lapse rate in the saturated lower layers of the air. It is about 3°F per 1,000 ft.

SATURATED AIR - Air containing all the water vapor that it can hold at a given temperature and pressure.

SATURATED VAPOR PRESSURE - The pressure exerted by the vapor in a saturated space.

SCOUR - The erosive action of running water in streams, which excavates and carries away material from the bed and banks. Scour may occur in both earth and solid rock material.

S-CURVE - The mass curve corresponding to a unit hydrograph or a distribution graph.

SECONDARY POROSITY - The porosity that results from fractures and solution channels.

SECOND-FEET - An abbreviated expression for cubic feet per second. See CFS.

SECOND-FEET PER SQUARE MILE - See CSM.

SECOND-FOOT DAY - See CFS-DAY.

SEDIMENT - The fragmental material that originates from weathering of rocks and is transported by, suspended in, or deposited by water or air, or is accumulated in beds by other natural agents.

SEDIMENTATION - The process of subsidence and deposition by gravity of suspended matter carried by water, sewage, or other liquids. It usually occurs when the velocity of the liquid is reduced below the point where it can transport the suspended material.

SEDIMENT DISCHARGE - (1) The rate at which a dry weight of sediment passes a section of a stream. (2) The quantity of sediment, as measured by dry weight, or by volume, that is discharged in a given time period.

SEDIMENT, SUSPENDED - Very fine soil particles which remain in suspension in water for a considerable period of time without contact with the bottom.

SEEPAGE - (1) The slow movement of water through small cracks, pores, interstices, etc. of a material into or out of a body of surface or subsurface water. (2) The loss of water by infiltration into the soil from a canal, reservoir, or other body of water, or from a field. Seepage is generally expressed as flow volume per unit time. During the process of priming, the loss is called "absorption loss."

SEICHE - An oscillation of the water surface of a lake or other body of water due to variations of atmospheric pressure, wind, or

minor earthquakes. The oscillation may be a foot or more in amplitude and may last several hours.

SHALLOW WELL - A well with a pumping head of 20 feet or less, permitting use of a suction pump.

SHEET EROSION - The erosion which occurs when water flows in a sheet down a sloping surface and removes material in a sheet of relatively uniform thickness.

SHIFTING CONTROL - A stream-gaging control which is affected by scour, fill, or backwater.

S-HYDROGRAPH - The direct surface discharge hydrograph resulting from a continuous succession of unit storms.

SIMULATION ANALYSIS - The study of the characteristics or behavior of a complex system (physical or nonphysical), using a physical or mathematical model of the system.

SKIMMING - The diversion of water from a stream or conduit by a shallow overflow in order to avoid diversion of sand, silt, or other debris carried as bottom load.

SLEET - A form of precipitation consisting of frozen raindrops cooled to the ice stage while falling through air at subfreezing temperatures.

SLIP-OFF SLOPE BANK - The bank of a meandering stream which is not eroded by stream action, and which may be built up gradually.

SLOPE-DISCHARGE - A curve which shows the discharge at a given gaging station, taking into account the slope of the water surface, as well as the gage height. This curve may be plotted either by using the difference between elevations of water surface at two fixed gages on the stream, instead of the slope or by using the three variables of discharge, elevation of water surface at the lower gage, and elevation of the water surface at the upper gage. Also called "slope-discharge diagram."

SLOPING GAGE - A staff gage used to register the elevation of the water surface in a stream channel, conduit, reservoir or tank, with a scale graduated to represent vertical elevation. A sloping gage is usually installed on a flat sloping bank where it is desirable to increase the accuracy of reading the gage; if A is the angle of the face of the gage with the vertical, the graduations on the gage would be spaced a distance apart equal to $\cos A$.

SNOW - Precipitation in the form of branched, hexagonal crystals or stars, often mixed with simple ice crystals, which fall more or less continuously from a solid cloud sheet. The crystals

may fall either separately or in coherent clusters forming snowflakes.

SNOW, COLD CONTENT OF - The amount of heat required to raise the temperature of the snowpack of 0°C. Usually expressed as the number of inches of liquid water (produced at the surface by either rain or melt) which, on refreezing within the pack, will warm the snowpack to 0°C.

SNOW COURSE - A line laid out and permanently marked on a drainage area along which during snow surveys the snow is sampled at definite distances or stations and at appropriate times to determine its depth, water equivalent, and density.

SNOW CRYSTAL - A configuration of ice crystals, usually in the shape of a hexagonal plane or delicate column, formed around a nucleus by sublimation, condensation and freezing, coalescence, or a combination thereof.

SNOW DENSITY - The ratio between the volume of meltwater derived from a sample of snow and the initial volume of the sample. This is numerically equal to the specific gravity of the snow.

SNOW DEPTH - The vertical distance between the surface of a snow layer and the ground beneath.

SNOWFALL - The amount of snow, hail, sleet, or other precipitation in solid form which reaches the earth's surface. It may be expressed in depth in inches as it falls, or in terms of depth in inches of the equivalent amount of water.

SNOW FIELD - An area, usually at high elevation or in polar latitudes, where snow accumulates and remains on the ground throughout the entire year.

SNOWFLAKE - A single snow crystal or an agglomeration of several snow crystals.

SNOW LINE - (1) The general altitude to which the continuous snow cover of high mountains retreats in summer, chiefly controlled by the depth of the winter snowfall and by the summer temperature. (2) A line, sometimes drawn on a map during the winter, which shows the lower elevation of the snow cover at a particular time.

SNOW, LIQUID WATER DEFICIENCY OF - The difference between the liquid water-holding capacity and the water content of a snowpack.

SNOW, LIQUID WATER-HOLDING CAPACITY OF - The maximum amount of liquid water that a snowpack can hold against gravity at a given stage of metamorphism and density. When the liquid water-holding capacity is reached, the snowpack is said to be "ripe."

SNOWMELT - The net decrease in water equivalent of the snowpack after allowing for increases due to precipitation. It does not include water which refreezes or is retained as liquid water within the snowpack.

SNOWMELT RATE - The rate of conversion of ice into water within a snowpack.

SNOW METAMORPHISM - The transformation of snowflakes within a snowpack into different forms or structures.

SNOWPACK - A field of naturally packed snow that ordinarily melts slowly during the early summer months.

SNOW QUALITY - The ratio of the weight of the ice within a snowpack to the total weight of the snowpack, usually expressed as a percentage.

SNOW SAMPLER - An instrument used in obtaining snow samples, which consists of a set of light, jointed metal tubes for taking samples and a spring scale graduated to read directly the corresponding depth of water contained in the sample.

SNOW STAKE - A graduated fixed pole or staff used to measure snow depth.

SNOW SURVEY - The process or operation of determining the depth, water content, and density of snow at various selected points on a drainage basin in order to ascertain the amount of water stored in the form of snow, and thus forecast subsequent runoff.

SNOW, THERMAL QUALITY OF - The ratio of the amount of heat required to produce a specific quantity of water from a snowpack to the amount of heat required to produce the same quantity of water from pure ice at 32^oF.

SNOW WATER EQUIVALENT - See WATER EQUIVALENT OF SNOW.

SOIL MOISTURE (Soil Water) - The water diffused in the upper part of the unsaturated zone of the soil, from which water is discharged by the transpiration of plants or by evaporation.

SOIL ZONE - The root zone.

SOUNDING - Measuring the depth of water, as in a well, river, or lake.

SPECIFIC CAPACITY OF A WELL - The ratio of discharge of a well to drawdown, usually measured in gallons per minute per foot.

SPECIFIC DISCHARGE (Specific Flux) - For ground water, the rate of discharge per unit area, measured at right angles to the direction of flow.

- SPECIFIC HEAT - The ratio of the amount of heat required to raise the temperature of a given weight of a given substance 1^oF, to the amount of heat required to raise the temperature of the same weight of water from 62^oF to 63^oF.
- SPECIFIC HUMIDITY - The mass of water vapor per unit mass of moist air.
- SPECIFIC RETENTION - The amount of water held in saturated rock or soil after the excess gravitational water has drained away; expressed as a percentage of the volume of the rock or soil.
- SPECIFIC YIELD - The amount of water that rock or soil, after being saturated, will yield when drained by gravity; expressed as a ratio or as a percentage of the volume of the rock or soil.
- SPECTROSCOPIC HYGROMETER - An instrument used to measure the selective absorption by water vapor of light in certain bands of the spectrum.
- STAFF GAGE - A graduated scale used to indicate the height of the water surface in a stream channel, reservoir, lake, or other water body.
- STAGE - The height of a water surface above an established datum plane. See also GAGE HEIGHT.
- STAGE-CAPACITY CURVE - A graph showing the relation of the surface elevation of the water in a reservoir, usually plotted as the ordinate, to the volume below that elevation, plotted as the abscissa.
- STAGE-DISCHARGE CURVE (RATING CURVE) - A graph showing the relation between the gage height, usually plotted as the ordinate, and the amount of water flowing in a channel, expressed as volume per unit of time and plotted as the abscissa.
- STANDARD PERMEABILITY - The permeability corresponding to a temperature of 60^oF.
- STATIC HEAD - The height above a standard datum of the surface of a column of water (or other liquid) that can be supported by the static pressure at a given point.
- STEMFLOW - The rainfall or snowmelt led to the ground down the trunks or stems of plants.
- STOCK RESOURCE - A resource which can be used up or consumed.
- STORAGE - (1) Water artificially impounded in surface or underground reservoirs for future use. (2) Water naturally detained in a drainage basin, such as ground water, channel storage, and depression storage. The term "drainage basin storage," or

simply "basin storage," is sometimes used to refer collectively to the amount of water in natural storage in a drainage basin.

STORAGE CAPACITY - See GROUND-WATER STORAGE CAPACITY; STORAGE CAPACITY, ACTIVE; STORAGE CAPACITY, INACTIVE; STORAGE CAPACITY, TOTAL.

STORAGE CAPACITY, ACTIVE - The total amount of usable reservoir capacity available for seasonal or cyclic water storage; gross reservoir capacity minus inactive storage capacity.

STORAGE CAPACITY, INACTIVE - That capacity below which the reservoir is not normally drawn, and which is provided for sedimentation, recreation, fish and wildlife, aesthetic reasons, or for creation of a minimum controlled operational or power head in compliance with operating agreements or restrictions.

STORAGE CAPACITY, TOTAL - The volume of a reservoir below the maximum controllable level, including dead storage.

STORAGE COEFFICIENT - (1) For surface water, the relation of storage capacity in a reservoir to the mean annual flow of a stream above the dam forming the reservoir. (2) For ground water, the volume of water an aquifer releases from or takes into storage per unit surface area of the aquifer per unit change in head.

STORAGE RATIO - The net available storage divided by the mean flow for one year.

STORAGE, USABLE - The volume of water normally available for release from a reservoir below the stage of the maximum controllable level. See also STORAGE CAPACITY.

STORM - A disturbance of the atmosphere which, unless specifically qualified, may include any or all meteorological disturbances, such as wind, rain, snow, hail, or thunder.

STORM LOSS - Infiltration plus depression storage; may also include interception loss.

STORM SEEPAGE - That part of precipitation which infiltrates the surface soil, and moves toward the streams as ephemeral, shallow, perched ground water above the main ground-water level. Storm seepage is usually part of the direct runoff. Also called INTERFLOW.

STREAM - A body of water flowing in a natural surface channel. Also, as in the term "stream gaging," water flowing in any channel, natural or artificial. Streams may be classified as follows:

In Relation to Time:

Ephemeral - A stream that flows only in direct response to precipitation, and whose channel is at all times above the water table.

Intermittent or Seasonal - A stream that carries water most of the time, or over most of its course, but ceases to flow occasionally.

Perennial - A stream that flows continuously.

In Relation to Ground Water:

Gaining - A stream or reach of a stream fed by ground water.

Insulated - A stream or reach of a stream that neither contributes water nor receives water from the saturated zone, and is separated from it by an impermeable bed.

Losing - A stream or reach of a stream that contributes water to the ground water.

Perched - Either a losing stream or an insulated stream that is separated from the underlying ground water by an unsaturated zone.

STREAM-CHANNEL DEGRADATION - See DEGRADATION, STREAM-CHANNEL.

STREAMFLOW - The discharge that occurs in a natural channel. "Streamflow" is a more general term than "runoff," as streamflow may be applied to discharge whether or not it is affected by diversion or regulation. See also RUNOFF.

STREAMFLOW DEPLETION - The amount of water that flows into a valley or onto a particular land area minus the water that flows out of the valley or off the land area.

STREAMFLOW ROUTING - A technique used to compute the effect of channel storage on the shape and movement of a flood wave.

STREAM GAGING - (1) The operation of measuring the velocity and average cross section of a stream of water in a channel or open conduit in order to determine the discharge. (2) A discharge measurement expressed numerically in appropriate units.

STREAM-GAGING STATION - A gaging station where a continuous record of the discharge of a stream is obtained.

STREAM GRADIENT - A general slope or rate of change in vertical elevation per unit of horizontal distance of the water surface of a flowing stream.

STREAM ORDER - A method of numbering streams as part of a drainage basin network. The smallest unbranched mapped tributary is a first-order stream, the stream receiving the tributary is a

second-order stream, and so on, with the main stream always of the highest order. It is usually necessary to specify the scale of the map used, as a first-order stream on a 1:62,500 map may be a third-order stream on a 1:12,000 map.

STREAM REGIMEN - See REGIMEN OF A STREAM.

STREAM UNDERFLOW - See UNDERFLOW.

STREAM, UNDERGROUND - A subsurface stream which has all the characteristics of a water-course on the surface--a definite channel with bed and banks, a definite stream of water, and a definite source(s) of supply.

SUBIRRIGATED LAND - Land with a high water table condition, either natural or artificially controlled, that normally supplies a RUNOFF.

SUBSURFACE FLOW - Water which infiltrates the soil surface and moves laterally through the upper soil layers until it enters a channel. See INTERFLOW.

SUBSURFACE WATER - All water below the land surface, including soil moisture, intermediate zone water, capillary fringe water, and ground water.

SUBTERRANEAN WATERS (Legal) - Those subsurface waters whose courses are well defined and reasonably ascertainable and whose existence is not temporary.

SUPPLEMENTAL IRRIGATION - See IRRIGATION, SUPPLEMENTAL.

SURFACE DETENTION - That part of the rain which remains on the ground surface during rain and either runs off or infiltrates after the rain ends; surface detention does not include DEPRESSION STORAGE.

SURFACE RUNOFF - See RUNOFF, SURFACE.

SURFACE WATER - Water on the surface of the earth.

SUSPENDED SEDIMENT - See SEDIMENT, SUSPENDED.

SUSPENSIDS - Colloidal particles which remain in suspension under all conditions and will combine or react only to a limited extent with the liquid in which they exist.

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TAILRACE - A channel which conducts water away from a water wheel.

TEMPERATURE INVERSION - A surface cooling at the earth's surface which sometimes leads to an increase in temperature with altitude.

TERRACE - A berm or discontinuous segments of a berm in a valley at some height above the flood plain, representing an abandoned flood plain of the stream.

TERTIARY TREATMENT - In sewage treatment, the treatment of effluent beyond secondary treatment, in order to obtain a very high quality effluent.

TEST HOLE - A well hole drilled for experimental or exploratory purposes.

THALWEG - (1) The lowest thread along the axial part of a valley. (2) A subsurface, ground-water stream percolating beneath and in the general direction of a surface stream course or valley. (3) The middle or chief navigable channel of a waterway.

THERMAL QUALITY - See SNOW, THERMAL QUALITY OF.

THERMAL STRATIFICATION (of a lake) - The vertical temperature stratification of a lake which consists of: (a) the upper layer, or epilimnion, in which the water temperature is virtually uniform; (b) the middle layer, or thermocline, in which there is a marked drop in temperature per unit of depth; and (c) the lowest stratum, or hypolimnion, in which the temperature is again nearly uniform.

THERMOCLINE - The middle thermal layer in a body of water, which lies between the EPILIMNION and HYPOLIMNION and has the greatest temperature difference per unit of depth (usually equal to or greater than 1°C per meter).

THERMOGRAPH - A self-registering thermometer which has a thermometric element consisting either of a bimetallic strip or a metal tube filled with alcohol or mercury, and makes an autographic record on a ruled chart wrapped around a clock-drive cylinder.

THROUGHFALL - In a vegetated area, the precipitation that falls directly to the ground, or the rainwater or snowmelt that drops from twigs or leaves.

TIME OF CONCENTRATION - The time required for water to flow from the farthest point on the watershed to the gaging station.

TOTAL HEAD - Energy contained by fluid because of its pressure, velocity, and elevation, usually expressed in feet of fluid (foot-pounds per pound).

TOTAL STORAGE CAPACITY - See STORAGE CAPACITY, TOTAL.

TRACE - An amount of rainfall or other form of precipitation so small that it cannot be measured in a rain gage. Its occurrence is usually noted on the daily record sheet by the word "trace" or the letter "T."

TRANSMISSIBILITY - A term incorrectly used for TRANSMISSIVITY.

TRANSMISSIBILITY COEFFICIENT - This term is now obsolete. See TRANSMISSIVITY.

TRANSMISSIVITY - The rate at which water is transmitted through a unit width of an aquifer under a unit hydraulic gradient; expressed as the product of the hydraulic conductivity and the thickness of the saturated portion of the aquifer.

TRANSPIRATION - (1) The quantity of water absorbed, transpired, and used directly in the building of plant tissue during a specified time period. It does not include soil evaporation. (2) The process by which water vapor escapes from a living plant, principally through the leaves, and enters the atmosphere.

TRANSPIRATION RATIO - The number of pounds of water required for transpiration per pound of dry plant tissue produced.

TRANSPORT CAPACITY - The ability of a stream to transport a suspended load, expressed in terms of the total weight of the suspended particles.

TREND - A unidirectional increasing or decreasing change in the average value of a hydrological variable.

TRIBUTARY - A surface or subsurface stream or other body of water which contributes its water, even though intermittently and in small quantities, to another larger stream or body of water.

TURBULENT FLOW - See FLOW, TURBULENT.

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ULTIMATE INFILTRATION CAPACITY - See INFILTRATION CAPACITY, ULTIMATE.

ULTIMATE WILTING POINT - See WILTING POINT, ULTIMATE.

UNDERFLOW - The downstream flow of water through the permeable deposits underlying a stream.

UNDERGROUND STREAM - See STREAM, UNDERGROUND.

UNIMPAIRED RUNOFF - Use RUNOFF.

UNIT HYDROGRAPH - (1) The hydrograph of direct runoff from a storm uniformly distributed over the drainage basin during a specified unit of time: the hydrograph is reduced in vertical scale to correspond to a volume of runoff from the drainage basin of one inch. (2) The hydrograph of surface runoff (not including ground-water runoff) on a given basin due to an effective rain falling for a unit of time.

UNIT PERIOD - The time duration of a unit storm.

UNIT STORM - A net rainfall one-inch deep which occurs over all parts of a drainage area at a uniform rate during a specified unit period of time.

USABLE STORAGE - See STORAGE, USABLE.

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VAPOR BLANKET - The layer of air which overlies a body of water and, due to its proximity to the water, has a water vapor content higher than that of the surrounding atmosphere.

VAPORIZATION - The process by which water changes from the liquid to the gaseous state.

VELOCITY, AVERAGE INTERSTITIAL - The specific discharge divided by the effective porosity.

VELOCITY HEAD - Energy contained by fluid because of its velocity; usually expressed in feet of fluid (foot-pounds per pound).

VENTURI METER - A meter, developed by Clemens Herschel, for measuring flow of water or other fluids through closed conduits or pipes. It consists of a venturi tube and one of several forms of flow registering devices.

VERTICAL-VELOCITY CURVE - A curve showing how the down-gradient velocity varies with depth along a vertical depth-observation line in a surface stream.

VIRGIN FLOW - See FLOW, VIRGIN.

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WASH LOAD - In a stream system, the relatively fine material in near-permanent suspension which is transported entirely through the system without deposition.

WASTE WATER - That water for which, because of quality, quantity, or time of occurrence, disposal is more economical than use at the time and point of its occurrence. Waste water to one user may be a desirable supply to the same or another user at a different location.

WATER ANALYSIS - The determination of the physical, chemical, and biological characteristics of water. Such analysis usually involves four kinds of examination: bacterial, chemical, microscopic, and physical.

WATER BUDGET - See HYDROLOGIC BUDGET.

WATER CONTENT OF SNOW - The amount of liquid water contained in a snowpack.

WATERCOURSE BED - That portion of the watercourse which carries water at ordinary stages.

WATER EQUIVALENT OF SNOW - The amount of water that would be obtained if the snowpack were melted.

WATER LEVEL - The water-surface elevation or stage.

WATER-LEVEL GAGE - A gage which indicates the water level in a reservoir, stilling well, or other receptacle.

WATER QUALITY - The chemical, physical, and biological characteristics of water in respect to its suitability for a particular purpose.

WATER RIGHT - A legally protected right, granted by law, to take possession of water occurring in a water supply and to divert that water for beneficial use.

WATERSHED - All lands which are enclosed by a continuous hydrologic drainage divide and lie upslope from a specified point on a stream. See also CATCHMENT AREA; DRAINAGE AREA.

WATER SPREADING - Controlled application of water to the land in order to recharge ground-water aquifers.

WATER TABLE - The upper surface of a saturated zone, where the body of ground water is not confined by an overlying impermeable formation. Where an overlying confining formation exists, the aquifer in question has no water table.

WATER-TABLE AQUIFER - An unconfined aquifer.

WATER YEAR - The 12-month period October 1 through September 30. The water year is designated by the calendar year in which it ends and which includes 9 of the 12 months. Thus, the year ending September 30, 1959, is the "1959 water year."

WATER YIELD (Water Crop or Runout) - The total runoff from a drainage basin through surface channels and aquifers; precipitation minus evapotranspiration.

WEATHER - One phase of the succession of phenomena whose complete cycle, recurring with greater or lesser uniformity every year, constitutes the climate of any locality.

WEEK-SECOND-FOOT - A unit of volume equivalent to 1 cubic foot per second flowing for one week, 7 day-second-feet, 604,800 cubic feet, or 13,884 acre-feet. (See the SI Conversion Table.)

WELL CAPACITY - The maximum rate at which a well will yield water under a stipulated set of conditions, such as a given drawdown, pump, and motor or engine size. Well capacity may be expressed in terms of gallons per minute, cubic feet per second, or other similar units.

WELL DEVELOPMENT - The application of a surging or brushing process to a well in order to draw fine material from the aquifer next to the well and increase its discharge capacity.

WELL FIELD - A tract of land which contains a number of wells for supplying a large municipality or irrigation district.

WELL HYDROGRAPH - A graphic representation of the fluctuations of the water surface in a well, plotted as ordinates, against time, plotted as abscissas.

WELL INTERFERENCE - The effects of neighboring pumping wells on the discharge and drawdown at a particular pumping well.

WET LINE - The length of sounding line below the water surface.

WETTED PERIMETER - The length of the wetted contact between a stream of flowing water and its containing conduit or channel, measured in a plane at right angles to the direction of flow.

WILTING POINT - The minimum quantity of water in a given soil necessary to maintain plant growth. When the quantity of moisture falls below this point, the leaves begin to droop and shrivel up. In any given soil the minimum quantity is practically constant for all plants, but it increases with a decrease in the size of soil particles.

WILTING POINT, ULTIMATE - The point at which the moisture content of the soil is such that all the leaves of plants growing in it are completely wilted and will not recover without the addition of water.

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XEROPHYTE - A plant which grows in arid areas. See also **HYDROPHYTE**; **PHREATOPHYTE**; **MESOPHYTE**.

* * *

YIELD - (1) The quantity of water expressed either as a continuous rate of flow (e.g., cubic feet per second) or as a volume per unit of time (e.g., acre-feet per year) which can be collected for a given use or uses from surface- or ground-water sources on a watershed. The yield may vary with the use proposed, with the plan of development, and also with economic considerations. "Yield" is more or less synonymous with "water crop." (2) Total runoff. (3) The streamflow in a given interval of time derived from a unit area of watershed. It is determined by dividing the observed streamflow at a given location by the drainage area above that location and is usually expressed in cubic feet per second per square mile. See also YIELD, AVERAGE ANNUAL; YIELD, FIRM; YIELD, PERENNIAL; YIELD, SAFE.

YIELD, AVERAGE ANNUAL - The average annual supply of water produced by a given stream or water development.

YIELD, FIRM - The maximum annual supply of a given water development that is expected to be available on demand, with the understanding that lower yields will occur in accordance with a predetermined schedule or probability.

YIELD, PERENNIAL - The amount of usable water of a ground-water reservoir that can be economically withdrawn and consumed each year for an indefinite period of time. It cannot exceed the natural recharge to that ground-water reservoir and ultimately is limited to the maximum amount of discharge that can be utilized for beneficial use.

YIELD, SAFE - With reference to either a surface- or ground-water supply, the rate of diversion or extraction for consumptive use which can be maintained indefinitely, within the limits of economic feasibility, under specified conditions of water-supply development. See also YIELD, PERENNIAL.

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ZONE OF AERATION - This term is now obsolete. See ZONE, UNSATURATED.

ZONE, SATURATED - The zone below the water table in which all the interstices are filled with water. Water in the saturated zone is called ground water.

ZONE, UNSATURATED - The zone between the land surface and the water table which characteristically contains liquid water under less than atmospheric pressure and water vapor and air or other gases at atmospheric pressure.

GLOSSARY OF SELECTED WATER QUALITY TERMS

AGP - See ALGAL GROWTH POTENTIAL.

AWT - See ADVANCED WASTEWATER TREATMENT.

ABSORPTION - The taking up of one substance into the body of another. An example is the absorption of water by a sponge. Not to be confused with adsorption.

ACCURACY - A measure of the agreement of a measured value with the known, true value. See PRECISION.

ACID MINE DRAINAGE - Drainage from certain mines, especially coal mines, which contain mineral acidity, primarily due to air oxidation of iron pyrites.

ACIDITY - A measure of carbon dioxide and other acids in solution. A solution with a pH of less than 4.5 contains mineral acidity (due to strong inorganic acids), while a solution having a pH greater than 8.3 contains no acidity.

ACTIVATED CARBON - A material produced by heating coal or wood in such a manner as to yield a porous structure, creating a very large internal surface area. Activated carbon is available in both powdered and granular forms, and is widely used to adsorb noncalcitrant organic compounds from water and wastewater. It provides one means of removing tastes and odors from drinking water.

ACTIVATED SLUDGE - The floc produced in raw or settled wastewater due to the growth of zooglyphic bacteria and other organisms in the presence of dissolved oxygen.

ACTIVATED SLUDGE PROCESS - A method of wastewater treatment in which the waste is aerated to develop a biological floc which is then removed by settling.

ACTIVITY - The effective concentration of a chemical based on thermodynamic considerations. Activity and concentration have the same units and have the same value in very dilute solutions.

ACTIVITY COEFFICIENT - A factor which relates activity to the concentration of a chemical species in solution; generally designated by γ ($A = \gamma C$). The activity coefficient is dependent upon the ionic strength of the solution; in very dilute solutions it has a value of one.

ACUTE - Showing immediate effects, as in acute toxicity.

ADSORBATE - Any material adsorbed onto the surface of another.

ADSORBENT - Any material which adsorbs another on its surface.

ADSORPTION - The adherence of a gas, liquid, or dissolved material on the surface of a solid. An example is the adsorption of organic materials by activated carbon. Not to be confused with absorption.

ADVANCED WASTEWATER TREATMENT (AWT) - Any process which reduces the level of impurities in a wastewater below that attainable through conventional secondary treatment.

AERATION - Any process by which intimate contact between air and liquid is assured, generally by spraying liquid in the air, bubbling air through water, or mechanical agitation of the liquid to promote surface absorption of air.

AEROBE - An organism which requires oxygen for its life processes.

AEROBIC - Denotes the presence of oxygen.

ALGAE - Simple aquatic plants, containing chlorophyll and lacking roots, stems and leaves.

ALGAL BLOOM - A proliferation of living algae on the surface of lakes, streams or ponds. It is associated with eutrophication and results in a deterioration in water quality.

ALGAL GROWTH POTENTIAL (AGP) - The maximum algal dry weight biomass produced in a natural water sample under laboratory conditions. Expressed as mg, dry weight per liter of sample.

ALKALINITY - The capacity of a water to neutralize acids, a property imparted principally by carbonates, bicarbonates, hydroxides and occasionally borates, silicates and phosphates. It is expressed in units of mg/l of CaCO_3 . A solution having a pH below 4.5 contains no alkalinity.

ALPHA RADIATION - Helium nuclei emitted by many radioactive substances.

ALUM - Common name for commercial-grade aluminum sulfate. Its chemical formula is $\text{Al}_2 (\text{SO}_4)_3 \cdot 14.3 \text{H}_2\text{O}$.

AMMONIA STRIPPING - A process for the removal of ammonia from wastewater. The waste is first made alkaline to favor the NH_3 form, and then aerated so that exchange between the waste and the atmosphere is encouraged. Stripping towers are often used, with the waste trickling downward as air is forced upward through the tower.

AMMONIFICATION - The transformation of organic nitrogen to ammonia, generally via bacterial activity.

ANAEROBE - An organism that does not require oxygen to maintain its life processes.

ANAEROBIC - Denotes the absence of oxygen.

ANAEROBIC DIGESTION - The degradation of organic matter by microorganisms in the absence of oxygen, particularly as related to the treatment of sewage sludge.

ANION - A negatively charged ion.

ANIONIC POLYELECTROLYTE - A polyelectrolyte carrying a negative charge in the polymer chain.

ANODE - An electrode at which oxidation occurs; a positive electrode.

ANOXIC - Denotes the absence of oxygen.

ANTAGONISM - An action whereby the effect of two active components is less than the sum of the two.

ATOMIC ABSORPTION - An analytical technique which involves the absorption of light by elements in the atomic state. Characteristic wavelengths are associated with each element. In conventional atomic absorption an atomic vapor is produced by an acetylene-air or acetylene-nitrous oxide flame, while in the flameless technique a carbon rod or graphite tube furnace is used.

AUFWUCHS - See PERIPHYTON.

AUTOTROPH - An organism that utilizes light energy or the oxidation of inorganic chemicals as its sole energy source. In the first instance the organism is called a photoautotroph, while in the latter case it is called a chemoautotroph.

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BAT - See BEST AVAILABLE TECHNOLOGY.

BOD - See BIOCHEMICAL OXYGEN DEMAND.

BOD LOADING - The BOD content, commonly expressed in pounds/day, of wastewater passing into a waste treatment system or a body of water.

BPT - See BEST PRACTICABLE TECHNOLOGY.

BACKWASH - The reversal of flow through a rapid sand filter to wash clogging material out of the filtering medium and reduce conditions causing loss of head.

BACTERIA - Microscopic unicellular organisms which decompose organic matter in nature and are used to stabilize organic wastes in treatment plants. Disease-causing forms are termed "pathogenic." (Singular form, Bacterium)

BACTERICIDAL - Able to kill bacteria.

BENTHIC ORGANISMS - Those organisms living at or near the bottom of a body of water.

BEST AVAILABLE TECHNOLOGY (BAT) - A national goal under the Water Pollution Control Act of 1972 (PL 92-500) which provides that industry shall use the best treatment technically and economically achievable for a category or class of point sources. BAT for industry is required by July 1, 1983, under the Act.

BEST PRACTICABLE TECHNOLOGY (BPT) - A national goal under the Water Pollution Control Act of 1972 (PL 92-500) which provides that industry shall use the best treatment practices practical, with due consideration to cost, age of the plant and equipment and other factors.

BETA RADIATION - High energy electrons which are emitted by many radioactive substances.

BIOASSAY - A method for quantitatively determining the concentration of a substance by its effects on the growth of a suitable animal, plant or microorganism under controlled conditions.

BIOCHEMICAL OXYGEN DEMAND (BOD) - The amount of oxygen required by aerobic bacteria in decomposing the organic matter in a sample under standard conditions. Reported as mg/l, indicating the mg of oxygen required per liter of sample. An incubation period of five days is often used, resulting in a BOD₅. A longer incubation period is used to measure the "ultimate" BOD.

BIODEGRADABLE - A substance that can be broken down by microorganisms.

BIODISC - See ROTATING BIOLOGICAL CONTRACTOR.

BIOTOWER - A means of wastewater treatment in which the waste is allowed to fall through a tower packed with synthetic media, on which there is biological growth. Similar to a trickling filter in concept.

BLOWDOWN - The fraction of circulating water which is wasted due to increased dissolved solids concentrations caused by evaporation.

BLUE-GREEN ALGAE - A group of phytoplankton which often cause nuisance conditions in water, so called because they contain a blue pigment in addition to chlorophyll.

BREAKPOINT CHLORINATION - The addition of chlorine to water or wastewater until the chlorine demand has been satisfied and further additions result in a residual that is directly proportional to the amount added beyond the breakpoint.

BUFFER - A solution which is resistant to pH changes.

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CCE - See CARBON CHLOROFORM EXTRACT.

CEC - See CATION EXCHANGE CAPACITY.

COD - See CHEMICAL OXYGEN DEMAND.

CARBON-CHLOROFORM EXTRACT (CCE) - A measurement of the organic content of a water. It consists of adsorbing the organic matter onto activated carbon, then extracting it with chloroform.

CARCINOGENIC - Cancer causing.

CATALYST - A substance that alters the speed of a reaction, but does not change the form or amount of product.

CATHODE - An electrode at which reduction occurs; a negative electrode.

CATION - A positively charged ion.

CATION EXCHANGE CAPACITY (CEC) - The total of exchangeable cations that a soil can adsorb; expressed in milliequivalents per 100 g of soil.

CATIONIC POLYELECTROLYTE - A polyelectrolyte carrying a positive charge on the polymer chain.

CENTRIFUGATION - In water and wastewater treatment, a method used to remove liquid from sludges through use of centrifugal forces.

CHELATION - The formation of an inorganic complex in which the same molecule is attached to a central atom at two different points.

CHEMICAL FEEDER - Mechanical device for measuring quantities of chemical and applying them to a water at a preset rate.

CHEMICAL OXYGEN DEMAND (COD) - The quantity of oxygen required to oxidize the organic matter in a sample, under specific conditions of oxidizing agent, temperature and time. A dichromate-sulfuric acid mixture is commonly used as the oxidizing media. Results are reported in mg/l, i.e., the mg of oxygen consumed by each liter of sample.

CHEMOAUTOTROPH - An organism that utilizes oxidation of inorganic chemicals for its energy and carbon dioxide for cell growth. Also called a chemosynthetic autroph.

CHEMOCLINE - The transition zone between layers in a meromictic lake.

CHLORINATION - The application of chlorine or one of its compounds to water or wastewater, often for disinfection purposes.

CHLORINE RESIDUAL - The concentration of chlorine remaining in water or wastewater at the end of a specified contact period which will react chemically and biologically. May be present as either combined or free chlorine, or both.

CHLOROPHYLL - The green pigments of plants. Chlorophyll a and b are the two most common forms.

CHRONIC - Showing effects only over a long period of time, as in chronic toxicity.

CLARIFICATION - A process or combination of processes where the primary purpose is to reduce the concentration of suspended matter in a liquid.

CLEAN WATER ACT OF 1977 - Amendments to the Water Pollution Control Act, passed December 28, 1977. Looked upon as a mid-course correction.

CLEAR WELL - A reservoir containing water which has been previously treated before entering the distribution lines.

COAGULANT - A chemical compound, such as alum, used to produce coagulation.

COAGULANT AID - A substance which is used to improve settling and strengthen flocs in the coagulation process. They are generally used in much smaller doses than the coagulant itself.

COAGULATION - The clumping of particles which results in the settling of impurities. It may be induced by coagulants such as lime or alum.

COLIFORM - Gram negative, non-spore forming, rod-shaped bacteria that ferment lactose and produce gas. They are used as indicators

of possible fecal contamination. Generally reported as colonies per 100 ml of sample.

COLOR COMPARATOR - An instrument that compares an unknown color with that of a standard color sample for matching purposes. It is used to quantitatively analyze a solution for a particular substance of interest. Often found in testing kits; generally requires a visual comparison.

COLOR UNIT- A standard unit used for color comparison, and equivalent of the color produced by a concentration of one mg/l of platinum in the form of chloroplatinate ion. The standard solution has a yellowish-brown color.

COLORIMETER - An instrument for measuring the concentration of a known constituent in solution by comparison with colors of a few standard solutions' concentrations of that constituent.

COMBINED AVAILABLE CHLORINE - Concentration of chlorine which is combined with ammonia as chloramine or as other chloro-derivatives yet is still available to oxidize organic matter.

COMBINED SEWERS - Those which carry both sanitary wastes and stormwater runoff.

COMPOSITE SAMPLE - A sample prepared by mixing several grab samples according to some predetermined plan. Flow composited or time-composited samples are commonly used.

CONCENTRATION - The amount of solute present in proportion to the total solution.

CONDUCTANCE - The conductivity of a solution as measured by a standard one-cm cell. Properly called "specific conductance" and reported in units of micromhos (microsiemens).

CONDUCTIVITY - A measure of the conducting power of a solution, equal to the reciprocal of the resistance. Expressed in millisiemens per meter (ms/m) or micromhos per centimeter ($\mu\text{mho/cm}$) at 25°C.

CONTACT STABILIZATION - A modification of the activated sludge process wherein a contact basin provides for the rapid adsorption of the waste. A separate tank is provided for stabilization of the solids before they are reintroduced into the raw wastewater flow.

CONVENTIONAL ACTIVATED SLUDGE - A process in which influent and recycled sludge enter at the head of the aeration tank.

CORROSION - A gradual deterioration or destruction of a substance or material by chemical action, frequently induced by electrochemical processes.

CROSS CONNECTION - A physical connection through which a supply of potable water could become contaminated.

CURIE - A unit of radioactivity defined as being equivalent to 3.7×10^{10} disintegrations per second.

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DO - See DISSOLVED OXYGEN.

DECHLORINATION - The partial or complete reduction of residual chlorine in a liquid by any chemical or physical process. Commonly used dechlorinating agents include activated carbon and sulfur dioxide.

DEFLUORIDATION - A process by which the level of fluoride in a water is reduced to prevent mottling of teeth or fluorosis in consumers. Either activated alumina or bone char is used in the process.

DEIONIZED WATER - See DEMINERALIZED WATER.

DEMINERALIZED WATER - Water which has been passed through a mixed-bed ion exchanger to remove soluble ionic impurities. Nonelectrolytes and colloids are not removed from water so treated.

DENITRIFICATION - The chemical or biochemical reduction of nitrate or nitrite to gaseous nitrogen, either as molecular nitrogen or as an oxide of nitrogen.

DESALINATION - The removal of dissolved salts from water.

DESORPTION - The removal of a substance adsorbed to the surface of an adsorbent.

DESTRATIFICATION - Mixing to eliminate water layers, particularly in lakes.

DETENTION TIME - The time water is held in a settling basin, calculated by dividing the basin volume by the average flow.

DETERGENT - A synthetic cleaning agent consisting of a long chain organic molecule having one end hydrophilic and the other end hydrophobic. Early "ABS" type detergents were not biodegradable, while the improved "LAS" detergents are.

DEWATERING - The extraction of a portion of the water present in a sludge or slurry, producing a dewatered product which is easier to handle.

DIATOMACEOUS EARTH - A yellow, white or light-gray material composed of the siliceous shells of diatoms and used in water filtration.

DIGESTION - In wastewater treatment, the biological decomposition of organic matter in sludge.

DIMICTIC LAKE - One which experiences two periods of full mixing annually.

DISINFECTANT - An agent that kills microorganisms.

DISINFECTION - The process of killing a large portion of microorganisms in or on a substance, but not bacterial spores.

DISSOCIATION CONSTANT - An equilibrium constant as applied to a compound which dissociates in solution.

DISSOLVED OXYGEN (DO) - The oxygen dissolved in water or sewage. Adequate concentrations of dissolved oxygen are necessary for the life of fish and other aquatic organisms and the prevention of offensive odors.

DISSOLVED SOLIDS - The total quantity of substances in a sample which are not removed by filtration through a 0.45 μm membrane filter. This is equivalent to filtrable residue.

DISTILLED WATER - Water which is obtained by condensation of the vapor, thus removing many of the impurities.

DIURNAL FLUCTUATION - Rhythmic changes which are apparent during a daily cycle.

DIVERSITY INDEX - A numerical expression of the evenness of distribution of aquatic organisms. Several different formulae are in current use for its calculation.

DUAL MEDIA FILTRATION - A system using two layers of dissimilar media, such as anthracite and sand.

DYSTROPHIC LAKE - A lake characterized by a lack of nutrients, and often having a low pH and a high humus content. This stage follows the eutrophic phase in the life cycle of a lake.

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E. COLI - See ESCHERICHIA COLI.

EDI - See EQUAL DISCHARGE INCREMENT.

ESP - See EXCHANGEABLE SODIUM PERCENTAGE.

ETR - See EQUAL TRANSIT RATE.

ECOLOGY - The branch of science dealing with the relationship between organisms and their environment.

EFFECTIVE SIZE - The size particle which is exceeded in fineness by ten percent of a sample.

EFFLUENT - The discharged liquid waste of sewage treatment or industrial processing.

ELECTRODIALYSIS - The removal of ions from water by transfer across a membrane using electrical current.

ELECTROLYTE - A substance which ionizes in water; or a solution containing ions.

ENDAMOEBIA HISTOLYTICA - A waterborne disease organism causing amoebic dysentery.

ENDOGENOUS RESPIRATION - A process during which microorganisms consume their own cell material for energy.

ENZYME - An organic catalyst.

EPILIMNION - The warm upper level of a stratified lake which remains in circulation during the stratification period.

EQUAL DISCHARGE INCREMENT (EDI) - A method used in measuring suspended sediment in a stream wherein samples are obtained at the centroids of equal discharge increments. This method requires knowledge of the flow distribution in the stream cross section, but can save time over the ETR method because fewer verticals are required.

EQUAL TRANSIT RATE (ETR) - A method used in measuring suspended sediment in a stream wherein the sample volume taken is proportional to the streamflow at each of several equally spaced verticals. This technique results in a gross sample proportional to the total streamflow.

EQUILIBRIUM - As used in the chemical sense, a state in which there are no changes in the relative concentrations of the chemical species present in a system. The specific relationship is given by the equilibrium constant for the reaction of interest.

EQUILIBRIUM CONSTANT - A value which describes the relationship between chemical species in a system at equilibrium. The value of the constant is dependent upon temperature.

EQUIVALENT WEIGHT - The weight of a substance which in a particular reaction corresponds to one gram-atom of hydrogen, or of hydroxyl, or any univalent ion.

EQUIVALENTS - The number of equivalent weights of a substance contained in a given mass.

ESCHERICHIA COLI (E. coli) - A bacterial species which inhabits the intestinal tract of man and other warm-blooded animals.

EUPHOTIC ZONE - An area, particularly in regard to lakes, where there is sufficient light for photosynthesis to take place.

EUTROPHIC - Pertaining to a lake characterized by large nutrient concentrations and high productivity. Such lakes are often shallow, with algal blooms and periods of oxygen deficiency.

EUTROPHICATION - The natural aging process of lakes, often accelerated by the activity of man, resulting in "cultural" eutrophication.

EXCHANGEABLE SODIUM PERCENTAGE (ESP) - The extent to which the adsorption complex of a soil is occupied by sodium; expressed as a percent of the cation exchange capacity.

EXTENDED AERATION - A modification of the activated sludge process which maintains a longer period of aeration, thus providing for sludge digestion within the aeration tank.

* * *

F/M RATIO - See FOOD TO MICROORGANISM RATIO.

FACULTATIVE - Having the ability to grow in the presence or absence of oxygen.

FECAL COLIFORM - Bacteria that are present in the intestine and feces of warm-blooded animals; their presence in water indicates fecal contamination. Generally reported as colonies per 100 ml of sample.

FECAL STREPTOCOCCI - Gram-positive, cocci bacteria found in the intestine of warm-blooded animals; their presence in water indicates fecal contamination. Generally reported as colonies per 100 ml of sample. The ratio of fecal streptococci to fecal coliform can sometimes indicate whether the contamination is of human origin.

FILAMENTOUS GROWTH Thread-like filaments formed by the growth of fungi in an activated sludge unit. Such growths often are responsible for problems of bulking sludge.

FILTRABLE RESIDUE - The total quantity of substances in a sample which are not removed by filtration through a 0.45 μm membrane filter. This is equivalent to total dissolved solids, and is reported as mg/l.

FILTRATE - Liquid which passes through a filter.

FILTRATION - The process of passing a liquid through a filtering medium for the removal of suspended matter.

FLOC - Small gelatinous masses formed in a liquid by the reaction of an added coagulant or through biochemical processes.

FLOCCULATION - The agglomeration of colloidal and finely divided suspended matter after coagulation facilitated by gentle mixing.

FLUORIDATION - The addition of fluoride to a water for the purpose of reducing dental caries in the consuming population. Common compounds used in the process include sodium silicofluoride, sodium fluoride, and fluosilicic acid.

FOOD TO MICROORGANISM RATIO (F/M Ratio) - The ratio of BOD loading (lbs/day) to the mass of mixed liquor suspended solids in the aeration tank of an activated sludge system.

FORMAL - Equivalent to molar, but technically more correct for electrovalent (ionic) compounds.

FREE AVAILABLE CHLORINE - The amount of chlorine available as the dissolved gas, hypochlorous acid, or hypochlorite ion.

* * *

GC-MS - An analytical technique involving the use of both gas chromatography and mass spectrometry, the former to separate a complex mixture into its components and the latter to deduce the atomic weights of those components. It is particularly useful in identifying organic compounds.

GAMMA RADIATION - High energy photons which are emitted by many radioactive substances.

GAS CHROMATOGRAPHY (GC) - A method of separating chemical components of a mixture which involves the passage of a gaseous sample through a column having a fixed adsorbent phase. It is in widespread use in quantitatively analyzing volatile compounds.

GRAB SAMPLE - One which is taken at only one point in time and space.

GRAIN - A unit of weight equivalent to 1/7000 pound. Hardness is sometimes expressed in units of grains per gallon.

GRIT - Dense inorganic matter, such as sand and gravel, present in water or sewage.

GRIT CHAMBER - A small detention basin designed to permit the settling of inorganic materials while passing the organic fraction.

* * *

HALOFORM - Any compound having the general formula, CHX_3 , where X represents a halogen. Chloroform, $CHCl_3$, is an example.

HALOGEN - Any of the elements fluorine, chlorine, bromine, iodine or astatine, which compose a family in the periodic table.

HALOGENATED ORGANICS - A general term for organic compounds containing one or more halogen atoms.

HARDNESS - The physical-chemical characteristic of water that is commonly recognized by the increased quantity of soap required to produce lather, due principally to the presence of calcium and magnesium. Hard water also produces scale in water heaters and boilers. It is commonly reported as mg/l of equivalent $CaCO_3$.

HEAVY METALS - Metallic elements with high molecular weights, generally toxic in low concentrations to plant and animal life. Examples include mercury, chromium, cadmium, arsenic and lead.

HETEROTROPH - Any organism which derives its energy and cell-building materials from organic substances.

HYDRATION - The chemical process of combination or union of water with other substances.

HYDROLYSIS - The chemical decomposition or splitting of a compound upon reaction with water.

HYPOLIMNION - The cold, lower level of a stratified lake. It often becomes anaerobic, producing a reducing environment.

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IMHOFF TANK - An anaerobic sewage treatment tank in which solids are withdrawn from the bottom of the tank.

INFLUENT - The input stream of a fluid, such as water into a reservoir, waste into a sewage treatment plant.

INORGANIC MATTER - Chemical substances of mineral origin, or more correctly, not of basically carbon structure.

ION - An atom or molecule which by loss or gain of one or more electrons has acquired a net electric charge.

ION EXCHANGE - A chemical process involving the reversible interchange of ions between a liquid and a solid exchange resin. Water may be softened in this manner by exchanging calcium and magnesium ions in the water for sodium ions.

ION-SELECTIVE ELECTRODE - See SELECTIVE ION PROBE.

IONIC STRENGTH - The weighted concentration of ions in solutions, computed by the formula

$$\text{Ionic Strength} = 1/2 \sum Z_i^2 C_i$$

where Z = the charge on a particular ionic species, and C = the concentration of a particular ionic species.

ISOTHERMY - In limnology, a state in which a lake is at the same temperature throughout and is well-mixed. Periods of isothermy occur in Spring and Autumn in dimictic lakes.

* * *

JTU - See JACKSON TURBIDITY UNITS.

JACKSON TURBIDITY UNIT (JTU) - A unit of turbidity. The method consists of placing a tube over a lighted candle and adding the sample water slowly, noting when the flame disappears from view through the water column. The greater the turbidity the higher the JTU value. More than 5 JTU is noticeable to the average water consumer. This unit is not identical to the NTU.

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KJELDAHL NITROGEN - See TOTAL KJELDAHL NITROGEN.

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LC₅₀ (LETHAL CONCENTRATION - 50) - The concentration of a toxic substance which is fatal to 50 percent of the organisms tested under specific test conditions and time period.

LD₅₀ (LETHAL DOSE - 50) - The dose of a toxicant that is fatal to 50 percent of the organisms tested in a specified time. The dose is the actual quantity administered to the organism.

LAGOON - In wastewater treatment, a shallow pond where the action of bacteria and algae stabilize a waste.

LEACHATE - Liquid which has percolated through the ground, such as water seeping through a sanitary landfill.

LENTIC - Concerning a standing aquatic environment.

LIME - Calcium oxide (CaO) used in many water and wastewater treatment operations such as softening, coagulation and phosphorus removal. Also termed "quicklime." Also, see SLAKED LIME.

LIMNOLOGY - The study of lakes.

LITTORAL - Referring to the shallow waters of lakes or the sea.

LOAD - A weight/time measure used to express the amount of some constituent in water, e.g., tons/day of sediment carried in a stream.

LOTIC - Concerning a moving aquatic environment.

* * *

MBAS - See METHYLENE BLUE ACTIVE SUBSTANCES.

MCL - See MAXIMUM CONTAMINANT LEVEL.

MPN - See MOST PROBABLE NUMBER.

MACRONUTRIENT - A chemical element necessary in relatively large amounts (usually more than one ppm in the plant) for the growth of plants.

MASS SPECTROMETRY - An analytical technique wherein ions are separated according to their ratio of charge to mass. From the mass spectrum produced the atomic weight of the particle can be deduced.

MAXIMUM CONTAMINANT LEVEL (MCL) - The designation given by EPA to water quality standards promulgated under the Safe Drinking Water Act.

MEDIAN TOLERANCE LIMIT - The concentration of a test substance at which just 50 percent of the test animals are able to survive for a specified period of exposure.

MEMBRANE FILTER - Filter made of plastic and having a known pore diameter. Such filters are used in the bacteriological examination of water and the separation of suspended matter before laboratory analyses.

MEROMICTIC LAKE - One which is permanently stratified, having upper and lower regions which do not mix.

MESOTROPHIC - Pertaining to a lake intermediate between oligotrophic and eutrophic stages of its life cycle.

METALIMNION - See THERMOCLINE.

METHYLENE BLUE ACTIVE SUBSTANCES (MBAS) - Any material which forms a blue colored salt with methylene blue, but generally interpreted as an indication of the presence of detergents.

MICRON - A unit of length equivalent to a micro-meter (μm). The latter is the preferred term.

MICRONUTRIENT - A chemical element required only in small amounts (usually less than one ppm in the plant) for the growth of plants.

MILLIPORE FILTER - Registered trade name for a series of membrane filters commonly used to remove bacteria. A typical filter has a pre-size of $0.45 \mu\text{m}$.

MINERALIZATION - The general process by which elements present in organic compounds are eventually converted into inorganic forms, ultimately to become available for a new cycle of plant growth.

MIXED LIQUOR - In wastewater treatment, the liquid in the aeration tank of an activated sludge system.

MIXED LIQUOR SUSPENDED SOLIDS (MLSS) - The quantity of suspended solids in the aeration tank of an activated sludge. Reported in units of mg/l.

MIXED MEDIA FILTRATION - A system using two or more dissimilar granular materials (such as anthracite, sand and garnet) blended by size and density. Such a filter is graded from coarse to fine in the direction of flow.

MIXOLIMNION - The uppermost region in a meromictic lake.

MOLAR - A solution containing the indicated number of moles of solute per liter of solution.

MOLE - In chemistry, the mass of a compound in grams numerically equal to its molecular weight. Also, the mass of a compound containing Avogadro's number of molecules.

MONIMOLIMNION - The lower region in a meromictic lake.

MOST PROBABLE NUMBER (MPN) - A statistically determined number which represents the number of bacteria most likely present in a sample, based on test data. Widely used in the evaluation of waters from a bacterial standpoint.

MUD BALLS - Accretions of siliceous incrustations on the exterior of sand grains in a rapid sand filter. Such deposits interfere with effective filtration.

MUTAGENIC - Causing mutation, or the abrupt change in the genotype of an organism.

* * *

NPDES - See NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM.

NTU - See NEPHELOMETRIC TURBIDITY UNITS.

NVSS - See NON-VOLATILE SUSPENDED SOLIDS.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) - A national permit system created by the Water Pollution Control Act Amendments of 1972 (PL 92-500) to control the discharge of pollutants into the waters of the United States.

NEPHELOMETER - A device which measures the intensity of light scattered at right angles to its path through a sample. It is used to measure turbidity, and the results are expressed as NTU.

NEPHELOMETRIC TURBIDITY UNIT (NTU) - A unit of measure for turbidity resulting from the use of a nephelometer. This unit is not identical to the JTU.

NEUTRALIZATION - The equalization of hydrogen and hydroxyl ion concentrations such that the resulting solution is neither acidic nor basic.

NITRIFICATION - The conversion of nitrogenous matter into nitrates by bacteria.

NITROGEN FIXATION - The conversion of elemental nitrogen to organic nitrogen by microorganisms or plants.

NON-FILTRABLE RESIDUE - The total quantity of substances in a sample which can be removed by filtration through a 0.45 μm membrane filter. Reported in mg/l, and sometimes referred to as "suspended solids."

NON-VOLATILE SOLIDS (NVS) - The quantity of solids in water, wastewater or other liquids, not lost by ignition of the dry solids at 600°C. Reported in mg/l.

NON-VOLATILE SUSPENDED SOLIDS (NVSS) - The quantity of solids in a sample which is removed by filtration but not lost by ignition at 600°C. Reported in mg/l.

NORMAL - A solution containing the indicated number of equivalents of solute per liter of solution.

NUTRIENTS - Elements or compounds essential as raw materials for organism growth and development, e.g., carbon, oxygen, nitrogen, and phosphorus.

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OLIGOTROPHIC - Pertaining to a lake low in dissolved nutrients. Such lakes are often deep, with sandy bottoms and very limited plant growth. This represents the early stages in the life cycle of a lake.

ORGANIC MATTER - Chemical substances of animal or vegetable origin. All are based upon carbon.

ORGANOLEPTIC - Related to bodily sensations, such as taste and smell.

ORTHOPHOSPHATE - Simple, inorganic phosphate forms (H_2PO_4^- , HPO_4^{2-} , PO_4^{3-}).

OSMOSIS - The process whereby a solvent passes through a semipermeable (or differentially permeable) membrane from a solution of lower concentration to one of higher concentration. The tendency for this to occur is measured as osmotic pressure.

OVERFLOW RATE - The flow into a basin divided by its total surface area, often expressed in units of gallons per day per square foot. It is used as a design parameter for settling basins.

OXIDATION - A chemical reaction that involves combination with oxygen or the loss of electrons. It is always occupied by reduction.

OXIDATION POND - A man-made body of water in which organic wastes are stabilized by the action of bacteria.

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PCB - See POLYCHLORINATED BIPHENYLS.

pH - The negative logarithm of the hydrogen ion activity (concentration) expressed in moles per liter. A pH of less than 7 indicates an acid solution, and if greater than 7 an alkaline solution. The pH scale ranges from 0-14 for practical purposes, but natural waters are generally in the range of 6-8.

POTW - Publicly owned treatment works, i.e., a public sewage treatment plant.

PPM - See PARTS PER MILLION.

PPT - See PARTS PER THOUSAND.

PARTS PER MILLION (ppm) - An expression of concentration which indicates one unit is contained in a total of a million units, generally by mass. Numerically equivalent to mg/l for dilute solutions.

PARTS PER THOUSAND (0/00, ppt) - An expression of concentration which indicates one unit is contained in a total of a thousand units. It is normally used to specify the salinity of water.

PATHOGEN - A disease-producing agent; usually applied to a living organism.

PERCENT SODIUM - The percent of cationic equivalents in a water which is attributable to sodium.

PERIPHYTON - An assemblage of microorganisms attached to and growing upon solid surfaces, such as the bottom of a stream.

PHENOLS - A group of organic compounds that in very low concentrations produce a taste and odor problem in water and which in higher concentrations are toxic to aquatic life.

PHOTOAUTOTROPH - An organism which utilizes carbon dioxide for cell growth and obtains its energy from the sun.

PHOTOSYNTHESIS - The biochemical process in green plants whereby carbon dioxide and water are converted to organic material.

PHYCOLOGY - The study of algae.

PHYTOPLANKTON - The plant portion of the plankton which are the primary food producers in aquatic environments and are commonly known as algae.

PLANKTON - A community of suspended, floating or weakly swimming organisms that live in open waters of lakes and rivers.

POLLUTION - Any introduction into water of microorganisms, chemicals, wastes, or wastewater in a concentration that makes the water unfit for its intended use.

POLYCHLORINATED BIPHENYLS - A general term for a group of chemical compounds which are chemically inert and not biodegradable. As a result of this they accumulate in the environment.

POLYELECTROLYTE - A high molecular weight substance which results in charged ions upon dissolving in water. They are widely used as coagulant aids in water treatment.

POLYMER - A substance which consists of grant molecules formed by the linkage of simple molecules (monomers). The linkage process is a chemical reaction called polymerization.

POLYPHOSPHATES - Molecularly dehydrated phosphates which hydrolyze to the ortho forms in aqueous solutions. An example is sodium hexametaphosphate, $\text{Na}_3 (\text{PO}_3)_6$.

POTABLE - Suitable for drinking.

PRECIPITATE - A solid which forms as a result of a chemical reaction.

PRECISION - The reproducibility of results using a particular analytical procedure; the consistency of results given by a procedure. See ACCURACY.

PRESSURE FILTRATION - A process by which liquid is removed from a sludge by using external pressure to force it through a filter.

PRIMARY DRINKING WATER REGULATION - One established under the Safe Drinking Water Act to protect the public health. An example is bacterial concentrations.

PRIMARY WASTEWATER TREATMENT - A general term for the removal of settleable organic material from sewage.

PROTOZOA - Small, one-celled animals including amoebae, ciliates, and flagellants. (Singular form, Protozoan)

PUBLIC LAW 92-500 (PL 92-500) - See WATER POLLUTION CONTROL ACT OF 1972.

PUBLIC LAW 93-523 - See SAFE DRINKING WATER ACT.

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QUICKLIME - See LIME.

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RBC - See ROTATING BIOLOGICAL CONTRACTOR.

ROE - See RESIDUE ON EVAPORATION.

RSC - See RESIDUAL SODIUM CARBONATE.

- RAD** - The standard unit of absorbed radiation dose, equal to the absorption of 100 ergs of energy per gram of material.
- RAPID SAND FILTER** - Generally a concrete basin filled with graded gravel and coarse sand. Filtration rates are about 40 times higher than in a slow sand filter, and cleaning is via a backwash operation.
- RAW SLUDGE** - The material settled out during the primary clarification of sewage.
- RAW WATER** - Untreated water, usually that entering the first unit of a water treatment plant.
- REAERATION** - Absorption of oxygen into water from the atmosphere. The rate of reaeration is proportional to the oxygen deficit.
- RECARBONATION** - The process of introducing carbon dioxide as a final stage in the lime-soda ash softening process. This lowers the pH and converts carbonates to bicarbonates, thereby stabilizing the solution against precipitates of carbonates.
- REM** - See ROENTGEN EQUIVALENT MAN.
- RESIDUAL SODIUM CARBONATE (RSC)** - The excess milliequivalents of carbonate and bicarbonate over the milliequivalents of calcium and magnesium in a sample. $RSC = (CO_3^{-2} + HCO_3^{-2}) - (Ca^{+2} + Mg^{+2})$, where all concentrations are expressed in meq/l. Waters with RSC values over 2.5 are generally not suitable for irrigation uses.
- RESIDUE ON EVAPORATION (ROE)** - A procedure for establishing the mineral content of a water. Also, see FILTRABLE RESIDUE; NON-FILTRABLE RESIDUE; TOTAL SOLIDS.
- REVERSE OSMOSIS** - An advanced method of water and waste treatment relying on a semipermeable membrane to separate water from pollutants. An external force is used to reverse the normal osmotic resulting in the solvent moving from a solution of higher concentration to one of lower concentration.
- RISING SLUDGE** - The rising of previously settled solids in the settling tank of an activated sludge system. The immediate cause is denitrification, resulting in the formation of nitrogen gas and buoyancy of the sludge mass. The result is that solids are carried away with the effluent.
- ROENTGEN** - An amount of radiation which, if stopped completely in air, would produce ions carrying positive and negative charges of 2.58×10^{-4} coulomb per kilogram of air.

ROENTGEN EQUIVALENT MAN (REM) - The unit of any ionizing radiation which produces the same damage to humans as one roentgen of high voltage x-rays.

ROTATING BIOLOGICAL CONTRACTOR (RBC) - A means of wastewater treatment in which large, closely-spaced plastic discs are rotated about a horizontal shaft. The discs alternately move through the wastewater and the air, developing a biological growth on their surface.

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SAR - See SODIUM ABSORPTION RATIO.

SRP - See SOLUBLE REACTIVE PHOSPHATE.

SVI - Sludge Volume Index

SAFE DRINKING WATER ACT (PL 93-523) - An amendment to the Public Health Service Act which passed Congress December 16, 1974, and which established primary and secondary quality standards for drinking water.

SALINITY - A measure of the mineral substances dissolved in water. Often expressed in units of 0/00, or parts per thousand.

SALMONELLA TYPHOSA - A waterborne microorganism which is the causative agent of typhoid fever.

SANITARY SEWERS - Those which carry only domestic wastewater.

SCALE - An accumulation of solid material on interior surfaces, such as pipelines, tanks, and boilers, as a result of the precipitation of mineral salts from water.

SCOUR - Action of a flowing fluid as it lifts and carries away the material on the sides or bottom of a waterway, conduit, or pipeline.

SECCHI DISK - A circular plate, used to measure the transparency or clarity of water by noting the greatest depth at which it can be visually detected. Its primary use is in the study of lakes.

SECONDARY DRINKING WATER REGULATION - One established under the Safe Drinking Water Act to protect the public welfare, as opposed to public health. Examples of such regulations include those relating to taste and odor.

SECONDARY TREATMENT - A general term for any process used to oxidize organic matter in sewage. It may be accomplished by biological or chemical-physical methods. Activated sludge and

trickling filters are two of the most common means of secondary treatment.

SEDIMENTATION - The removal of particulate matter, chemical floc and precipitates from suspension by gravity settling.

SELECTIVE ION PROBE - An electrode for which the measured voltage is proportional to the concentration of a specific ion in the solution being tested. The most common example is the pH probe, which responds to the hydrogen ions in solution.

SELF-PURIFICATION - The ability of a body of water to rid itself of pollutants.

SEMIPERMEABLE MEMBRANE - A barrier, usually thin, that permits passage of particles up to a certain size or of a special nature. Also termed a differentially permeable membrane.

SEPTIC TANK - A settling tank in which settled sludge is in immediate contact with sewage flowing through the tank, and wherein solids are decomposed by anaerobic bacterial action. Usually used in rural areas.

SETTLABLE SOLIDS - In the Imhoff cone test, the volume of matter in a one-liter sample that settles to the bottom of the cone in one hour.

SHIGELLA DYSENTERIAE - A waterborne microorganism which is the causative agent of bacillary dysentery.

SLAKE - To become mixed with water so that a true chemical combination takes place, as in the slaking of lime.

SLAKED LIME - Calcium hydroxide which is formed by the addition of water to quicklime; a process termed "slaking."

SLOW SAND FILTER - Essentially a concrete basin covered with graded gravel and about 3 feet of sand. Cleaning is accomplished by removing the surface layers of sand at intervals. These are washed and stored for reuse.

SLUDGE - Any accumulation of solids which were separated from water or wastewater during processing. Also, organic deposits found on the bottom of streams or other bodies of water.

SLUDGE AGE - A measure of the time biological solids are retained in a basin calculated by dividing the mass of volatile solids in the basin by the total mass of volatile solids wasted during a given time period. Expressed in units of time.

SLUDGE BULKING - A common problem encountered in the operation of activated sludge plants in which a portion of the sludge does not settle properly and is carried out with the effluent.

SLUDGE VOLUME INDEX (SVI) - The volume in ml occupied by one gram of dried solids. Used in conjunction with the activated sludge process. Also known as the Mohlman Index.

SLURRY - A thin, watery muc, or any substance resembling it, such as a lime slurry.

SODA ASH - Sodium carbonate, a chemical used to remove non-carbonate hardness from water.

SODIUM ADSORPTION RATIO (SAR) - An expression of relative activity of sodium ions in exchange reactions with soil, indicating the sodium or alkali hazard to soil. It is calculated from the expression

$$\frac{\text{Na}}{\sqrt{\frac{\text{Ca} + \text{Mg}}{2}}}$$

where all quantities are expressed in meq/l. It is particularly important in waters used for irrigation.

SOLUBILITY PRODUCT CONSTANT (Ksp) - The equilibrium constant applicable to a saturated solution of some salt.

SOLUBLE REACTIVE PHOSPHATE (SRP) - That phosphate which is detected by analysis of a sample which has been filtered through a 0.45 μm membrane filter.

SOLUTE - Any material which is dissolved in another, such as salt in water.

SOLVENT - Any material which acts to dissolve another, such as water dissolving salt.

SPECIFIC CONDUCTANCE - The conductivity of a solution as measured using a 1-cm cell. Expressed in siemens (μmho) at 25°C.

SPECIFIC UTILIZATION RATE - See FOOD TO MICROORGANISM RATIO.

SPRAY IRRIGATION - Any irrigation by means of nozzles along a pipe or from perforated overhead pipes.

SPECTROPHOTOMETER - An instrument that measures transmission or apparent reflectance of light as a function of wavelength, permitting accurate analysis of color or specific wavelengths.

STEP AERATION - A modification of the activated sludge process wherein the waste enters the aeration tank at a number of different points, while recycled sludge enters at the head of the tank.

STOICHIOMETRY - The numerical ratio in which two or more chemical substances combine.

STORM SEWERS - Those which carry only stormwater runoff, and no sanitary wastes.

STRATIFICATION - The arrangement of a body of water, as a lake, into two or more horizontal layers of differing characteristics, such as temperature, density, etc.

STREETER-PHELPS EQUATION - A means of predicting the effects upon dissolved oxygen levels of organic loading to a stream based on the deaeration and reaeration rates, and resulting in an oxygen sag curve.

SUBSTRATE - (1) The substances used for food by microorganisms in liquid suspension, as in wastewater treatment; or (2) the surface, natural or artificial, upon which an organism is attached.

SUBSTRATE REMOVAL RATE - See FOOD TO MICROORGANISM RATIO.

SUSPENDED SOLIDS - Any solid substances present in water in any undissolved state, usually contributing directly to turbidity. Suspended material can be removed by filtration.

SYNERGISM - An action whereby the total effect of two active components is greater than the sum of the two.

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TDS - See TOTAL DISSOLVED SOLIDS.

ThOD - See THEORETICAL OXYGEN DEMAND.

TKN - See TOTAL KJELDAHL NITROGEN.

TL₅₀ - See MEDIAN TOLERANCE LIMIT.

TOC - See TOTAL ORGANIC CARBON.

TON - See THRESHOLD ODOR NUMBER.

TAPERED AERATION - A modification of the activated sludge process wherein air is introduced at a higher rate at the head of the tank than in subsequent sections.

TERATOGENIC - Causing birth defects.

TERTIARY WASTEWATER TREATMENT - Any process which follows or goes beyond the treatment effected by conventional secondary treatment.

THEORETICAL OXYGEN DEMAND (ThOD) - The amount of oxygen that theoretically is required to totally oxidize a substance.

THERMAL POLLUTION - The degradation of water quality by the introduction of a heated effluent, primarily as a result of the discharge of cooling waters from electrical power generation.

THERMOCLINE - A zone of rapid temperature change in a stratified body of water, separating the epilimnion from the hypolimnion.

THRESHOLD ODOR NUMBER (TON) - A value indicative of the maximum dilution which can be made of a sample with its odor remaining detectable. A higher TON indicates a stronger odor.

TOTAL DISSOLVED SOLIDS (TDS) - The dry weight of dissolved material, organic and inorganic, contained in water or waste. Dissolved solids cannot be removed by filtration, and excessive dissolved solids makes water unpalatable for drinking and unsuitable for industrial uses. Generally reported in mg/l. Also called filtrable residue.

TOTAL KJELDAHL NITROGEN (TKN) - The total concentration of nitrogen in a sample present as ammonia or bound in organic compounds.

TOTAL ORGANIC CARBON (TOC) - All available carbon capable of being oxidized. A measure of the organic content in a sample.

TOTAL SOLIDS - The sum of dissolved and undissolved constituents in water or wastewater, usually expressed in mg/l.

TOXICITY - The state, quality or degree of being poisonous.

TOXIN - A poison produced by an organism.

TRACE METALS - A general term for metals found in small quantities (less than 1 mg/l) in water, usually due to their insolubility.

TRICKLING FILTER - A means of secondary sewage treatment wherein a bed of rocks or other suitable material provides a surface for the growth of microorganisms. As the wastewater passes through the trickling filter, organic material is metabolized by the attached organisms.

TURBIDIMETER - A device used to measure the degree of turbidity in a sample.

TURBIDITY - An interference to the passage of light due to insoluble particles of soil, organics, microorganisms and other materials.

* * *

ULTRAVIOLET RADIATION (UV) - Light waves shorter than the visible blue-violet waves of the spectrum, i.e., below 3900 Angstroms. UV can be used for the disinfection of water.

UNDERDRAIN - A drain that carries away water from prepared beds to which water or wastewater has been applied.

UNIFORMITY COEFFICIENT - The ratio of sieve sizes which will pass 60 percent and 10 percent of a sample, respectively.

* * *

VACUUM FILTRATION - A process by which liquid is extracted from a sludge. The filtrate is forced through a filtering material by means of a vacuum.

VIBRIO COMMA - The waterborne microorganism which causes asiatic cholera.

VIRUS - The smallest (10-300 μm in diameter) life form capable of producing infection or diseases in man or other larger species. Complex macromolecules which are able to reproduce themselves only in living cells and are capable of producing infection and diseases. They are approximately 10-300 μm in diameter.

VOLATILE SOLIDS - The quantity of solids in a sample which is lost by ignition of the dry solids at 600°C.

* * *

WATER - A colorless, odorless and transparent liquid which freezes at 0°C and boils at 100°C and has the chemical formula H_2O .

WATER POLLUTION CONTROL ACT AMENDMENTS OF 1972 (PL 92-500) - National legislation passed October 18, 1972, setting a timetable for attaining the goal of fishable, swimmable waters by July 1, 1983, and elimination of all pollutant discharges into the nation's water by 1985. Particular sections of this act have become well-known in their own right:

Section 201 - Provides federal grants for the construction of sewage treatment works.

Section 208 - Provides federal grants for the development and implementation of waste management plans in areas with substantial water quality problems.

Section 404 - Requires the Corps of Engineers to issue permits for the disposal of dredge and fill material in navigable waters.

WATER QUALITY - The chemical, physical and biological characteristics of water with respect to its suitability for a particular use.

WATER QUALITY CRITERION - The recommended maximum (or minimum) concentration of a constituent in water used for a particular purpose, based upon available scientific evidence.

WATER QUALITY STANDARD - The legally allowed concentration of a constituent in natural waters or effluent discharges. Generally expressed as a maximum allowable concentration (minimum for DO), and addressed to a particular use.

WATER SOFTENING - Any process for removing from water, in whole or in part, those cations which produce hardness (primarily calcium and magnesium).

WEIR LOADING RATE - An expression of the flow over a weir calculated by dividing the flow by the total effluent weir length. Typical units are gpd/ft.

* * *

ZETA POTENTIAL - In a colloidal system the difference in potential between the immovable layer attached to the surface of the dispersed phase and the dispersion medium. It is related to particle stability and therefore is a useful parameter in coagulation operations.

ZOOGLA - A jelly-like matrix developed by bacteria which is abundant in activated sludge flocs and trickling filter slimes.

REFERENCES

The following references were used in compiling this glossary:

- American Society of Civil Engineers. Glossary--Water and Sewage Control Engineering. American Society of Civil Engineers, 1949.
- Arnett, J. L. Nomenclature for Instream Assessments. U.S. Fish and Wildlife Service, 1976.
- Butler, Stanley S. Engineering Hydrology. New York: Prentice-Hall, Inc., 1957.
- Chow, Ven Te, ed. Handbook of Applied Hydrology. New York: McGraw-Hill Book Co., 1964.
- Huntoon, Peter W. Finite Difference Methods As Applied to the Solution of Groundwater Flow Problems. Laramie, Wyoming: Water Resources Research Institute, University of Wyoming, 1974.
- Klingeman, Peter C., and the University Council on Water Resources Standing Committee on Engineering and Physical Sciences. System International d'Unites: Metric Measurement in Water Resources Engineering. Lincoln, Nebraska: University of Nebraska, 1976.
- Linsley, R. K., Kohler, M. A., and Paulhus, J. L. H. Hydrology for Engineers. New York: McGraw-Hill Book Co., 1958.
- U.S. Army Corps of Engineers. Flood Plain Information; Cheyenne, Wyoming. Vol. II: Crow Creek. Omaha, Nebraska: U.S. Army Corps of Engineers.
- U.S. Department of the Interior, Bureau of Reclamation. Conversion Factors and Formulas of Use to the Hydrologist.
- U.S. Department of the Interior, Geological Survey. Definitions of Selected Ground-Water Terms--Revisions and Conceptual Refinements. A Report of the Committee on Redefinition of Ground-Water Terms. Open-file Report, August, 1970.
- U.S. Department of the Interior, Geological Survey. Definitions of Selected Ground-Water Terms--Revisions and Conceptual Refinements. Water-Supply Paper 1988. Washington, D. C.: Government Printing Office, 1972.

U.S. Department of the Interior, Geological Survey. General Introduction and Hydrologic Definitions. Water-Supply Paper 1541-A. Washington, D. C.: Government Printing Office, 1960.

World Meteorological Organization and United Nations Scientific and Cultural Organization. International Glossary of Hydrology. WMO/OMM/BMO--No. 385. Geneva, Switzerland: Secretariat of the World Meteorological Organization.

SI CONVERSION TABLE

Measurements that describe quantities used in water resources engineering are expressed in a variety of traditional ways. These include such terms as the acre-foot, the second-foot-day, cubic feet per second per square mile, inches per square mile, U.S. gallons per minute, and even the miner's inch. Because of this diversity of terms, conversion of numbers among the U.S. customary measurement system, the English measurement system, and the metric measurement system (which includes some variations among user countries) has long plagued students and teachers alike.

The United States officially is shifting over to the internationally recognized and adopted system for measurement, System International d'Unites, officially abbreviated SI in all languages. Over the next several years, students and practitioners in water resources engineering will need to be conversant in two or more measurement systems--the new SI, as it is phased in, and the older U.S. customary, English and metric systems as they are phased out of use. (Note: For some measures, the SI units differ from the old metric units previously used; therefore, some attention must be given to avoid confusion between the old metric and new international measurement languages.)

The following table presents numerical values to convert to SI units from several commonly used units. This is done for the physical quantities most frequently used in U.S. water resources practice. The conversion factors are shown here to four significant figures, which is adequate for most uses. Where needed, the factors are written with the letter E (for exponent) followed by a plus or minus sign and a digit. This indicates the exponential power of 10 by which the number must be multiplied. For example, 1.000 E+4 equals 1.00×10^4 or 10,000. This table has been classified according to the type of physical quantity. The classification is arranged alphabetically.

SI CONVERSION TABLE

To Convert From:	Multiply By:	To Obtain:	Units
<u>Acceleration</u>			
foot/second ²	x 0.304 8	= meter/second ²	m/s ²
<u>Area</u>			
acre	x 4 047	= meter ²	m ²
foot ²	x 0.092 90	= meter ²	m ²
hectare	x 1.000 E+4	= meter ²	m ²
inch ²	x 6.452 E-4	= meter ²	m ²
mile ²	x 2.590 E+6	= meter ²	m ²
yard ²	x 0.836 1	= meter ²	m ²
<u>Bending Moment or Torque or Moment of Force</u>			
foot-pound _{force}	x 1.356	= newton-meter	N-m
<u>Capacity (see Volume)</u>			
<u>Density (see Mass/Volume)</u>			
<u>Discharge (see Volume/Time)</u>			
<u>Energy or Work</u>			
BTU	x 1 055	= joule	J
calorie	x 4.187	= joule	J
foot-pound _{force}	x 1.356	= joule	J
kilowatt-hour	x 3.600 E+6	= joule	J
<u>Energy/Area·Time</u>			
BTU/foot ² -second	x 1.135 E+4	= watt/meter ²	W/m ²
BTU/foot ² -hour	x 3.152	= watt/meter ²	W/m ²
calorie/cm ² -minute	x 697.3	= watt/meter ²	W/m ²
<u>Flow Rate (see Mass/Time or Volume/Time)</u>			
<u>Force</u>			
dyne	x 1.000 E-5	= newton	N
kilogram _{force}	x 9.807	= newton	N
kip	x 4 448	= newton	N
pound _{force}	x 4.448	= newton	N
<u>Force/Area (see Pressure)</u>			

SI CONVERSION TABLE

(continued)

To Convert From:	Multiply By:	To Obtain:	Units
<u>Heat</u>			
BTU/foot ²	x 1.136 E+4	= joule/meter ²	J/m ²
BTU/hour-foot ² --°F	x 5.678	= watt/meter ² --kelvin	w/m ² ·K
BTU/pound _{mass}	x 2 326	= joule/kilogram	J/kg
BTU/pound _{mass} --°F	x 4 187	= joule/kilogram --kelvin	J/kg·K
BTU/second-foot ² --°F	x 2.044	= Watt/meter ² --kelvin	W/m ² ·K
calorie/cm ²	x 4.184 E+4	= joule/meter ²	J/m ²
calorie/gram	x 4 187	= joule/kilogram	J/kg
calorie/gram--°C	x 4 187	= joule/kilogram --kelvin	J/kg·K
<u>Length</u>			
foot	x 0.304 8	= meter	m
inch	x 0.025 40	= meter	m
mile, nautical	x 1 852	= meter	m
mile	x 1 609	= meter	m
yard	x 0.914 4	= meter	m
<u>Mass</u>			
Pound _{mass} (avoird.)	x 0.453 6	= kilogram	kg
slug	x 14.59	= kilogram	kg
ton (long, 2240 lb _m)	x 1 016	= kilogram	kg
ton (short, 2000 lb _m)	x 907.2	= kilogram	kg
ton (metric)	x 1 000	= kilogram	kg
<u>Mass/Time</u>			
pound _{mass} /second	x 0.453 6	= kilogram/sec	kg/s
<u>Mass/Volume or Density</u>			
gram/cm ³	x 1 000	= kilogram/meter ³	kg/m ³
pound _{mass} /foot ³	x 16.02	= kilogram/meter ³	kg/m ³
pound _{mass} /gallon	x 119.8	= kilogram/meter ³	kg/m ³
slug/foot ³	x 515.4	= kilogram/meter ³	kg/m ³
<u>Power</u>			
BTU/second	x 1 054	= watt	W
BTU/minute	x 17.57	= watt	W
BTU/hour	x 0.293 1	= watt	W

SI CONVERSION TABLE

(continued)

To Convert From:	Multiply By:	To Obtain:	Units
calorie/second	x 4.184	= watt	W
calorie/minute	x 0.069 73	= watt	W
foot-pound _{force} /second	x 1.356	= watt	W
horsepower (550 ft·lb _f /s)	x 745.7	= watt	W
horsepower (electric)	x 746.0	= watt	W
horsepower (water)	x 746.0	= watt	W

Pressure or Stress or Force/Area

atmosphere	x 1.013 E+5	= pascal	Pa
bar	x 1.000 E+5	= pascal	Pa
dyne/cm ²	x 0.100 0	= pascal	Pa
foot of water (39.4°F)	x 2 989	= pascal	Pa
gram _{force} /cm ²	x 98.07	= pascal	Pa
inches of mercury	x 3 386	= pascal	Pa
inches of water (39.4°F)	x 249.1	= pascal	Pa
kilogram _{force} /meter ²	x 9.807	= pascal	Pa
kip/inch ² (ksi)	x 6.895 E+6	= pascal	Pa
millibar	x 100	= pascal	Pa
millimeters of mercury	x 133.3	= pascal	Pa
pound _{force} /foot ²	x 47.88	= pascal	Pa
pound _{force} /inch ² (psi)	x 6 895	= pascal	Pa

Stress (see Pressure)

Temperature

degree Celsius	+ 273.15	= kelvin	K
degree Fahrenheit	+ 459.67 ÷ 1.8	= kelvin	K
degree Rankine	÷ 1.8	= kelvin	K
degree Fahrenheit	- 32 ÷ 1.8	= degree Celcius	

Time

day	x 8.640 E+4	= second	s
hour	x 3 600	= second	s
minute	x 60.00	= second	s
month (mean calendar)	x 2.628 E+6	= second	s
year (calendar)	x 3.154 E+7	= second	s

Torque (see Bending Moment)

Velocity or Speed

foot/second	x 0.304 8	= meter/second	m/s
foot/minute	x 0.005 080	= meter/second	m/s

SI CONVERSION TABLE

(continued)

To Convert From:	Multiply By:	To Obtain:	Units
foot/hour	x 8.467 E-5	= meter/second	m/s
kilometer/hour	x 0.277 8	= meter/second	m/s
mile/hour	x 0.447 0	= meter/second	m/s
<u>Viscosity</u>			
centipose	x 0.001 000	= pascal--second	Pa·s
centistokes	x 1.000 E-6	= meter ² /second	m ² /s
foot ² /second	x 0.092 90	= meter ² /second	m ² /s
poise	x 0.100 0	= pascal--second	Pa·s
pound _{force} --sec/foot ²	x 47.88	= pascal--second	Pa·s
slug/foot-second	x 47.88	= pascal--second	Pa·s
stokes	x 1.000 E-4	= meter ² /second	m ² /s
<u>Volume or Capacity</u>			
acre-foot	x 1 233	= meter ³	m ³
barrel (oil, 42 gal)	x 0.159 0	= meter ³	m ³
board foot	x 0.002 360	= meter ³	m ³
bushel (U.S.)	x 0.035 24	= meter ³	m ³
foot ³	x 0.028 32	= meter ³	m ³
gallon (U.S. liquid)	x 0.003 785	= meter ³	m ³
inch ³	x 1.639 E-5	= meter ³	m ³
liter	x 0.001 000	= meter ³	m ³
yard ³	x 0.764 6	= meter ³	m ³
<u>Volume/Time or Discharge or Flow Rate</u>			
foot ³ /second	x 0.028 32	= meter ³ /second	m ³ /s
foot ³ /minute	x 4.719 E-4	= meter ³ /second	m ³ /s
gallon/minute	x 6.309 E-5	= meter ³ /second	m ³ /s
gallon/day	x 4.381 E-8	= meter ³ /second	m ³ /s
<u>Work (see Energy)</u>			